WAYSIDE AMENITY CENTER AT KITTUR, KARNATAKA

A **Thesis**
Submitted in Partial Fulfillment of the Requirements
for the Degree of **B.Arch.**
by

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Exam No: 494

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Acknowledgements

As I come to the completion of my thesis, I realize that a lot of it would not have been possible without the help, support and encouragement given to me, by those, to whom I feel greatly indebted to. Today, as I submit my thesis report on the topic **WAYSIDE AMENITY CENTER AT KITTUR, KARNATAKA.**

I take this opportunity to express my heartfelt gratitude to all those who were behind me in the completion of my thesis. I convey my sincere gratitude to my guide, **PROF. AR. RASIKA HAVAL** of Architecture, for her constant support, guidance and understanding throughout my thesis. I am grateful to all the teachers and the non-teaching staff for being available to me and providing all the facilities for successfully accomplishing this thesis and helping me during all the stages of my work.

I also thank my friends and classmates, who have always been there to support me. At last, I would thank my family to always help me and make me stand where I stand today and make sure I do not fall behind.

Declaration

I hereby declare that except where specific reference is made to the work of others, the contents of this thesis are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This thesis is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Acknowledgements.

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Exam No : 494

DYPCET,
Kolhapur

Certificate

This is to certify that the thesis entitled **WAYSIDE AMENITY CENTER AT KITTUR, KARNATAKA** submitted by **Mr. Pranjal Mahadeo Deshmukh** for the award of the degree of Bachelor of Architecture is a bonafide1 record of the research work carried out by him/her under my supervision and guidance. The content of the thesis, in full or parts have not been submitted to any other institute or university for the award of any degree or diploma.

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Guide

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Date:

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ABSTRACT:

This thesis proposes the concept of Wayside Amenity Centres as transformative spaces along highways, aiming to enhance the contemporary travel experience. Recognizing the intrinsic allure of journeys and the pivotal role of infrastructure in facilitating safe and enjoyable travel, the study delves into the imperative of crafting warm, technologically equipped, and culturally enriching rest stops.

The objectives encompass the creation of welcoming hubs that prioritize traveller comfort, integrate modern conveniences, and catalyse local tourism and economic growth. Addressing the need for eco-conscious design, the research advocates for sustainable practices to mitigate environmental impact and foster community engagement.

The scope entails envisioning innovative designs tailored to diverse landscapes and cultural contexts along India's expansive highway network. While the project acknowledges the challenges of site-specific considerations and shifting traffic patterns, it underscores the potential of Wayside Amenities to redefine highway travel as a holistic and immersive experience. Through meticulous planning and strategic implementation, these centres aim to emerge as enduring landmarks that celebrate heritage, promote sustainability, and enrich the journey of every traveller.

KEYWORDS: Wayside Amenity Centre, Highway, Traveller

LIST OF FIGURES:

- Fig 6.1.1: Prototype Facility for Cars Passengers only
- Fig 6.1.2: Prototype Facility for Trucker only
- Fig 6.1.3: Comprehensive Facility for Cars, Buses and Trucks (Source: MoRTH)
- Fig 6.3.1: Tata Power Launches the First Electric Vehicle Charging Station in Mumbai
- Fig 6.5.1: A typical Convenience Store by Shell India
- Fig 6.5.2: A Shift from a Vehicle Centric Approach to a Consumer Centric Approach
- Fig 8.1.1: Existing village in Bhuj, Gujarat with adobe walls and thatched roofs
- Fig 8.1.3: Plan Concept
- Fig 8.1.4: Roof Detail
- Fig 8.1.5: Render View
- Fig 8.1.6: Site Plan
- Fig 8.1.7: Site Section
- Fig 8.1.8: Render Views
- Fig 8.2.1: Site Plan
- Fig 8.2.2: East Side Elevation
- Fig 8.2.3: Views
- Fig 8.3.1: View
- Fig 8.3.2: View
- Fig 8.3.3: Site Plan
- Fig 8.3.4: Section
- Fig 8.3.5: Views
- Fig 8.4.1: Indicative Layouts
- Fig 8.4.2: Master Plan
- Fig 8.4.3: Render View
- Fig 8.5.1: Conceptual View (source: MSRDC)
- Fig 8.5.2: Location (source: MSRDC)
- Fig 8.5.3: Site Plan and Surroundings of the Foodway
- Fig 8.5.4: Ground Floor Plan
- Fig 8.5.5: First Floor Plan
- Fig 8.5.6: Sections
- Fig 8.5.7: Elevations
- Fig 8.5.8: Views
- Fig 8.6.1: Site Plan and Surroundings of the Food Court
- Fig 8.6.2: Views
- Fig 8.6.3: Fuel Station
- Fig 8.6.4: Truck Terminus

- Fig 8.6.5: Trucker’s Dhaba and Dormitory
- Fig 8.6.6: Views
- Fig 8.7.1: Views
- Fig 11.1: Average Rainfall
- Fig 11.2: Average Min-Max temperature
- Fig 11.3: Average Precipitation
- Fig 11.4: Sanctioned Document

INDEX:

CONTENTS	PAGE NO.
1. INTRODUCTION	8
2. AIM	8
3. OBJECTIVES	8
4. NEED OF PROJECT	9
5. SCOPE & LIMITATION	9
6. METHODOLOGY	10
7. LITERATURE REVIEW	11-15
9. CASE STUDIES	16-43
10. COMPARATIVE ANALYSIS	44
11. SITE SELECTION & ANALYSIS	45-49
12. DESGIN PROGRAM	50-56
13. REFERENCE	57

1. INTRODUCTION:

Life on the move or the process of a journey is something that cannot be expressed in bare/simple words. There are times when traveling from one place to another can often feel like an adventure, where the unknown awaits, and every moment is filled with the anticipation of discovery. Whether you're exploring new landscapes, cultures, or cuisines, the journey itself becomes an exciting part of the experience. Traveling long distances used to be quite challenging and risky before the invention of vehicles. Drivers would often spend days on the road, and the journey itself could be tough.

In order to refuel and prepare for the remaining distance, they choose to make or would rather make a halt. These journeys are often marked by vast stretches of highway twisting through diverse landscapes and connecting distant regions, shows the critical role of organizations like National Highways Authority of India (NHAI) is an important government organization in India that is in charge of creating and maintaining the country's highway network to ensure these roads are safe, well-maintained, and equipped with necessary amenities, allowing travellers to navigate these challenging terrains with greater ease.

Apart from that, having carefully designed wayside amenities along these highways makes the travel experience even better. These wayside amenities offer useful services like food, bathrooms, and places to stay. They not only make the journey more convenient but also allow travellers to discover the local culture and beautiful scenery of the areas they travel through, making their trips more enjoyable and unforgettable. Additionally, the presence of well-planned wayside amenities along the highways enhances the overall road travel experience by providing essential facilities and creating opportunities for travellers to connect with their surroundings.

2. AIM:

This thesis aims to imagine, design, and promote the construction of Wayside Amenity, which act as transformational places alongside highways to improve the present-day travel experience.

3. OBJECTIVES:

- Creating warm and friendly Wayside Amenity Centres to make driving on the highway a pleasant and memorable experience.
- To Include modern technology and digital services to meet the information, connectivity, and convenience needs of today's high-tech tourists.
- Encourage tourism to the areas, which will draw people there and support local businesses by generating jobs.

4. NEED:

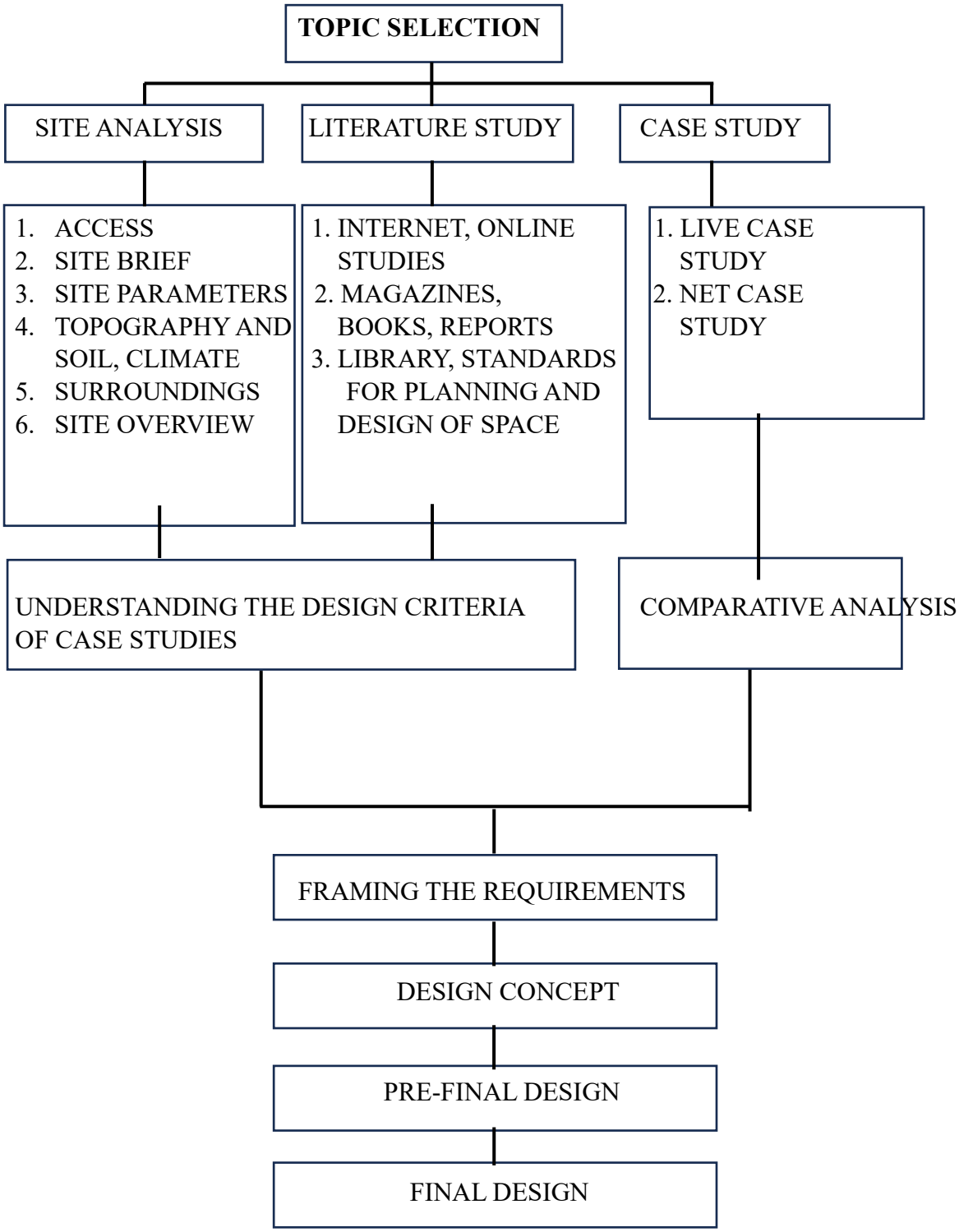
Driving long distances on highways can be mentally and physically challenging, making travellers seek rest areas that provide convenience, safety, and relaxation. Traditional rest stops often lack eco-friendly features, generating more waste and consuming a lot of energy, harming the environment. Moreover, highway corridors passing through economically undeveloped areas limit opportunities for local businesses to flourish. Introducing Wayside Amenities can act as gateways for cultural exploration and heritage preservation, enabling travellers to engage with the history and traditions of the areas they traverse.

