

PROFESSIONAL TRAINING REPORT

Submitted in partial fulfillment of the requirements for the award of
Master of Architecture degree in Sustainable Architecture

by

Madhumitha. K (39890009)



SCHOOL OF BUILDING AND ENVIRONMENT
DEPARTMENT OF ARCHITECTURE

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

DEC 2020



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

(Est U/s(3) of UGC Act,1956) Accredited with Grade "A" by NAAC (A Christian Minority Institution)

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHEMMENCHERY, CHENNAI – 600119. TAMILNADU.

PHONE: 2450 1443/9941912481 INTERNET: www.sathyabama.ac.in

E-mail: archhod@sathyabama.ac.in



**SCHOOL OF BUILDING AND ENVIRONMENT
DEPARTMENT OF ARCHITECTURE
M. Arch (Sustainable Architecture)**

**PROFESSIONAL TRAINING PORTFOLIO (S89 INT)
DEC 2020**

Name of the Student : Madhumitha. K

Semester : III

Reg No. : 39890009

Batch : 2019-2021



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SCHOOL OF BUILDING AND ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

M. Arch (Sustainable Architecture)

BONAFIDE CERTIFICATE

This is to certify that the professional training (S89 INT) is the work of MADHUMITHA. K (39890009) who had undergone training in **DHANA ARCHITECTS, CHENNAI** and has been monitored by the continuous assessment during **Dec 2020 to Jan 2021.**

DR. DEVYANI GANGOPADHYAY

DEAN,

School of Building and Environment Department of
Architecture

Submitted for Viva voce Examination held on Sheetal. A.

Internal Examiner

External Examiner



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E-mail: archhod@sathyabama.ac.in



DECLARATION

I, **Madhumitha. K**, hereby declare that the Professional Training Report **December 2020 to January 2021** done by me under the guidance of **Ar.Dhanasekar** is submitted in partial fulfillment of the requirements for the completion of practical training session.

DATE :

PLACE :

SIGNATURE OF CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. Devyani Gangopadhyay**, Dean and Head of Department, School of building and Environment, Dept. of architecture for providing me necessary support and details at the right time during the progressive training session.

I would like to express my sincere and deep sense of gratitude to **Ar. Dhanasekar, Principal Architect, Dhana Architects, Chennai** for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work. My sincere thanks to **Ar. Sheetal Kalamkar**, Professional Training Coordinator for her motivation.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Architecture who were helpful in many ways for the completion of the project.

CONFIRMATION LETTER Annexure – V



5, II floor, 36, CS Towers
Bazullah Road, TNagar, Chennai 17
O: + 91 637 971 16 18
M: + 91 988 430 68 69
www.dhanarchitects.com

07-12-2020

To
The Dean,
Department of Architecture,
School of Building and Environment,
Sathyabama Institute of Science and Technology,
Chennai – 600119

Dear Madam,
Sub: Confirmation for Internship.

This is to confirm that **Madhumitha. K (39890009)**, pursuing M. Arch (Sustainable Architecture) in Sathyabama Institute of Science and Technology (Deemed to be University) will be undergoing her Internship with us from 07.12.2020 to 25.01.2021 for a period of 30 working days.

Regards,

T. Dhanasekar M.arch
architect

CONSOLIDATED CERTIFICATE Annexure – IX



5, II floor, 36, CS Towers
Bazullah Road, TNagar, Chennai 17
O: + 91 637 971 16 18
M: + 91 988 430 68 69
www.dhanarchitects.com

27.01.2021

To
The Dean,
Department of Architecture,
School of Building and Environment,
Sathyabama Institute of Science and Technology,
Chennai - 600119

Dear Madam,
Sub: Completion of one month Professional Training

This is to certify that **Madhumitha. K (39890009)**, pursuing M.Arch (Sustainable Architecture) - 3rd Semester in Sathyabama Institute of Science and Technology (Deemed to be University) have successfully completed one month Professional Training with us for the period from **07.12.2020 to 27.01.2021**.

Her contribution of work during the period was appreciable and was very helpful to our organization

Regards,

T. Dhanasekar M.Arch
Architect

WEEKLY REPORT

(Annexure –VII)



SATHYABAMA
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DEPARTMENT OF ARCHITECTURE

M. Arch (Sustainable Architecture)

Continuous Assessment Report for Professional training

(Continuous progress report of the trainee architect/Project Manager for the period of 30 working days in the office to be submitted to HOD by the Trainee attending the training session)

1. Name of the office / organization : Dhana Architects

2. Address & Contact Number : No.5, II floor, CS Towers, Bazullah Road, T Nagar, Chennai – 17. 9884306869

3. Name of the student : Madhumitha. K

4. Duration : From 07.12.2020 To 12.12.2020

5. Total No. of days : 4 days

6. Evaluation of Performance criteria shall be on

* **Note:** Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
Documentation and tracking of project					√
Presentation Skills developed		√			
Understanding of construction details & techniques					√
Participation and contribution in project meetings		√			
Understanding of codes and standards		√			
Schedule preparation & tracking activities					√
Preparation / Management of drawings		√			
Learning / Application of software in Projects		√			
Preparation of concept for projects					√
Site Management / Discussion with clients					√

Overall Grading*	7.5
------------------	-----

(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

7. Any other Remarks : _____

8. Signature of the
Head of the Office /
Organization (With Seal):





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2. Address & Contact Number : No.5, II floor, CS Towers, Bazullah Road, T Nagar, Chennai – 17. 9884306869

3. Name of the student : Madhumitha. K

4. Duration : From 14.12.2020 To 19.12.2020

5. Total No. of days : 5 days

6. Evaluation of Performance criteria shall be on

* **Note:** Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
Documentation and tracking of project					√
Presentation Skills developed		√			
Understanding of construction details & techniques					√
Participation and contribution in project meetings		√			
Understanding of codes and standards		√			
Schedule preparation & tracking activities					√
Preparation / Management of drawings		√			
Learning / Application of software in Projects		√			
Preparation of concept for projects					√
Site Management / Discussion with clients					√

Overall Grading*	7.5
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(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

7. Any other Remarks : _____

8. Signature of the
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Organization (With Seal):





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- Name of the office / organization : Dhana Architects
- Address & Contact Number : No.5, II floor, CS Towers, Bazullah Road, T Nagar, Chennai – 17. 9884306869
- Name of the student : Madhumitha. K
- Duration : From 21.12.2020 To 26.12.2020
- Total No. of days : 4 days

6. Evaluation of Performance criteria shall be on

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
Documentation and tracking of project					√
Presentation Skills developed		√			
Understanding of construction details & techniques					√
Participation and contribution in project meetings		√			
Understanding of codes and standards		√			
Schedule preparation & tracking activities					√
Preparation / Management of drawings		√			
Learning / Application of software in Projects		√			
Preparation of concept for projects					√
Site Management / Discussion with clients					√

Overall Grading*	7.5
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(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

7. Any other Remarks : _____

8. Signature of the
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- Name of the office / organization : Dhana Architects
- Address & Contact Number : No.5, II floor, CS Towers, Bazullah Road, T Nagar, Chennai – 17. 9884306869
- Name of the student : Madhumitha. K
- Duration : From 28.12.2020 To 02.01.2021
- Total No. of days : 4 days

6. Evaluation of Performance criteria shall be on

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
Documentation and tracking of project					√
Presentation Skills developed		√			
Understanding of construction details & techniques					√
Participation and contribution in project meetings		√			
Understanding of codes and standards		√			
Schedule preparation & tracking activities					√
Preparation / Management of drawings		√			
Learning / Application of software in Projects		√			
Preparation of concept for projects					√
Site Management / Discussion with clients					√

Overall Grading*	7.5
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(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

7. Any other Remarks : _____

8. Signature of the
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2. Address & Contact Number : No.5, II floor, CS Towers, Bazullah Road, T Nagar, Chennai – 17. 9884306869

3. Name of the student : Madhumitha. K

4. Duration : From 04.01.2021 To 09.01.2021

5. Total No. of days : 5 days

6. Evaluation of Performance criteria shall be on

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
Documentation and tracking of project					√
Presentation Skills developed		√			
Understanding of construction details & techniques					√
Participation and contribution in project meetings		√			
Understanding of codes and standards		√			
Schedule preparation & tracking activities					√
Preparation / Management of drawings		√			
Learning / Application of software in Projects		√			
Preparation of concept for projects					√
Site Management / Discussion with clients					√

Overall Grading*	7.5
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(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

7. Any other Remarks : _____

8. Signature of the
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2. Address & Contact Number : No.5, II floor, CS Towers, Bazullah Road, T Nagar, Chennai – 17. 9884306869

3. Name of the student : Madhumitha. K

4. Duration : From 11.01.2021 To 13.01.2021

5. Total No. of days : 2 days

6. Evaluation of Performance criteria shall be on

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
Documentation and tracking of project					√
Presentation Skills developed		√			
Understanding of construction details & techniques					√
Participation and contribution in project meetings		√			
Understanding of codes and standards		√			
Schedule preparation & tracking activities					√
Preparation / Management of drawings		√			
Learning / Application of software in Projects		√			
Preparation of concept for projects					√
Site Management / Discussion with clients					√

Overall Grading*	7.5
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(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

7. Any other Remarks : _____

8. Signature of the
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Organization (With Seal)



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2. Address & Contact Number : No.5, II floor, CS Towers, Bazullah Road, T Nagar, Chennai – 17. 9884306869
3. Name of the student : Madhumitha. K
4. Duration : From 18.01.2021 To 23.01.2021
5. Total No. of days : 5 days
6. Evaluation of Performance criteria shall be on

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
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Site Management / Discussion with clients					√

Overall Grading*	7.5
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(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

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8. Signature of the
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3. Name of the student : Madhumitha. K
4. Duration : 27.01.2021
5. Total No. of days : 1 day
6. Evaluation of Performance criteria shall be on

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology		√			
Active Participation in the Project activities		√			
Documentation and tracking of project					√
Presentation Skills developed		√			
Understanding of construction details & techniques					√
Participation and contribution in project meetings		√			
Understanding of codes and standards		√			
Schedule preparation & tracking activities					√
Preparation / Management of drawings		√			
Learning / Application of software in Projects		√			
Preparation of concept for projects					√
Site Management / Discussion with clients					√

Overall Grading*	7.5
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(A – 8.0, B – 7.0, C – 6.0, D – 5.5, E – 5.0, F – <5)

7. Any other Remarks : _____

8. Signature of the
Head of the Office /
Organization (With Seal)



WORK DIARY

(Annexure –VIII)

DATE	PROJECT NAME	WORK DONE
07.12.2020 – 12.12.2020	METRO RAIL STATION AT PERUNGUDI	PROJECT INTRODUCTION, CLIMATE ANALYSIS AND SITE ANALYSIS
14.12.2020 – 19.12.2020	METRO RAIL STATION AT PERUNGUDI	CASE STUDY OF TWO METRO STATIONS IN INDIA
21.12.2020 – 26.12.2020	METRO RAIL STATION AT PERUNGUDI	SIMULATION OF THE CASE STUDY PROJECTS AND FINDINGS FROM THE STUDY
28.12.2020 – 02.01.2021	METRO RAIL STATION AT PERUNGUDI	UNDERSTANDING THE OPTIONS GIVEN FOR THE DESIGN. DEVELOPING 3D MODEL FOR THE GIVEN OPTIONS
04.01.2021 – 09.01.2021	METRO RAIL STATION AT PERUNGUDI	SIMULATION OF THE DEVELOPED 3D MODEL
11.01.2021 – 13.01.2021	METRO RAIL STATION AT PERUNGUDI	FINDINGS AND THE RESULT OF THE SIMULATION DEVELOPED
18.01.2021 – 23.01.2021	METRO RAIL STATION AT PERUNGUDI	ANALYSIS AND CONCLUSIONS ON THE OPTIONS WORKED OUT
27.01.2021	METRO RAIL STATION AT PERUNGUDI	FINAL CONSOLIDATED PRESENTATION OF THE PROFESSIONAL TRAINING WORK

Chief Architect Signature:

Office seal:



(Annexure –X)

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
1.	GENERAL	
2.	HISTORY OF THE FIRM	
3.	PROJECT 1 DETAILS	
4.	DRAWINGS	
5.	PROJECT 2 DETAILS	
6.	DRAWINGS	
7.	„	
8.	„	
9.	„	
10.	„	
11.	„	
12.	„	
13.	„	
14.	CRITICAL OVERVIEW OF THE FIRM	

FIRM HISTORY

Dhana Architects are an award-winning interdisciplinary practice, operating in fields of architecture, interiors, sustainability and urbanism. The Firm was Established in 2009 under the creative direction of architect T.

Dhanasekar, they believe that architecture and sustainability is about creating a lasting positive impact on our surroundings and our planet. Therefore, they measure their projects on the impact they create both functionally and aesthetically.

They are specialized in Sustainable and Architectural projects. Notable projects are Metro Rail projects, wherein the Energy analysis is done by the team for the CMRL projects.

Chennai is the fourth largest metro system in India. Chennai Metropolis has been growing rapidly and the traffic volumes on the roads have also been increasing enormously.



CHENNAI

13.0827° N, 80.2707° E



AIM

This project aims at providing the people of Chennai with a fast, reliable, convenient, efficient, modern and economical mode of public transport, which is properly integrated with other forms of public and private transport including buses, sub-urban trains and MRTS.

INTERMODAL SYSTEM

Metro stations in Chennai, including links to a suburban rail, a proposed BRT line, buses, and auto rickshaws as well as parking for cars and 2-wheel transportation.



KOYAMBEDU



THIRUVATTIYUR



ALANDUR



AIRPORT

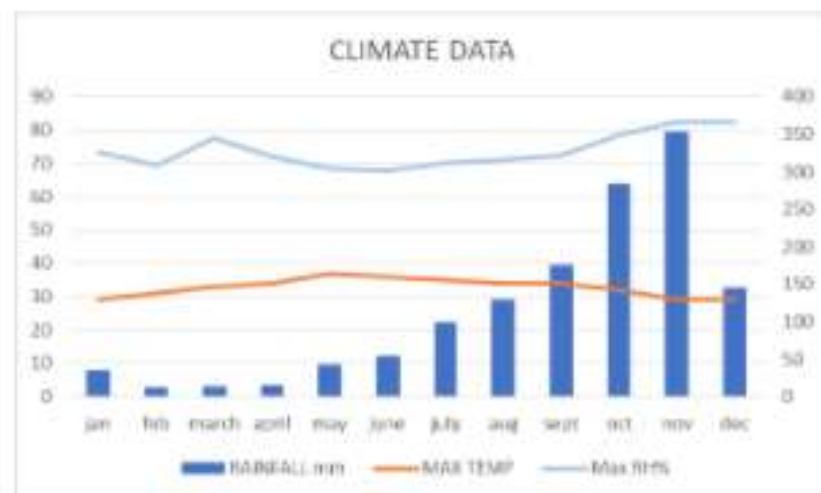


PHASE I

CHENNAI

13.0827° N, 80.2707° E

Chennai features a tropical wet and dry climate. Chennai lies on the thermal equator and is also coastal, which prevents extreme variation in seasonal temperature. For most of the year, the weather is hot and humid. The most prevailing winds in Chennai is the Southwesterly between the end of May to end of September and the Northeasterly during the rest of the year.



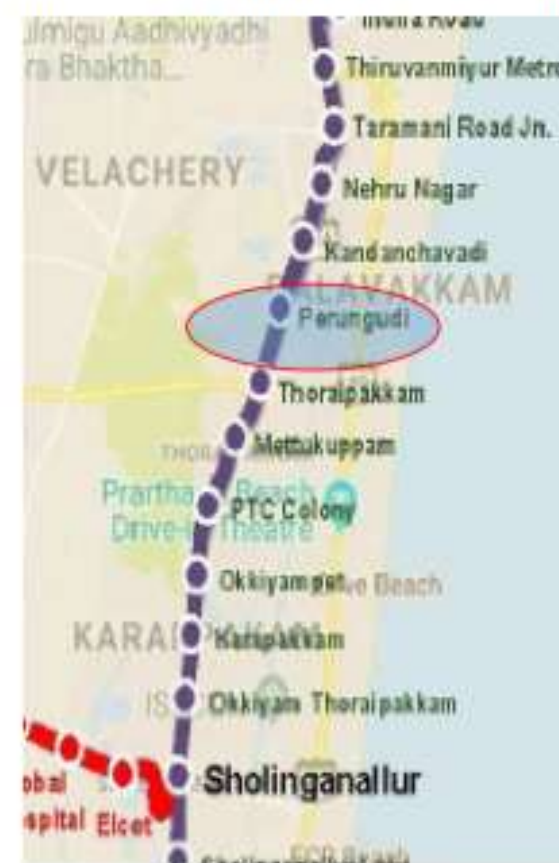
Chennai is categorized under the warm and humid climate.

As we can see that the monsoon falls in the month of sept to nov which is predominantly N-E, with extreme temperature and humidity, comfort is achieved only through good wind movement



The Detailed Project Report for Chennai Metro Rail Phase-II Corridors for 107.55 km covering 3 corridors - C3, C4 and C5 was prepared in March 2017.

Corridor-4 : Lighthouse to Poonamallee Bypass



The project started from the omr road having the typical plan for metro as this metro line has a similar landuse pattern. Perungudi is the first station for the design which for pitched.

Transport department has also proposed the a flyover, which is taken into consideration for the metro design.

Thiruvanniyur Metro to Perungudi	Population: 3.27 mn Households: 0.67 mn Income segment: MID, HIG	Institutional: Residential Industrial	Residential: 2-2.5 Institutional: 1-2 Industrial: 1-25	Located on IT corridor well developed Physical and Social Infrastructure Proximity to Employment Hubs	Residential: 345 Office: 17.8 mn sq.ft	Residential: 1555 Office: 0.35 mn sq.ft	
Thiruvanniyur Metro to Sholinganallur	Population: 3.02 mn Households: 0.63 mn Income segment: MID, HIG	Institutional: Residential Commercial Open space Light Industrial	Residential: 2-2.5 Institutional: 1-2 Commercial: 2-2.5 Industrial: 1-25 IT Corridor Benefits - Additional 1.5 times of the Ordinary FSI Permissible	Located on IT Corridor Presence of Budget apartments and Villas Affordable Office and Retail Rents Infrastructure developments	Residential: 2715 Office: 10.37 mn sq.ft Retail: 1.33 mn sq.ft	Residential: 4205 Office: 1.26 mn sq.ft	

INTRODUCTION

There are a total of 23 Elevated Stations along the stretch.

It was opened to the public within four years of starting construction, making it the fastest completed metro project in India

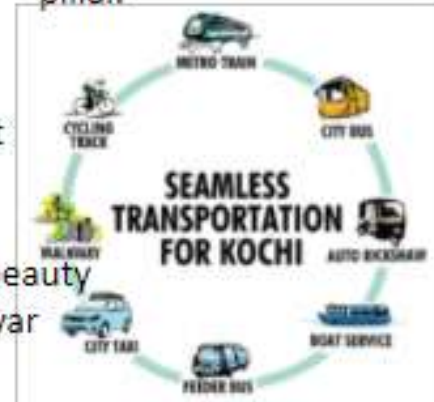
ALUVA STATION

The station designs are contemporary but inspired by socio-cultural themes.

Aluva station's theme is Kerala's natural beauty and the station's interiors depict the Periyar and the other major rivers in the state.

SUSTAINABILITY

The system is also involved in sustainable initiatives with the introduction of non-motorized transport corridors in the city, installation of solar panels for power and vertical garden on very sixth metro pillar.



The IIA presented the designs of 14 stations to the KMRL.



SOCIAL INCLUSION



VERTICAL GARDEN



SOLAR ENERGY



PLASTIC BOTTLE RECYCLING

CONCEPT

Every Kochi Metro station is designed on a specific theme around Kerala culture and geography.



Themed Stations

Aluva	ABUNDANT BOUNTY OF NATURE IN KERALA WITH A SPECIAL FOCUS ON WESTERN GHATS, PERIYAR & OTHER RIVERS	There are 44 rivers in Kerala, all but three originating in the Western Ghats. 41 of them flow westward and 3 eastward. The rivers of Kerala are small, in terms of length, breadth and water discharge. The rivers flow faster, owing to the hilly terrain and the short distance between the Western Ghats and the sea. Major rivers: Periyar, Pamba, Bharathapuzha, Chaliyar, Chalakudi, Kadalundi.
Pulimchodu	Western Ghats - Ecological region, flora & fauna	- Ecoregions - South Western Ghats moist deciduous forests - Ecoregions - South Western Ghats montane rain forests - The sheer number of species of plants (exceeding 4000) in the Western Ghats of Kerala, of which nearly 1500 i.e. more than 30% are endemic to this region.
Campyapatti	Western Ghats - Hills & peaks	Wayanad, Silent valley, Anaimalai hills, Cardamom hills, Agastya hills, Nilgiri hills

CASE STUDY 1 - ALUVA METRO STATION

Plastic Bottle Recycling

KMRL has installed Plastic Bottle Recycling Machines at few stations. The machines have been designed to dispose and recover products effectively for recycling. The highlight of the machine is that customers using the facility will be incentivized by way of discount coupons redeemable at select commercial outlets. Food outlets and supermarkets will be linked with the machine manufacturer for provision of coupons.

