

REDEVELOPMENT OF ERNAKULAM RAILWAY STATION

A THESIS

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Architecture degree

By

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**DEPARTMENT OF ARCHITECTURE
SCHOOL OF BUILDING AND ENVIRONMENT**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY) Accredited**

With Grade "A++" by NAAC

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MAY 2024



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BONAFIDE CERTIFICATE

This is to certify that Thesis Report is the bonafide work of **Pabin M (39210056)** who carried out the Thesis entitled "**Redevelopment of Ernakulam Railway Station**" under our supervision from December 2023 to May 2024.

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I, **PABIN M** hereby declare that the Thesis Report entitled "Redevelopment of Ernakulam Railway Station " done by me under the guidance of **Ar.Evelyn Jeny**(Internal Guide), **Ar.Surya Rajkumar** (Internal Review Member) and **Ar.Kishore Panikkar** (External Guide) Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Architecture Degree.

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PABIN M

THESIS SYNOPSIS

Southern Railway has taken up the redevelopment work of Ernakulam Junction and the tender for the work was awarded in July 2022. They are large infrastructures that should ideally define the image of the city in which they are placed, but that is hardly the case. The stations are generally crippled with low level of maintenance and lack of passenger convenient designs. The existing building is hardly capable of handling such large number of passengers, as a result, the experience is below average, in terms of convenience and comfort. So there is a need to improve the existing station to meet its projected per day handling passenger capabilities. Also to solve the lack of load or off load spaces the goods or parcels.. It should have proper approach road connecting nearby areas. Fairly level ground is preferred. Sufficient land availability for future expansion and development. It is a no brainer to criticise the existing infrastructure, as it was constructed during British India. Railway commuters have increased to about ten folds since then, the buildings are not designed to cater to the situation they are facing. The redeveloped station will be endowed with state-of-the-art amenities such as two connecting concourses to both terminals, sufficient in-house retail, food and beverages superior road connectivity with the city, amenities for the old and physically challenged passengers, green building design features with optimum use of natural lighting and ventilation.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Indian Railways, the prime movers of the nation, is pivotal to the development of the country. It is the third largest network under a single management. It carries **l a r g e s t n u m b e r o f p a s s e n g e r s** (approximately 6.7 billion in a year) and one of the largest volumes of cargo (794 million tones in the year 2007-08) among the worlds major rail systems. (Railway Board, 2009).

Its network of over 64000 route-kms has integrated markets and connected communities over widely spread out geographies across the length and breadth of the country. In the year when the railway vision was laid down i.e. 2008-09, IR carried over 6900 million passengers and lifted 833 million tonnes of freight traffic, making it the third largest railway network in the world in terms of size, the world's topmost passenger carrier (in terms of Passenger Kilometres) and fourth largest rail freight carrier. (Railway Board, 2009).

1.2 NEED OF THE PROJECT

Ernakulam Junction Railway Station (also known as Ernakulam South Station) is one of the busiest Railway Junction Stations in South India with more than 128 scheduled daily train services. Southern Railway has taken up the redevelopment work of Ernakulam Junction and the tender for the work was awarded in july 2022 . The redevelopment work are being expedited at a steady pace with a vision to modernize the major railhead with futuristic designs, infrastructure and to provide best facilities to passengers.

1.3 AIM

The aim is to modernise it with futuristic designs and infrastructure and to provide the best facilities to passengers. Some of the recent works done include shifting of booking counter,

reservation counters, entrance, and enquiry to new locations, diversion of traffic from the main entrance to the new entrance near the area manager's office, and diversion of parking to new locations to facilitate piling for west terminal building, according to an official communication.

1.4 OBJECTIVE

The objective is to take up revamping under following heads and beyond, Large Passenger Concourse Areas with adequate and high quality facilities for the users.

Movement Systems – Pedestrian : There will be seamless movement of incoming as well as outgoing passengers. It will also take care of integration of passengers coming from Paharganj side towards Ajmeri Gate, it will continue to integrate with the existing Kochi Metro.

Movement Systems – Vehicular : It will be designed in such a manner, so that, the station does not become a barrier between both sides of the city. Vehicles will have more than one option to enter and exit. The road network will circumscribe the terminal building, so that vehicles can cross either sides, without having to use the existing congested flyover.

Amenities : Adequate number of toilets , clean drinking water, security, food courts, restaurants and railway residence

1.5 ARCHITECTURAL VISION

Looking ahead to 2050 requires us to think in conceptual terms in the hope of pushing the boundaries of creative thinking. The rail industry is often thought of as conservative; however, there is a need to proceed with foresight, to embrace creative thinking beyond projecting the present into the future.

The stations will have segregated areas for passengers, commercial activities and railway officers. There will be dedicated approach roads for traffic to railway station along with municipal roads with its integration in circulating areas. The much-awaited development will lay foundation to the Railways in bringing them at par with the world class transport system. New Delhi Railway Station will act as the benchmark for the other major stations in India and in the World.

CHAPTER 2

LITERATURE CASE STUDIES

2.1 ANAND VIHAR RAILWAY STATION

Location - New Delhi, India

Area- 99500 sqm

Interstate Connectivity- 5 states

Opened – 19 DEC 2009

Platforms- 3 (PHASE-I) PHASE 2 IN CONSTRUCTION

2.11 PHASE 2 DEVELOPMENT

The total area available is 9.2 hectares. It has a frontage of about 500m along the main Ghazipur road. Main entry to ISBT is from Road No. AH-56. The present ISBT is functional in the name of Vivekananda Inter State Bus Terminal, Anand Vihar, East Delhi.

2.12 SITE PLAN

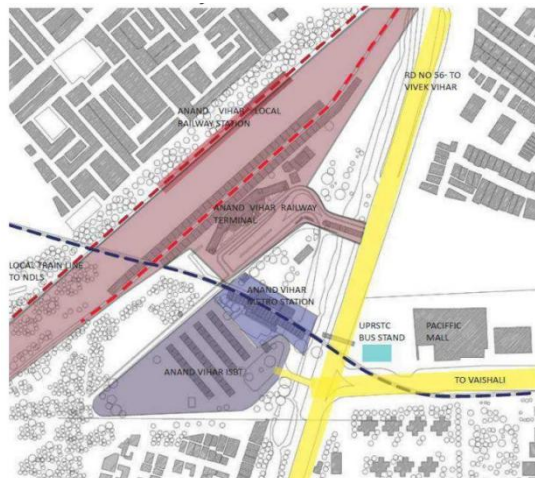


Figure 2.11: Site plan

2.13 CONNECTIVITY

- Number of platforms will be increased to 7 in total
- Terminal will have a capacity to handle over 3 lakh passengers and as many as 270 trains daily.
- Linking of this terminal with the original Anand Vihar station.