5. SCOPE & LIMITATION:

The scope of the project is to develop innovative designs for Wayside Amenity Centres that prioritize simplifying traveller's life, caring for the environment, encouraging the growth of nearby companies, utilizing modern technology, and highlighting the unique culture and history of each location.

Choosing the right spot in India's vast highway network is key. Creating a universally suitable Wayside Amenity might be tricky due to different landscapes and cultures along highways, with site-specific factors restricting comparisons. Success depends on sustained highway traffic popularity, and shifts in traffic patterns could affect facility demand and usage.

6. METHODOLOGY:



7. LITERATURE REVIEW:

1. MoRTH Policy for the Development of Wayside Amenity Centres:

The National Highway Authority of India (NHAI) and the nineteenth report of The Committee on Public Undertakings 2017–18 both state that the Ministry of Road Transport and Highways has requested that the NHAI create comprehensive wayside amenities for all types of passengers in addition to planning to build wayside amenities along India's national highways. Based on a sustainable economic model that takes into consideration the socioeconomic character of the individual regions, these stopovers will offer appropriate facilities for stops and rests at intervals of 50 km along national roads. A Public-Private Partnership (PPP) model will be used to create the project. (Tourism, 2017)

Facilities larger than five acres will be created under the term "Highway Village," while facilities smaller than five acres will be produced under the name "Highway Nest." As a result, more than a thousand of these facilities would be built around the country. In order to construct highway amenities as an authority franchise, private landowners with a sufficient land size can collaborate with NHAI, as per the organization's demand for public-private engagement. (Highways M. o., 2017)

The amount of land available through the NHAI is limited, therefore working with private landowners will both help save the public funds required for land acquisition and support farmers. The recommended approach for private property owners looking to build a roadside amenity centre is the "Franchise Model" (as Operating Model), with NHAI in charge of development oversight. As a result, NHAI has created three adaptable prototypes for the same, with gas stations playing a crucial role in each multifunctional building. (Government M., 2016)

Fig 6.1.1: Prototype Facility for Cars Passengers only

Fig 6.1.2: Prototype Facility for Trucker only

Fig 6.1.3: Comprehensive Facility for Cars, Buses and Trucks (Source: MoRTH)

2. A Paradigm Shift in the Industry Dynamics of Fuel Retail:

The easy fuel stop of yesterday is coming to an end at petrol stations. The retail petroleum business is being disrupted by a number of broad-based phenomena. Oil marketing firms and gasoline merchants are under pressure to redesign the classic fuel station as part of their broader business transformation due to changing market conditions, competitive dynamics, alternative fuel types, and increasing customer expectations. Liquid fossil fuels will soon be replaced by electric power. Today's gas stations will soon become outdated locations for maintenance and fuelling, and the introduction of the Smart City Grid into cities will allow for a widespread distribution of power for consumer charging. (Deepak Nagpal, 2019)

The way things are going now will change how fuel stations compete, and it means traditional fuel businesses need to change a lot. Fuel sellers should come up with a detailed plan by changing what they sell, improving how they do business, changing the look of their stations and stores, and using new digital technologies. (Mirko Rubies, 2019)

Criteria for location for the same shall be governed by the following factors:

- One franchise to be awarded every 40 kms.
- Minimum 5 kms away from any toll plaza to avoid congestion on highways.
- Minimum 5 kms outside the municipal limits to avoid congestion within the cities.

3. The Indian Scenario:

The government and policymakers have a big job ahead as they try to put electric charging stations at gas stations all over the country. In India, the Niti Aayog, a think tank for the government, is working with the Oil Ministry to quickly set up 1,000 charging stations at gas stations in a few big cities. The government is suggesting plans with financial support to make it easier to have 5,000 electric charging stations in cities and on highways. This program is a test to quickly set up the electrical infrastructure and aims to have 40% of vehicles in India be electric.

Fig 6.3.1: Tata Power Launches the First Electric Vehicle Charging Station in Mumbai

As part of the national plan to have more places for electric vehicles (EVs) to charge, a list of big cities has been made. These cities, including Delhi, Ahmedabad, Bangalore, Chennai, Mumbai, Hyderabad, Surat, Pune, and Kolkata, along with some main highways, will get EV charging stations in the first three years until 2022. The goal is to have at least one charging station in cities every 3 kilometres and on both sides of highways every 25 kilometres. The Niti Aayog plan suggests changing all traditional three-wheeler engines to EVs by 2023 and two-wheelers with engines up to 150 cc by 2025. (Bisht, 2018)

The government has set aside ₹10,000 crore for the first part of the plan called Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME). This plan mainly looks to build more places where electric vehicles (EVs) can charge and make public transportation electric. The budget also offers big opportunities and benefits for people who want to buy electric cars, making them more affordable compared to regular petrol and diesel cars. (Ghosh, 2019)

4. Design Constraints at a Fuel Station:

Oil Marketing Company (OMC) executives are not in Favor of adding electric vehicle (EV) charging stations at fuel stations. They argue that it would disrupt the quick flow of cars getting fuel because charging EVs takes longer. In the current setup, cars come in, quickly get fuel, and leave, but adding a charging station would slow things down, leading to longer lines and inconvenience for customers. The executives are concerned that this change could reduce the number of customers served each day and, initially, there won't be many EV customers. (Choudhary, 2019)

Adding charging stations at petrol pumps can be a good first step to encourage more people to use electric vehicles (EVs). However, over time, charging points will likely be available in many places where cars or bikes can be parked, like parking lots, homes, and offices. This means consumers won't need to go to petrol pumps as much. To stay competitive, it's important for oil marketing companies (OMCs) and fuel retailers to strategically enter the EV charging market. Just making small changes to current petrol pump designs won't be enough to keep up with the changes happening in the fuel industry.

5. Adaptive Measures:

- Guide the Transformation of The Convenience Store
- Become A Player in Last-Mile Delivery
- Making Most of the Prime Piece of Real Estate
- Invest in Charging Infrastructure and Advanced Mobility
- Improve Existing Offerings and Push into Adjacent Value Pools
- Enhance the Customer Fuelling Experience

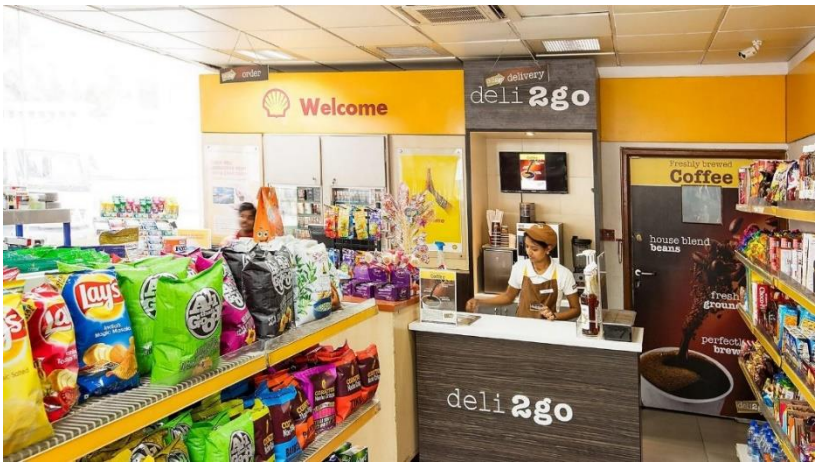


Fig 6.5.1: A typical Convenience Store by Shell India

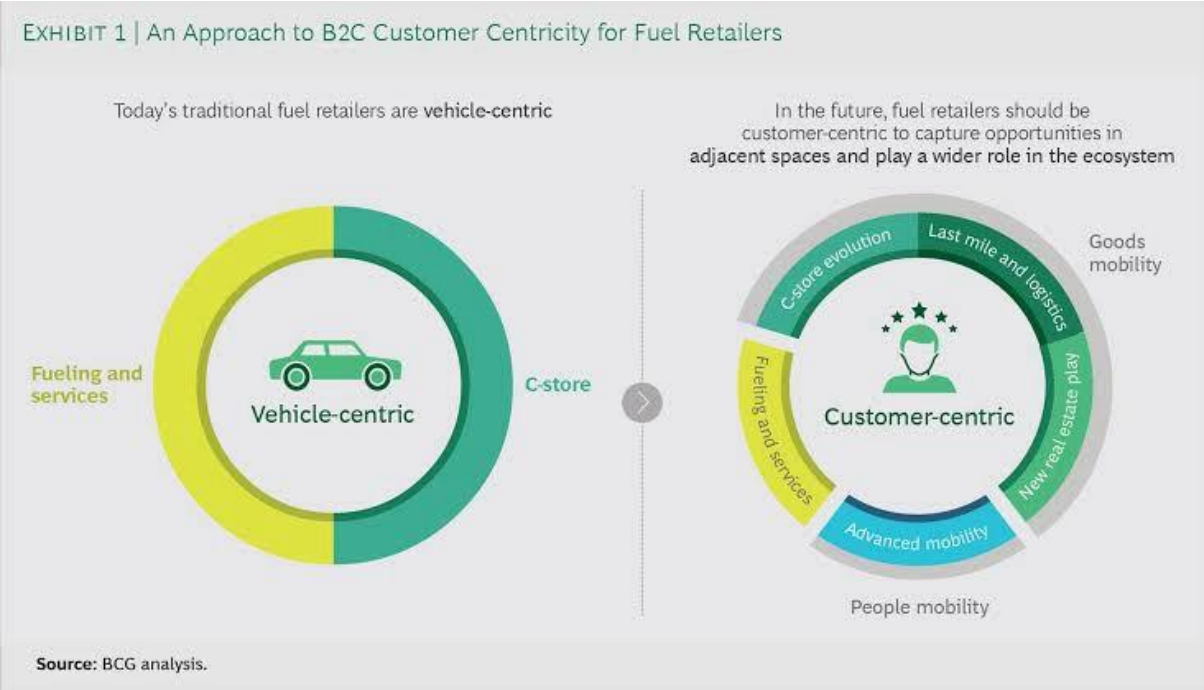


Fig 6.5.2: A Shift from a Vehicle Centric Approach to a Consumer Centric Approach

8. CASE STUDIES:

Net Case Study 01: Highway 99, Aakhol, Gujarat:

1. Project Overview:

- Location: Aakhol, Gujarat
- Site Area: 5000-10000 sq. ft
- Architect: Sanjay Puri Architects

2. Concept and Development:

- Local building materials and techniques are proposed, taking inspiration from the Gujarati vernacular architecture in the area where this place is situated.

Fig 8.1.1: Existing village in Bhuj, Gujarat with adobe walls and thatched roofs

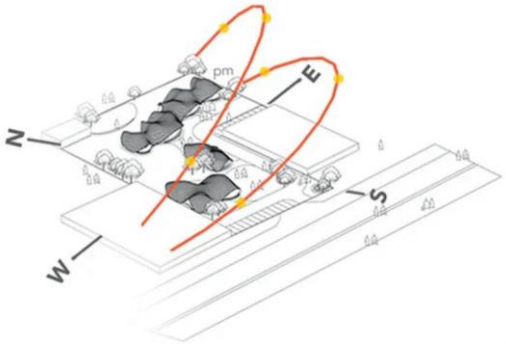


Fig 8.1.2: Sun Path Diagram

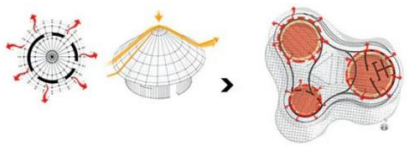


Fig 8.1.3: Plan Concept

- A circular form gives even distribution of lateral forces during earthquake

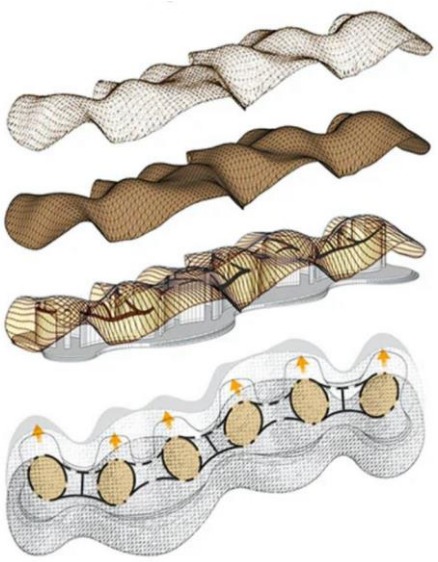


Fig 8.1.4: Roof Detail

- In response to the desert climate of the region all the facilities are north oriented. They are proposed to be built in adobe with straw thatched roofs and bamboo framework.