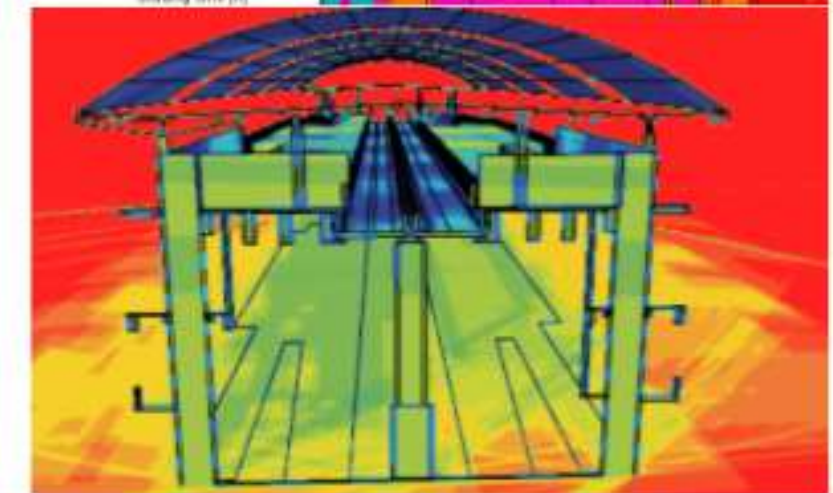
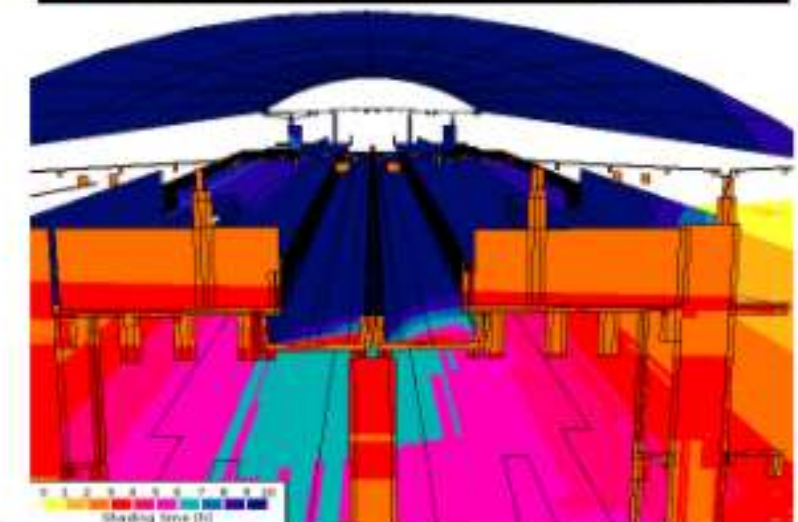
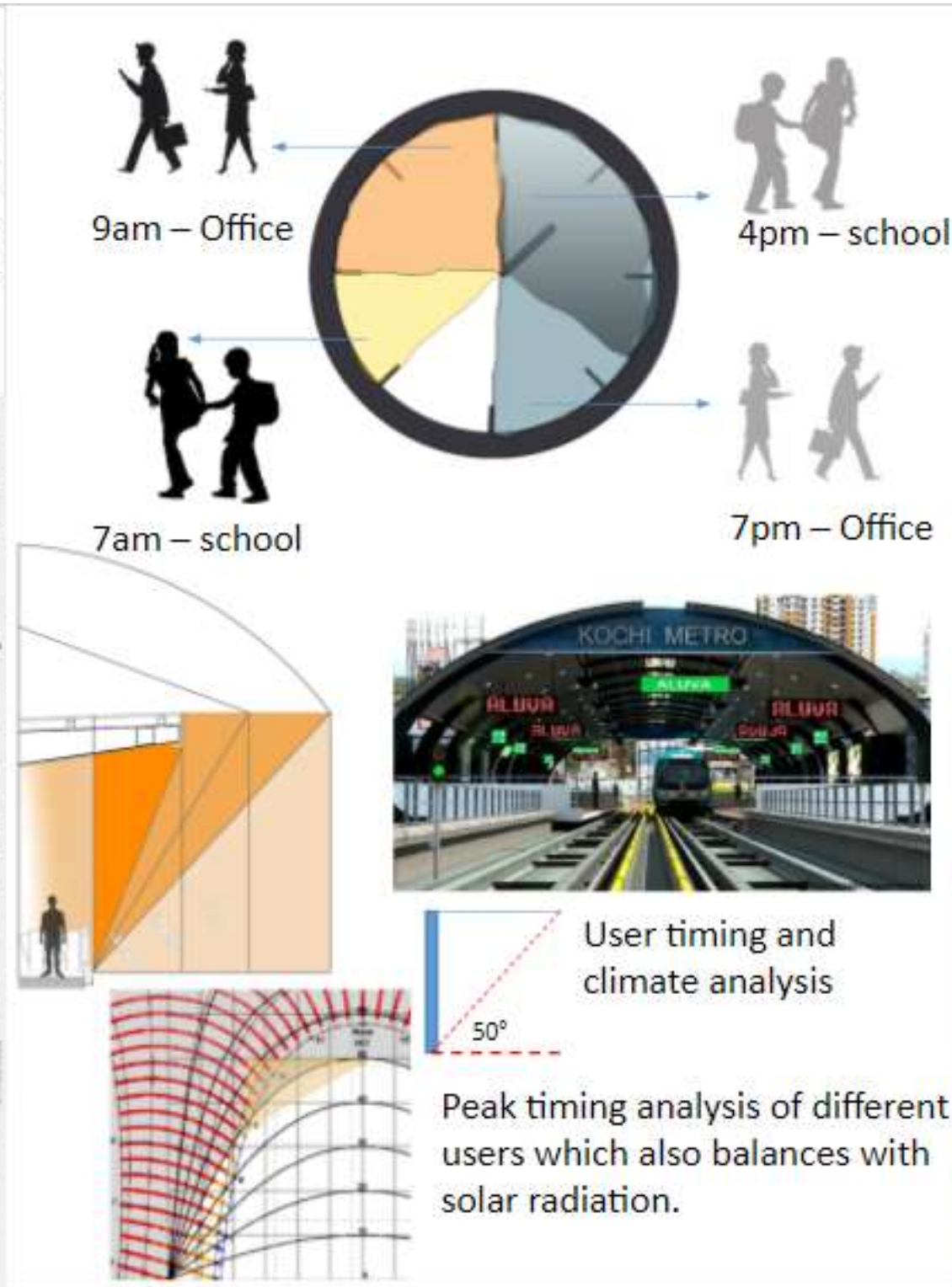
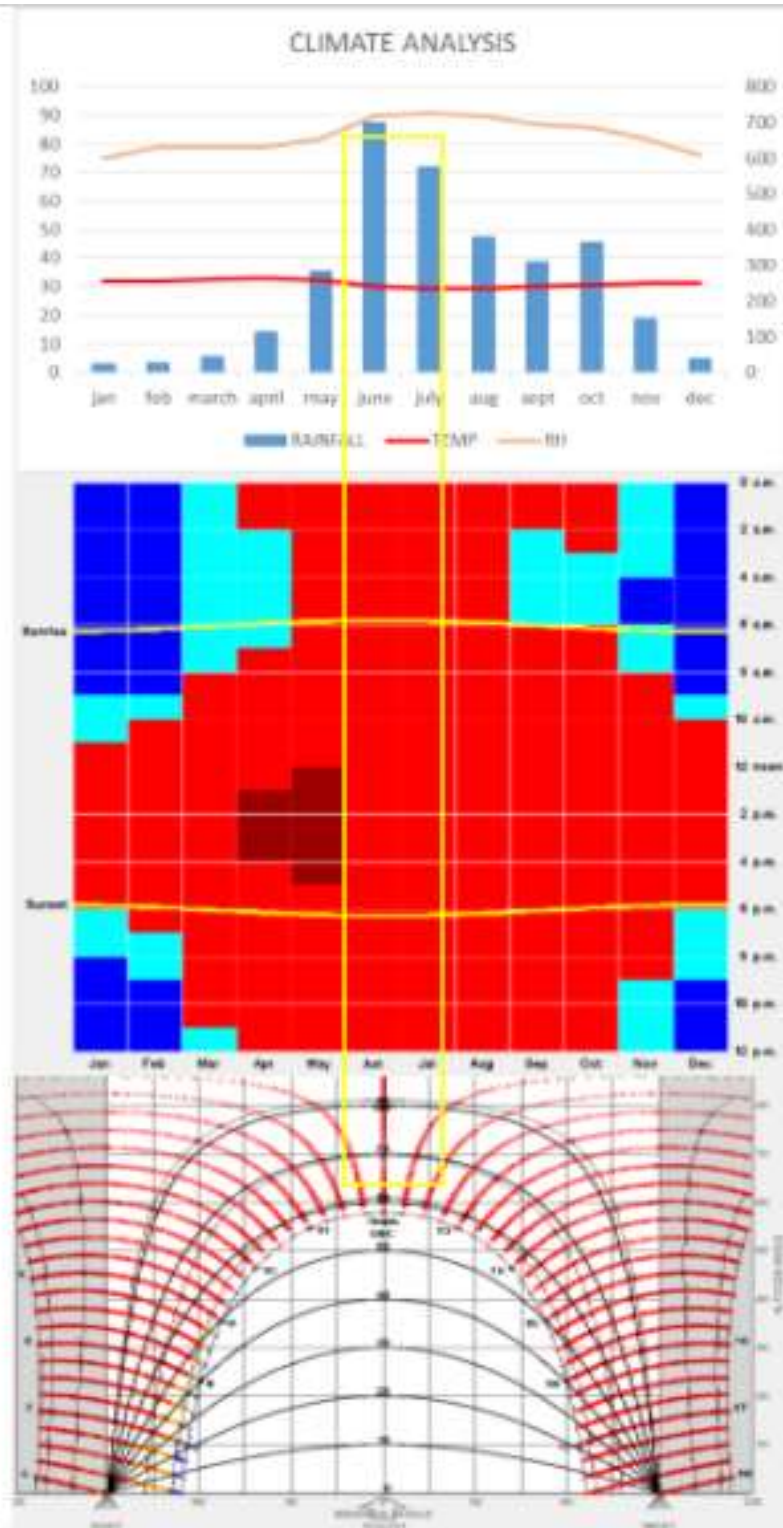
Vertical Gardens

Every sixth pillar of Kochi Metro will have a vertical garden, utilising biodegradable waste from the city instead of soil. The plants contained on the coir beds will be watered using drip irrigation.

Solar Energy

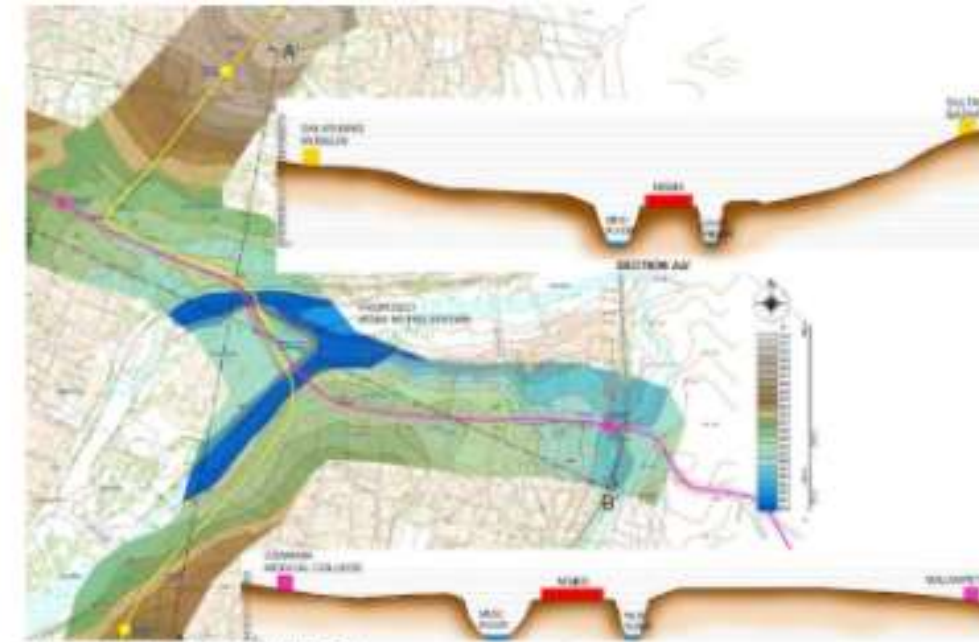
Solar panels on the roofs of metro stations





Hyderabad Metro Rail

Hyderabad Metro Rail Limited is the Government Enterprise, which had initiated the Metro rail project for Hyderabad. The Project was allotted to L&T company in Public Private Partnership (PPP) mode. Metro Rail was approved for 71.16 km., covering three high density traffic corridors of Hyderabad. The Metro Rail System has proved to be the most efficient in terms of energy consumption, space occupancy and numbers transported. Hyderabad Metro Rail project covers three high density traffic corridors of Hyderabad:



The analysis

1. The area proposed for proposed Metro rail station is 1.75 Ha. The site is the height from the road level. The site is flat and covered with grass and trees. Part of the site is used for APJEE bus stand and parking area. Another part is used as a field plot. It is having well connectivity to the Metro line above.
 2. Substation area is having very low level of very little and they will not disturb any. But per the master plan the purpose of existing to site is decreasing business concerns and will increase. The people in this area are opposing the project as it spoils their land.
 3. Impact of O&G there are many bus stops, small shops and markets. The Metro construction may have impact on them.
 4. Surrounding houses are surrounded with many heritage structures, religious structures, landmarks and old constructions having heritage value.
 5. Highway area roads are narrow and with heavy traffic only. And also there are many religious places and institutions are in this area.
 6. There are old buildings to be demolished in the study area in order to make way for the construction of Metro station according to the IRBT proposal.
 7. There are old trees to be cut in the study area according to the IRBT station proposal.
 8. There are possibilities of construction of Metro line in the future within construction in this area.
- To increase the impact on the road side buildings, heritage structures and trees because of the Metro station construction activities, there should be careful alignment and design in these areas.

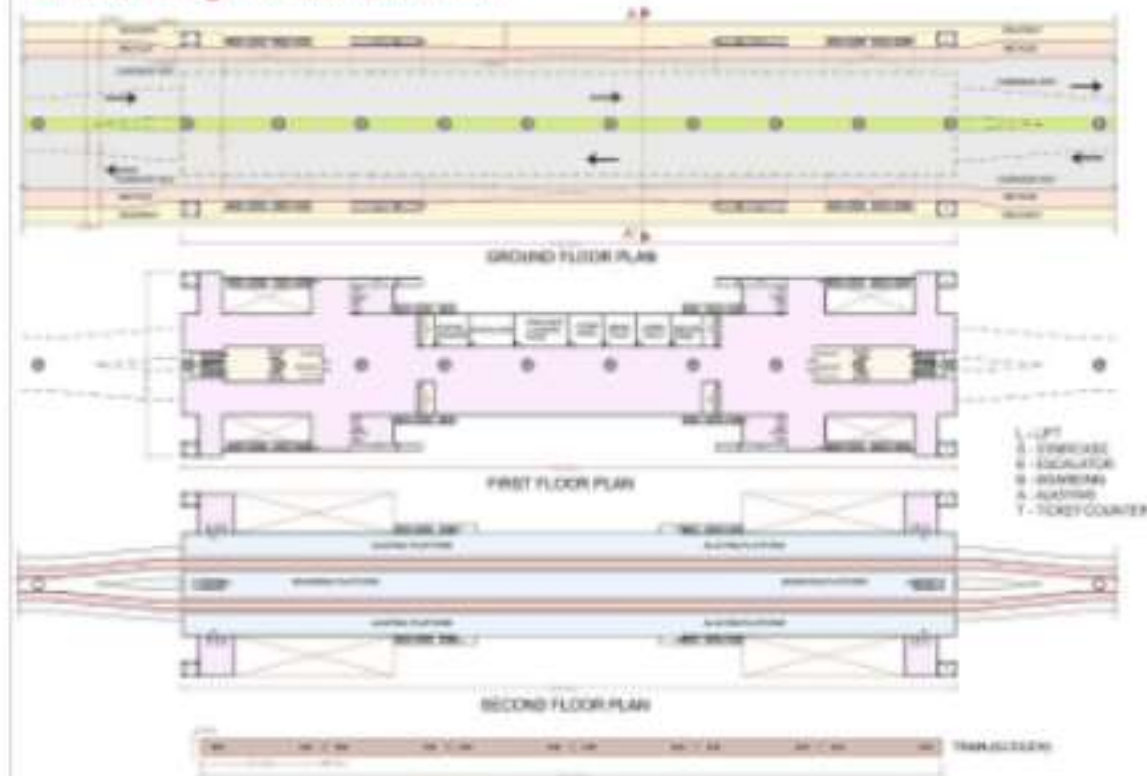
Environment Impacts of Metro Rail

Aspect of Environment	Likely Impacts
A. LAND ENVIRONMENT	
Construction Phase	• Increase in soil erosion due to construction activities • Pollution by construction activities • Use of land for labour facilities • Solid waste from labour facilities
B. WATER QUALITY	
Construction Phase	• Surface runoff from project site • Oil/fuel and waste spills • Sewage Discharge from labor camps and site office
Operation Phase	• Oil/fuel and waste spills • Discharge of sewage
C. AIR POLLUTION	
Construction Phase	• Dust generation from construction activities • Air pollution due to increased vehicular movement • Fugitive emissions from various construction equipments
Operation Phase	• Increased emission due to vehicle movement and DG set
D. NOISE POLLUTION	
Construction Phase	• Noise due to operation of various equipment • Noise due to construction activities • Noise due to increased vehicular movement
Operation Phase	• Noise from vehicle movement
E. TRAFFIC PATTERN	
Construction Phase	• Traffic congestion on roads due to construction material truck movement • Traffic obstruction to other trucks due to congestion • Slow movement of vehicles on roads
Operation Phase	• Improved traffic movement
F. SOCIO-ECONOMICS	
Construction Phase	• Increased job opportunity • Increased commercial activities • Displacement of people along the metro routes
Operation Phase	• Increased revenue • Real estate value enhancement and increased commercial activities • Increased job opportunities