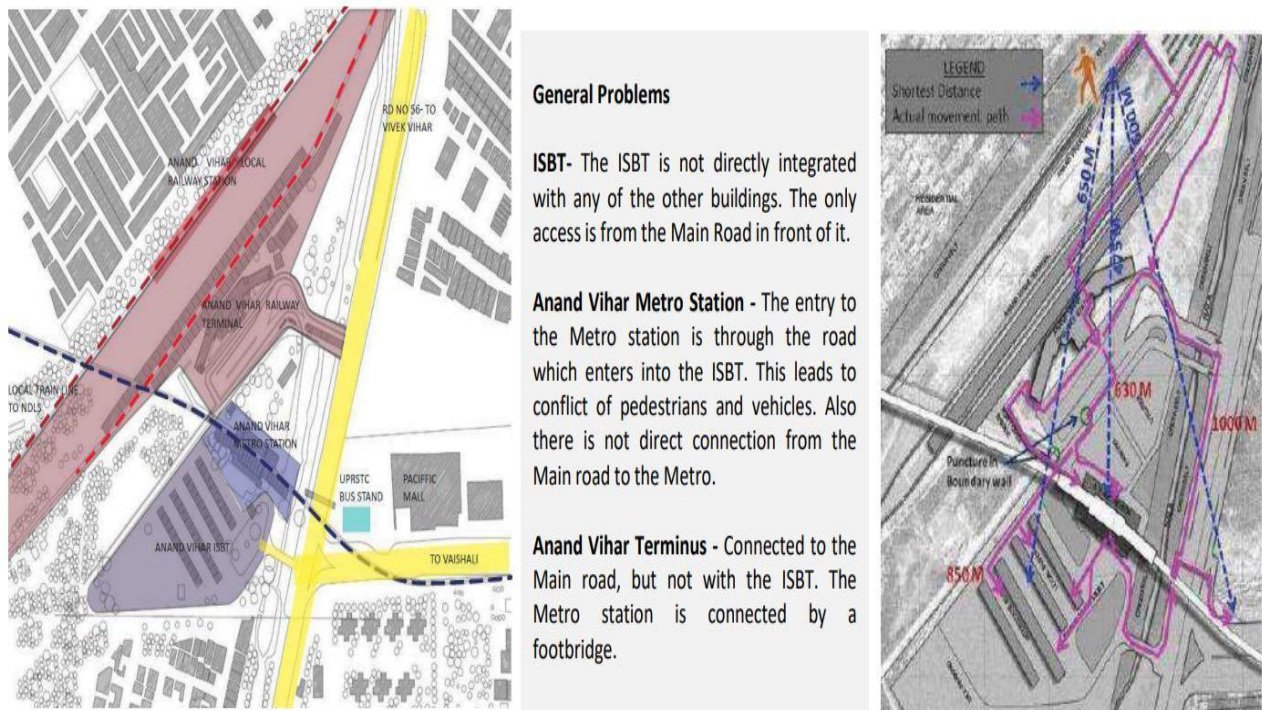


Figure 2.12: Terminal connectivity



Figure 2.13: Bus stand connectivity

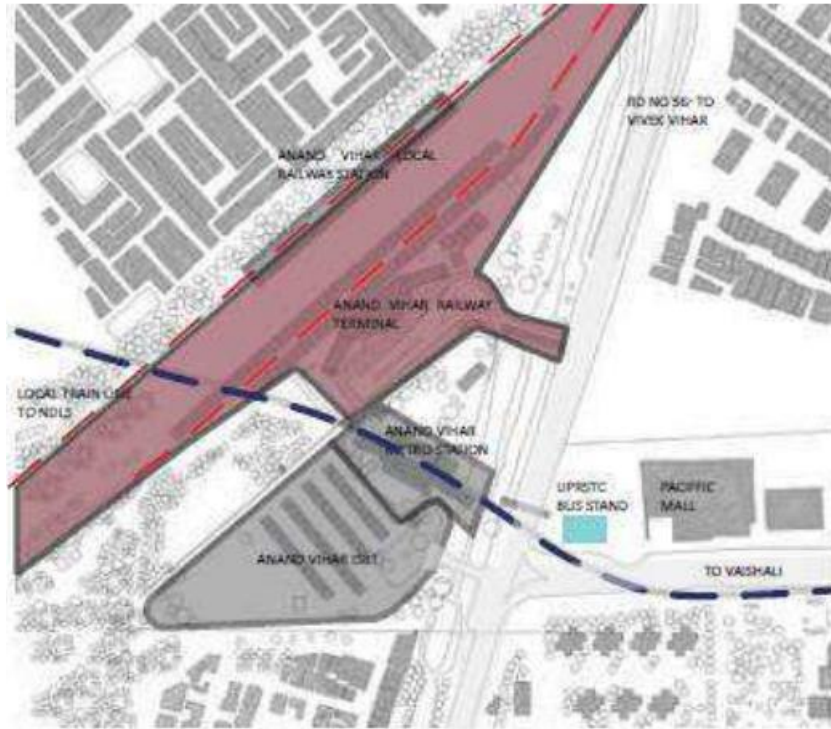


Figure 2.14: Station layout

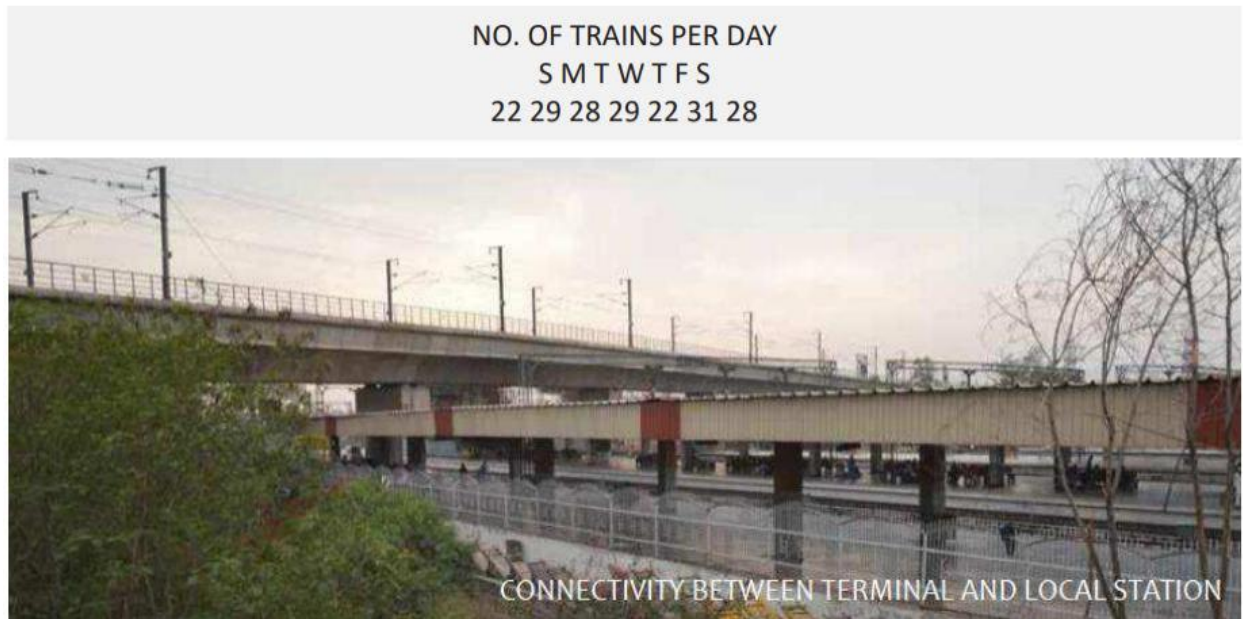


Figure 2.15: Connectivity between terminal and local station



Figure 2.16: ISBT Bus stand

2.14 FACILITIES

1. The station has facilities like booking offices, booking counters, waiting for halls with facilities for handicapped passengers, high-speed wifi, separate arrival and departure areas, reservation halls, toilets, parcel and luggage office, operational and service accommodation and parking areas.
2. The station also has some modern amenities like ATMs, a touch-screen enquiry system, foreignexchange counters, commercial and maintenance offices, food plazas, and a computerised ticketing facility. Retiring rooms and dormitories are also provided in the station building
3. The terminal has a separate parcel loading facility, two escalators and six lifts and a special heritage gallery and custom-made subways which can be used by physically challenged passengers.
4. To enhance the use of solar power under National Solar Mission to generate electricity on its own; Vivaan Solar, a company from Gwalior was chosen to install 1.1 MW of rooftop solar project at the railway station in 2016. The rooftop solar power project under Public Private Partnership will be executed under design, build, finance, operate and transfer (DBFOT) format.
5. There is also a foot-over bridge for pedestrians which connects the railway station to the Delhi metro station at Anand Vihar. § In 2020 the station was given a five star rating, the first in Delhi and third in India, for its food related facilities.