3. Salient Features:

    - Bamboo provides stiffness as well as versatility while being light weight and easily available.
    - Low hanging thatched roofs protect the interiors from the harsh heat and are also light-weight.
    - Circular/Elliptical shaped walls make the structure stable and less prone to wind and seismic damage.
    - Mud Walls keep the interiors cool during summer and warm during winters.

Fig 8.1.5: Render View

4. Site details and Surroundings:

Fig 8.1.6: Site Plan

5. Concept:

The Gujarat state government is constructing new roads to connect small villages and farmlands, improving existing infrastructure. These villages lacked basic amenities like electricity, water supply, and proper roads for many years. The new roads require facilities for travellers, such as rooms, washrooms, and highway restaurants. Inspired by the local vernacular architecture called 'Bhungas,' circular structures adapted for earthquake-prone areas, the design uses affordable materials like adobe and thatch. The buildings are north-oriented for shade, considering the harsh desert climate. This approach is cost-effective, sustainable, and eco-friendly, with construction costs at only 12 Euros per sq. ft. Multiple such facilities are planned over the next two years, promoting sustainable and traditional construction methods in the region.

6. Site Section:

Fig 8.1.7: Site Section

7. Photo Gallery:

Fig 8.1.8: Render Views

Net Case Study 02: United Oil Gasoline Station, Los Angeles, United States:

1. Project Overview:

- Location: La Brea and Slauson avenues in Los Angeles's Mid-City neighbourhood
- Site Area: 630 m2
- Architect: Kanner Architects
- Year: 2009
- Manufacturers: Bendheim, Lamberts

2. Concept and Development:

The United Oil Gas Station combines the city's car culture history with modern convenience, featuring a unique design integrating a 12-pump gas station, mini-market, and car wash. The structure resembles freeway interchanges in Southern California, with a concrete ramp guiding patrons over the mini-market to the car wash. A curving metal structure forms the roof, extending as a canopy over the pumps. This daring design revitalizes the streetscape, creating a distinctive and functional space for vehicular needs and quick shopping.

3. Site details and Surroundings:

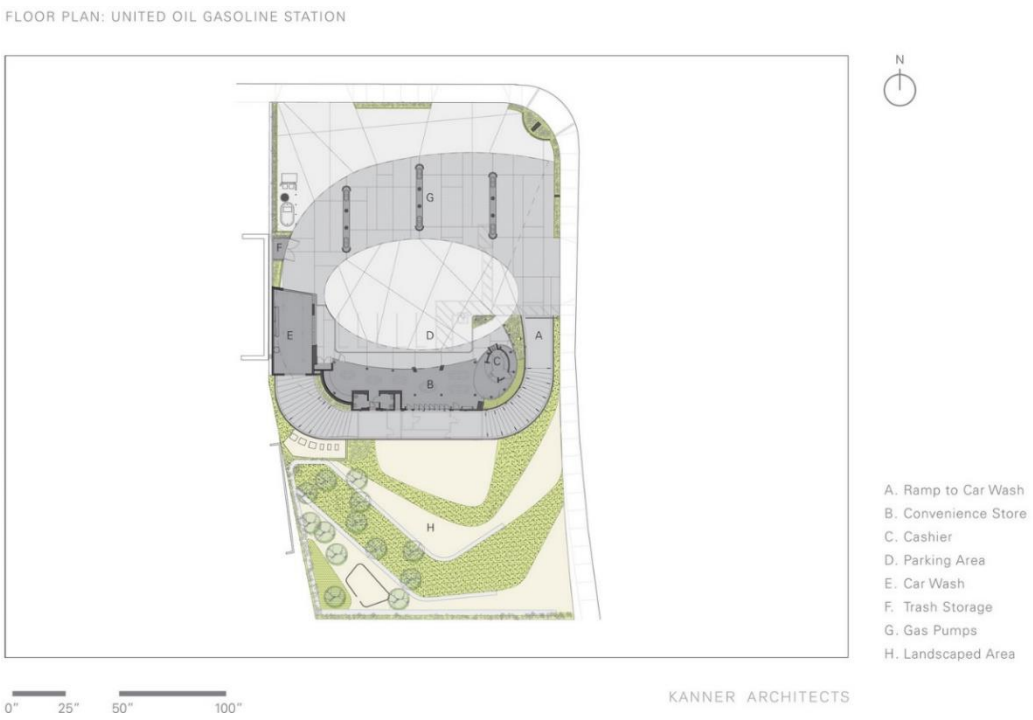


Fig 8.2.1: Site Plan

4. Elevation:

- East Side Elevation

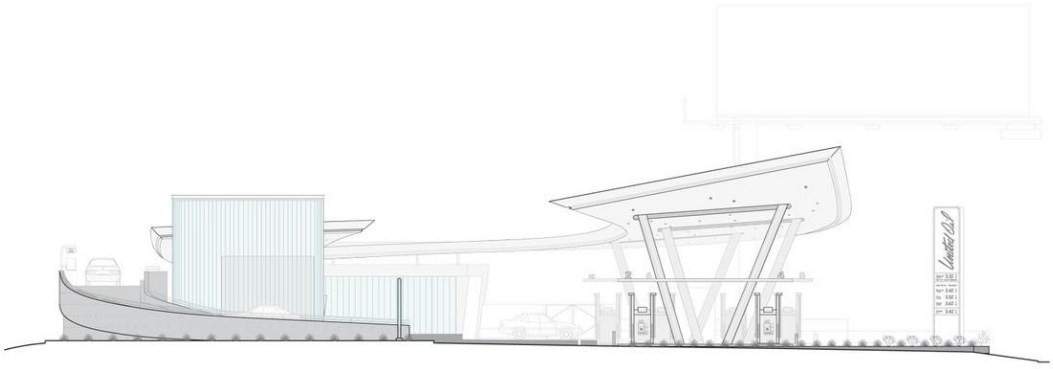


Fig 8.2.2: East Side Elevation

5. Photo Gallery:

Fig 8.2.3: Views

Net Case Study 03: Yangmei Rest Area, Taoyuan City, Taiwan, China:

1. Project Overview:

- Location: Taoyuan City, Taiwan, China
- Site Area: 1300 m2
- Architect: Betty Chou Architect & Associates, Chin Ying Hao Architect
- Year: 2022

2. Concept and Development:

- The Yangmei Rest Area along a major highway has a straightforward purpose: a convenience store and restrooms. The design aims to bring nature and simplicity to the often-artificial highway setting. The building features a large roof, three cylinders, and a tower visible from the highway. The tower, covered in mesh, houses a store on the ground floor and mechanical space above. Restrooms are arranged in three cylinders of different sizes, each with a garden courtyard at the centre. The design enhances visibility, improves queuing efficiency, and prioritizes public safety in this busy highway rest area.

Fig 8.3.1: View

- The large roof above the cylinders and the store provides ample shade, creating a unified space. Steel columns support the roof, defining an open area with lights and seating. The roof's shape adapts to the site's dynamic environment and invites people inside. Gaps in the roof allow for effective ventilation in the subtropical climate. The roof reflects daylight around the garden courts and directs rainwater to nourish the gardens. Despite budget and time constraints, the construction used precise procedures, with all structures made of

architectural concrete within six months. The design, while simple, enhances the short stay for visitors, offering a serene spot amid the hustle of highway travel.

Fig 8.3.2: View

3. Site detail and Surrounding:

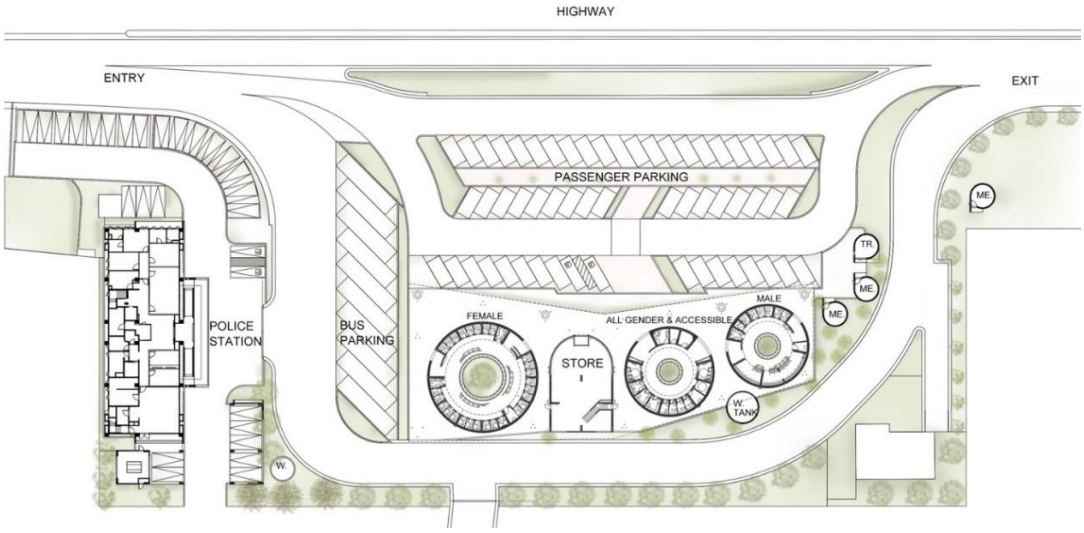


Fig 8.3.3: Site Plan

4. Section:

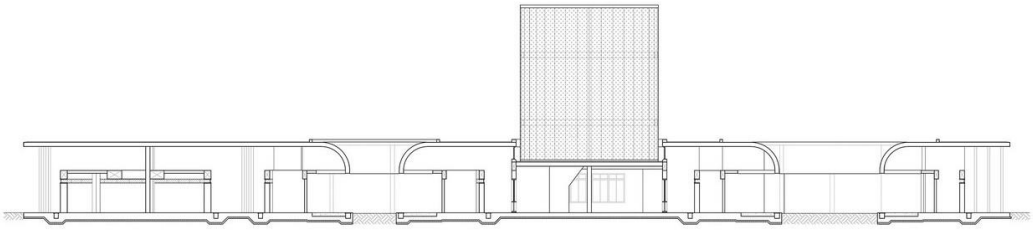


Fig 8.3.4: Section

5. Photo Gallery:

Fig 8.3.5: Views

Net Case Study 03: Approved Master Plan for DME (Delhi Mumbai Expressway); Sites Under Construction:

1. Project Overview:

- Location: Delhi-Mumbai Expressway
- Site Area: Average Site Area 7Hectares

2. Opportunity:

- Fuel Stations
- Food Courts/ Dhaba's
- Hotel & Convention Centre
- Guest & Meeting Rooms
- Banquet & Wedding Halls
- Warehouse & Logistic Facilities
- Automobile Showrooms
- Auto Workshops
- Convenience Store & ATM
- Trucke User & Parking
- Truckers Dormitory/ Self Laundry/ Self Cooking
- Clean Washrooms & Drinking Water
- Ample Bus & Car Parking
- Electric Charging Station
- Children Play Area & Landscaping
- Medical Clinic, First Aid, Minor Service Area, Doctor on Call
- Village Haat (Gram Bazaar), Local Craft Shops
- Regional Design Components & Village Haat