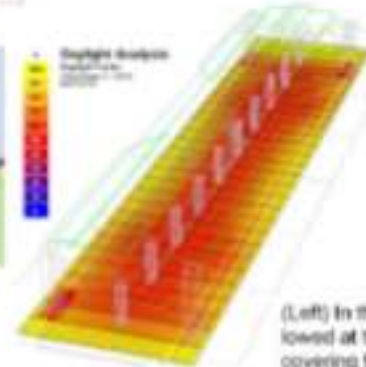
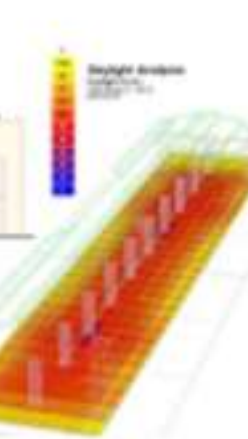
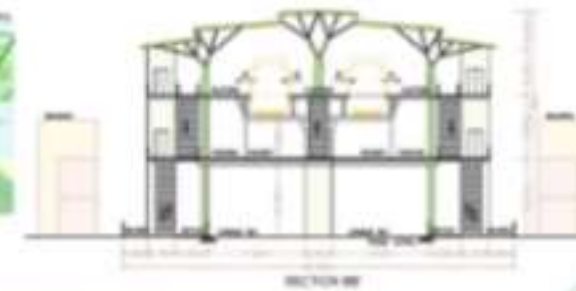
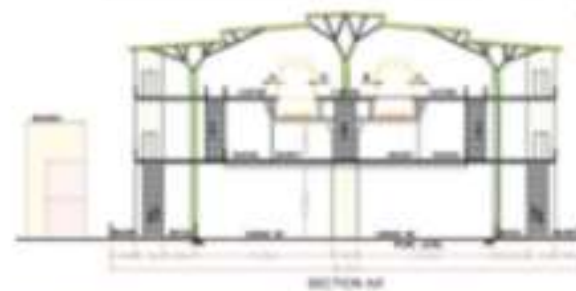
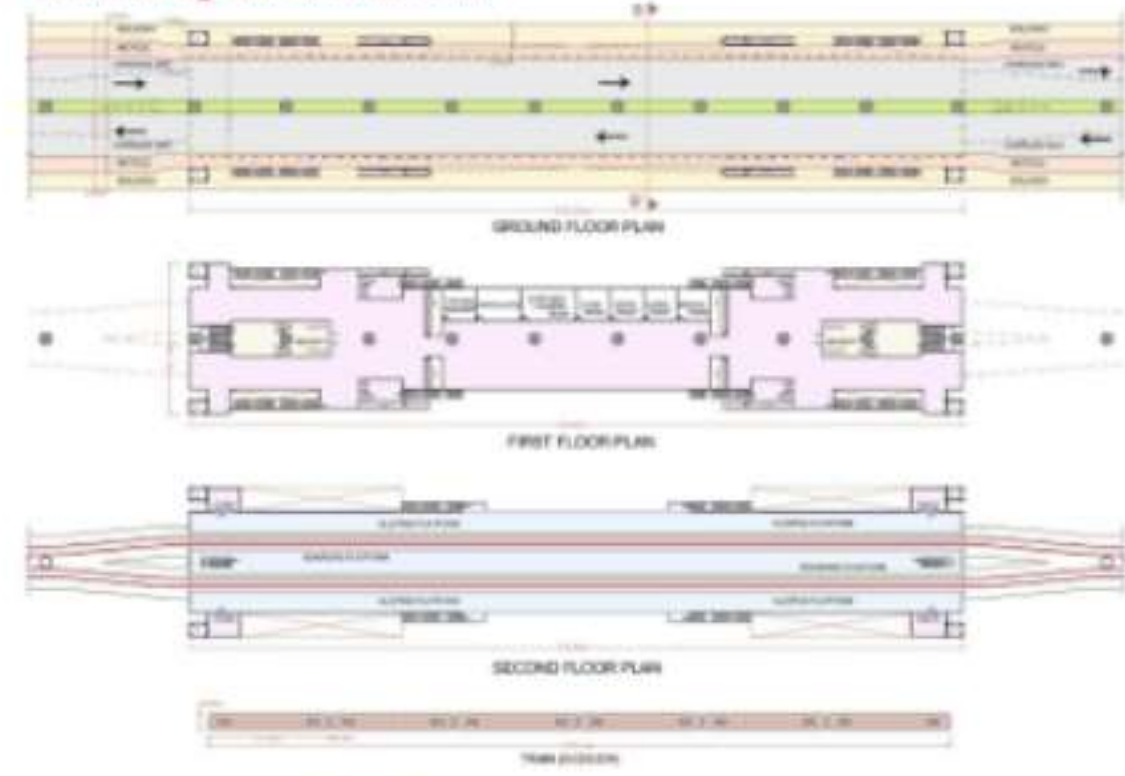
S. No.	Impacts	Negative Impact		Positive Impact		No Impact
		Short Term	Long Term	Short Term	Long Term	
Project Location						
i.	Displacement of People		•			
ii.	Change of land use		•			
iii.	Loss of trees/vegetation	•				
iv.	Spilling of oil/fuel	•				
v.	Impact on archeological property					•
Construction Phase						
i.	Pressure on local infrastructure	•				
ii.	Impact on water quality		•			
iii.	Impact on air quality including dust generation		•			
iv.	Noise pollution		•			
v.	Traffic congestion and loss of access		•			
vi.	Spilling and disposal of construction material		•			
vii.	Public health and safety		•			
viii.	Social impact	•				
Operational Phase (Expected)						
i.	Increase in local level	•				
ii.	Water Harvesting & Recharge	•				
iii.	Industrial Infrastructure development				•	
iv.	Quality of life Human use value				•	
v.	Job Opportunities				•	
vi.	Decrease in Air pollution				•	



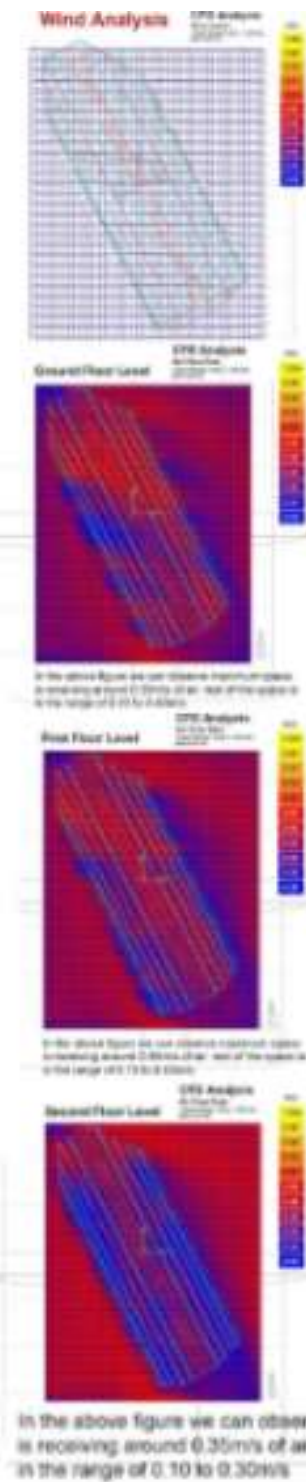
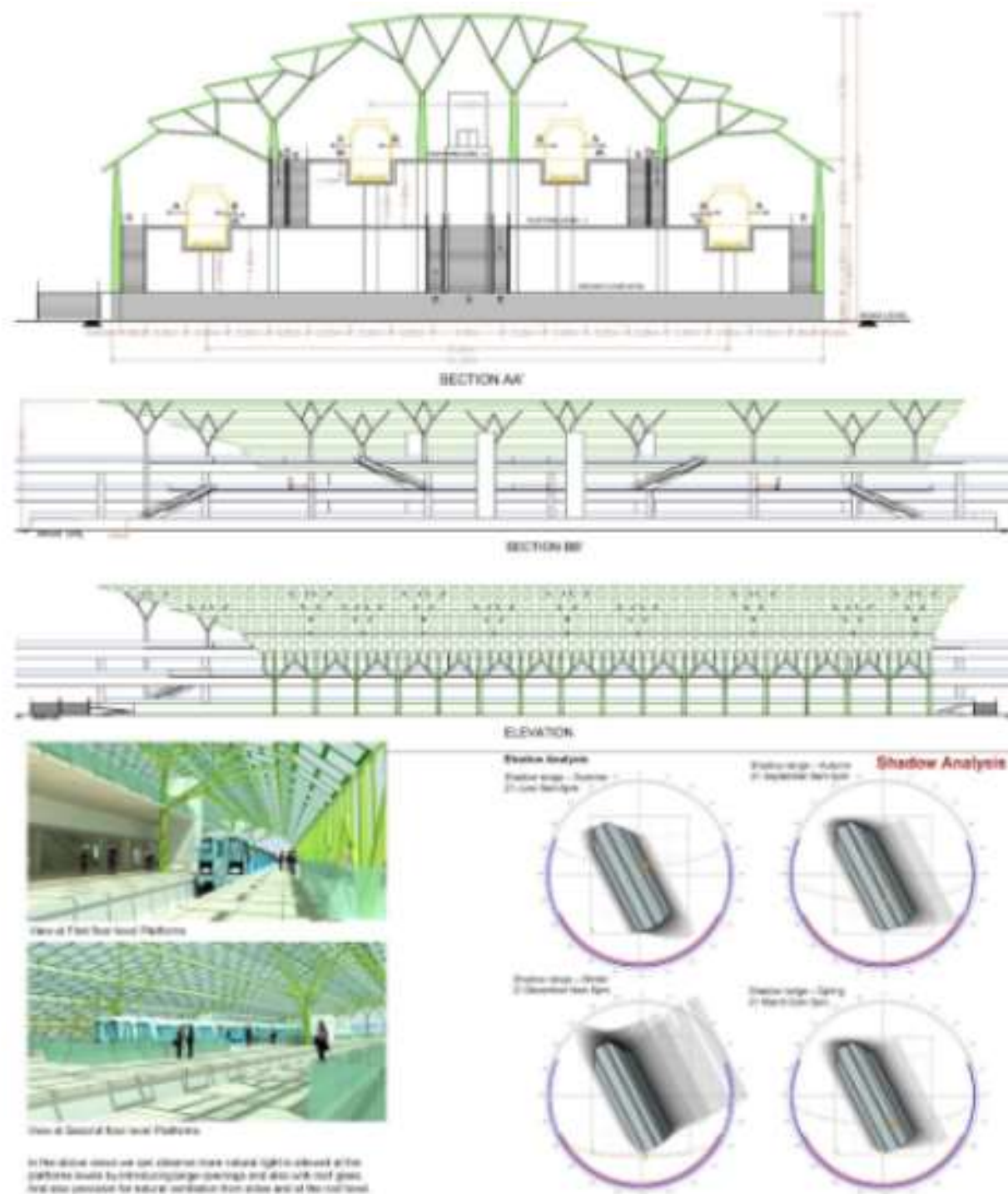
Station Design for 36m wide road



Station Design for 30m wide road



(Left) In the day light analysis we can observe more day light is allowed at the road level by introducing large openings and also not covering full width of the road. The daylight at Road level received ranging about 50% near median to 90% at the edges of the road. And also provision for natural ventilation from sides.

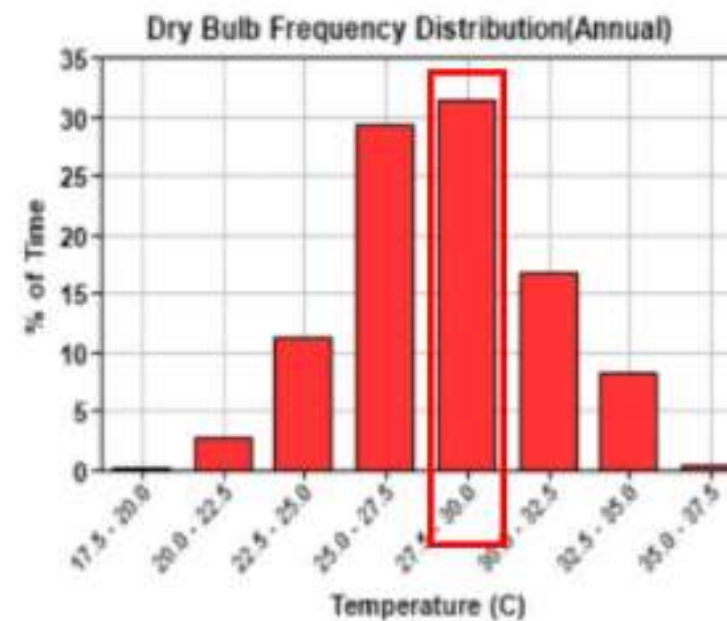


Weather Station: GBS_00M12_12_105079
 Distance to your project: 1.4 mi (2.2 km)
 Latitude = 12.8833, Longitude = 80.2333

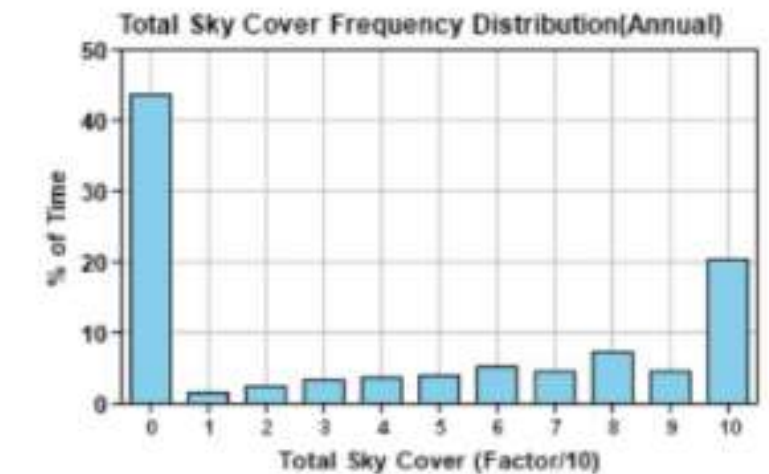
Cooling Degree Day		Heating Degree Day	
Threshold	Value	Threshold	Value
18.3 °C	3624	15.3 °C	0
21.1 °C	3610	15.6 °C	0
23.9 °C	1166	12.8 °C	0
26.7 °C	666	10 °C	0

☀ ☁ ☔

Annual Design Conditions				
Threshold	Cooling		Heating	
	Dry Bulb (°C)	MCWB (°C)	Dry Bulb (°C)	MCWB (°C)
0.1 %	35.5	25.3	19.9	19.9
0.2 %	35.3	26.7	20.5	19.4
0.4 %	35.1	26.4	20.8	19.7
0.5 %	35.0	26.1	21.0	20.0
1 %	34.8	25.9	21.5	20.8
2 %	34.1	25.7	22.1	21.4
2.5 %	33.9	25.7	22.4	21.7
5 %	33.3	25.5	23.1	22.2



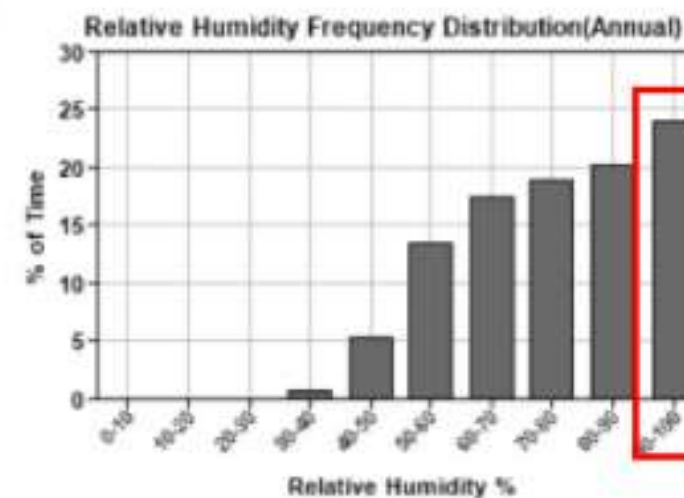
Acc to manual calculation comfortable temperature for chennai is 24.3°C, which is experienced for only 15% of time in a year



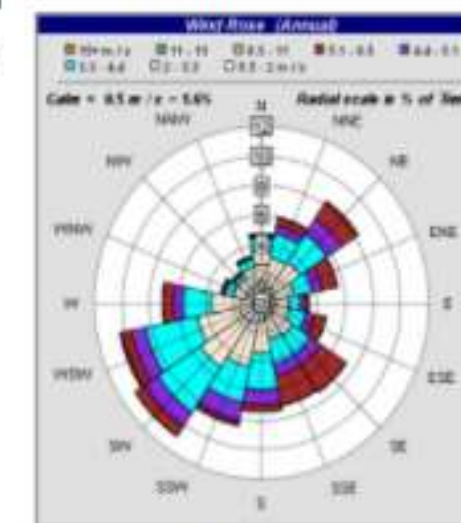
60% of time in a year has sky cover ranging 1 to 10, from this we can conclude that chennai experiences long wave radiation.



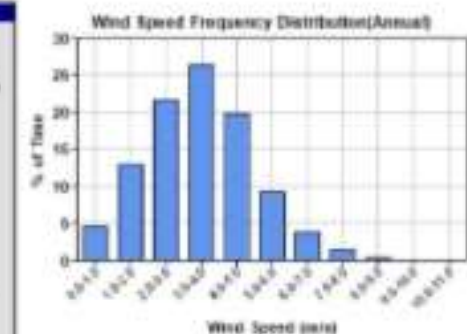
Max temperature for design is experienced in the month of may.



The comfortable RH is 50 %, where as chennai experiences more than 50% of RH for 95% of time in a year.

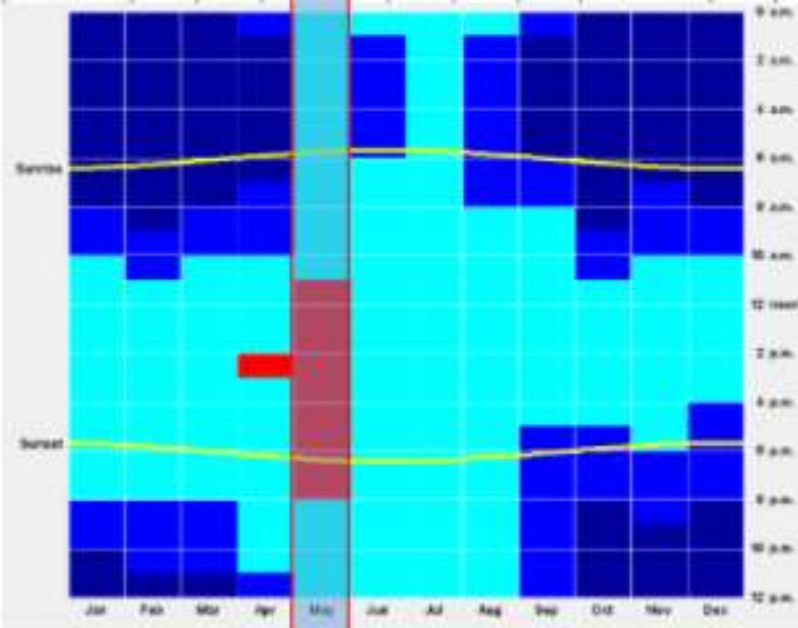


Prevailing winds in Chennai are usually southwesterly between April and October and north-easterly during the rest of the year.

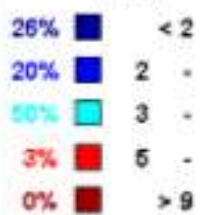


Predominant wind speed is 3-4 m/s annually.

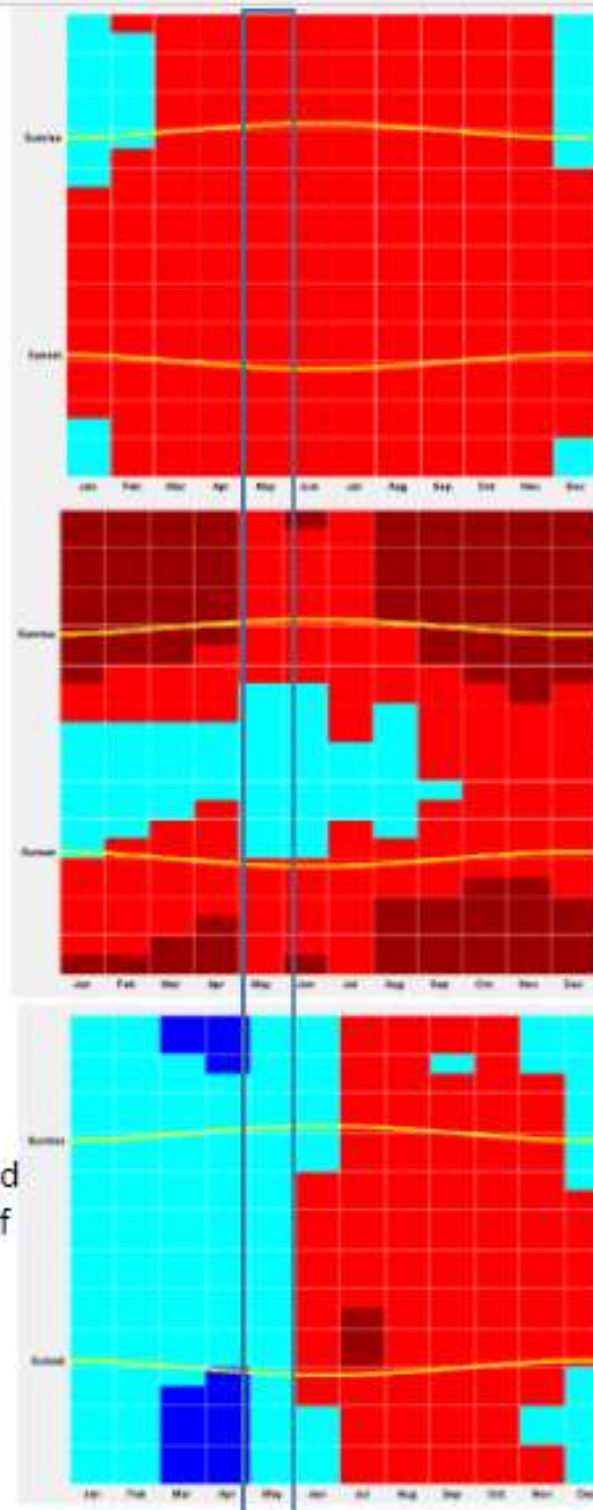
TEMPERATURE



WIND SPEED (m/s)



Correlation of temperature and wind speed indicates that in the month of may there is extreme temperature and also higher wind speed as well. Our design should satisfy these aspects



DRY BULB TEMP (degrees C)



Temperature reading for respective month through out the day

RELATIVE HUMIDITY (percent)



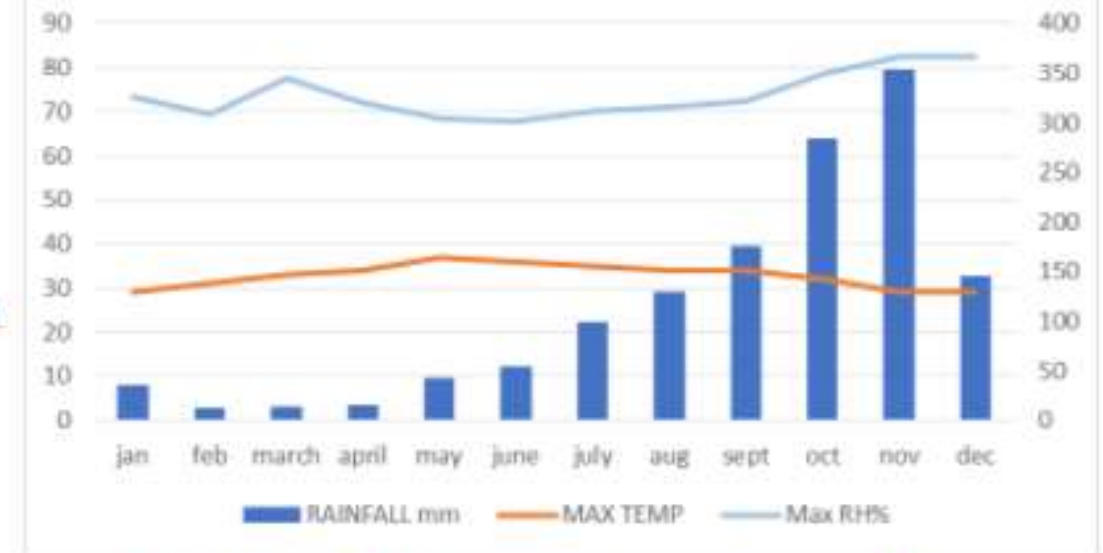
Relative humidity chart indicates that from the month jan to sept rh level is from 40 - 80 where as from oct to dec it is 60 - 80

SKY COVER (percent)



Maximum sky cover is indicated from the month July to November.