2.15 PEDESTRIAN CIRCULATION

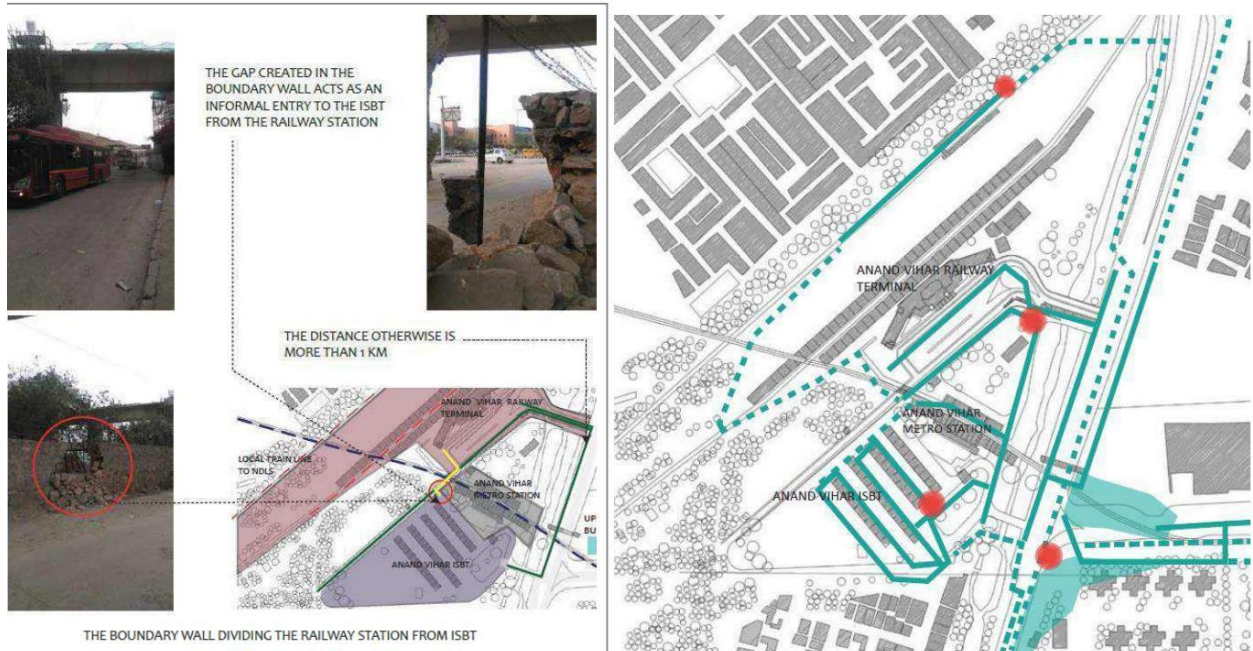


Figure 2.17: Pedestrian circulation from station to bus stand

2.16 VEHICULAR CIRCULATION

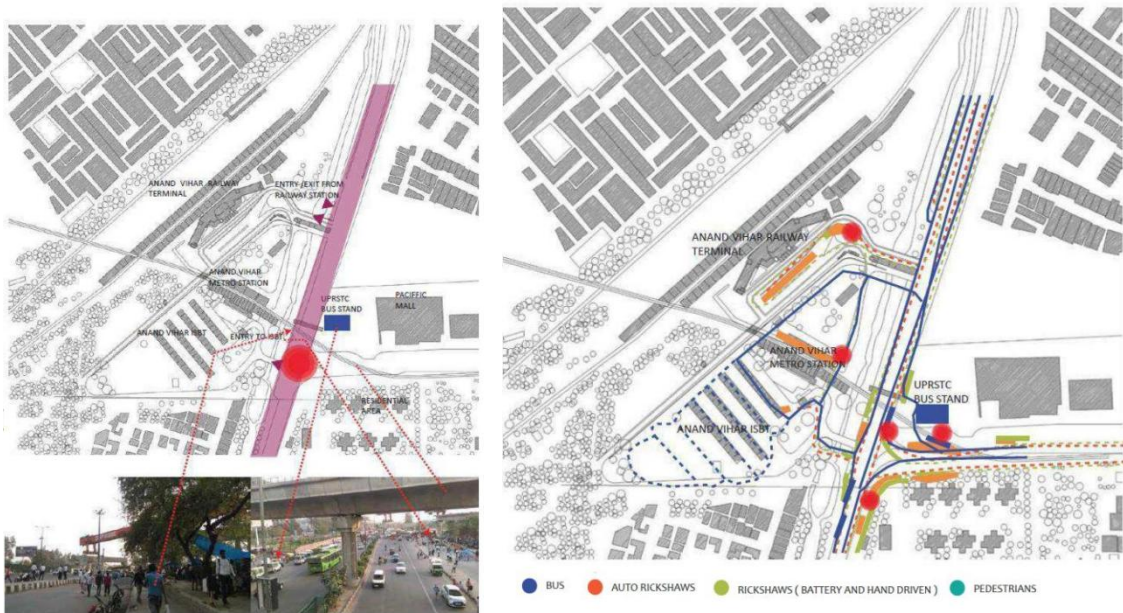


Figure 2.18: Vehicular circulation

2.17 PROPOSED INTEGRATED PLAN

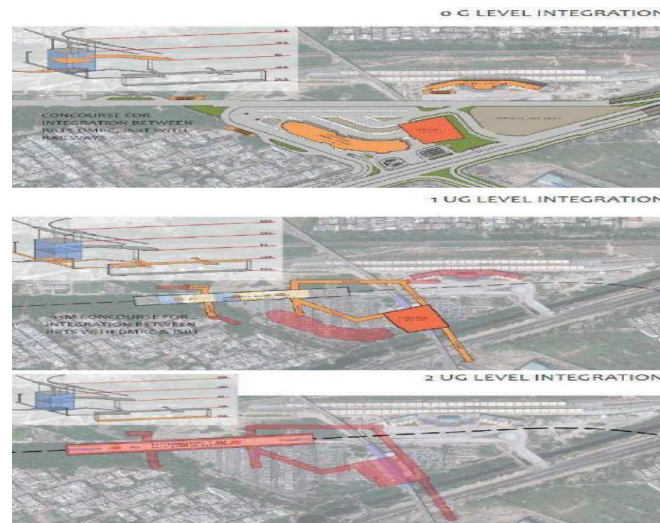
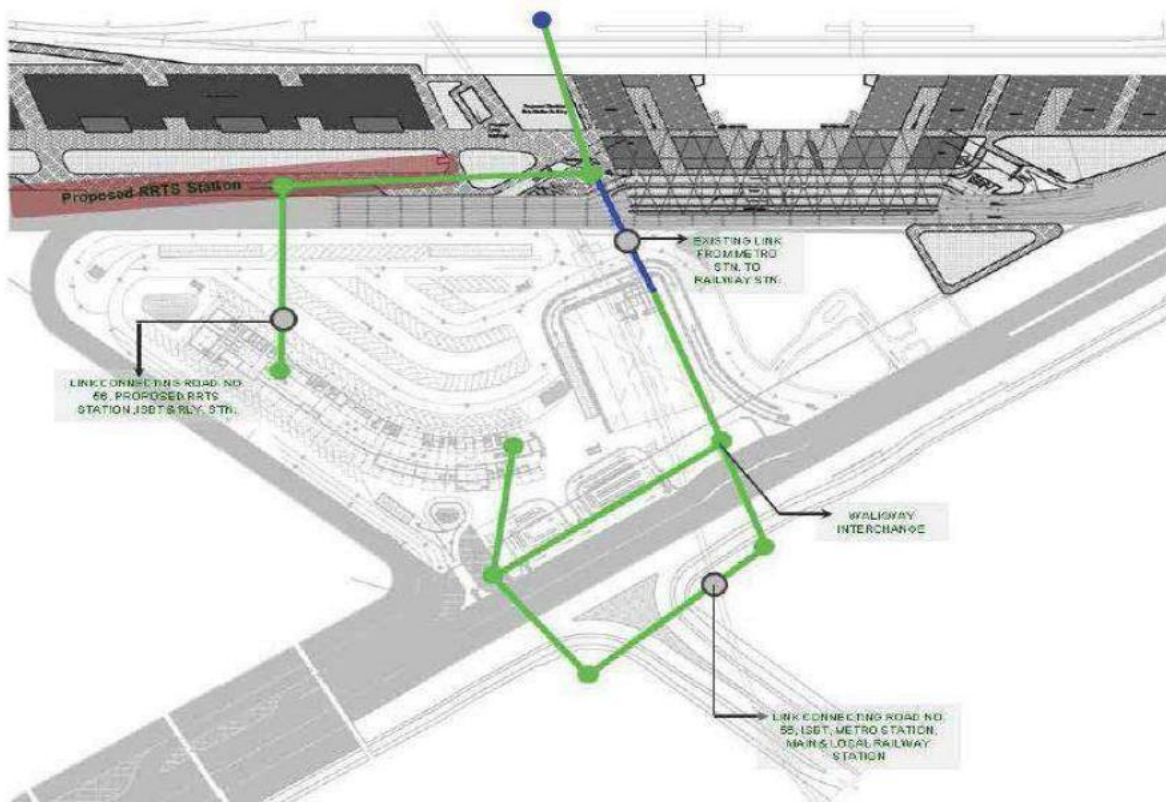


Figure 2.19: Proposed integrated plan

2.2 CHENNAI CENTRAL RAILWAY STATION

Location: Gandhi-Irwin
Road, Egmore, Chennai
Coordinates: 13.0780°N
80.2616°E

Chennai egmore formarly known as Madras Egmore, also known as Chennai Elumbur (station code: MS), is a railway station in Chennai, Tamil Nadu, India . S i t u a t e d i n t h e neighborhood of Egmore, it is one of the four intercity railway terminals in the city.

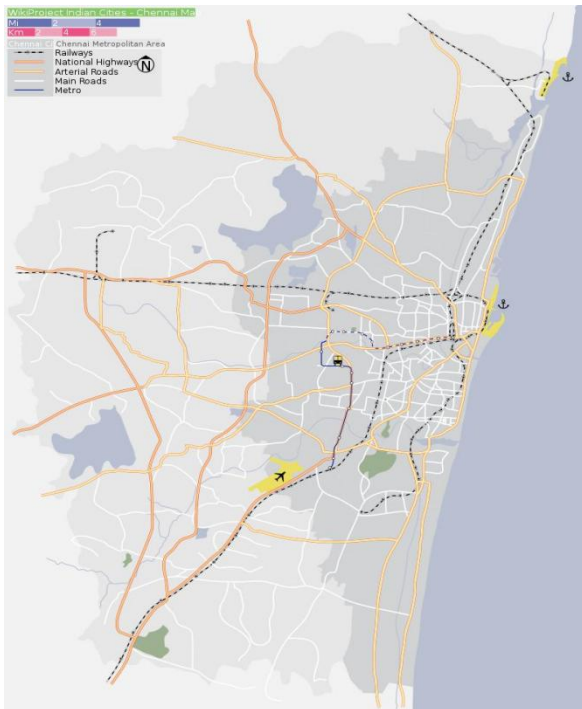


Figure 2.21: Chennai map layout



Figure 2.22: 7&8 th platforms

- A. Chennai Central is a terminal station with bay platforms. The average length of railway tracks in the station is 600 metres.

- B. The entire complex has 17 platforms to handle long-distance trains with 5 platforms exclusively for suburban trains.
- C. The total length of the station is about 950 m. The main building has 12 platforms and handles long-distance trains.
- D. There is a platform 2A between platforms 2 and 3; it is used to handle short-length trains like the Chennai Rajdhani Express, Vijayawada Jan Shatabdi Express, Bengaluru Shatabdi Express, Mysuru Shatabdi Express and the Gudur Passenger.
- E. The 13-storied annex building, the Moore Market Complex building, has 5 platforms and handles north- and westbound suburban trains.
- F. As of 2015, all platforms except 2A platforms, in the station were able to accommodate trains with 24 coaches. Platform 2A is the shortest of all platforms in the station and can accommodate trains with 18 coaches. Chennai Central is the only station that has a platform numbered 2A.

2.21 ARCHITECTURE

Built in the Gothic Revival style, the original station was designed by George Harding and consisted of four platforms and a capacity to accommodate 12-coach trains. It took another five years for the work to be completed, when the station was modified further by Robert Fellowes Chisholm with the addition of the central clock tower, Travancore 'caps' on the main towers, and other changes. The redesign was eventually completed in 1900. The main building, a combination of Gothic and Romanesque styles has been declared as a heritage building. The clock tower with the flagstaff, the tallest of the towers of the main building, has four faces and reaches a height of 136 ft. It is set to chime every quarter of an hour and every hour.

2.22 SERVICES

Chennai Central railway station is a major transit point for shipment of inland and sea fish in South India through trains. The terminus handles fish procured from Kasimedu which is sent to Kerala and sea fish from the West Coast which is brought to Chennai and ferried to West Bengal. As of 2012, on an average, the terminus handles transportation of 200 boxes of fish, each comprising 50 kilograms (110 lb) to 70 kilograms (150 lb) of consumable fish. The station also handles 5,000 postal bags daily.

2.23 BRIDGE

Bridge No.7 across the Buckingham Canal connects the terminus with the railway yards and stations to the north. The bridge, measuring 33.02 m in length and carrying six tracks, acts as the gateway to the terminus.

2.24 FACILITIES PROVIDED

- 1) The station has bookshops, restaurants, accommodation facilities, internet browsing centres, and a shopping mall. The main waiting hall can hold up to 1,000 people. Ø In spite of being the most important terminus of the region, the station lacks several facilities such as coach position display boards. The main concourses too have long exhausted their capacity to handle the increasing passenger crowd.
- 2) There are passenger operated enquiry terminals and seven touch-screen PNR status machines in the station.
- 3) The station has three split-flap timing boards, electronic display boards and plasma TVs that mention train timings and platform number.
- 4) A passenger information center in the station has been upgraded with "Spot your Train" live train display facility, information kiosks and passenger digital assistance booths. Ø The terminus, however, has only 10 toilets, which is inadequate to its 350,000 passengers.

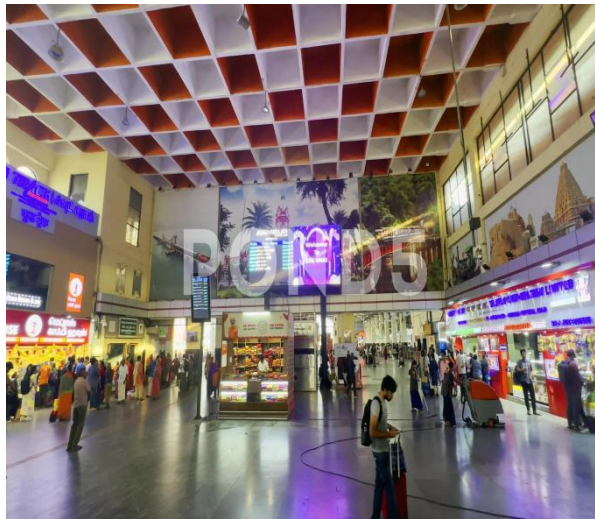


Figure 2.23: Platforms & stalls

2.25 CONNECTIVITY

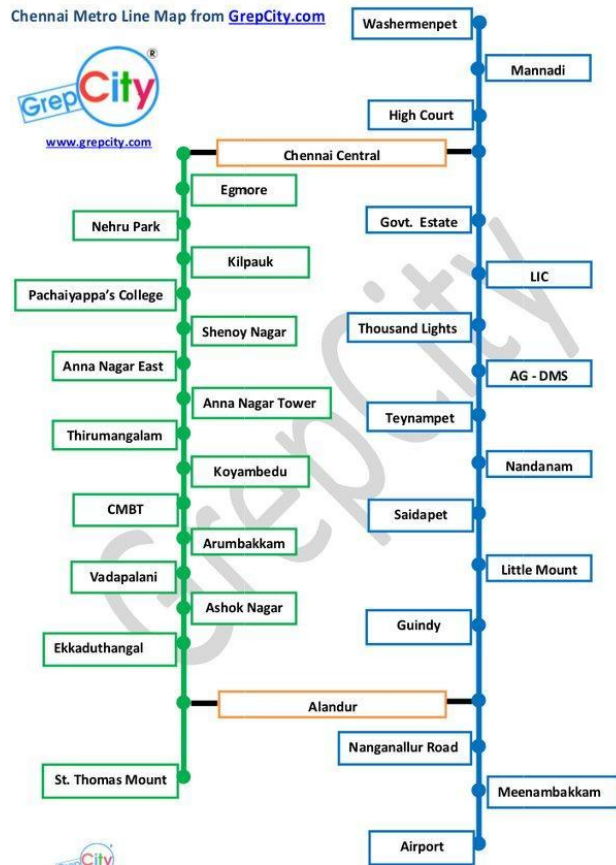


Figure 2.24:Chennai metro connectivity



Figure 2.25: Landmarks

1. Marina Beach : 3.2 kms from Chennai Central railway station
2. Sri Parthasarathy Temple : 3.4 kms from Chennai Central railway station
3. Kapaleeshwar Temple : 5.6 kms from Chennai Central railway station
4. Guindy National Park : 13 kms from Chennai Central railway station
5. Kalikambal Temple : 2 kms from Chennai Central railway station

2.3 ROTTERDAM CENTRAL STATION



Lead Architects	: Jan Benthem, Marcel Blom, Adriaan Geuze, Jeroen van Schooten
Design Team	: Arman Akdogan, Anja Blechen, Freek Boerwinkel, Amir Farokhian, Joost Koningen, Joost van Noort, Falk Schneeman, Daphne Schuit, Matthijs Smit (!), Andrew Tang, Wouter Thijssen, Joost Vos
Area	: 50000.0 sqm
Project Year	: 2013

Fig. 24 : Rotterdam Central Station (Arch Daily)

Number of Daily Passengers – 110,000 daily

Number of Platforms – 13

Platform Type – Island Platforms

Station Type – Integrated Terminal for Bus, Tram, Intercity International High Speed Trains and Metro Rail.



Rotterdam's former Centraal Station by architect Sybold van Ravesteijn built 1950-1957.