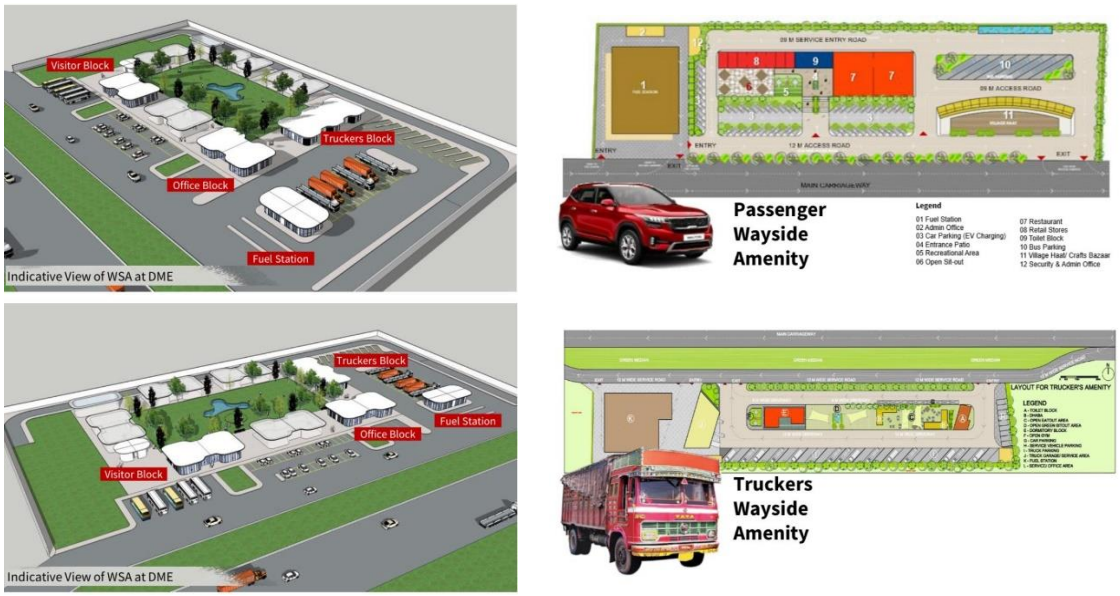
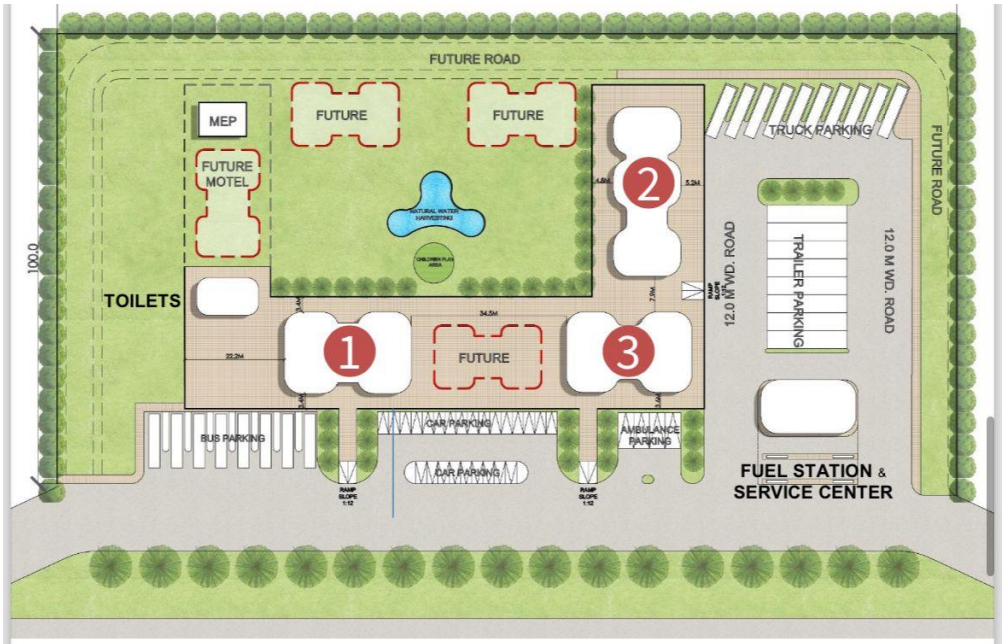


Fig 8.4.1: Indicative Layouts

3. Site detail and Surroundings:



Block No.	Block Category		Item	Block Area (Sq.m)
1	Visitor Block		Restaurant	467
			Travel Info & Passenger Facility	
			Telephone Kiosk	
			Toilet	
			Parking - Car	1,081
			Parking - Bus	847
			Car Service Station	483
			Bus Service Station	
			Service Station & Repair Shop	
			Spare Part Shop	
			Fuel Station	
			Children Play Area	
		Sub Total		2,879

Block No.	Block Category		Item	Block Area (Sq.m)
2	Truckers Block		Dormitory	264
			Dhaba	
			Telephone Kiosk	
			Toilet	
			Parking Truck	2,432
			Parking - Extra Large Trailer	1,005
			Service Station & Repair Shop	288
			Spare Part Shop	
			HCV/ LCV Service Station	
			Fuel Station	
		Sub Total		3,990
3	Office Block		Trauma	590
			Parking Ambulance	
			Maintenance Office	
		Sub Total		590
4	Miscellaneous		Waste Dump & Treatment	130
			ESS	
			Water Reservoir Tank	
			Soak Pit/ Septic Tank	
			Solar Plant	
		Sub Total		130
		Total		**7,589**

Fig 8.4.2: Master Plan

4. Photo Gallery:

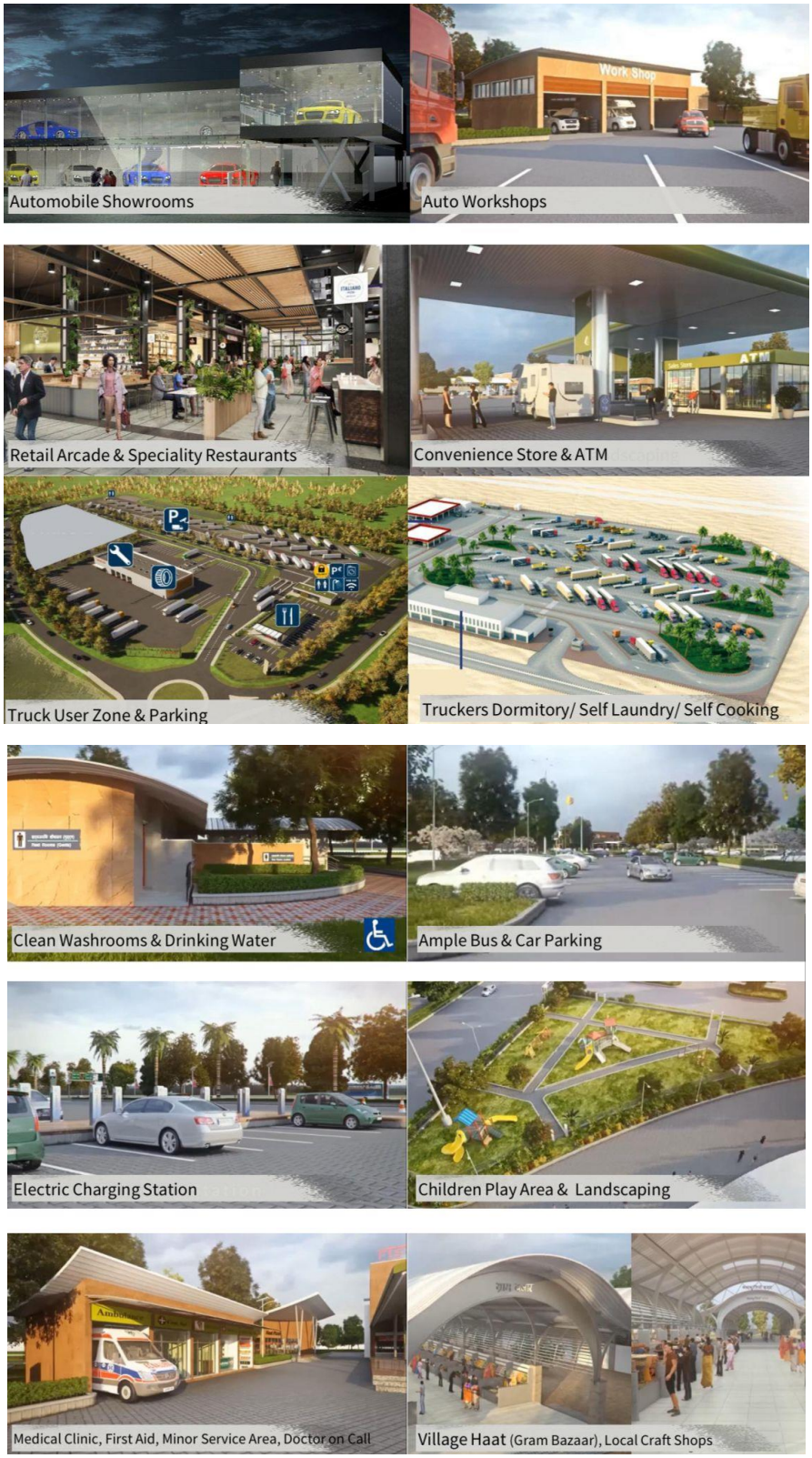


Fig 8.4.3: Render View

Live Case Study 01: Foodway, Mumbai-Pune Expressway, Sarsan, Maharashtra:

1. Project Overview:

- Location: Sarsan, Khalapur on Mumbai Pune Expressway
- Site Area: 4.65 Hectares (11.49 Acres)
- Built Area: 2.03 Acres
- Architects: StudioBoxx, Mumbai
- Project Management Consultants: StudioBoxx, Mumbai
- Client: Expressway Truck Terminus and MSRDC
- Land Ownership: Maharashtra State Road Development Corporation Ltd. (MSRDC)
- Functional Provisions: Food Court, Fuel Station and Truck Terminus
- Status: Completed in 2018

2. Concept & Development:

- The project in Sarsan, Khalapur, on the Mumbai Pune Expressway includes a food court, fuel station, and truck terminus on an 11.49-acre site. StudioBoxx Architects in Mumbai handled the master planning, architecture, interior design, and project management. This facility boasts one of the largest food areas and fuel stations in the country. Positioned at the heart of the expressway, Foodway aims to capture the energy of people in the twin cities, offering a unique exposure for brands. Notably, the facility features both quick-serve restaurants and fine dining, catering to a variety of tastes.

3. Location and Proximity:

- Foodway is located on a very busy part of the Mumbai-Pune Expressway, near the Khalapur Toll Plaza, with around 500,000 vehicles passing by on average.
- It's just 1500m from the toll plaza, 8 kms from Adlabs Imagica, and 18.6 kms from Lonavala, attracting 36,000 visitors every day due to its convenient location.