CLIMATE DATA



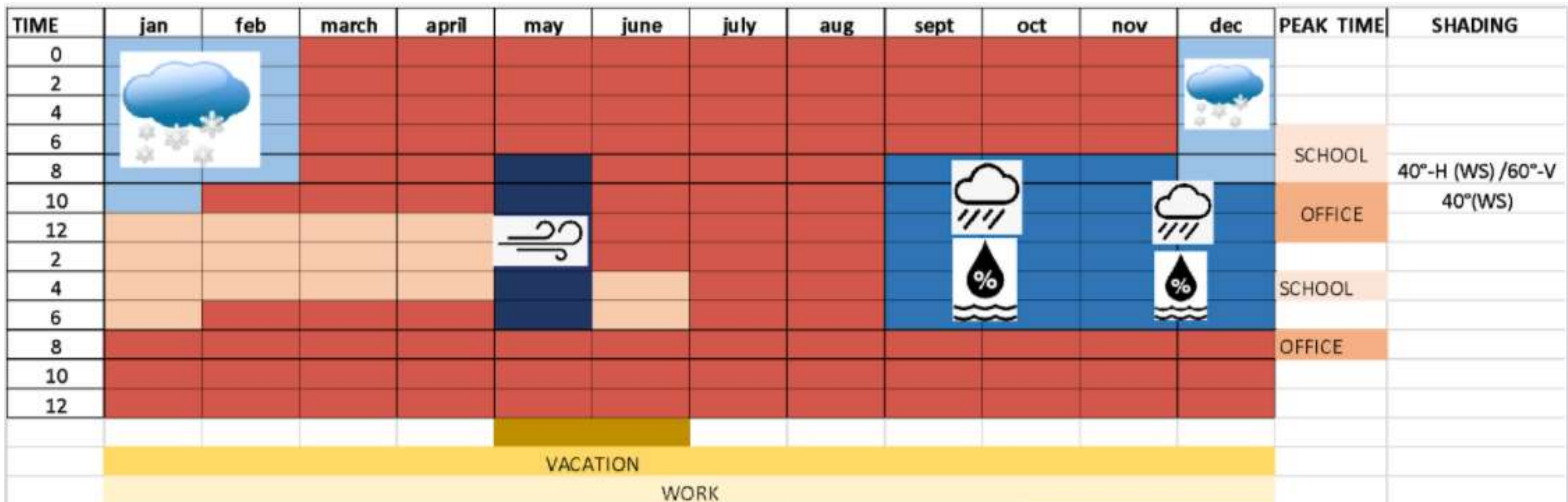
Cumulative analysis of rainfall ,temperature and RH

Cumulative analysis for the whole day

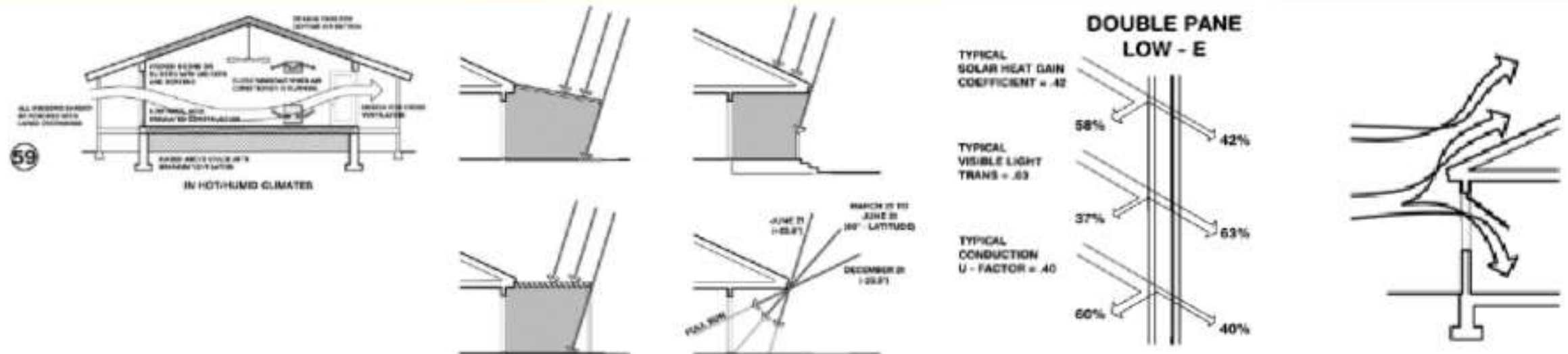
Maximum temperature is recorded in the month of may analyzing the same with other parameter we can conclude that relative humidity in that month is 40-60 and also it's a clear sky

Relative humidity is also recorded high from the month of September to December as monsoon is also recorded in this period

Overall design aspects such as ventilation and shading devices should be taken into consideration is what we inferred from this analysis



Over all analysis of all the parameters and also recording the user occupancy through out the year, there are few techniques that can be incorporated



MAHONEY TABLE GRAPH

Air Temperature

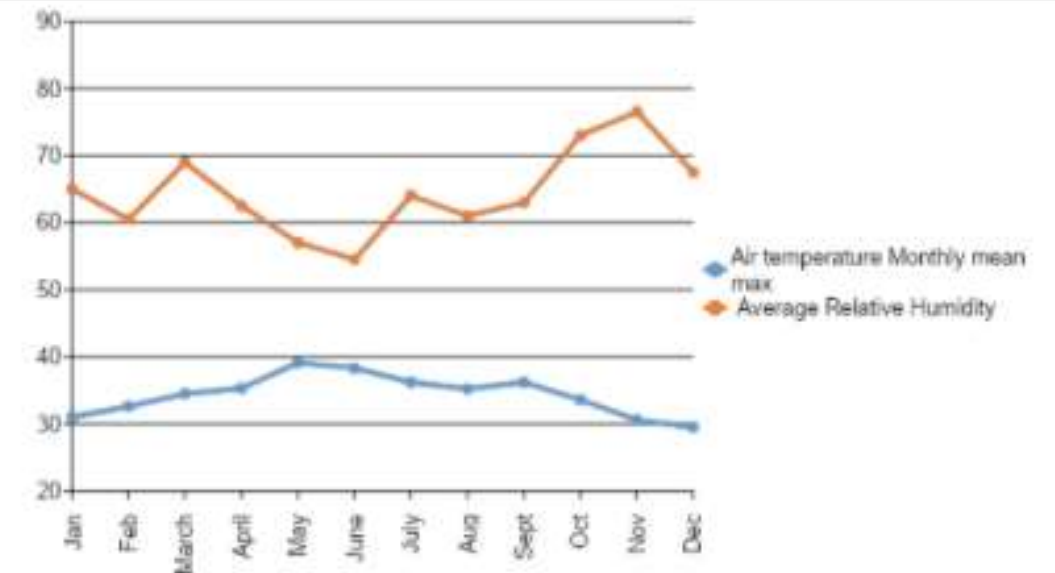
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	high	AMT
Air temperature Monthly mean	31	32.6	34.5	35.3	39.1	38.3	36	35.2	36.2	33.6	30.6	29.5	37	28.5
monthly mean min.	16.9	18.9	22.3	23.9	24.9	24.4	24	23.4	24.3	23.2	21.8	19.7	20	17
Monthly mean range	14.1	11	12.2	12	14.2	13	12	14	11.9	15	8.8	16	low	AMR

RELATIVE HUMIDITY %

	jan	feb	march	april	may	june	july	aug	sept	oct	nov	dec
Monthly mean max. a.m.	72	68	72	64	59	57	68	66	67	76	81	72
monthly mean min. p.m.	58	53	66	61	55	52	60	56	59	70	72	63
Average Relative Humidity	65	60.5	69	62.5	57	54.5	64	61	63	73	76.5	67.5
Humidity group	4	3	4	4	3	3	3	4	4	4	4	4

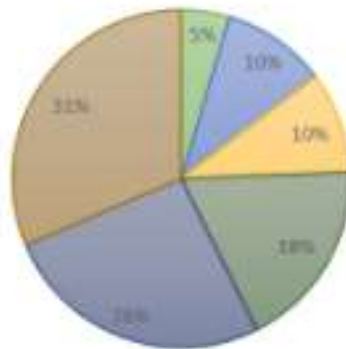
INDICATORS-Table 1

	jan	feb	march	april	may	june	july	aug	sept	oct	nov	dec
	4	3	4	4	3	3	3	4	4	4	4	4
Humid : H1	→	→	→	→				→	→	→	→	→
H2	→		→	→				→	→	→	→	→
H3										→	→	
Arid : A1					→	→	→					
A2												
A3												



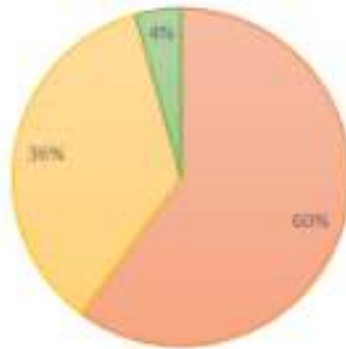
S.No	Design Parameters	Design Recommendation as per MAHONEY table
1	Layout	Orientation North and South, Long axis E-W
2	Spacing	Open spaces for wind penetration
3	Air movement	Rooms single banked, permanent provision for air movement
4	Openings	Minimum opening of 25% – 40%
5	Position of openings	In windward side
6	walls	Heavy walls, over 8 hrs time lag
7	Roofs	Heavy roofs, over 8 hrs time lag
8	Rain protection	Protection necessary for heavy rain
9	External features	Space for outdoor activities

EDUCATION



■ Literate ■ Primary ■ Upper Primary ■ High School ■ Higher Secondary ■ College

JOB



■ Business ■ Service - Private ■ Service Government

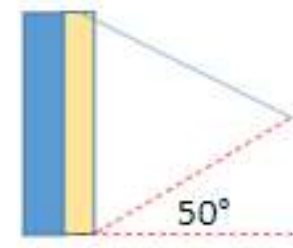
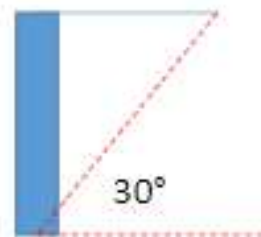
Chart Title



■ Commercial ■ Residential



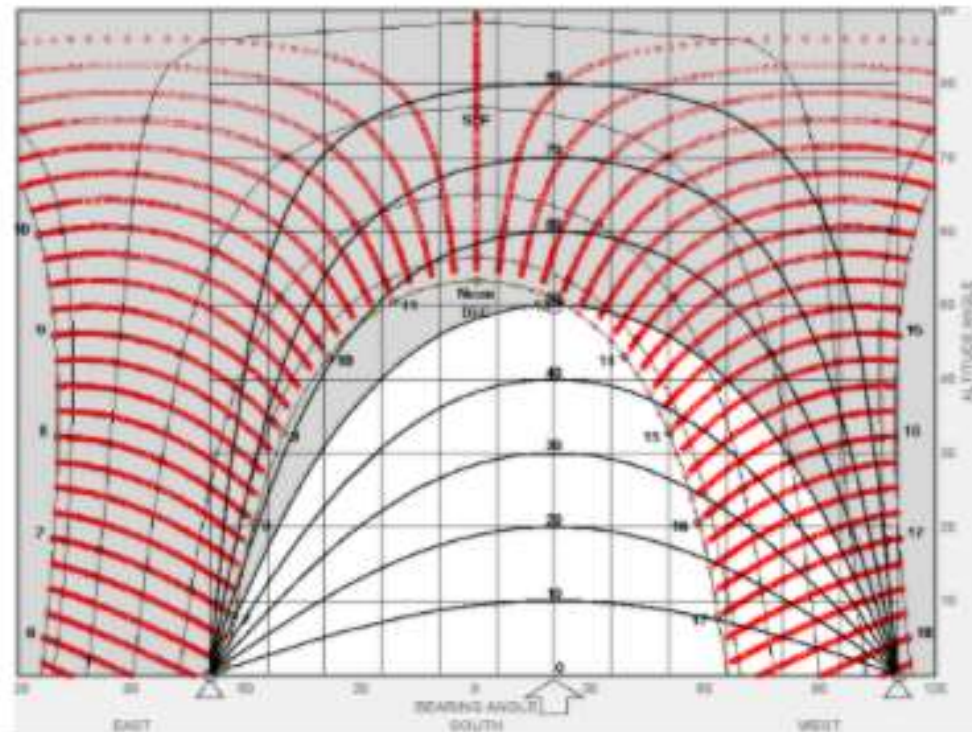
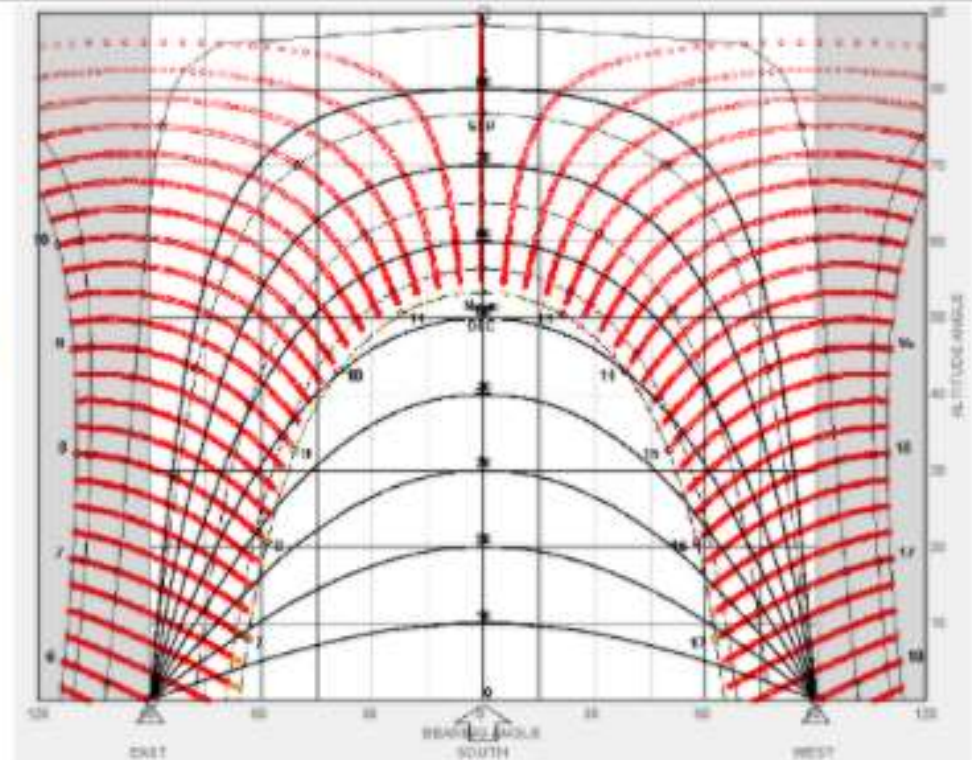
7-9AM



8-9AM

Maximum users in this location are students and working people, usage of metro by these users are morning from 7am to 9 am and in the evening from 3pm to 7pm.

Taking these peak time into consideration we suggest that providing horizontal shade from the angle of 30° to 50° would help in reducing the solar radiation through the vertical envelope.



	MORNING										AFTERNOON								
	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	MONTHLY	
Jan					3%	8%	29%	68%	17%	15%	17%	20%	27%					Jan 23%	
Feb				3%	3%	15%	38%	70%	15%	13%	15%	17%	22%	32%				Feb 22%	
Mar				3%	8%	24%	49%	67%	15%	13%	14%	16%	19%	26%				Mar 23%	
Apr			5%	5%	17%	33%	60%	62%	16%	14%	15%	17%	19%	24%	31%			Apr 24%	
May		6%	6%	10%	23%	40%	67%	58%	17%	16%	16%	18%	20%	23%	28%	36%		May 26%	
Jun		6%	6%	14%	27%	44%	71%	56%	18%	16%	17%	18%	20%	23%	27%	34%		Jun 26%	
Jul		6%	6%	13%	25%	43%	69%	57%	18%	17%	17%	19%	21%	24%	28%	35%		Jul 27%	
Aug			6%	8%	20%	37%	63%	60%	18%	16%	17%	18%	21%	24%	30%			Aug 26%	
Sep			4%	4%	12%	28%	54%	64%	16%	15%	16%	17%	20%	26%	35%			Sep 24%	
Oct				4%	4%	19%	43%	68%	16%	14%	16%	18%	22%	30%				Oct 23%	
Nov					3%	10%	32%	71%	17%	15%	17%	20%	26%					Nov 23%	
Dec					3%	5%	26%	64%	17%	16%	17%	21%	28%					Dec 22%	
	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	ANNUAL	
	MORNING										AFTERNOON								24%

The chart signifies that overall throughout the year the sun radiation is higher from 10am to 11am.

In the month of may and june we experience the high temperature.

When we relate the user timing and the solar radiation we can conclude that from 7am to 9am no much of radiation is affecting the environment except the month of may ,june and july which should be addressed in the design

Simulation shows that daylight duration is around 8 hours when shading device is not provided ,where as in the Fig.b we can visualize that daylight is between 2-4 hours with shading device.