Figure 2.31: Rotterdam station western building

2.31 FACILITIES PROVIDED

1. The passenger terminal is a national and international hub that connects train, tram, bus and subway.
2. It includes commercial spaces, a lounge, restaurants, offices, parking for cars and bicycles.
3. There are largely transparent roof structure which covers all the tracks over a length of 250 meters, flood the platforms with light.

4. o 130,000 solar cells cover 10,000 sq. m of the total roof area of 28,000 sq. m

2.32 PLANNING PROCESS

1. The Terminal has been designed such that there is minimum hindrance to the passenger movement. There is a non ticketed area, which also functions as departure concourse and offers some amount of retail space.

2. The Terminal has been designed such that there is minimum hindrance to the passenger movement. There is a non ticketed area, which also functions as departure concourse and offers some amount of retail space.

3. The routing through the station is logical; travellers are guided by a direct view of the trains and by the daylight that penetrates to the traveller's passage via the voids that extend.

2.33 DRAWINGS



Figure 2.32: Site plan

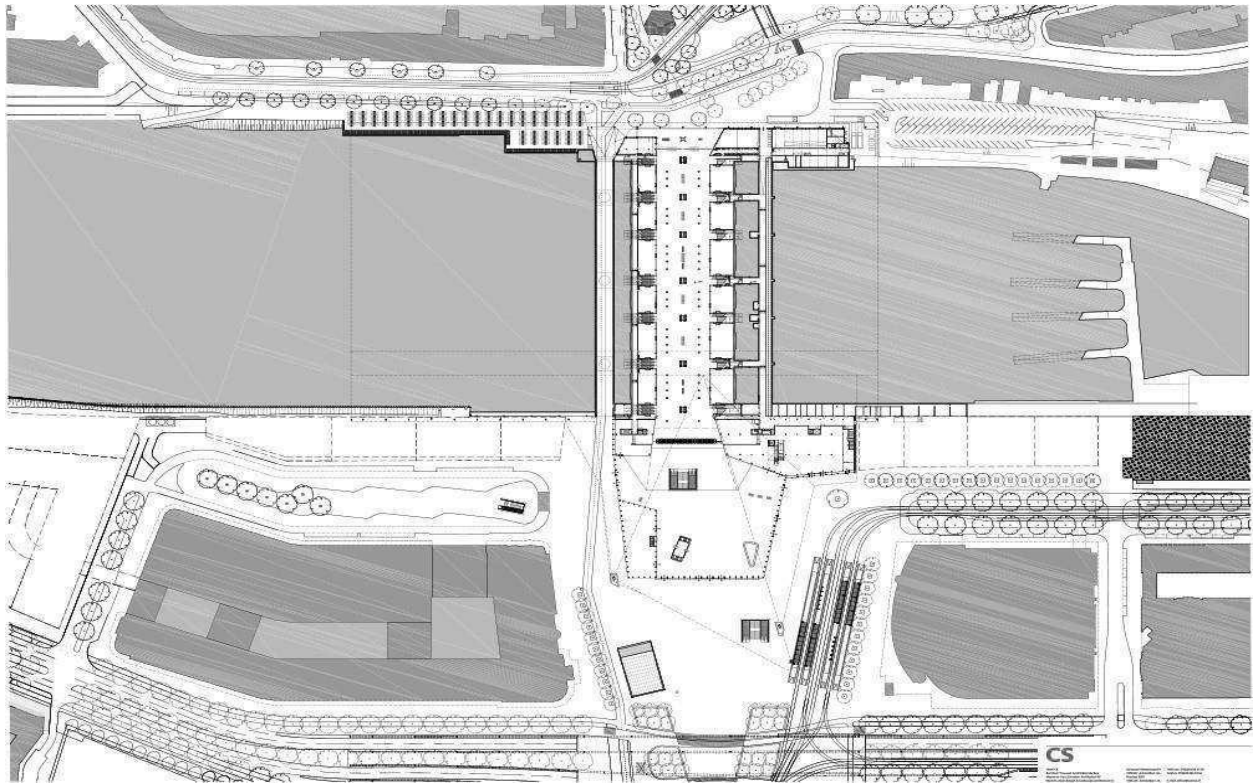


Figure 2.33: Ground floor plan

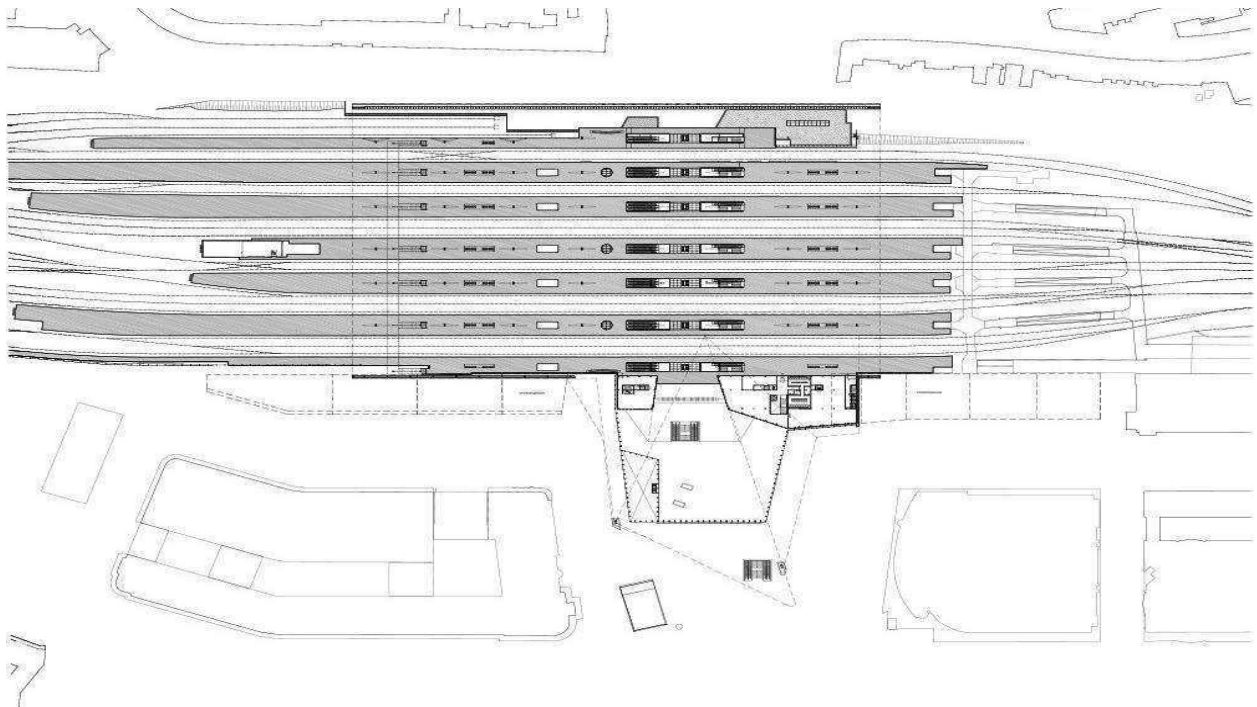


Figure 2.34: First floor plan

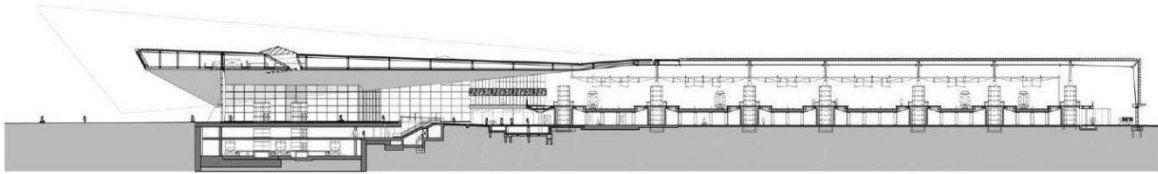


Figure 2.35: Section 1

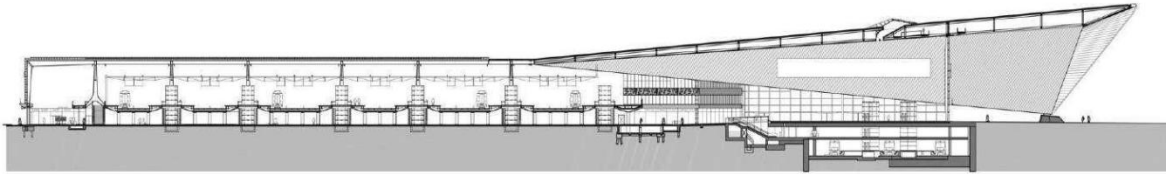


Figure 2.36: Section 2

2.34 INFERENCE

- a. Rotterdam Centraal Station is a one of its kind terminal station with elevated tracks.
- b. This gives a free flow for the incoming passengers, and provides zero visibility hindrance to the platforms.
- c. The Terminal building acts as an envelope for the entire station, thus, even the platforms have mechanically conditioned air.
- d. Solar PV Panels helps in reducing energy bills and Co2 emissions.
- e. The Iconic Design becomes an Instant visual image to the tourists and the travellers, which helps in way finding.
- f. It has multiple functionality with integration to metro rail service, high speed international trains, trams and buses.

2.4 TAIYUAN SOUTH RAILWAY STATION



Architects	: CSADI
Location	: Taiyuan, Shanxi, China
Architects Team	: CSADI - the 3rd architectural and structural department
Architects In Charge	: Li, Li Wang, Ji Zhang, Xing Sun, Guo Fu
Engineering	: Deliang Zhou, Dengwu Cao, Wei Zhang
Area	: 183952.0 sqm
Project Year	: 2014

Fig. 32 : Taiyuan South Railway Station (Arch Daily)



Architects: CSADI

Area: 183952 m²

Year: 2014

2.41 FACILITIES PROVIDED

The external space enclosing structure of Taiyuannan Railway Station employs novel double-layer hollow glass and stone combined curtain. 6+12+6 tempered LOW-E hollow glass and stone combined curtain, 600mm air space between two layers of curtains and unique curtain system greatly enhances the thermal inertia of the architectural surface and ensures stable indoor temperature, favourable for reduction of energy consumption of the station in Taiyuan in cold winter. Passive energy-saving measures and active ecological technology combined in the design effectively reduces energy consumption of the building, comprehensively improving the demonstration effect of ecological and environmental protection of the station.

2F: waiting areas, including special areas for business class passengers, group passengers, mothers and children, and the disabled passengers; servicing areas including information desks, restaurants, bank, shops, toilets, and hot drink water; ticket barriers; left luggage office (At the west end of the floor)

1F: Platforms, exits and entrances, security checks, ticket hall, arrival hall, ticket office (close to west exit), taxi stands, bus stops, parking lots, toilets, exits. The terminal building has two floors above ground and one underground, connected by escalators, elevators, and stairs. The station mainly consist of Terminal Building and two Squares.