Fig 8.5.1: Conceptual View (source: MSRDC)

Fig 8.5.2: Location (source: MSRDC)

4. Salient Features:

- Food Court with A 40,000 Sq. Ft. Carpet Area.
- Totem Of 22m Height With 2.5m Height Per Level.
- 3,000 Persons Per Hour Serving Capacity.
- Toilets For Special Needs and Drinking Water Facility.
- 60,000 Persons Per Day Serving Capacity.
- Loading/Unloading Bay Via Service Passage.
- 1,200 Persons Total Seating Capacity.
- Multiple DGs With Metered Supply.
- 575 Persons Seating Capacity on The Ground Floor.
- Water Supply by Tankers and STP Present on Site.
- 12,500 Sq. Ft. Common Dining Area.
- IOC Fuel Station Of 0.88 Ha Area.
- Semi-Open and Double Height Dining Space.
- Service Capacity Of 3,000 Customers Per Hour.
- 125 Car And 10 Bus Parking Bays.
- 10% YoY Traffic Rise Expected at Facility.
- Truck Terminus With 125 Parking Bays.
- 1,500 Turnover of Vehicles Per Hour.

5. Concept & Structure:

- The building has a sturdy structure with a grid of 8m x 8m and a lightweight roofing system covered with double insulation.
- Circular columns support the front, and there's a continuous archway for multiple entrances.
- The structure is mostly double-height and open, allowing natural light and ventilation, creating a comfortable environment for visitors. This openness suits the tropical climate of Mumbai-Pune.
- The food court layout includes anchor shops in the corners, washrooms in the centre, and kiosks along the front. This setup encourages visitors to move through the facility seamlessly.
- Loading/unloading areas and other services are located at the back and on the first floor.

6. Site detail and Surroundings:

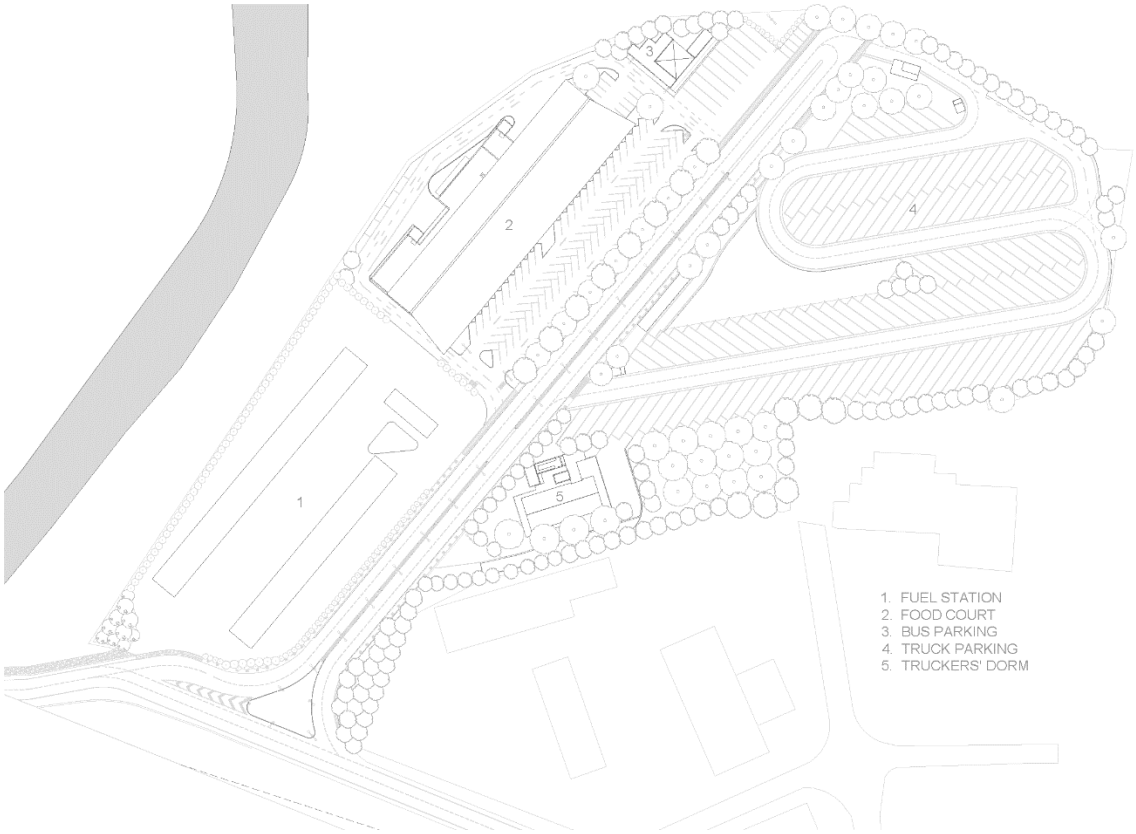


Fig 8.5.3: Site Plan and Surroundings of the Foodway

7. Floor Plans:

Fig 8.5.4: Ground Floor Plan

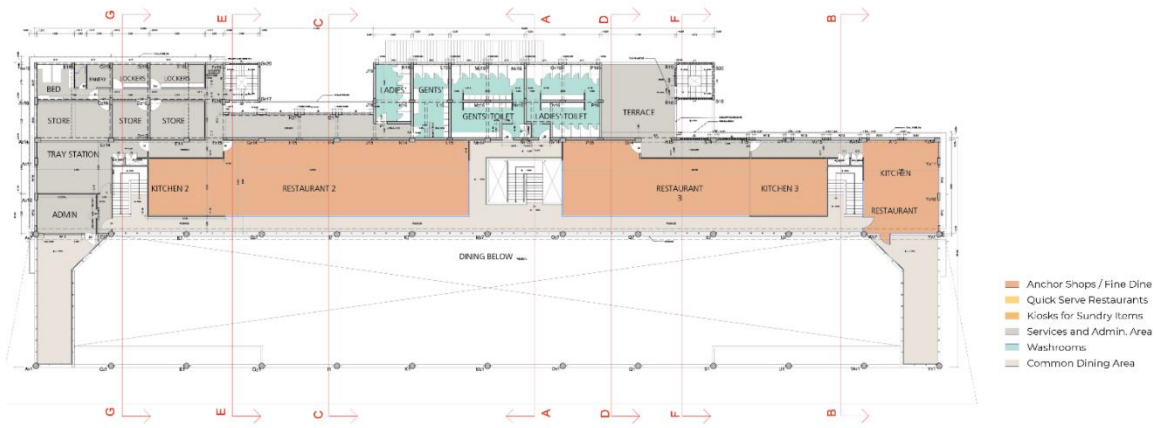
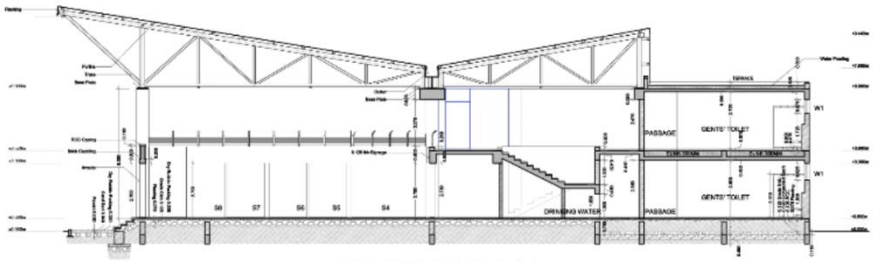
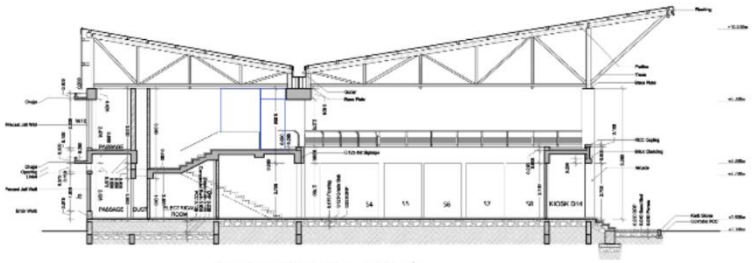


Fig 8.5.5: First Floor Plan

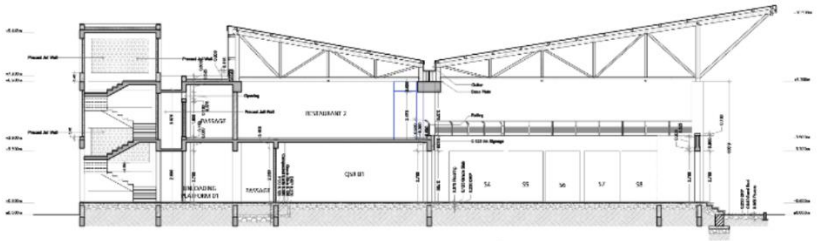
8. Sections:



SECTION AA'



SECTION BB'



SECTION EE'