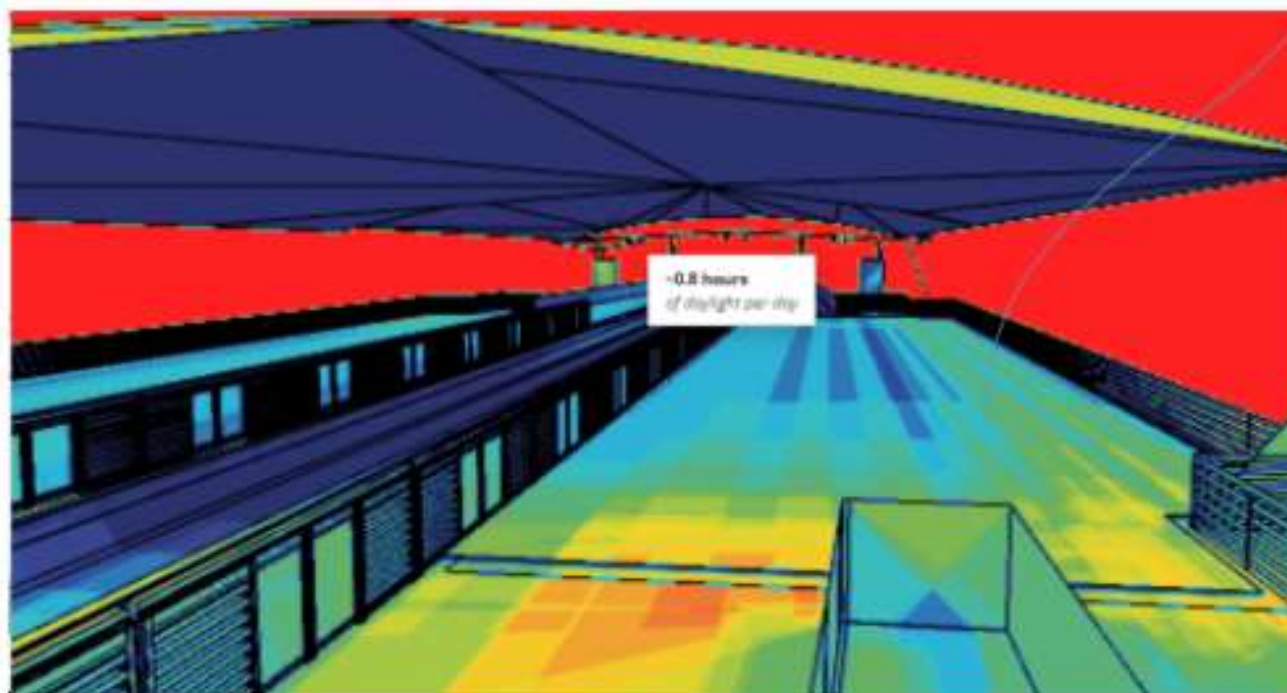


Fig.A

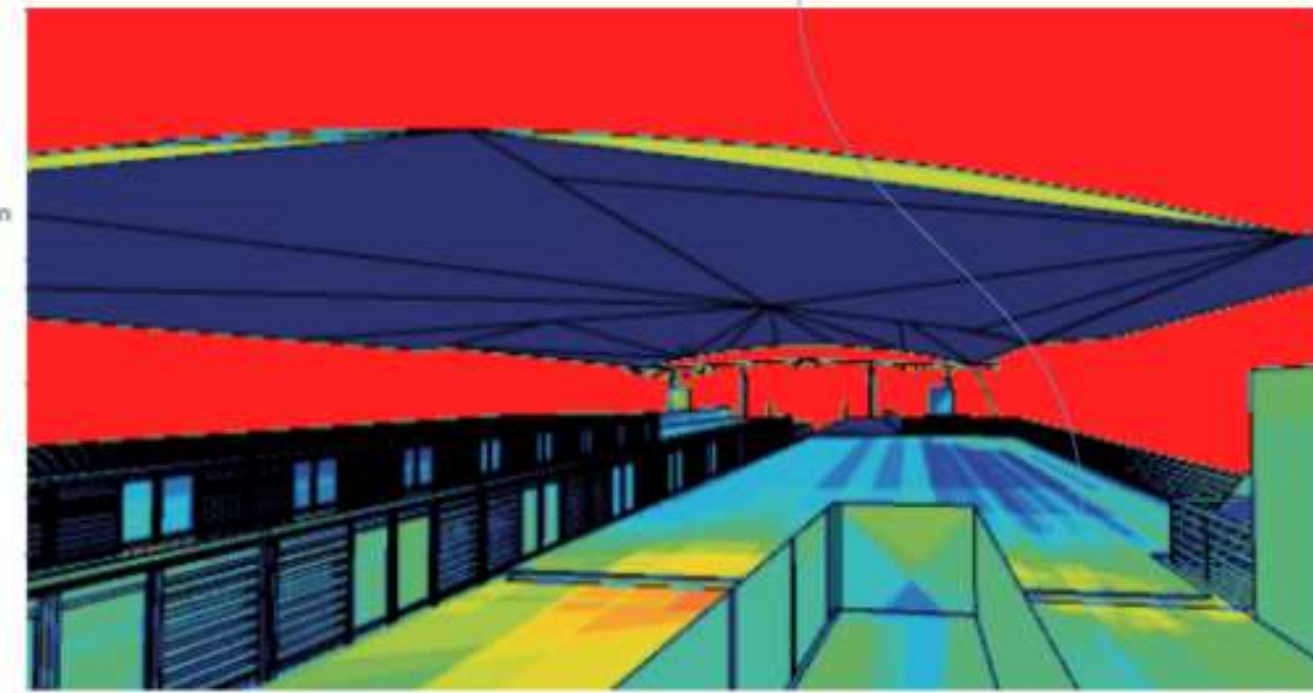
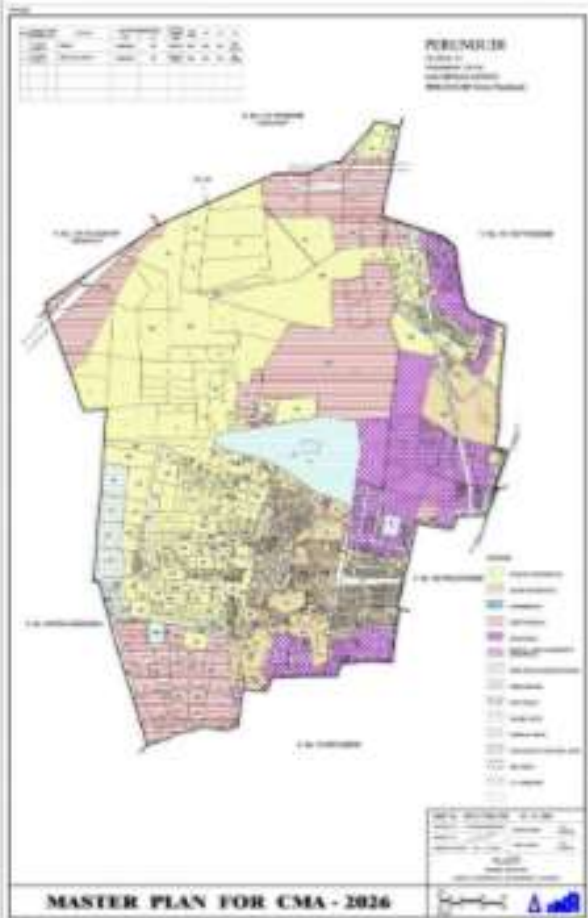


Fig.B



The land use map of perungudi shows that the major part of land comes under primary residential and industrial.



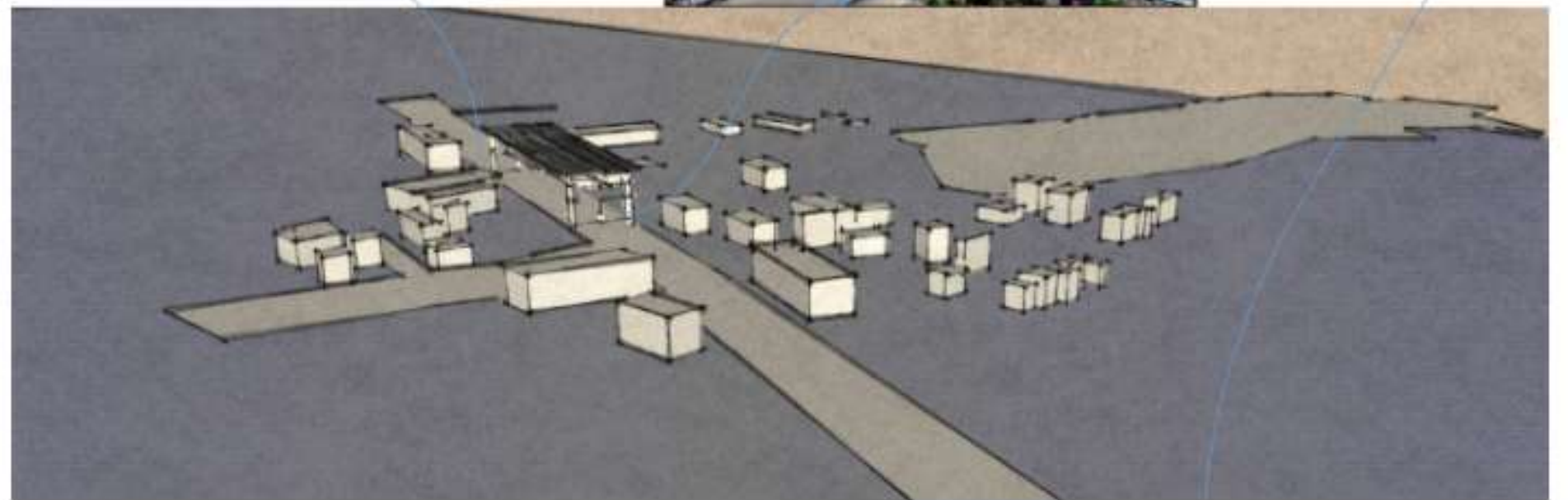
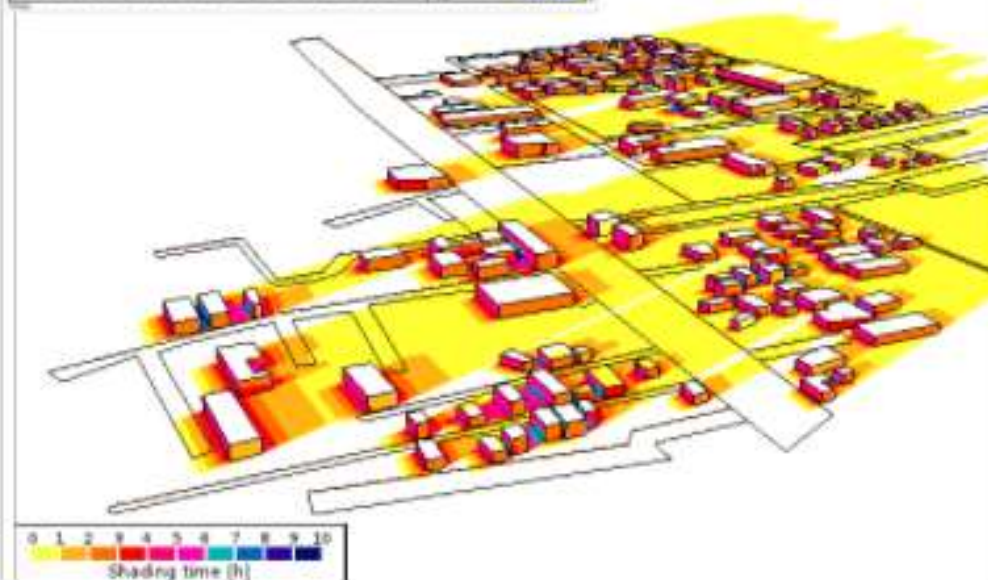
IT building in perungudi near the proposed site for metro



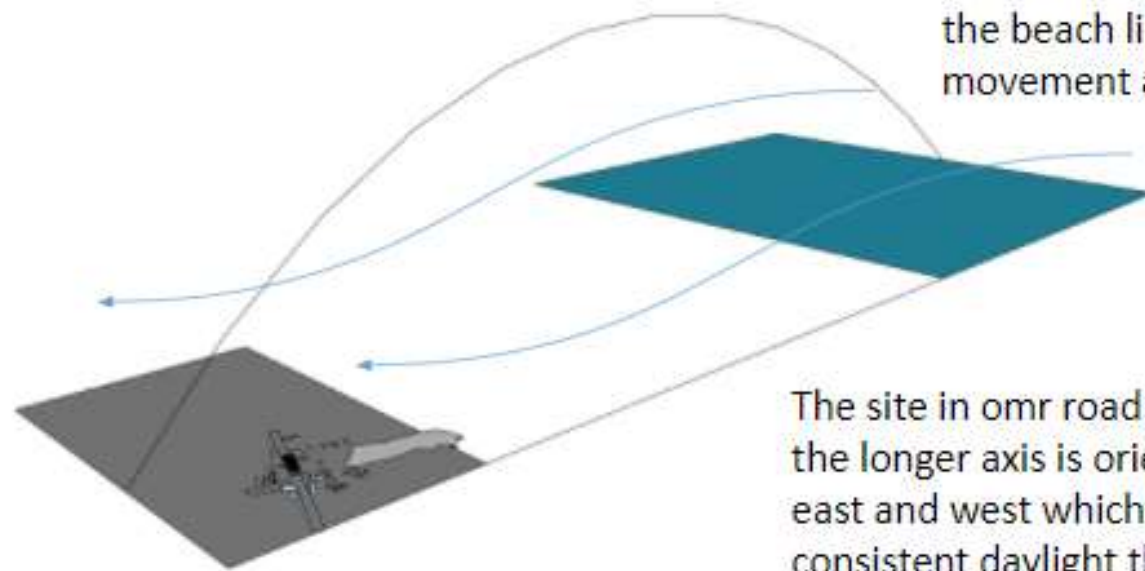
The skyline of perungudi road



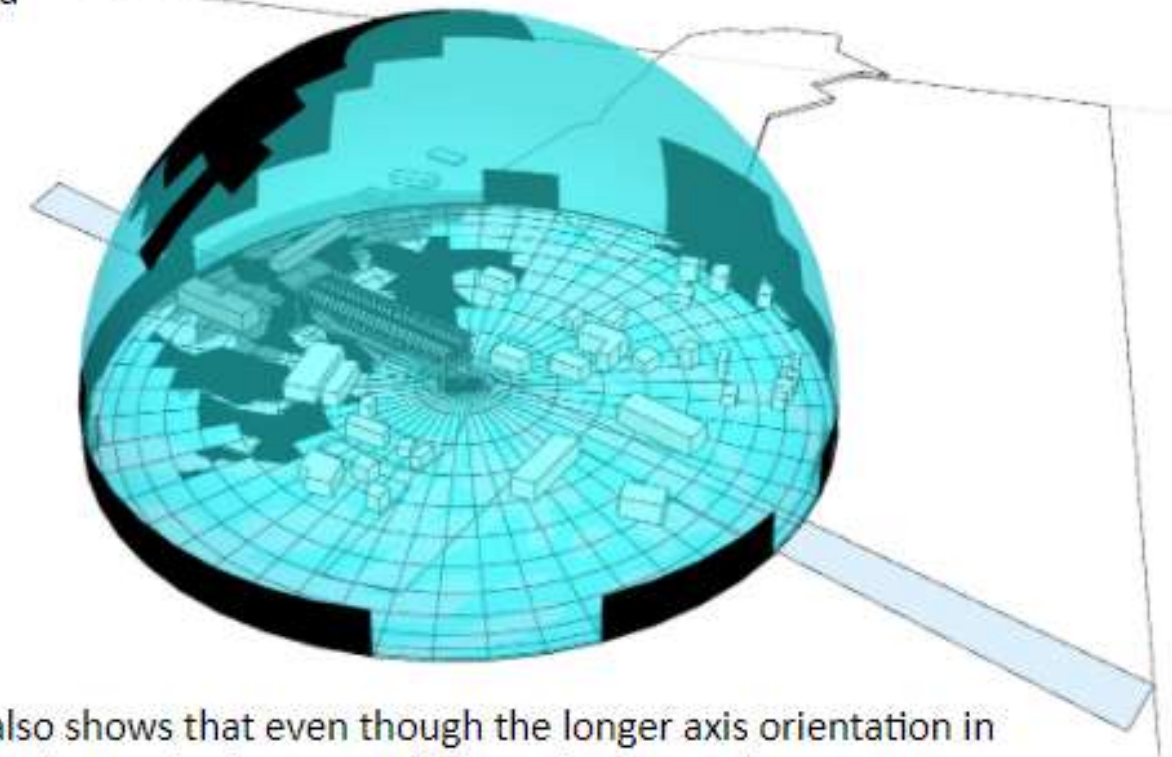
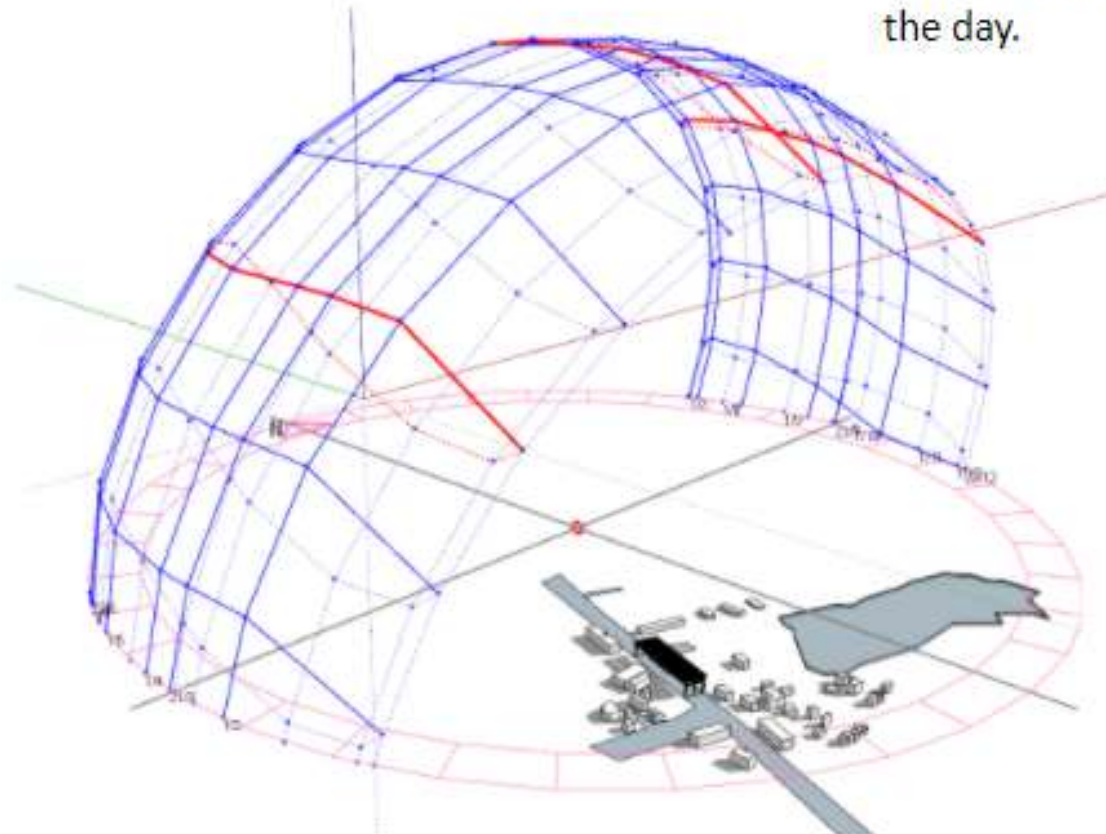
Toll Plaza perungudi



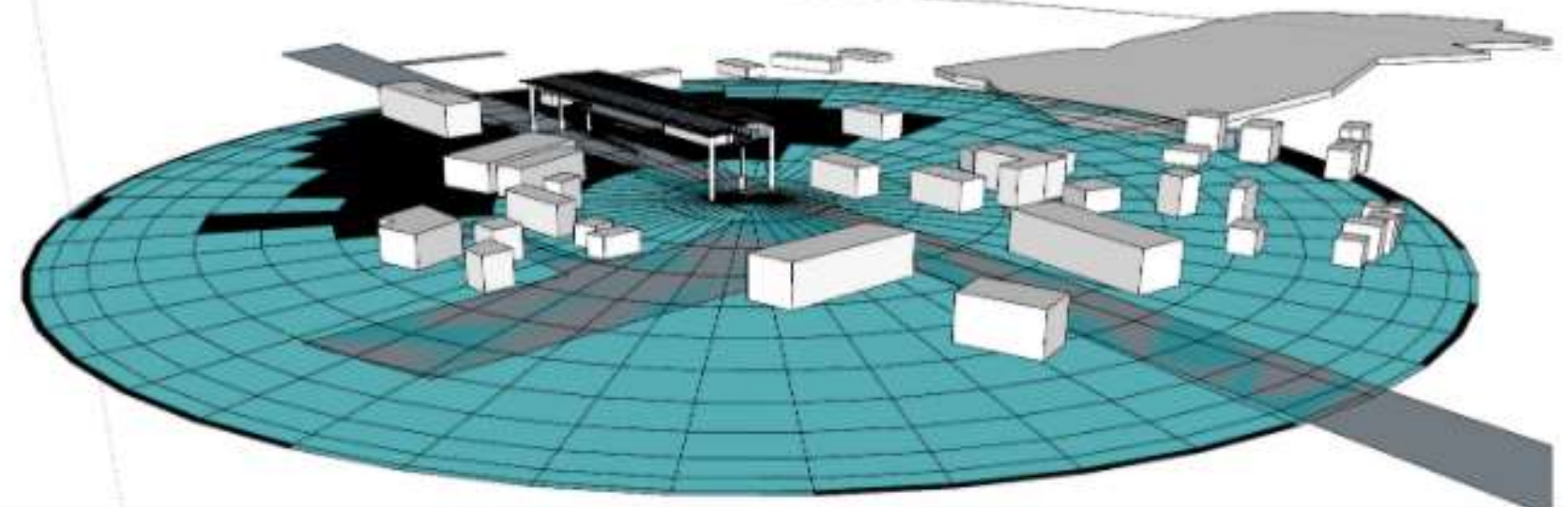
As we can see the omr stretch is parallel to the beach line, which enhance the wind movement as well

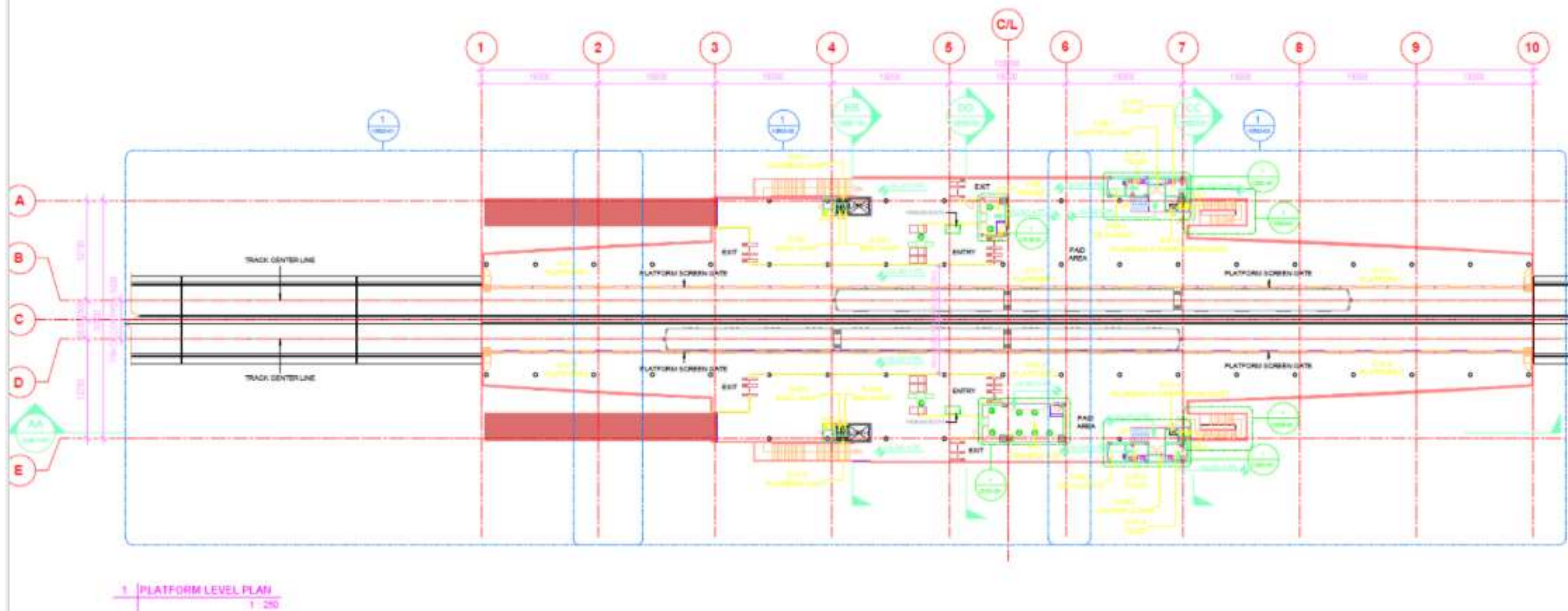


The site in omr road is where the longer axis is oriented in east and west which gives a consistent daylight throughout the day.