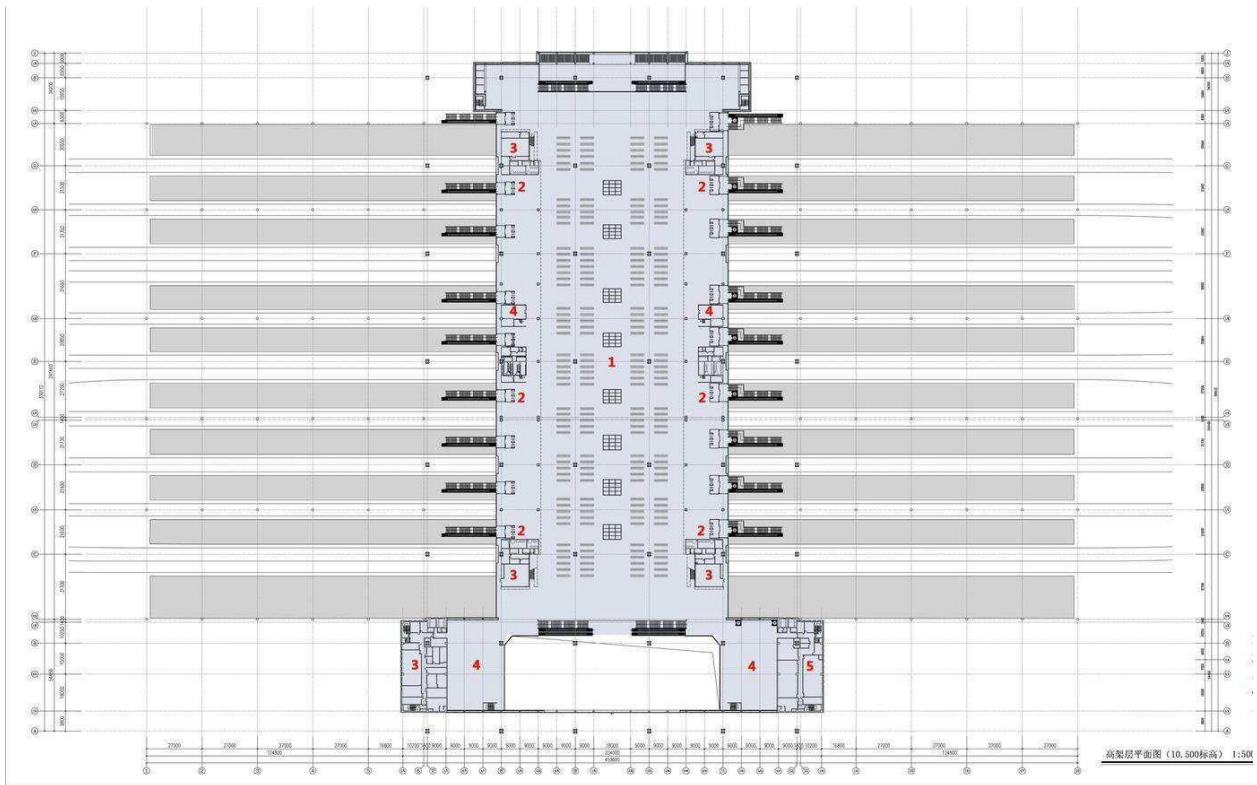


Figure 2.41: Ground floor plan

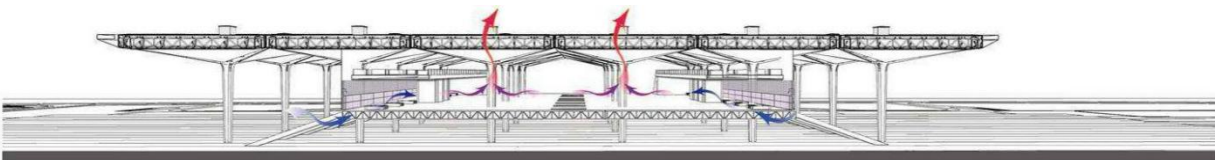


Figure 2.42: Section1

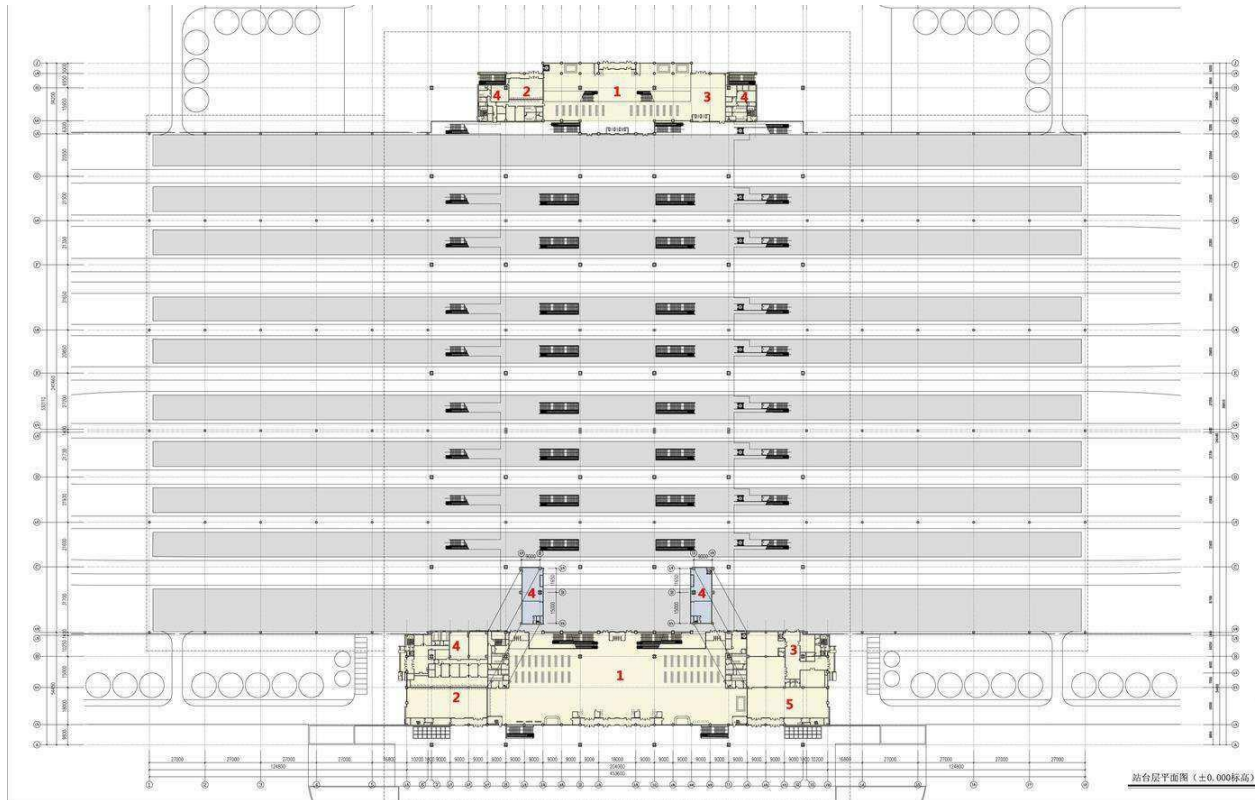


Figure 2.43: Platform level ground floor plan

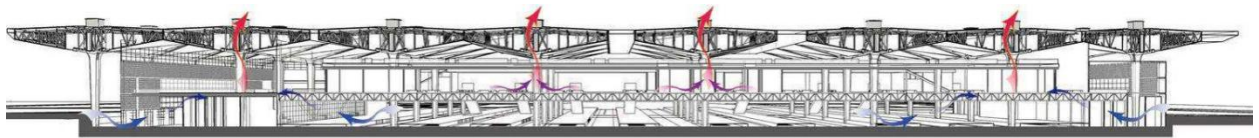


Figure 2.44: Section 2

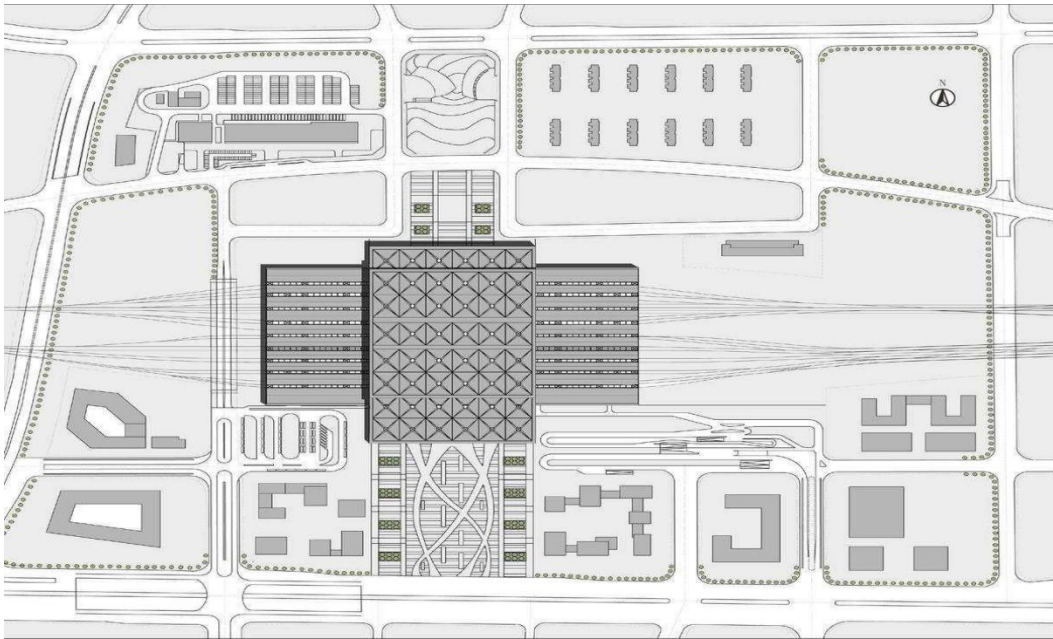


Figure 2.45: Site Plan



Figure 2.46: Cross section



Figure 2.47: Inverted structure



Figure 2.48: Support structure in the eastern side

2.42 INFERENCE

- The Taiyuan South Railway Station is arguably the largest of the bunch, at least from the previous two stations (Anand Vihar & Rotterdam).
- It has 18 Platforms, comparable to NDLS in size. • The Structural system adopted has many features, such as allowance of day light, multi layered glass to capture the radiant atmospheric heat during winter.
- The Segregation of Departing Passengers and arriving passengers is done extremely well. The arriving passengers are directly carried out of the terminal building, thereby not letting them to mix with the departing passengers.
- There are retail areas inside the terminal building.
- Although it is a huge terminal station in size, yet the footfall (Daily) is comparatively less compared to the previous two stations.

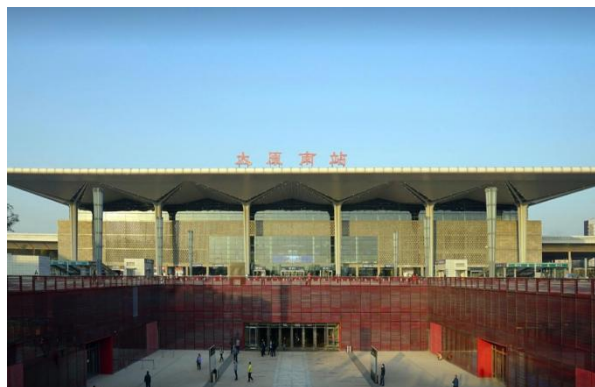


Figure 2.49: Connectivity to main building and metro station

3 SITE RESEARCH

Approximate Area of the Site

1,94,249 sqm or 48 Acre

3.1 LAYOUT

- ◆ Ernakulam Junction has four lines branching off from it to four different directions:
- ◆ North towards Chennai/Bangalore (via Palakkad) and Mumbai (via Shoranur–Kozhikode).
- ◆ South towards Thiruvananthapuram via Alappuzha–Kollam.
- ◆ South-west towards Willingdon Island and Cochin Harbour Terminus (CHTS).
- ◆ East towards Thiruvananthapuram via Kottayam–Kollam.