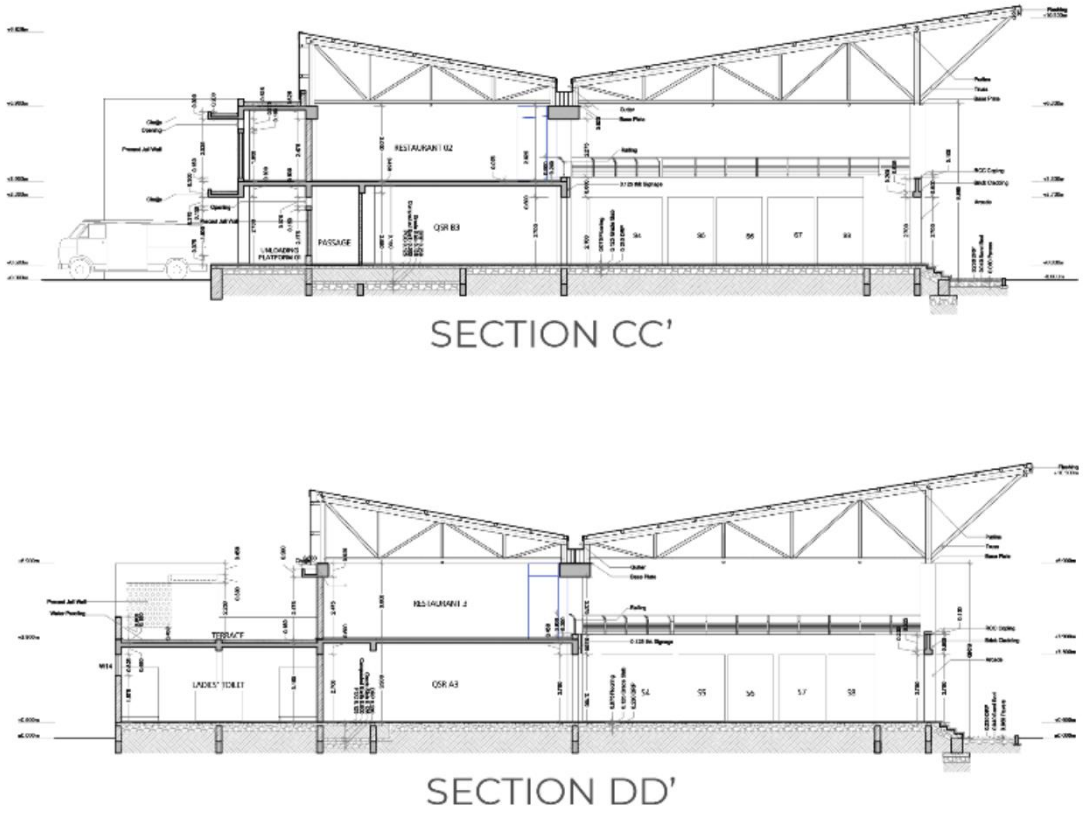


Fig 8.5.6: Sections

9. Elevations:

Fig 8.5.7: Elevations

10. Photo Gallery:

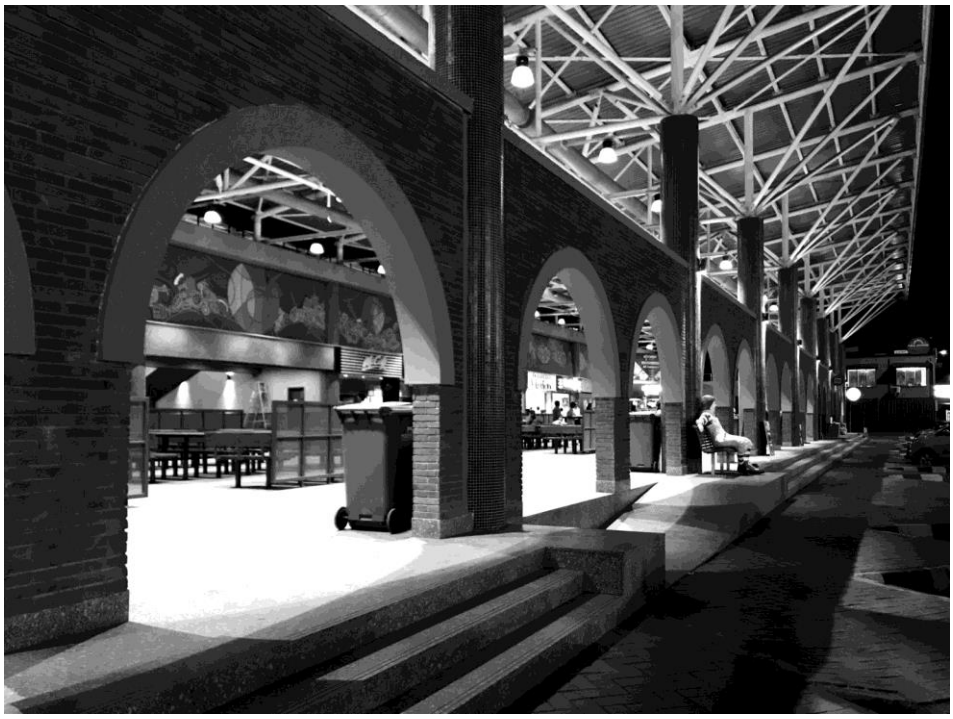


Fig 8.5.8: Views

Live Case Study 02: Ocean Grand Cube, Mumbai-Pune Expressway, Khopoli, Maharashtra:

1. Project Overview:

- Location: Khopoli on Mumbai Pune Expressway
- Site Area: 5.66 Hectares (14 Acres)
- Client: Expressway Truck Terminus and MSRDC
- Land Ownership: Maharashtra State Road Development Corporation Ltd. (MSRDC)
- Functional Provisions: Food Court, Upcoming Fuel Station and Truck Terminus
- Status: Completed in 2020

2. Concept & Development:

- The project in Khopoli, on the Mumbai Pune Expressway includes a food court, an upcoming fuel station, and truck terminus on an 14-acre site. This facility boasts one of the largest food area. Positioned at the heart of the expressway, This Centre aims to capture the energy of people in the twin cities, offering a unique exposure for brands. Notably, the facility features both quick-serve restaurants and fine dining, catering to a variety of tastes.

3. Location and Proximity:

- Ocean Grand Cube is located on a very busy part of the Mumbai-Pune Expressway, near the Khalapur Toll Plaza, with around 500,000 vehicles passing by on average.
- It's just 1500m from the toll plaza, 8 kms from Adlabs Imagica, and 18.6 kms from Lonavala, attracting 38,500 visitors every day due to its convenient location.

4. Salient Features:

- Food Court with 40 shops in it.
- Timings: 7AM-1AM
- Footfall: 5000-6000 Cars, 350+ Buses, 300+ Trucks.
- 3,500 Persons Per Hour Serving Capacity.
- Toilets For Special Needs and Drinking Water Facility.
- 80,000 Persons Per Day Serving Capacity.
- Loading/Unloading Bay Via Service Passage, lifts.
- 1,500 Persons Total Seating Capacity.
- Multiple DGs With Metered Supply.
- Water Supply by Tankers and STP Present on Site.
- Common Dining Area.
- Semi-Open and Double Height Dining Space.
- 400 Car And 35 Bus Parking Bays.
- 12% YoY Traffic Rise Expected at Facility.
- Truck Terminus With 200+ Parking Bays.
- 3000 Private Cars, 1000 Transport cars, 300-350 buses, 300 trucks Turnover of vehicles a day

- Truck Terminals was constructed in 2019
- Dormitory facilities for drivers with attached toilets and Dhaba's.
- Low rates for drivers to afford stay and food.
- Office Management staff: 12 including Plumber and Electrician.
- Food Outlet Staff according to their brand.
- No Future Expansion Plan.
- Approx. 90% vehicles stop on the Food Plaza.
- Tunnel Storage facility with material lifts for loading and unloading of raw materials.
- OWC Plant also provided.
- Waste food and organic matters used for producing manures.

5. Concept & Structure:

- The building has a sturdy structure with a lightweight roofing system covered with double insulation.
- The structure is mostly double-height and open, allowing natural light and ventilation, creating a comfortable environment for visitors. This openness suits the tropical climate of Mumbai-Pune.
- The food court layout includes anchor shops in the corners, washrooms in the centre, and kiosks along the front. This setup encourages visitors to move through the facility seamlessly.
- Loading/unloading areas and other services are located at the back with material lifts.

6. Site detail and Surroundings:

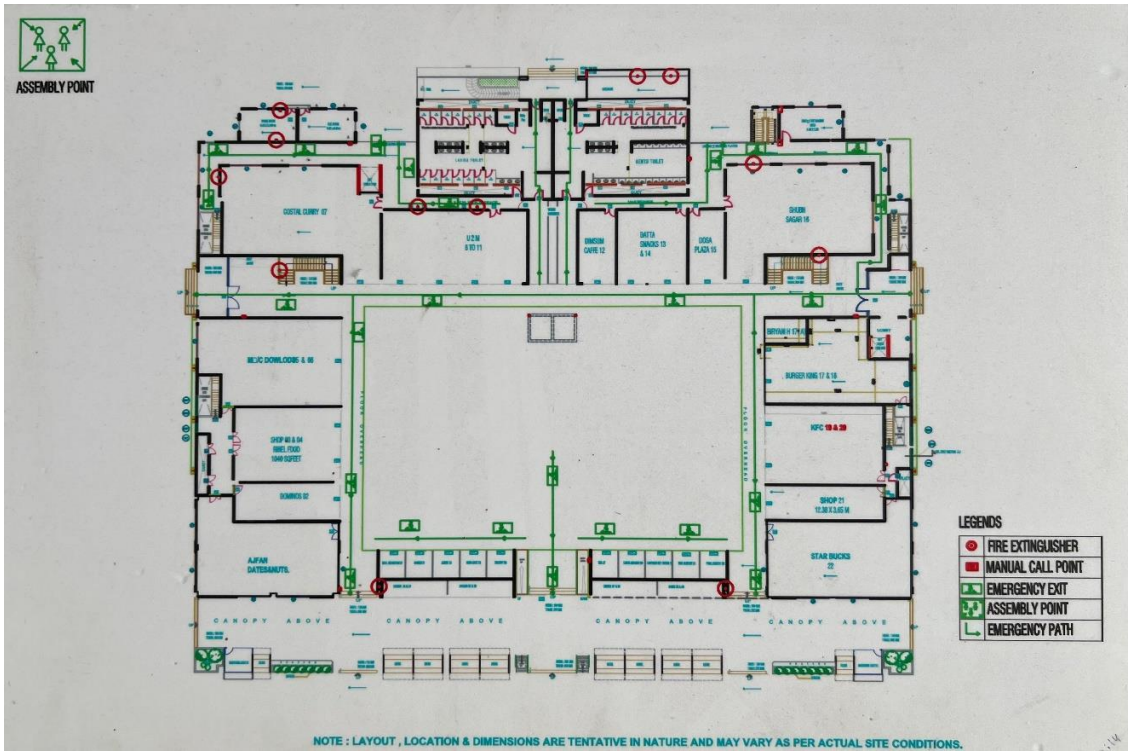


Fig 8.6.1: Site Plan and Surroundings of the Food Court.

7. Photo Gallery:




Fig 8.6.2: Views

Fig 8.6.3: Fuel Station

Fig 8.6.4: Truck Terminus

Fig 8.6.5: Trucker's Dhaba and Dormitory

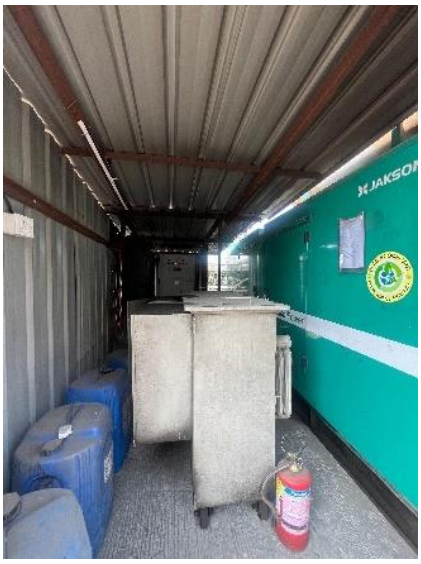


Fig 8.6.6: Service

Live Case Study 03: Hotel Aram Regency, Khambaktki Ghat, Satara, Maharashtra:

1. Project Overview:

- Location: Khambatki Ghat on NH4 Highway – Satara
- Site Area: 12 Acres
- Client: Private
- Land Ownership: Private
- Functional Provisions: Food Court, Upcoming Cinema Hall, Food Mall and Food Park
- Status: Completed in 2018

2. Concept & Development:

- The project in Khambatki Ghat, on the NH4 which includes a food court, an upcoming Cinema Hall, Food Mall and Food Park on an 12-acre site. This facility boasts one of the largest food areas. Notably, the facility features both quick-serve restaurants and fine dining, catering to a variety of tastes.

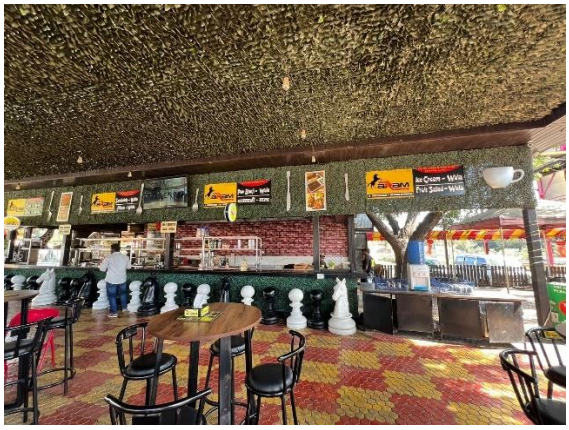
3. Location and Proximity:

- Hotel Aram Regency is located on a very busy part of the NH4 highway, near the Khambatki Tunnel, with around 500,000 vehicles passing by on average.
- It's just 23km from the toll plaza, 40kms from Satara, and 4 kms from Khambatki, attracting 2500 visitors every day due to its convenient location.

4. Salient Features:

- Snack Court with 9 counters in it.
- Timings: 6:30AM-9PM
- Footfall: 2000 for Snack Counters, 500 for Restaurant.
- Toilets For Special Needs and Drinking Water Facility.
- Loading/Unloading Bay Via Service Passage, lifts.
- Multiple DGs With Metered Supply.
- Common Dining Area.
- Semi-Open and Double Height Dining Space.
- Total Staff: 80 persons.
- Parking for 30-35 cars, Two-wheeler parking on roadside.
- Kids Play Area with Adventure Park, Skyline, Zipline, High Ropes
- Sales: 60-70K daily.
- Upcoming theme park and cinema with 150 capacity.
- Future Expansion space of 2Acres for Hotel and Lodging.