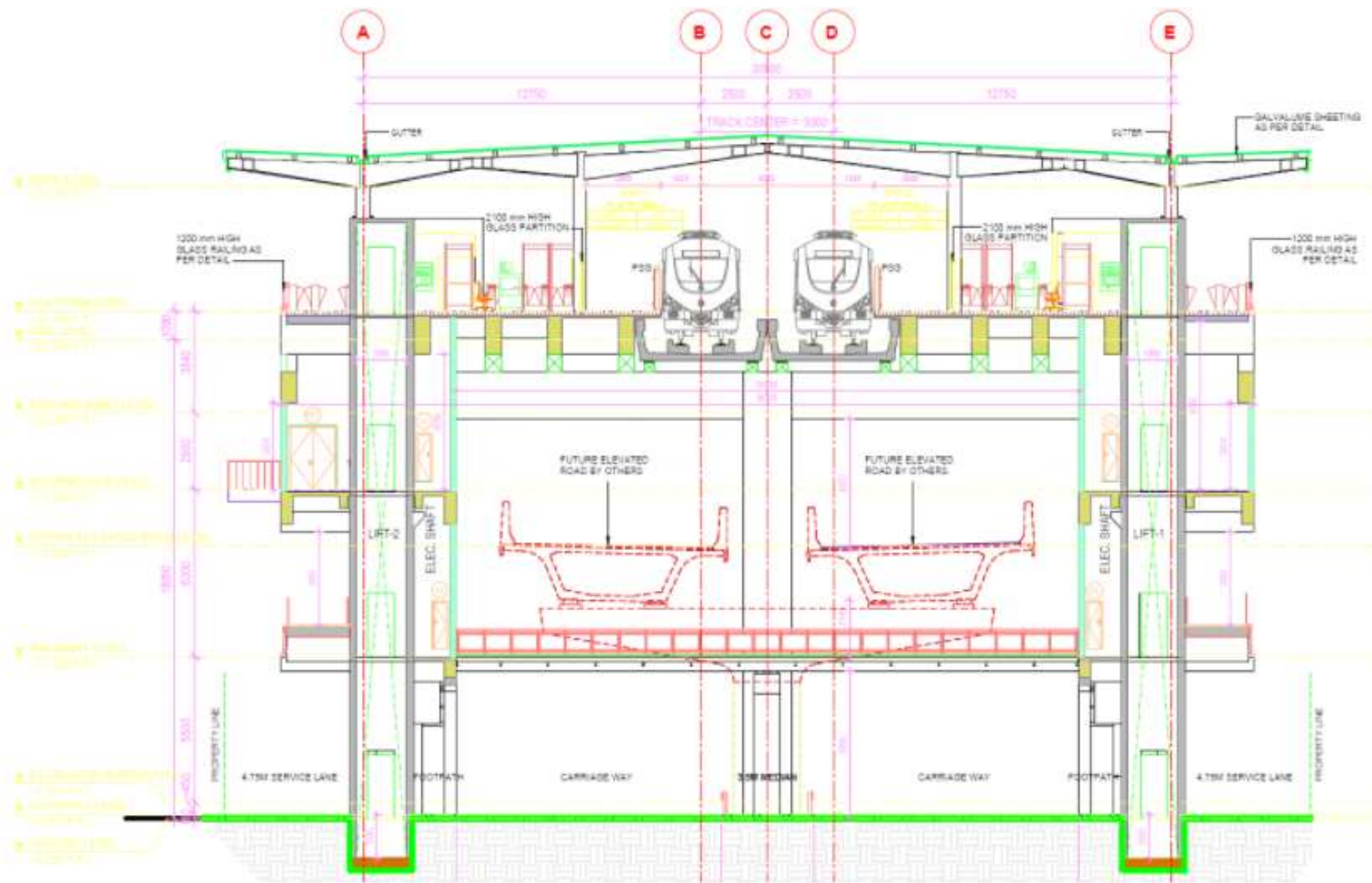


The sky view factor also shows that even though the longer axis orientation in east and west, the maximum shadow space falls on the metro site.

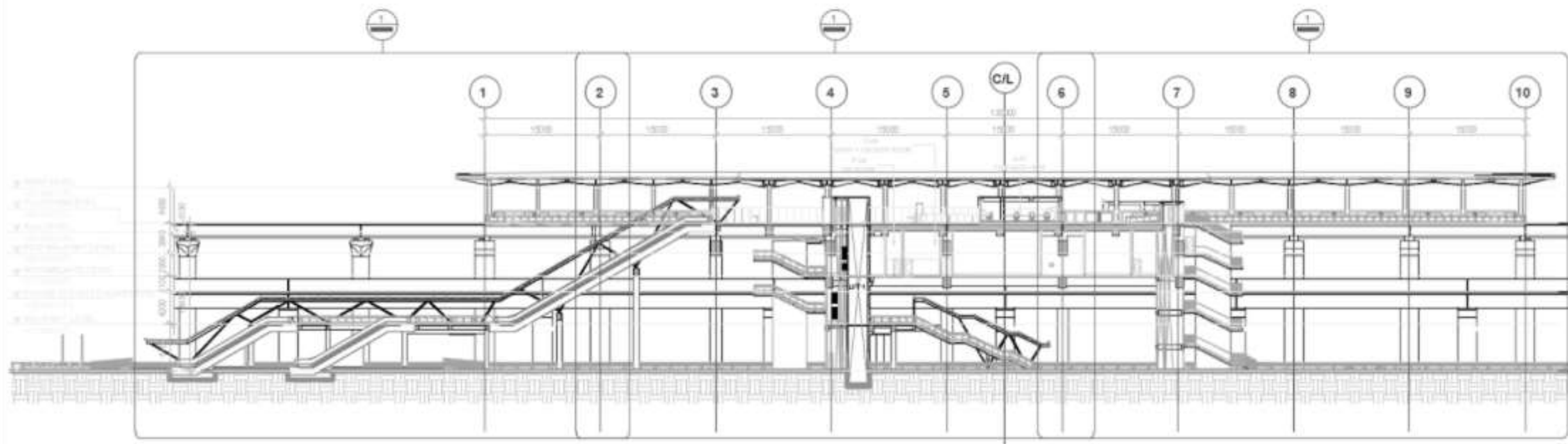




PLATFORM PLAN – PERUNGUDI METRO STATION



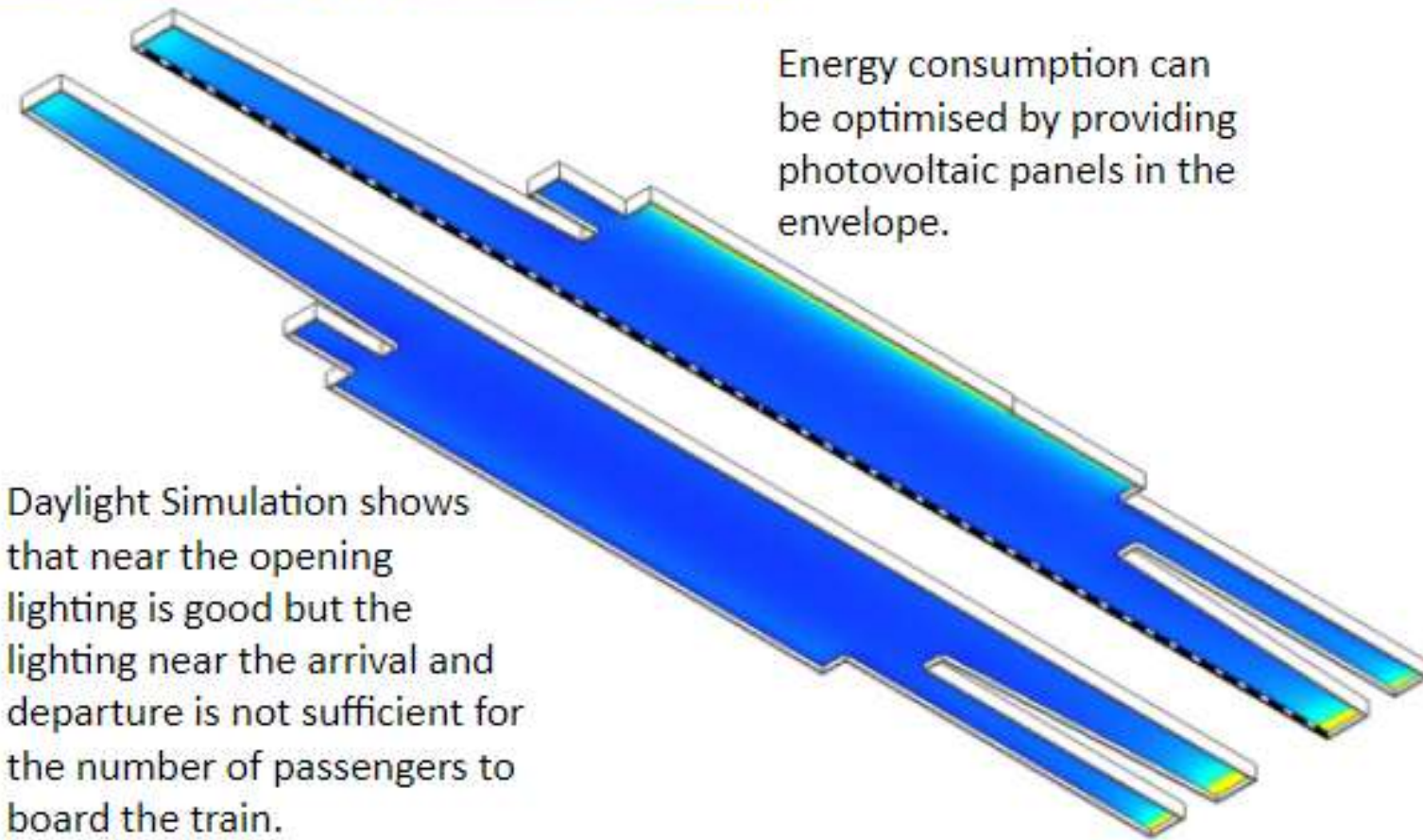
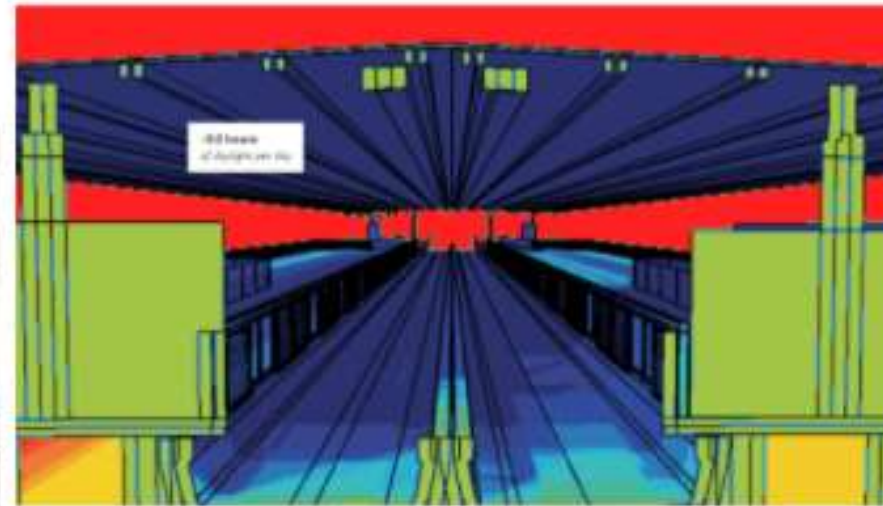
SECTION- PERUNGUDI METRO STATION



OPTION 1

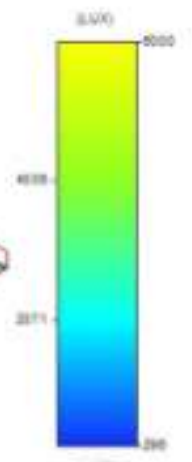


Option one has been designed in a way where the lighting and wind movement is provided from the longitudinal axis.



Energy consumption can be optimised by providing photovoltaic panels in the envelope.

Daylight Simulation shows that near the opening lighting is good but the lighting near the arrival and departure is not sufficient for the number of passengers to board the train.

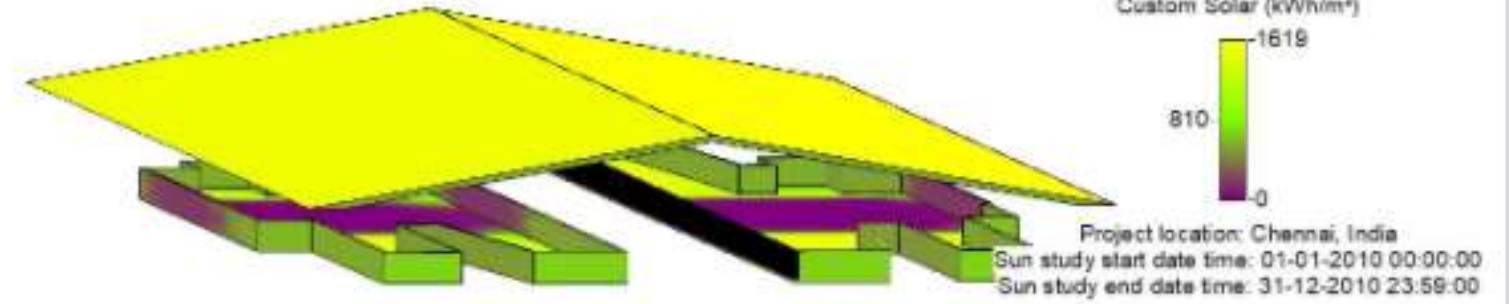
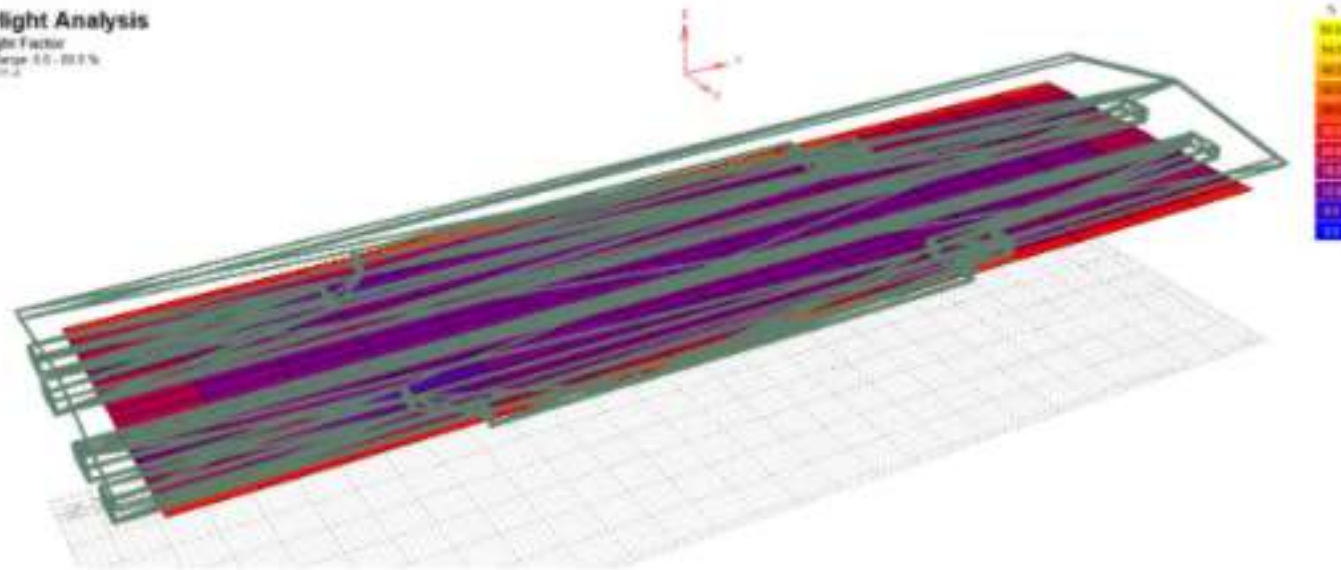


Press Shift+F10 to Show/Hide this window

OPTION 1

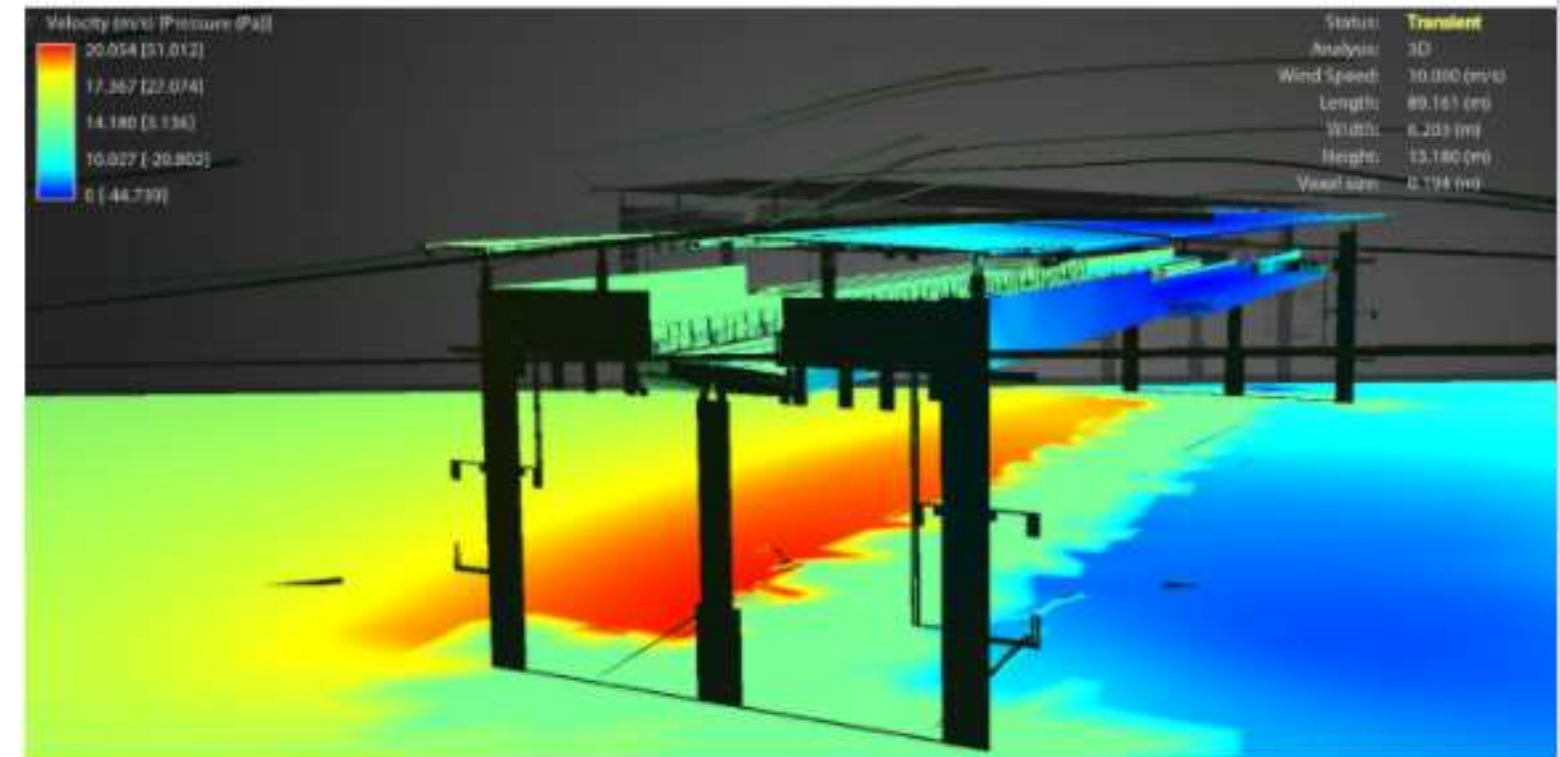
Daylight Analysis

Daylight Factor
Value Range: 0.0 - 100.0 %

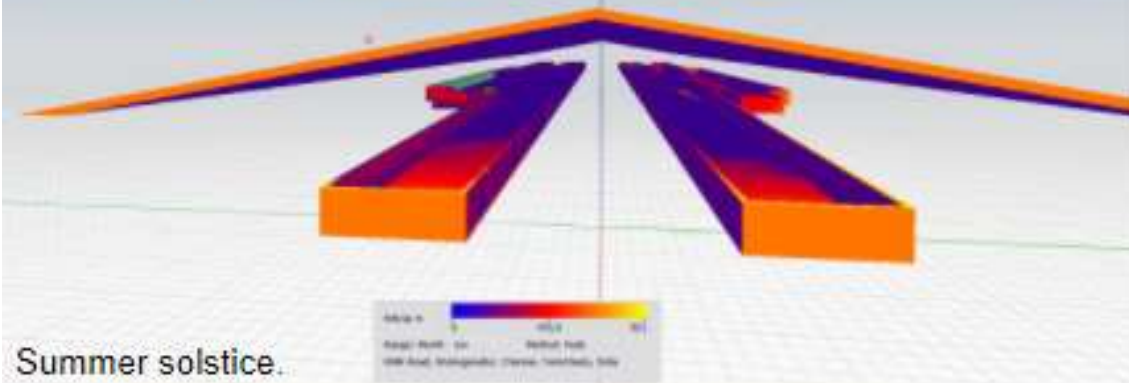


Shading device is used extensively for cutting down the direct radiation to a greater extent. Material selection for the envelope shall be considered with respect to solar radiation.