The station has six platforms to handle long-distance trains and local trains and two entrances (the Main entry and the Eastern entry). Its A1 classification is the highest a station can achieve on Indian Railways. It does have all amenities expected out of a major junction including a paid air-conditioned lounge with free WiFi, a library, rest room, children's play areas etc.



Fig 3.1: Connectivity to all directions

3.2 SITE REQUIREMENTS

- Parking space for 165 cars and 120 two- wheelers
- Two air concourses
- 8 st 2 a -m-long skywalk link to the adjacent metro Station
- 13 escalators and 22 lifts
- 11-m wide approach road

3.3 REDVELOPMENT REQUIREMENTS

- The ERN station will get multi-level car parking, air concourse, new foot overbridge (FOB) and skywalks from the station to the FOB and metro station.
- The work of“Re-development of Ernakulam

Junction Railway Station” was awarded as an EPC contract to M/s Bridge and Roof Company India Ltd for RS.299.95 Crore.

- Superior infrastructure, futuristic facilities, and a pleasing ambience.
- The terminals will be equipped with ticketing area, Waiting Lounges, commercial area, various Railway offices, skywalk and concourses.

3.4 WORKS ALREADY CARRIED OUT

- Project Management Consultancy office completed and occupied by the agency. • Test Pile Concreting for service building, Multilevel Car Parking, West Terminal, Skywalk, East Terminal and other railway offices has been completed and initial pile load test completed.
- Topographical survey, Soil Exploration, Drone survey completed for the project site. • Staff quarters were demolished and alternate accommodation for residents provided.
- Existing station building demolished for a length of 50 m to start the construction of West Terminal Building



Fig 3.2: On going works

3.5 TYPES OF PLATFORM

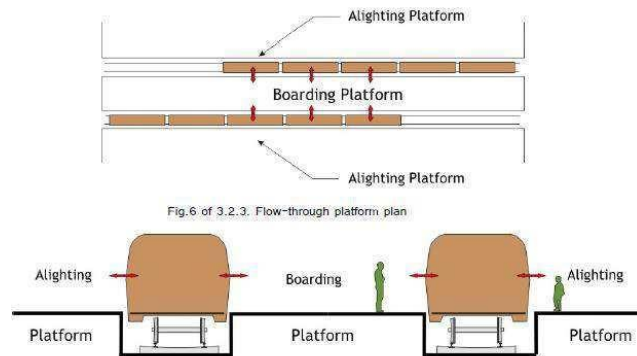


Fig 3.3: Flow through platform

Platform Length

Platform length is typically determined by the length of the longest train anticipated for the station (e.g., a 24-coach train at 22.5m per coach with a 22m engine at each end will require at Least a 584 m platform) plus 4.5 m or as directed by INDIAN RAILWAYS.

Platform Width

An architecturally preferred minimum 2.640 m clear distance to any obstruction, such as a VCE, from the platform edge. This distance includes the .609 m wide platform safety edge, a 1.725 m clear passage for customers circulating along the platform length, and a .13 m buffer zone along the length of the obstruction.

Services

Terminal Building should be well lit, with maximum day lighting. And providing necessary points for artificial lighting where ever necessary. Sound & Acoustic treatment is required in upper class waiting lounges. MEP is applicable to the type of the terminal building.

Parking Requirements

As per the bye laws, Parking requirement is 2 ECS per 100 Sqm. (Proposed Built up Area – 12,000 Sqm) Total Parking Required therefore = 165 Car Parking & 120 two wheelers.

Structural Systems

A modern Railway Station requires Large span structures for minimum visual and physical hindrance.

Materials Used

Glass is required for Curtain Wall System. For Large span roof, Steel girders and space frames are required. The Substructure can be made out of RCC.



Fig 3.4: Existing places need to be redeveloped

4 AREA STATEMENT

FACILITIES AND AMENITIES

Sl.NO	Space Designation	No Of Users	Area Required (sqm)
1	Waiting Areas	1000	1000
2	Waiting Halls	1500	1500
3	Retiring rooms for passengers	50 Rooms+ 5 Dorms	750
4	Dispensary	15	150
5	Refreshment Rooms	750	1500
6	Restaurant &Bars (5nos)	250-500	2500
7	Info. Counter	1000	100
8	Bank/ATM	10000- 20000	100
9	Public Toilets	50,000- 1,50,000	1500
		TOTAL	9100

SUPPORTING FUNCTIONS

Sl.NO	Space Designation	Area Required (sqm)
1	Railway police office	1500
2	MCO Office and rest rooms	1500
3	Restroom for ticket collection officers	1000
4	Restroom for guards and train drivers	1000
5	Office and storage for railway mail service	200
6	Restroom for porters	150
7	Toilets for staff	150
8	Trolley storage	100
9	Bedrolls store	300
10	Telegraph office and enquiry	20
11	Electrician room	50
12	Switch room	120
13	Battery room	100
14	Main store and sub store	200
TOTAL		6390

OUTDOOR FUNCTIONS

Sl.NO	Space Designation	Area Required (sqm)
1	Con course (20000 per hour)	10000
2	Circulating space	5000
3	Multi level car parking(250 cars)(2 ECS per 100 sqm)	3000
4	Two wheeler parking	2000
5	Bus lane(10 bus)	1000
6	Goods parking	1000
	TOTAL	22,000

TOTAL AREA REQUIREMENT

Sl.NO	Types of Function	Area Required (sqm)
1	Ticketing and booking	2075
2	Facilities and amenities	9100
3	Outdoor Functions	22,000
4	Supporting Functions	6390
5	Administration	1500
	TOTAL	41,065 sqm

FACILITIES AND AMENITIES

Sl.NO	Space Designation	No Of Users	Area Required (sqm)
1	Waiting Areas	1000	1000
2	Waiting Halls	1500	1500
3	Retiring rooms for passengers	50 Rooms+ 5 Dorms	750
4	Dispensary	15	150
5	Refreshment Rooms	750	1500
6	Restaurant & Bars (5nos)	250-500	2500
7	Info. Counter	1000	100
8	Bank/ATM	10000- 20000	100
9	Public Toilets	50,000- 1,50,000	1500
	TOTAL		9100

5 SITE ANALYSIS

NEIGHBOURHOOD CONTEXT



LANDMARKS



- LULU MALL - 8KM
- KERALA FOLKLORE MUSEUM - 5KM
- MATTANCHERRY PALACE - 8KM
- MARINE DRIVE - 3KM
- MANGALAVANAM BIRD SANTUARY - 5KM

Fig 5.1: Neighbourhood context

SOIL TYPE

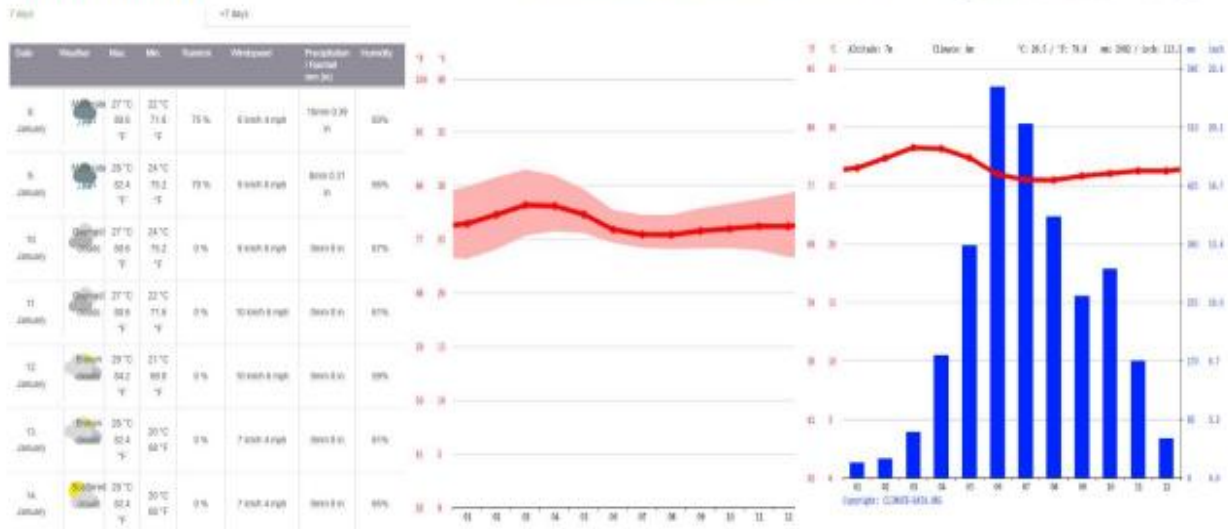
The lateritic soil covers the eastern portion of the area. The soil is porous and well drained and hence suited for all garden works. On removal of the top soil, laterite is present as a homogeneous mass which can be cut as building blocks. The alluvial soil is the characteristic type seen over the remaining part of the city.



VIEWS AROUND THE SITE



TEMPERATURE, WINDSPEED, PRECIPITATION



The annual variation of temperature in the Kochi region is between 22°C and 32°C and a more or less uniform temperature exists throughout the year. Because of the nearness to the sea and due to the large area of backwaters in the region, the humidity is high all round the year. Kochi has a tropical climate with intense solar radiation and abundant precipitation.

Fig 5.2: Soiltype, temperature and precipitation

CONNECTIVITY



- Ernakulam town railway station - 4Km



- Nearest Bus stand of Ernakulam Junction is Ksrct Bus Stand Ernakulam. Distance -1.6 kms.
- Nearest Airport of Ernakulam Junction Railway Station is Cochin International Airport, Kochi. Distance from Ernakulam Junction Railway Station to Cochin International Airport is 30 kms.

AREA

FUNCTIONS	AREA REQUIRED (SQM)
TICKETING AND BOOKING	2785
AMENITIES	21000
CONCOURSE OUTER	20000
SUPPORTING FUNCTIONS	6870
ADMINISTRAT ION	1500
AREA	52155 SQM

Fig 5.3: Connectivity

TOPOGRAPHY



The average altitude towards the eastern fringes is about 7.5 m above MSL, and towards the west the altitude is less than one metre on an average. The whole of the land slopes gradually from east to west. The terrain features have adverse influence on the sewerage and drainage system of the area. Percolation of effluent from septic tank and dispersion trenches pollute the ground Water. Commercial wastes are mostly directed to open surface drains. The continued effects of all these factors result in the abuse of water courses, environmental deterioration and public health hazards.