5. Photo Gallery:



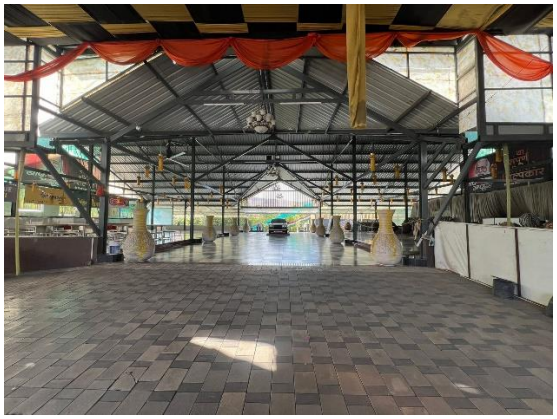



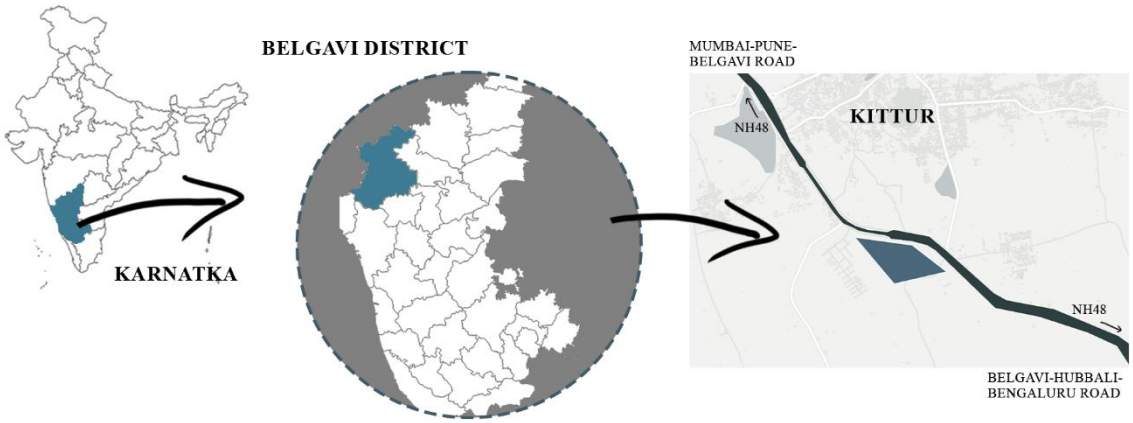

Fig 8.7.1: Views

9. COMPARATIVE ANALYSIS

PARAMETRES	LIVE CASE STUDY	NET CASE STUDY 1	NET CASE STUDY 2
NAME	Foodway, Mumbai-Pune Expressway	Highway 99, Gujarat	Yangmei Rest Area, China
LOCATION	Mumbai-Pune Expressway, Sarsan	Aakhol, Gujarat	Taoyuan City, Taiwan, China
ARCHITECT	StudioBoxx, Mumbai	Sanjay Puri Architects	Betty Chou Architect & Associates, Chin Ying Hao Architects
CLIMATE	Tropical, Wet and Dry Climate	Hot and Humid	Subtropical
SITE AREA	4.65 Hectares (11.49 Acres)	5000-10000 sq. ft	1300m2
BUILT UP AREA	2.03 Acres	-	-
YEAR OF CONSTRUCTION	2018	Under Construction	2022
DESIGN	integrates a food court, fuel station, and truck terminus, showcasing one of the country's largest food areas and fuel stations	Mud Walls keep the interiors cool during summer and warm during winters.	to bring nature and simplicity to the often-artificial highway setting.
CONCEPT	The structure is mostly double-height and open, allowing natural light and ventilation, creating a comfortable environment for visitors.	Local building materials and techniques are proposed, taking inspiration from the Gujarati vernacular architecture in the area where this place is situated.	The building features a large roof, three cylinders each with a garden courtyard at the center, and a tower visible from the highway.
FACADE	The building has a sturdy structure with a grid of 8m x 8m and a lightweight roofing system covered with double insulation.	They are proposed to be built in adobe with straw thatched roofs and bamboo framework	RCC
AMENITIES	Food Court, Rest Area, Parking, Shops,	Food court, Parking, hotel, rest area	Rest rooms, large courtyard
SERVICES	Water Supply and drainage, fire Existing, Hvac	Water Supply and drainage, fire Existing, Hvac	Water Supply and drainage, fire Existing, Hvac

10.SITE SELECTION & ANALYSIS

LOCATION: Kittur, Belagavi, Karnataka



PLOT AREA: 74020.20 SQ.M (18.291 ACRES)

HISTORY & TOURISIM:

Kittur, a village in Karnataka, India, became famous in the 19th century for the Kittur Uprising of 1824-25. The brave queen, Rani Chennamma, fought against the British East India Company trying to take over. Even though she fought hard, the rebellion was stopped, and Rani Chennamma became a symbol of resistance. Today, Kittur is a reminder of its history and the strong spirit of its people who fought for freedom against colonial rule.

CLIMATE:

Kittur village in Karnataka generally experiences a tropical climate. Summers are typically hot with temperatures reaching highs, often above 30° C Monsoon season, from June to September, brings heavy rainfall, contributing to the region's greenery. Winters are mild, with temperatures dropping to around 15-20° C.

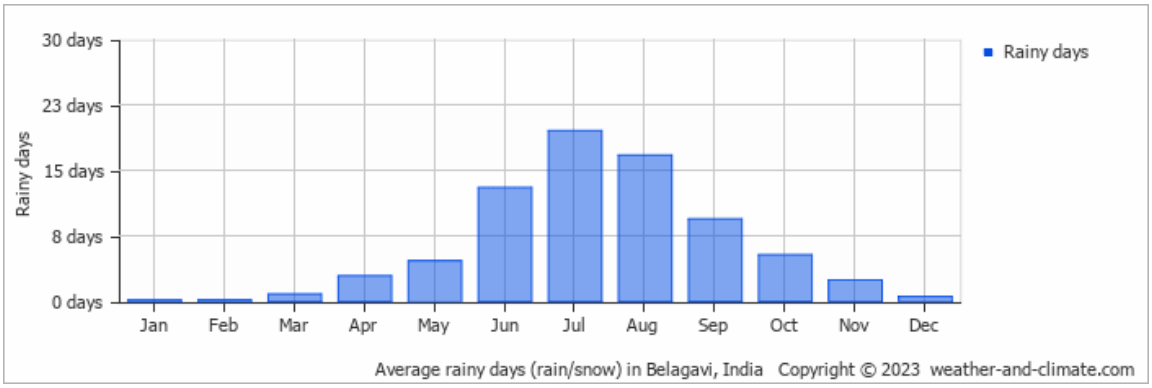


Fig 11.1: Average Rainfall

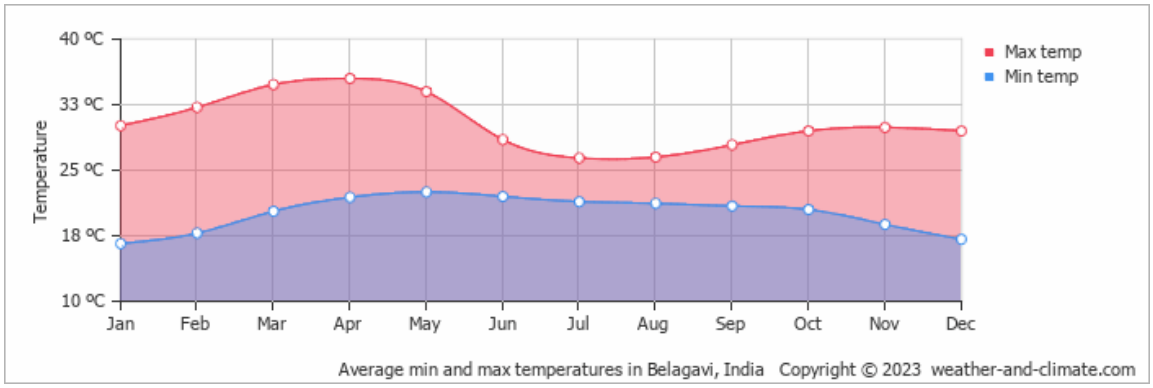


Fig 11.2: Average Min-Max Temperature

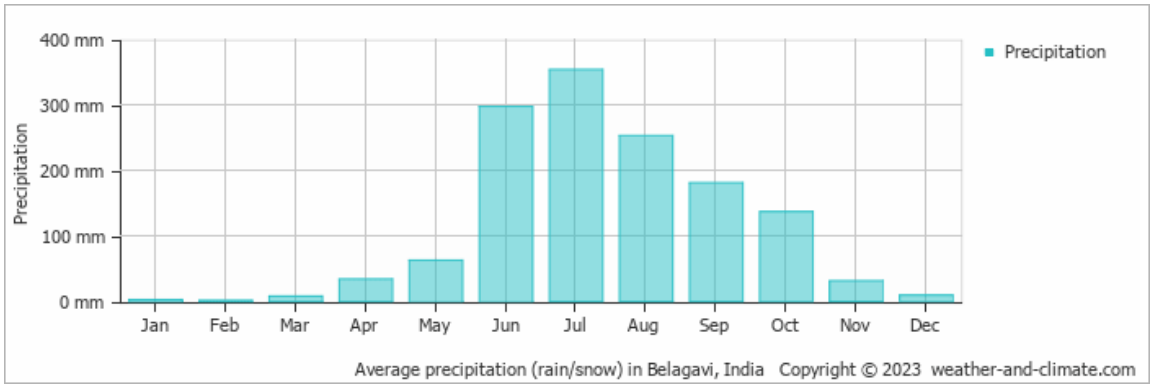


Fig 11.3: Average Precipitation

DEMOGRAPHICS:

Kittur is a large village located in Haveri Taluka of Haveri district, Karnataka with total 478 families residing. The Kittur village has population of 2343 of which 1177 are males while 1166 are females as per Population Census 2011.

In Kittur village population of children with age 0-6 is 301 which makes up 12.85 % of total population of village. Average Sex Ratio of Kittur village is 991 which is higher than Karnataka state average of 973.

LITERACY RATE:

Kittur village has lower literacy rate compared to Karnataka. In 2011, literacy rate of Kittur village was 68.71 % compared to 75.36 % of Karnataka. In Kittur Male literacy stands at 79.22 % while female literacy rate was 58.00 %.

NH4 HIGHWAY:

NH 4 linked four of the 10 most populous Indian cities – Mumbai, Pune, Bangalore, and Chennai. NH 4 was 1,235 km (767 mi) in length and passed through the states of Maharashtra, Karnataka and Tamil Nadu. It is now numbered as National Highway 48.

NH 4 constituted roughly 90% of the Golden Quadrilateral's Mumbai–Chennai segment.

Maintained by NHAI

State: Karnataka

Major Cities: Belgaum, Hubli, Dharwad

AMENITIES:

NATURE:

An Industrial Complex Is Situated in The Vicinity of The Site At A Distance Of Around 20kms.

TOPOGRAPHY:

The Site Is Slightly Sloppy.

VEGETATION:

The Site Is Open Site and Has Very Few Natural Trees.