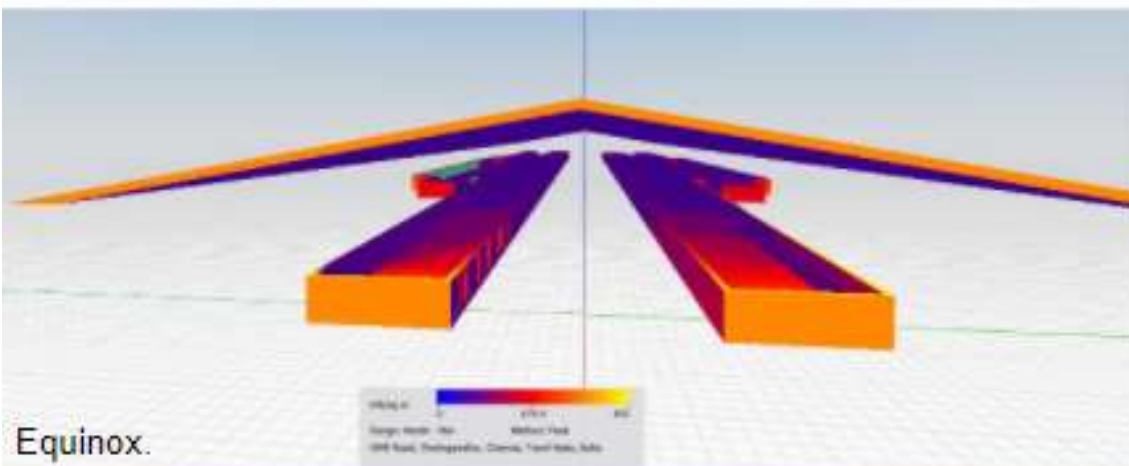
Metro station is situated in 20 m high from the ground level which allows unobstructed wind movement also creates positive pressure on the surface.



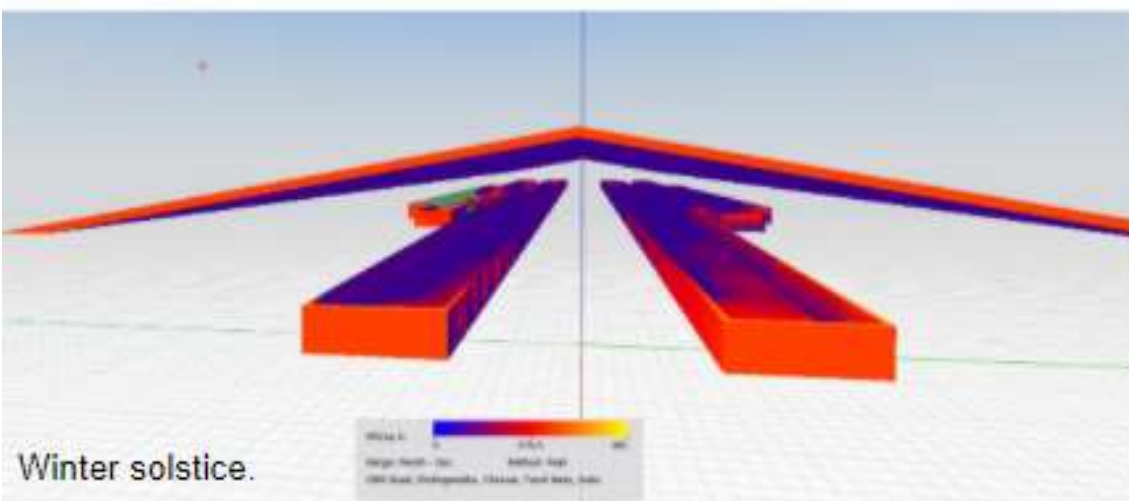
OPTION 1



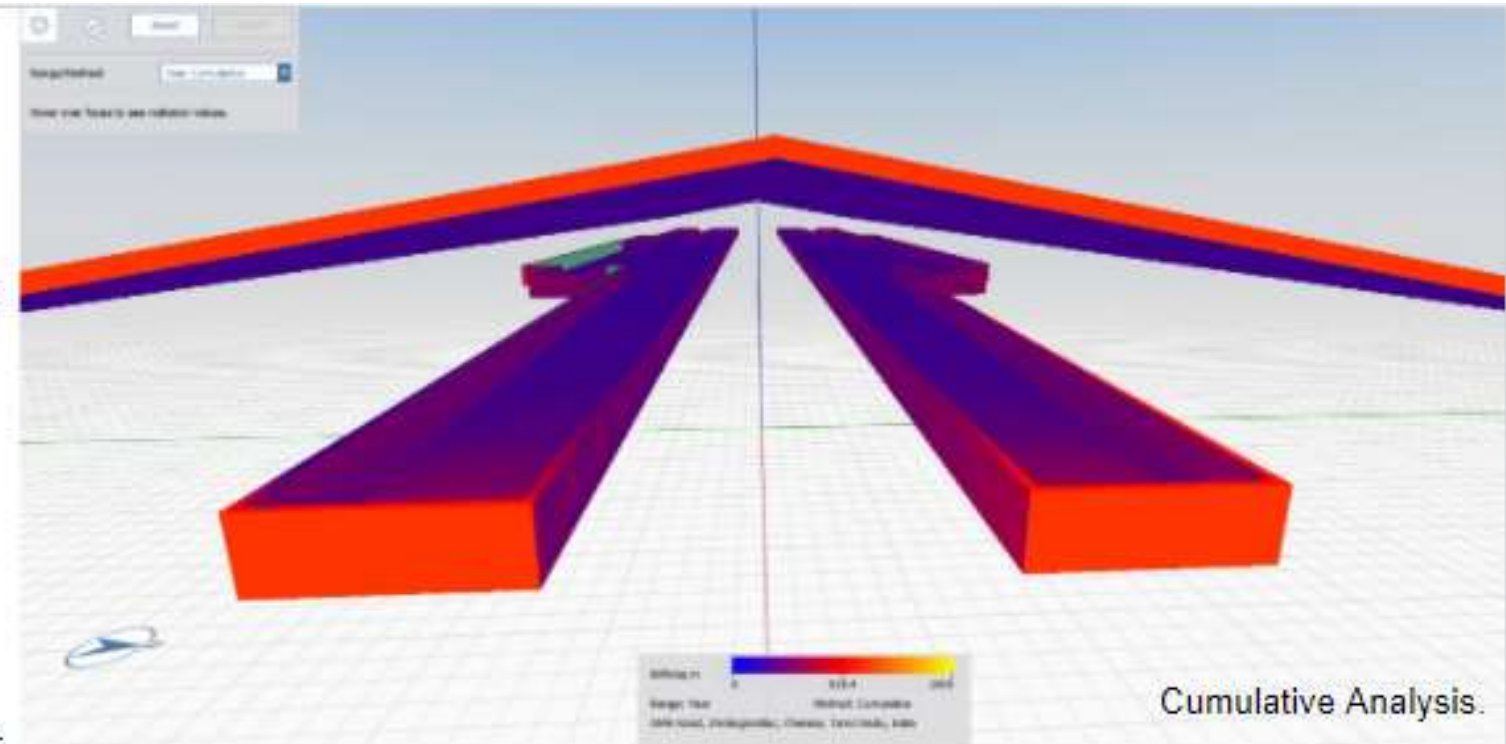
Summer solstice solar radiation analysis shows that the max area of platform falls under the range of 0 – 475 wh/sq.m.



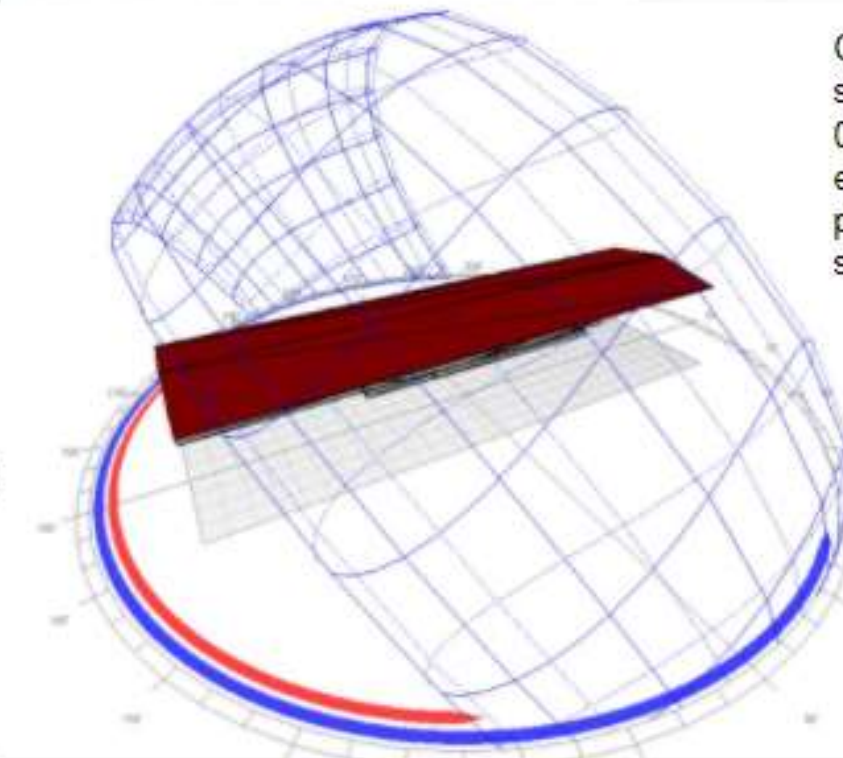
Equinox solar radiation analysis also shows that the max area of platform falls under the range of 0 – 475 wh/sq.m.



Winter solstice solar radiation analysis shows that the max area of platform falls under the range of 0 – 250 wh/sq.m. radiation is little higher on the eastern façade.



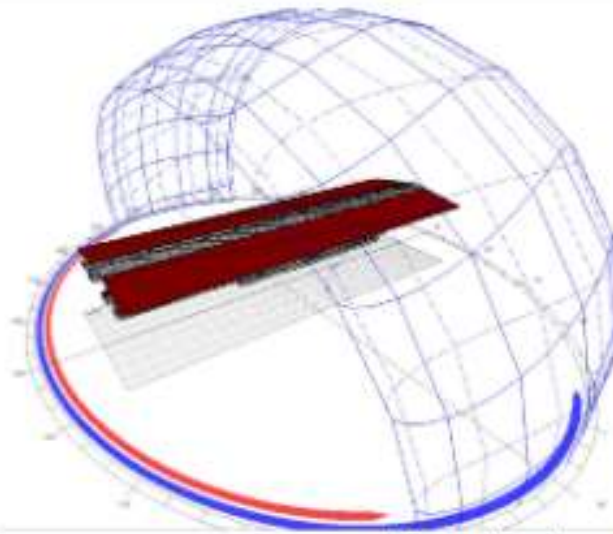
Cumulative analysis of solar analysis shows that over all radiation falls under 0 - 300 wh/sq.m. , which would not be enough for typology. To enhance the performance the envelope material selection also plays a major role.



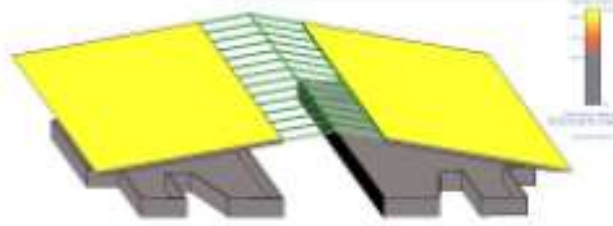
OPTION 2



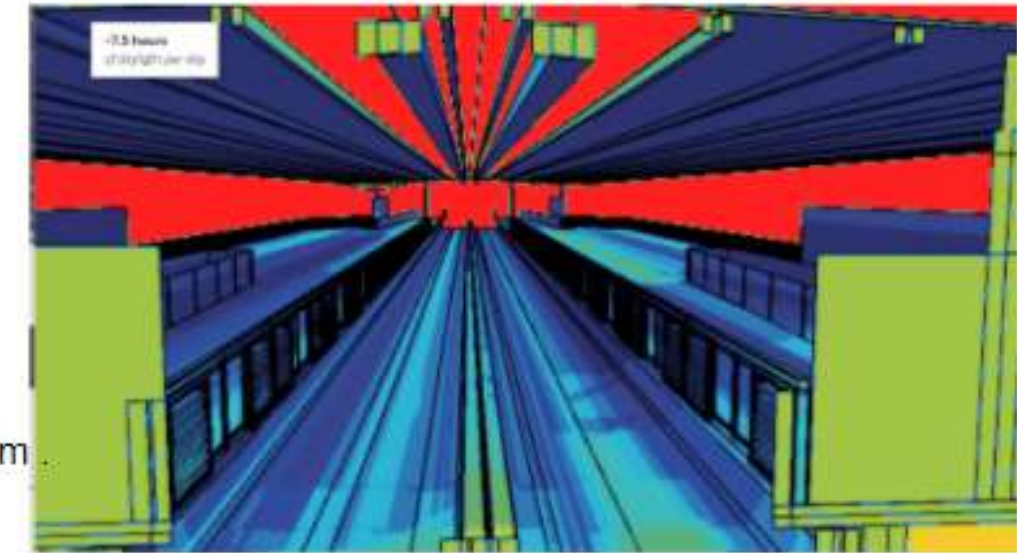
Visuals of interior of platform ..



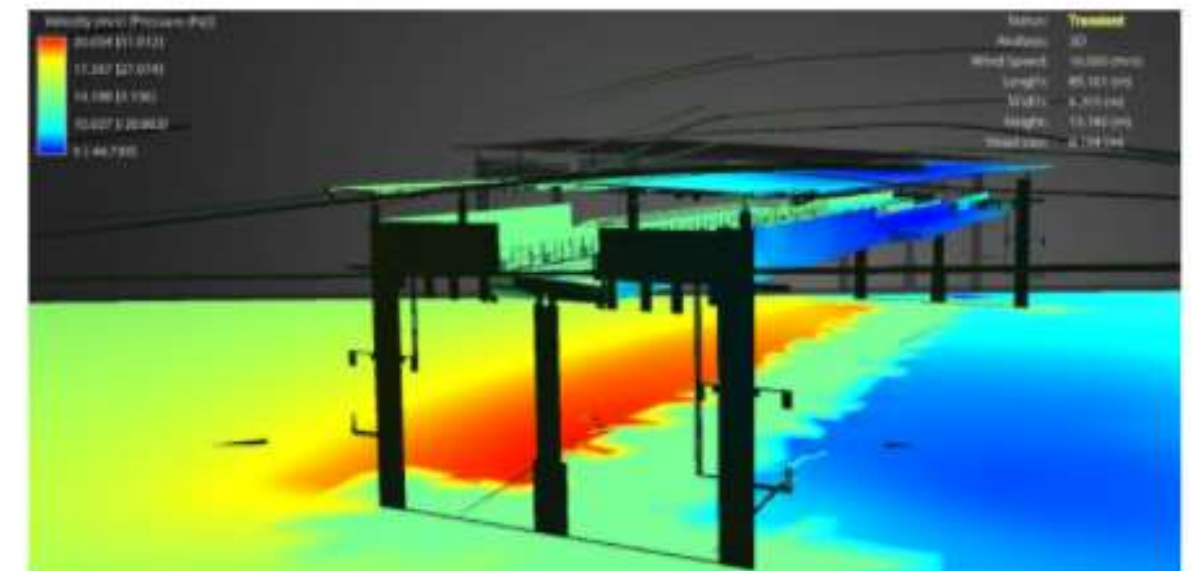
Model in the sun path diagram

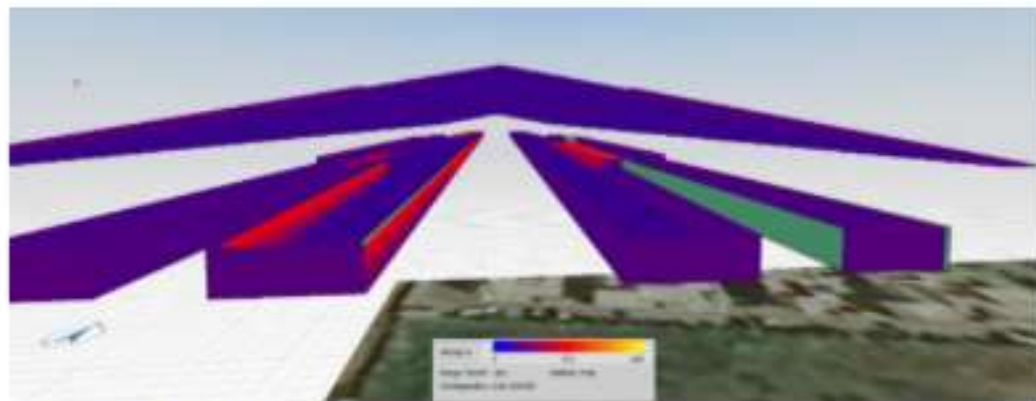


The station is oriented longitudinally on east and west side which also enhances the wind movement



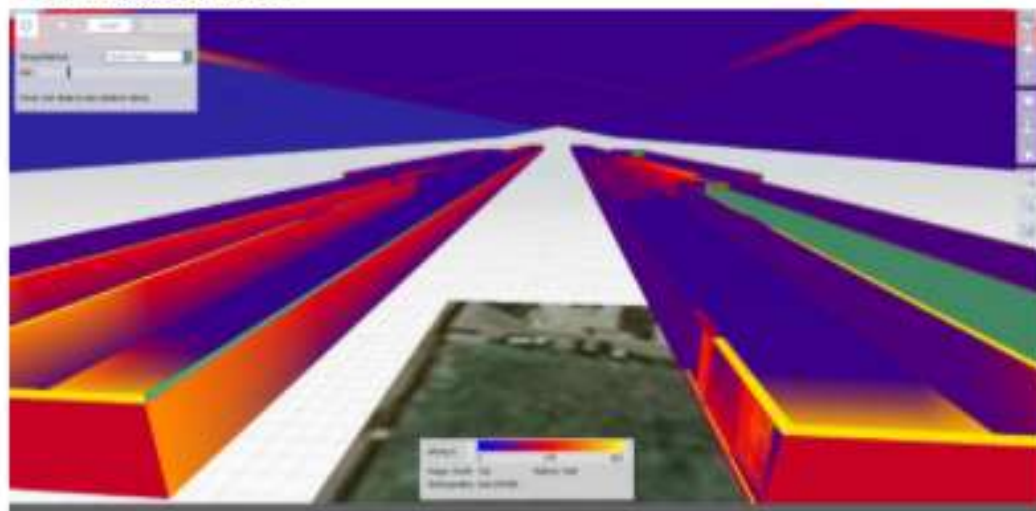
As we can see through the day lighting simulation option two with opening in the middle helps in creating a better daylight to the users.