LANDUSE



Fig 5.4: Topography and landuse

6 PROGRAM LAYOUT

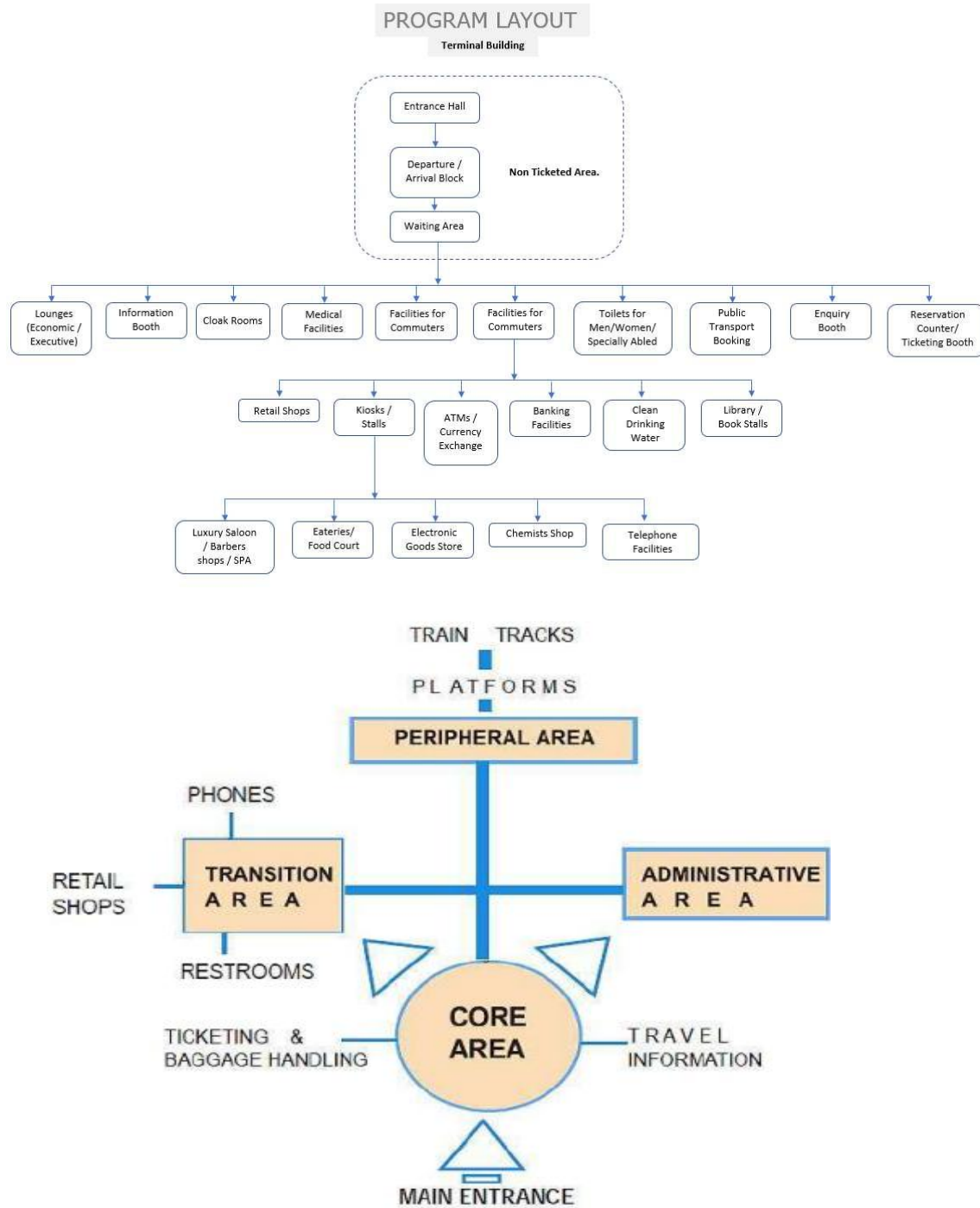


Fig 6.1: Program layout

7 WORKING DRAWINGS

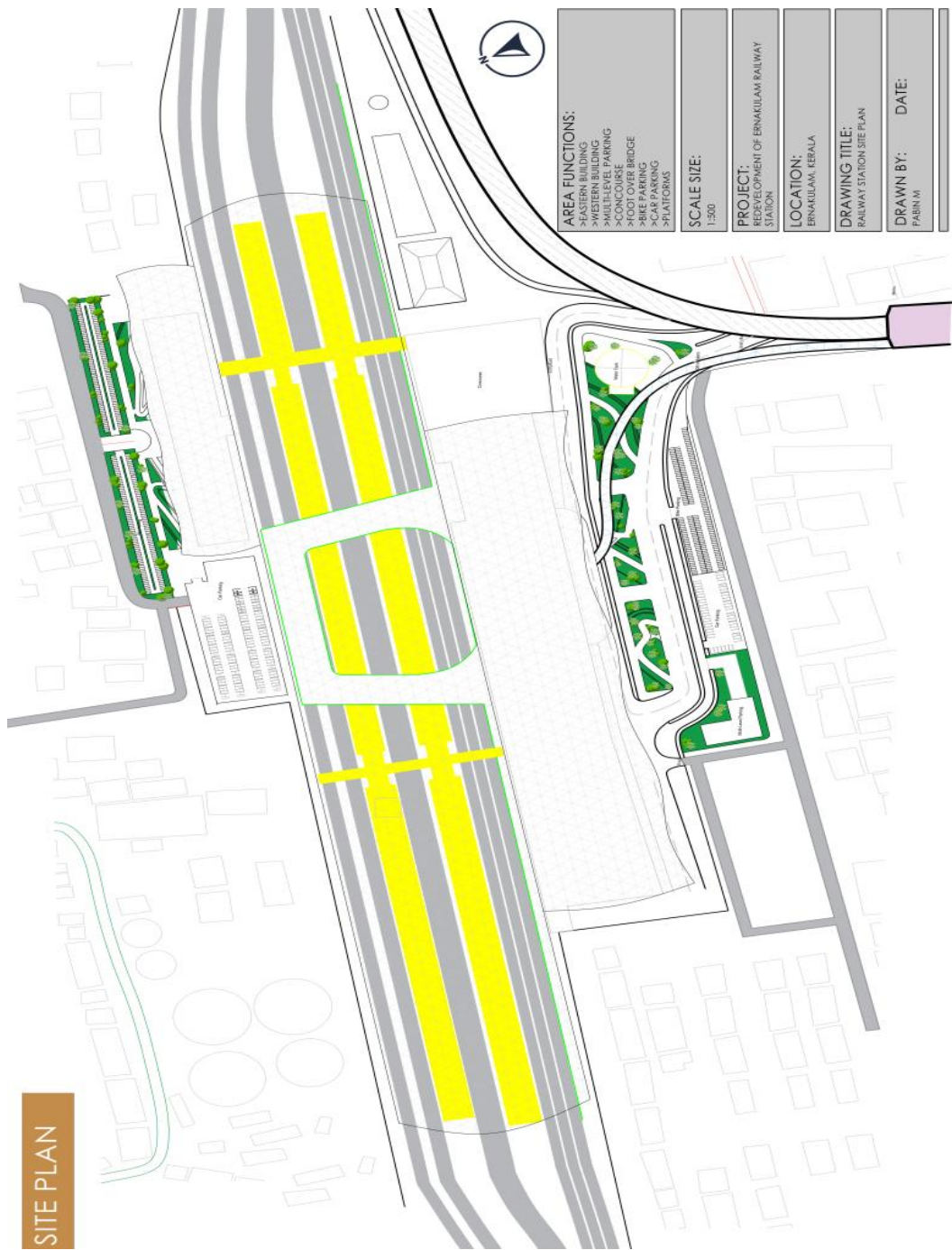


Fig 7.1: Site Plan

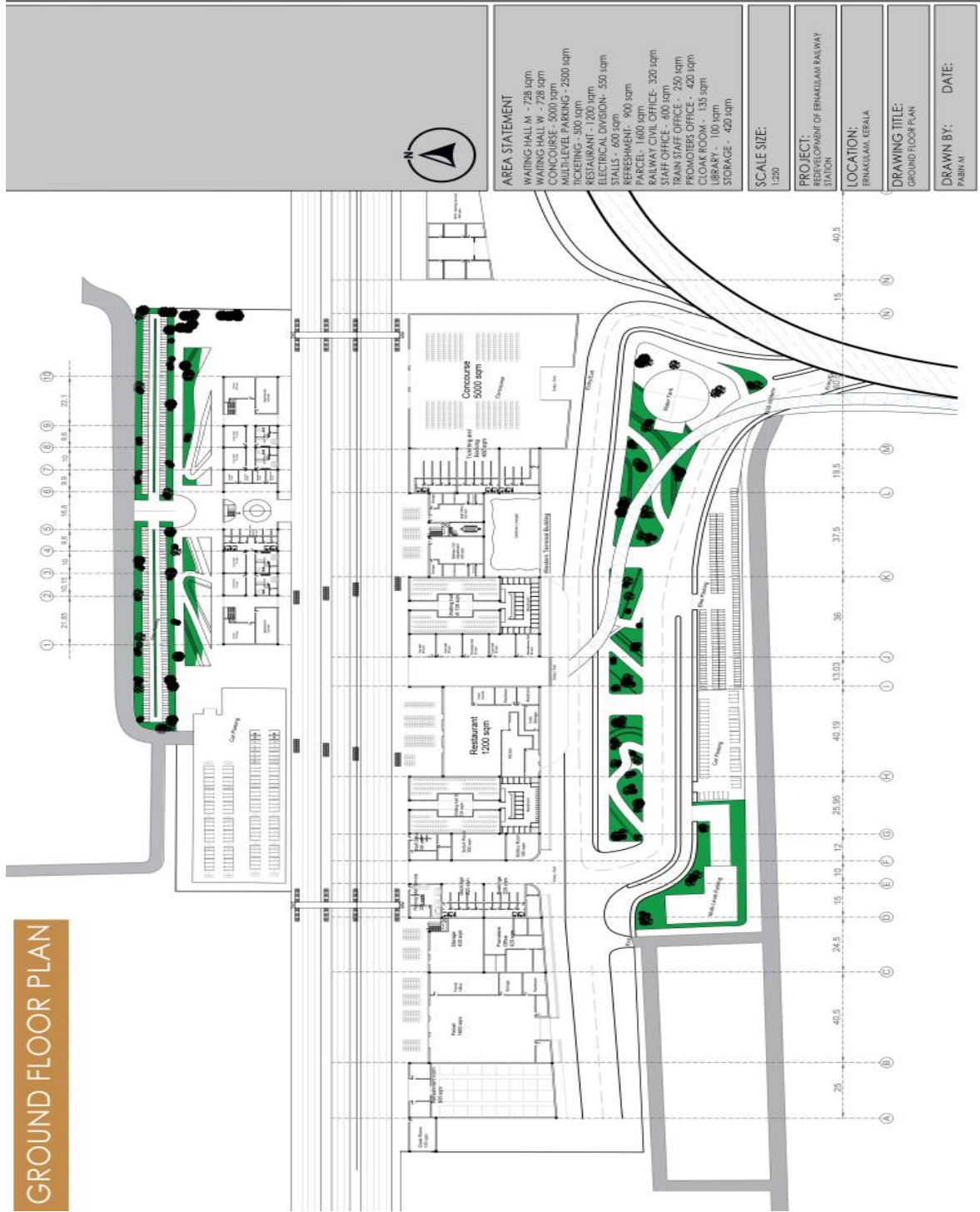


Fig 7.2: Ground floor plan

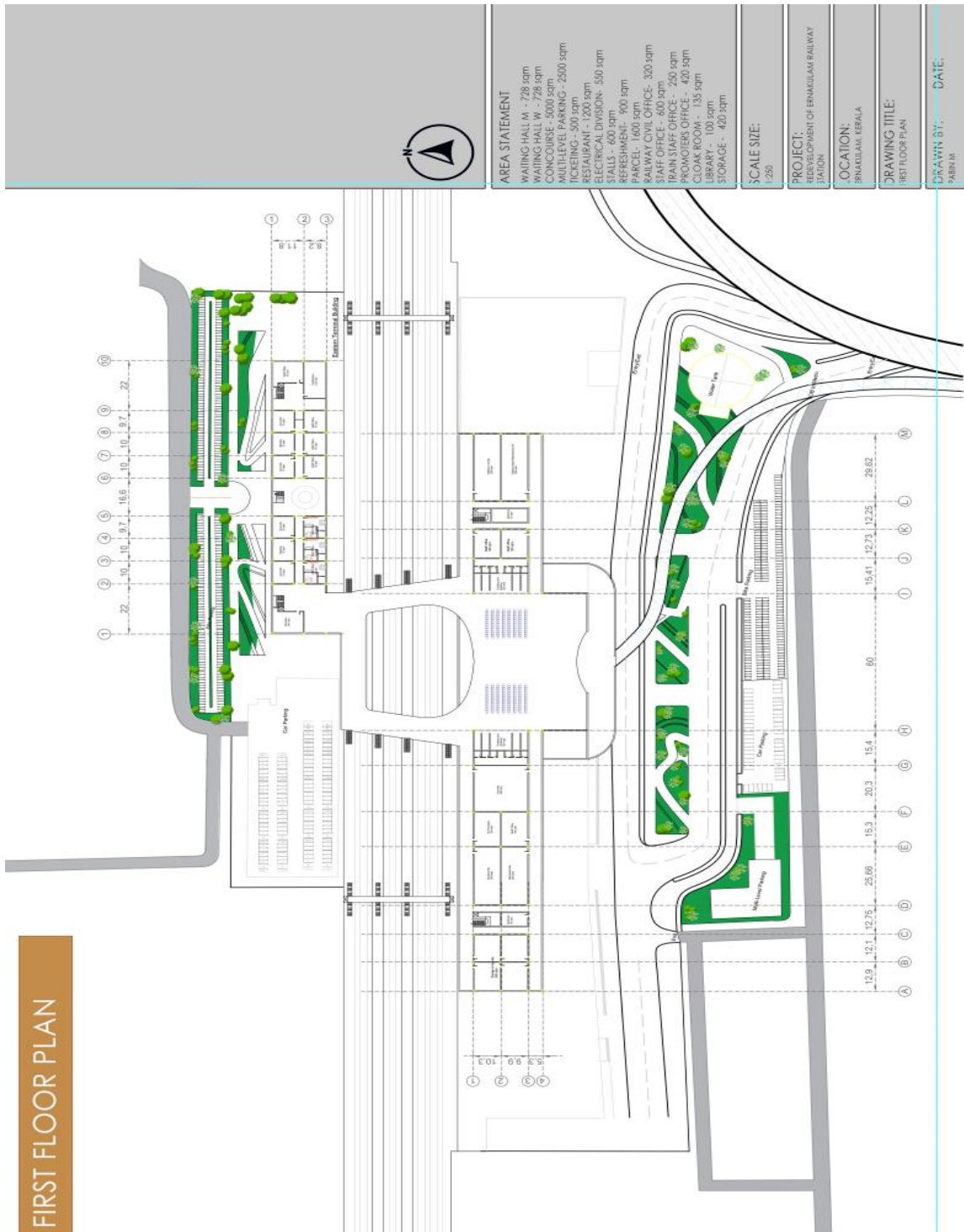


Fig 7.3: First floor plan

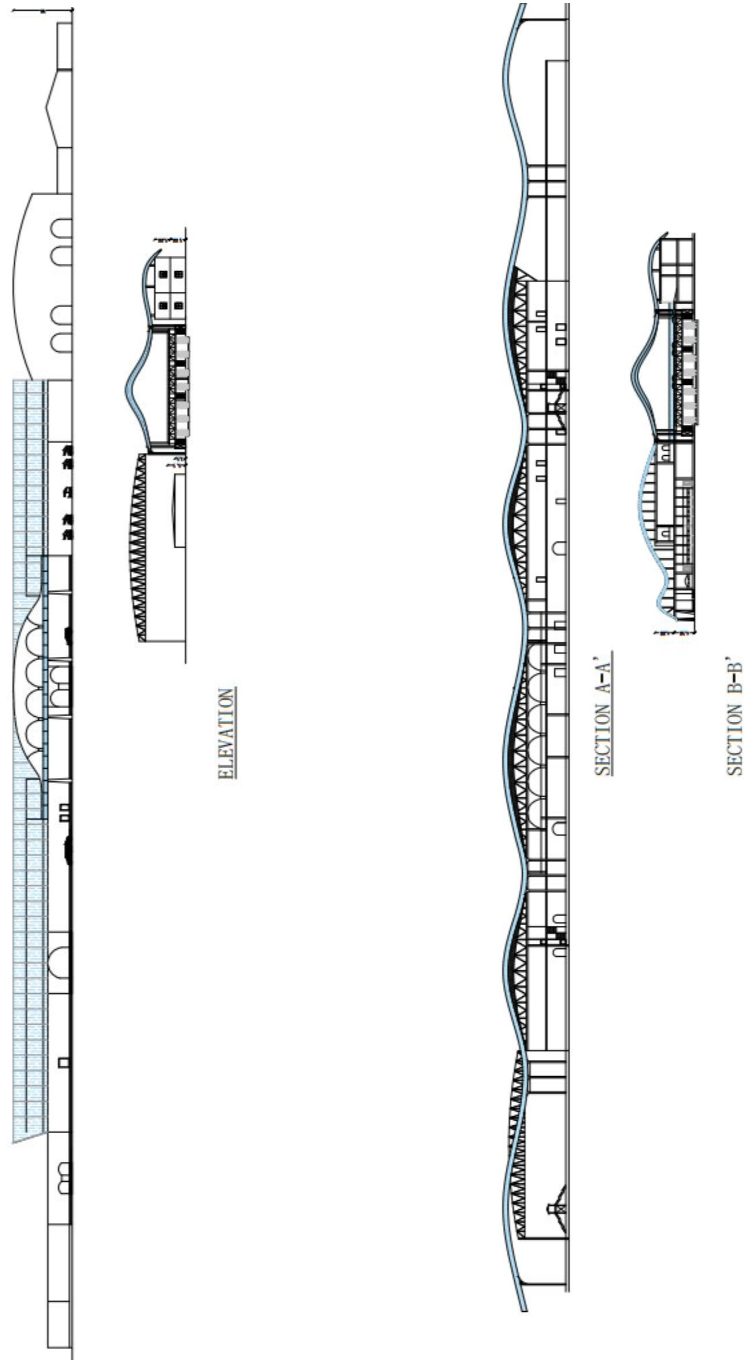


Fig 7.4: Section A-A', B-B'



Fig 7.5: Platform rendering



Fig 7.6: Western building station

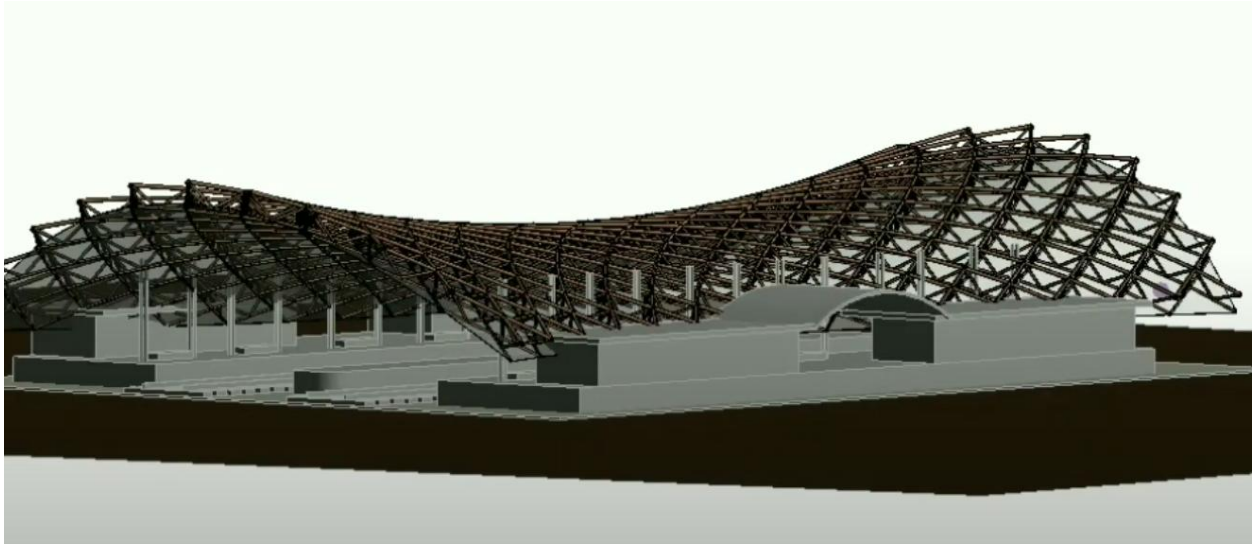


Fig 7.7: Parametric roof

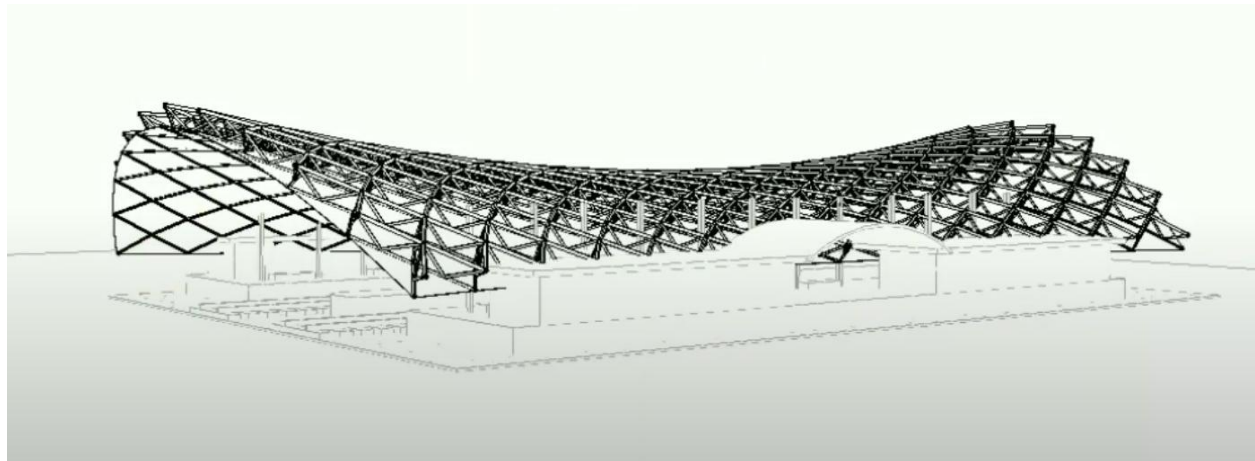


Fig 7.8: Inverted glass parametric structure

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