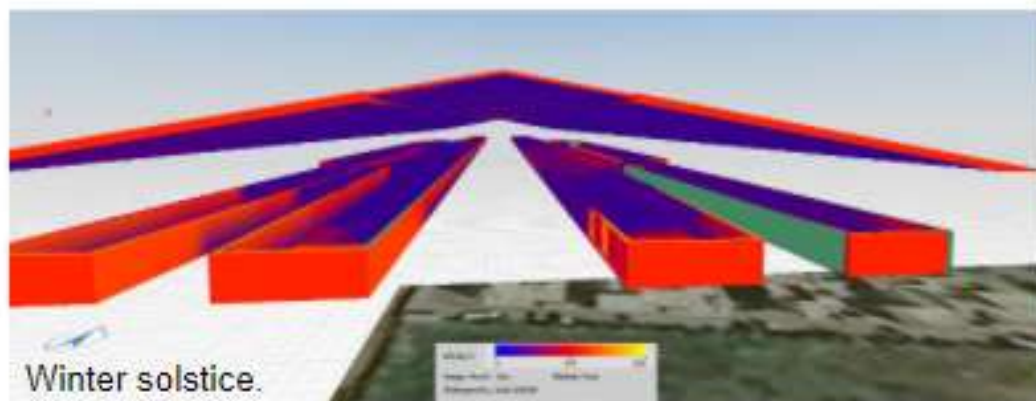
Summer solstice.

Summer solstice even though the overall required lighting is not achieved the above glazing helps enhance the visibility naturally .



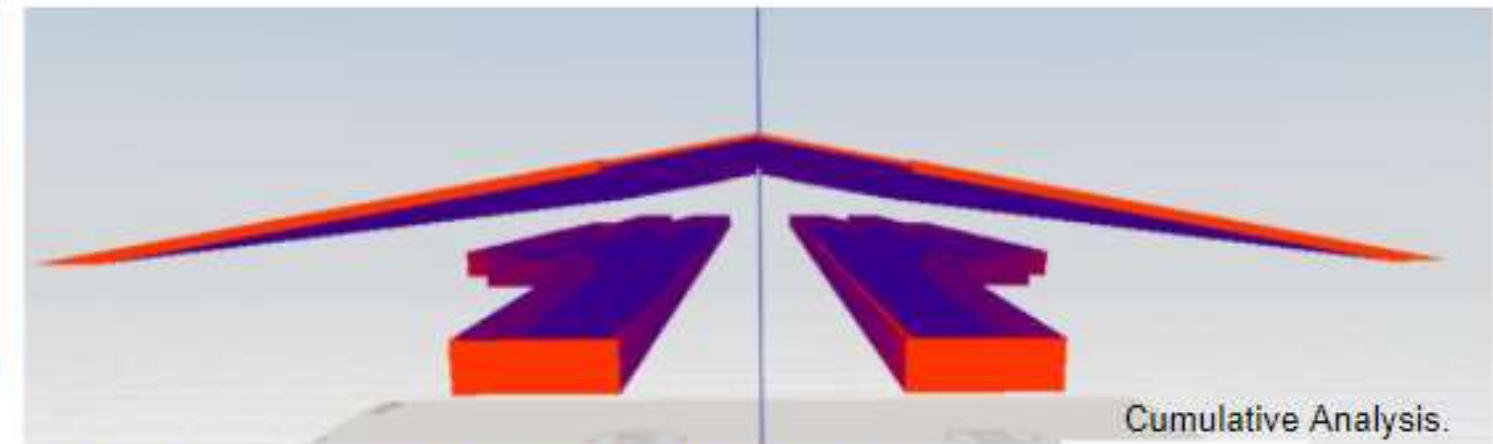
Equinox.

In equinox we can experience good radiation due to the above glazing.



Winter solstice.

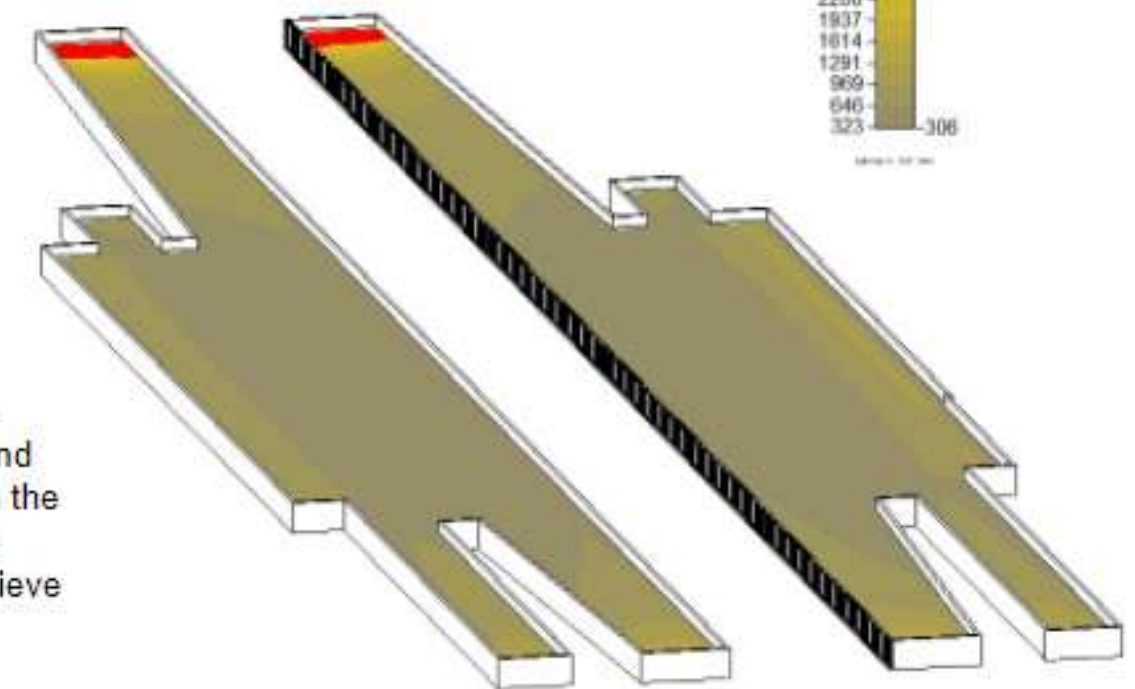
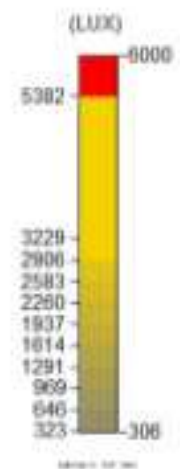
Winter solstice is also getting good amount of radiation with the help of above glazing.



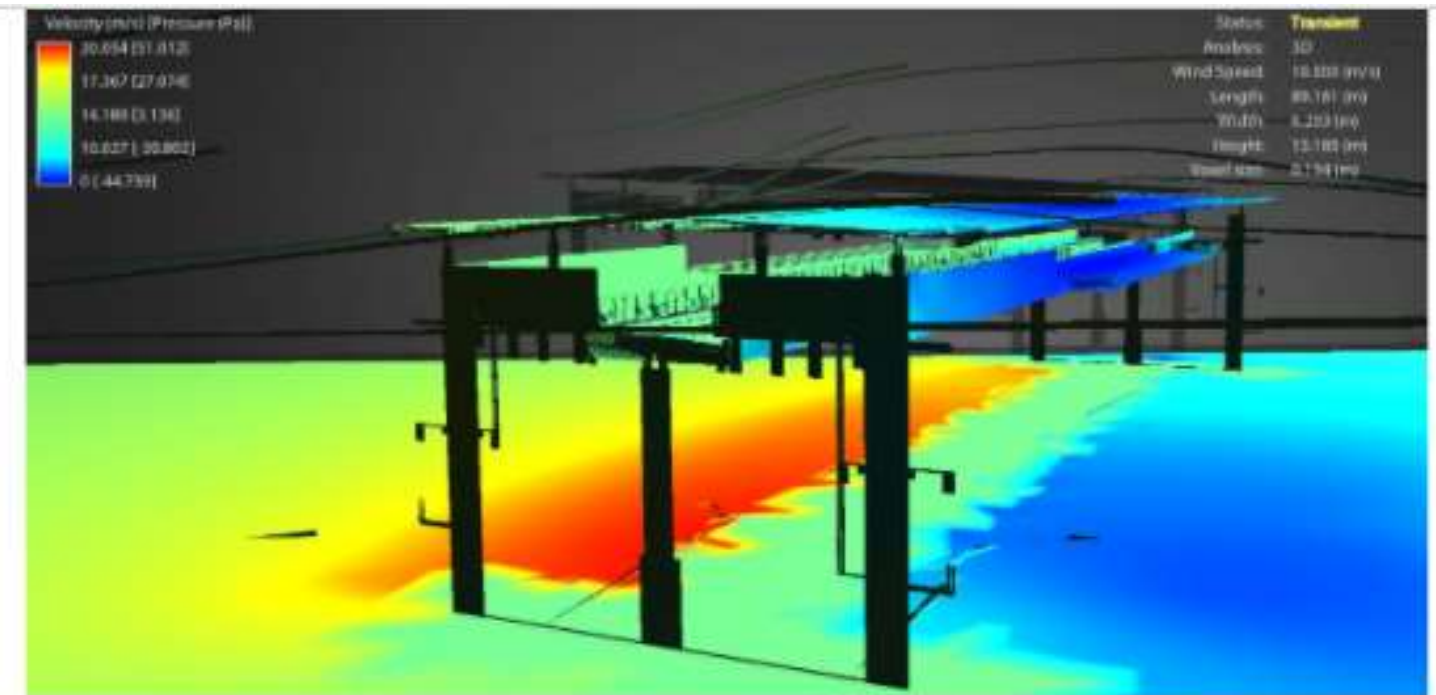
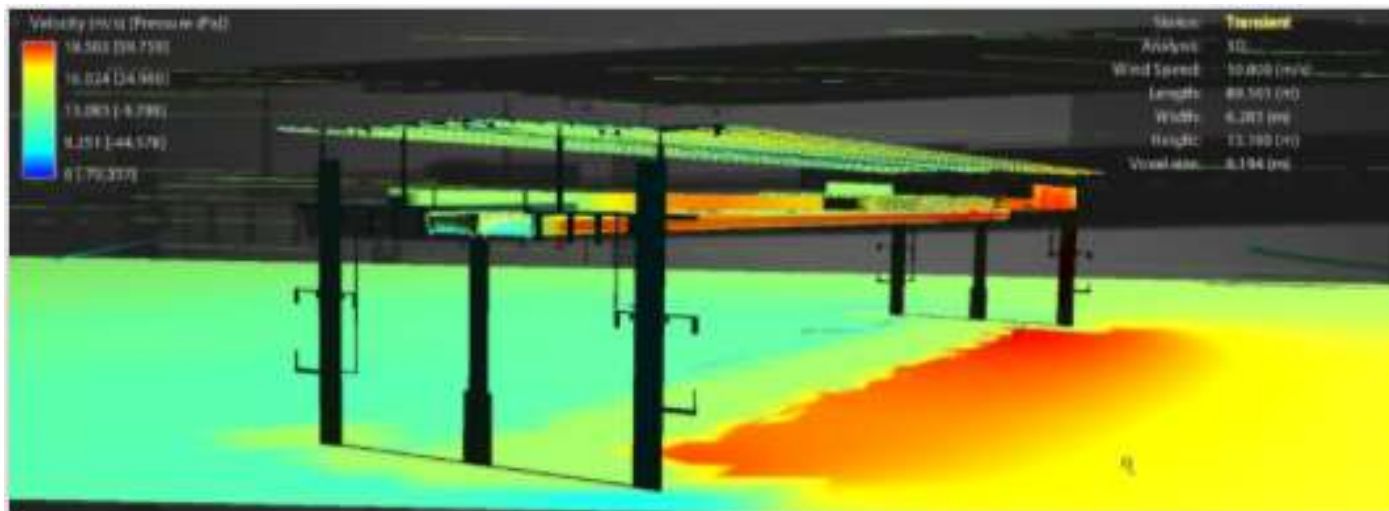
Cumulative Analysis.

The over all radiation analysis conveys that the radiation reduced to a greater extent.

The daylight analysis proves that natural daylight could be achieved with the presence of skylight in the roof



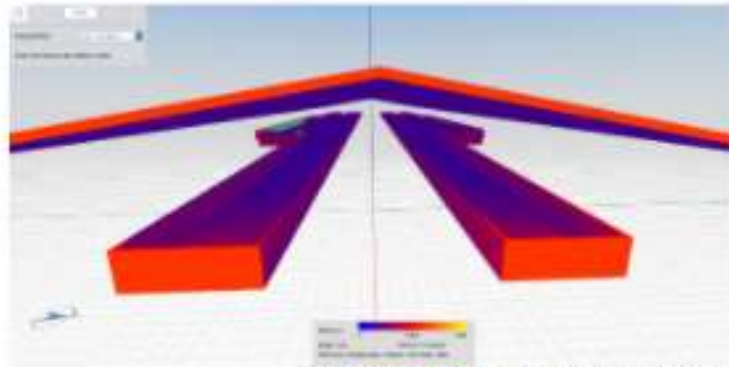
Max lux level achieved in the platform is around 323 – 646 lux. In the periphery of the station they achieve till 2260lux



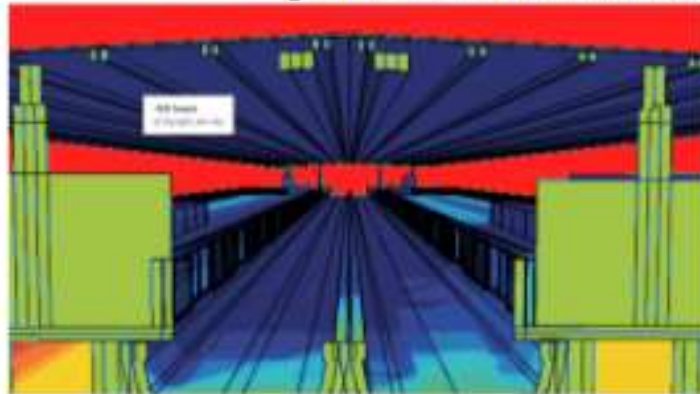
Unobstructed wind movement is seen in all options, but the presence of grill helps in wind crossing the platform.



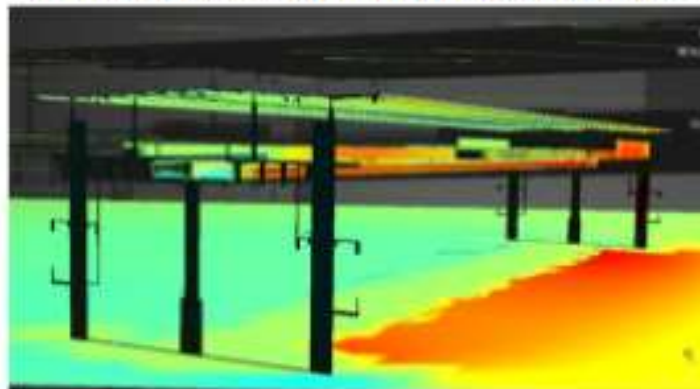
OPTION 1



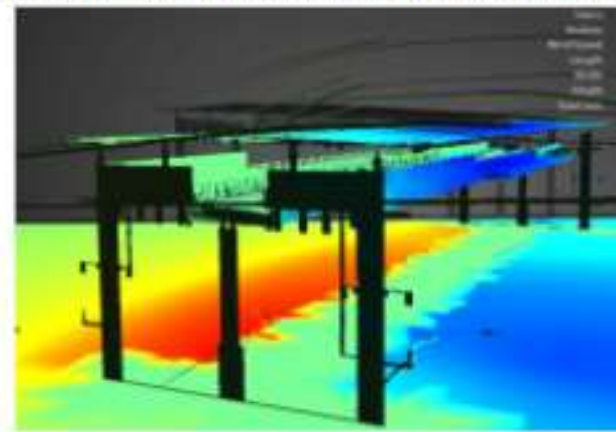
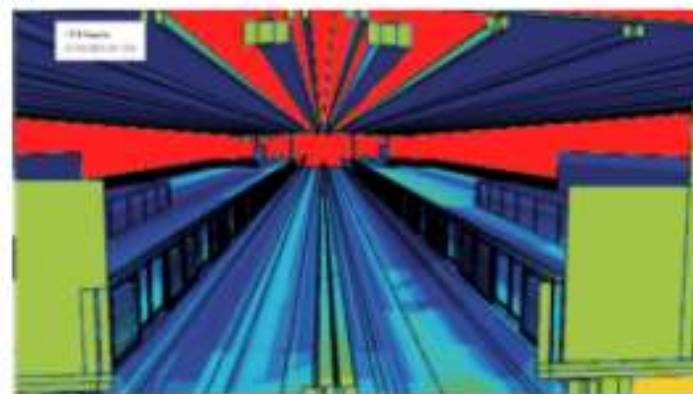
Even with the presence of skylight in the envelope the radiation is reduced to a greater extent due to shading device.



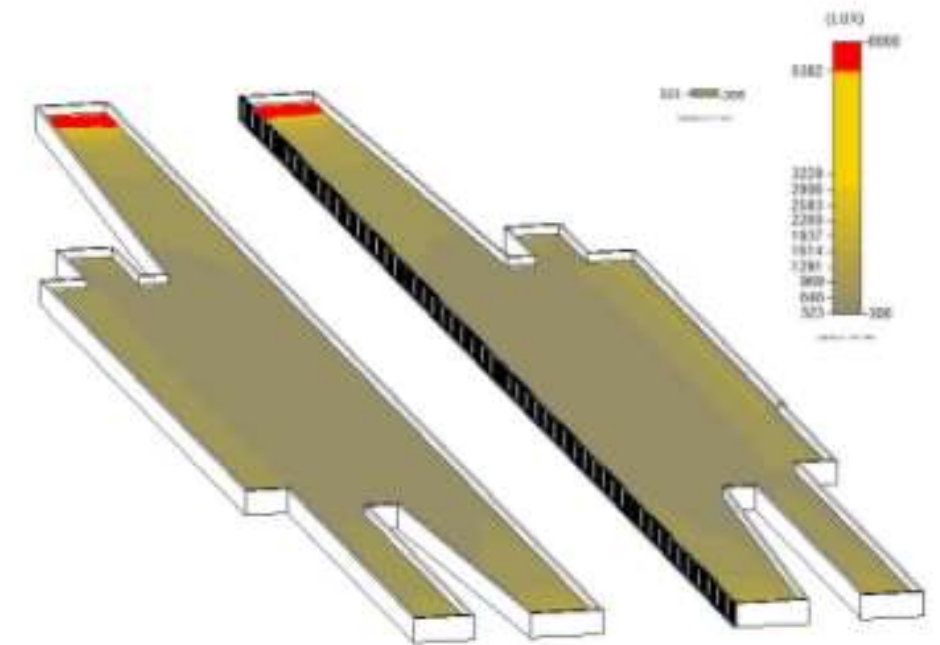
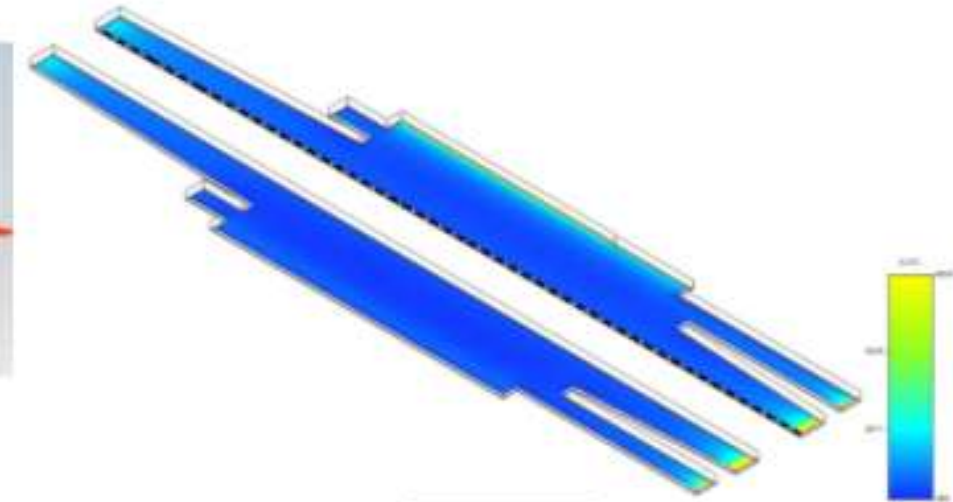
As we can see through the day lighting simulation option two with opening in the middle helps in creating a better daylight to the users.



OPTION 2



There is a better wind movement in option 2 and also there is only positive pressure which enhances the wind movement



Option 2 works better in receiving the natural day lighting with presence of skylight in the envelope.