WATER SUPPLY:

Water Supply Through Municipality

SITE SELECTION AND JUSTIFICATION:

Site Code – Bangalore to Belgaum/NH4/457+648/LHS/Dharwad/Karnataka

- Site Location

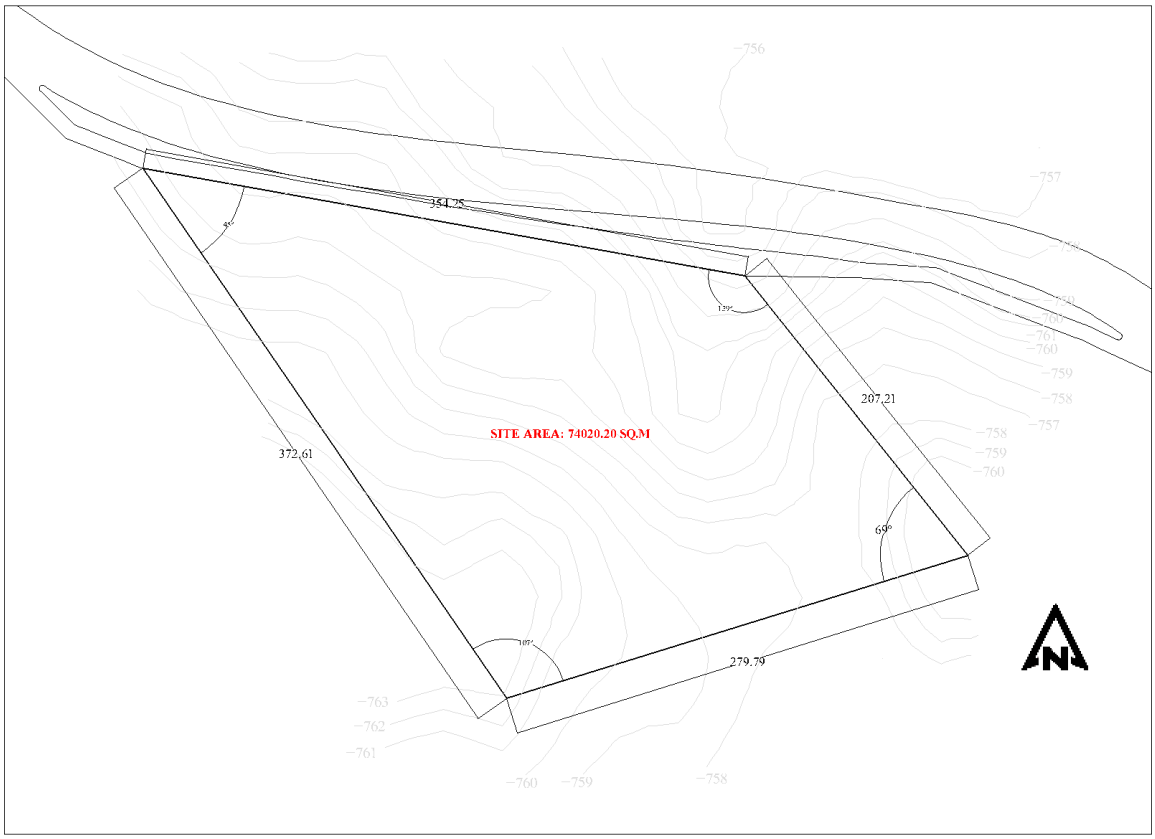
Parameters	Details
NH Number	4
Geo Coordinates	15.587195, 74.784979
Chainage	457+648 (L.H.S)
Local Access	Directly from NH 4 via service road
Land Area	3.87 Ha
Location of nearest Toll Plaza	Hirebagewadi Toll Plaza

- Site Attributes

- Site Photographs

Fig 11.2: Sanctioned Document

SITE PLAN:



11.DESIGN PROGRAM:

To create a functional and attractive design, we had to address several key aspects based on the building type and its needs:

- Understanding the surroundings
- Considering the weather conditions
- Ensuring easy access
- Planning movement and management
- Balancing open and built areas
- Integrating necessary services
- Deciding on construction methods and materials

SPACES:

- Food Court
- Retail Outlets
- Restaurants
- Hotel
- Fuel Station
- Driver's Rest Area
- Parking

FINAL REQUIREMNTS:

SR.NO.	REQUIREMNTS	NUMBER	AREA (IN SQ.M)	TOTAL AREA (IN SQ.M)	CAPACITY
A.	**WAYSIDE AMENITY BUILDING**				
	1. RECEPTION AND WAITING AREA	2	50	100	
	2. RESTAURANT				150
	2.1 RECEPTION	1	25	25	
	2.2 DINING AREA	2	150	300	
	2.3 KITCHEN	1	50	50	
	2.4 STORAGE	1	30	30	
	2.5 COLD STORAGE	1	20	20	
	2.6 TOILETS AS PER NORMS				
	3. CAFÉ				100
	3.1 DINING AREA	1	200	200	
	3.2 KITCHEN	1	30	30	
	3.3 STORAGE	1	20	20	
	3.4 TOILETS AS PER NORMS				
	4. LOCAL ARTISAN AREA				200
	4.1 DANCE & MUSIC HALL	1	500	500	
	4.2 LOCAL SHOPS	12	25	300	
	4.3 TOILETS AS PER NORMS				
	5. MANAGEMNET AND SECURITY				
	5.1 RECPTION & WAITING AREA	1	25	25	
	5.2 DIRECTOR CABIN	1	40	40	
	5.3 MANAGER CABIN	1	20	20	
	5.4 HR CABIN	2	20	40	
	5.5 ADMIN OFFICE	1	30	30	
	5.6 SECURITY OFFICE	1	30	30	
	5.7 PANTRY	1	25	25	
	5.8 TOILETS AS PER NORMS				

	6. BANQUET HALL				350
	6.1 HALL	1	500	500	
	6.2 DINING AREA	1	150	150	
	6.3 PREPARATION AREA	1	50	50	
	6.4 TOILETS AS PER NORMS				
	7. EVENT HALL	1	300	300	150
	7.1 TOILETS AS PER NORMS				
	8. GYMNASIUM	1	300	300	
	8.1 TOILETS AS PER NORMS				
	9. HOTEL				38ROOMS
	9.1 HERITAGE ROOM	8	40	320	(100)
	9.2 DELUX ROOM	24	50	1200	
	9.3 GRAND SUITE	4	150	600	
	9.4 AMBASSADOR ROOM	2	200	400	
	10. SPA				
	10.1 RECEPTION AND WAITING	1	25	25	
	10.2 SPA ROOM	3	15	45	
	10.3 DRINKS COUNTER	1	20	20	
	10.4 STORAGE	1	15	15	
	10.5 LEISURE AREA	1	50	50	
	10.6 TOILETS AS PER NORMS				
	11. INFITY POOL	1	500	500	
	11.1 TOILETS AS PER NORMS				
	12. LAUNDRY	1	90	90	
	13. HOUSE KEEPING	1	60	60	
	TOTAL			**6410**	

B.	**FOOD MALL**				
	1. DINING AREA-1	2	1000	2000	1200
	2. FOOD SHOPS	26	40	1040	
	3. DRIVE THROUGH COUNTERS	2	100	200	
	4. RETAILS STORES	6	100	600	
	5. TOILETS AS PER NORMS				
	TOTAL			**3840**	
C.	**RESORT**				
	RESORT	10	60	600	20
	TOTAL			**600**	
D.	**STAFF QUARTERS**				
	1. 2BHK ROOM	2	150	300	
	2. 4BHK ROOM	2	300	600	
	TOTAL			**900**	
E.	**TRUCKERS DORMITORY**				
	1. RECEPTION	1	25	25	
	2. DINING AREA	1	300	300	150
	3. KITCHEN	1	50	50	
	4. PANTRY	1	20	20	
	5. STORAGE	1	20	20	
	6. DOUBLE BED DORM	14	15	210	
	7. GROUP DORM	4	30	120	
	8. GAME AND LEISURE AREA	1	500	500	
	9. TOILETS AS PER NORMS				
	TOTAL			**1245**	

F.	**FUEL STATION**				
	1. ADMIN OFFICE	1	30	30	
	2. SALES OFFICE	1	20	20	
	3. MANAGER OFFICE	1	20	20	
	4. CAR SHOP	1	30	30	
	5. TOILETS AS PER NORMS				
	TOTAL			**100**	
G.	**CLINIC & POLICE ROOM**				
	1. RECEPTION AND WAITING	1	50	50	
	2. POLICE ROOM	2	20	40	
	3. INVESTIGATION ROOM	1	50	50	
	4. DOCTORS ROOM	2	25	50	
	5. EMERGENY ROOM	1	60	60	
	6. TOILETS AS PER NORMS				
	TOTAL			**250**	
TOTAL AREA OF ALL BLOCKS				**12985**	

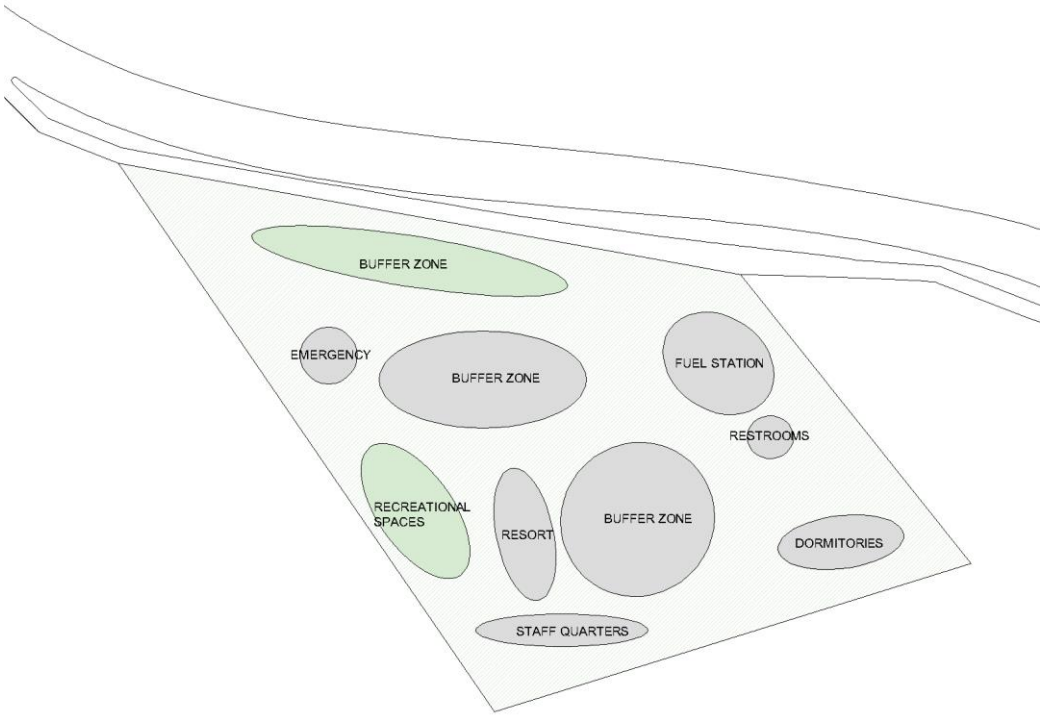
AREA CALCULATIONS:

AREA CALCULATIONS		
TOTAL PLOT AREA:	**74020.20 SQ.M (18.29 ACRES)**	
DESCRIPTION	**COMMERCIAL PREMISE**	**FUEL STATION PREMISE**
AREA	**70132.8 SQ.M (17.33 ACRES)**	**3887.40 SQ.M (0.96 ACRES)**
GROUND COVERAGE	**40%**	**40%**
FAR	**1.5**	**2**
PERMISSIBLE BUILT-UP AREA	**105199.2 SQ.M**	**7774.8 SQ.M**
PERMISSIBLE GROUND COVERAGE	**28053.12 SQ.M**	**3109.92 SQ.M**
SETBACKS	**6M ON ALL SIDES**	**6M ON ALL SIDES**
HEIGHT RESTRICTIONS	**24M INCLUDING PARAPET**	

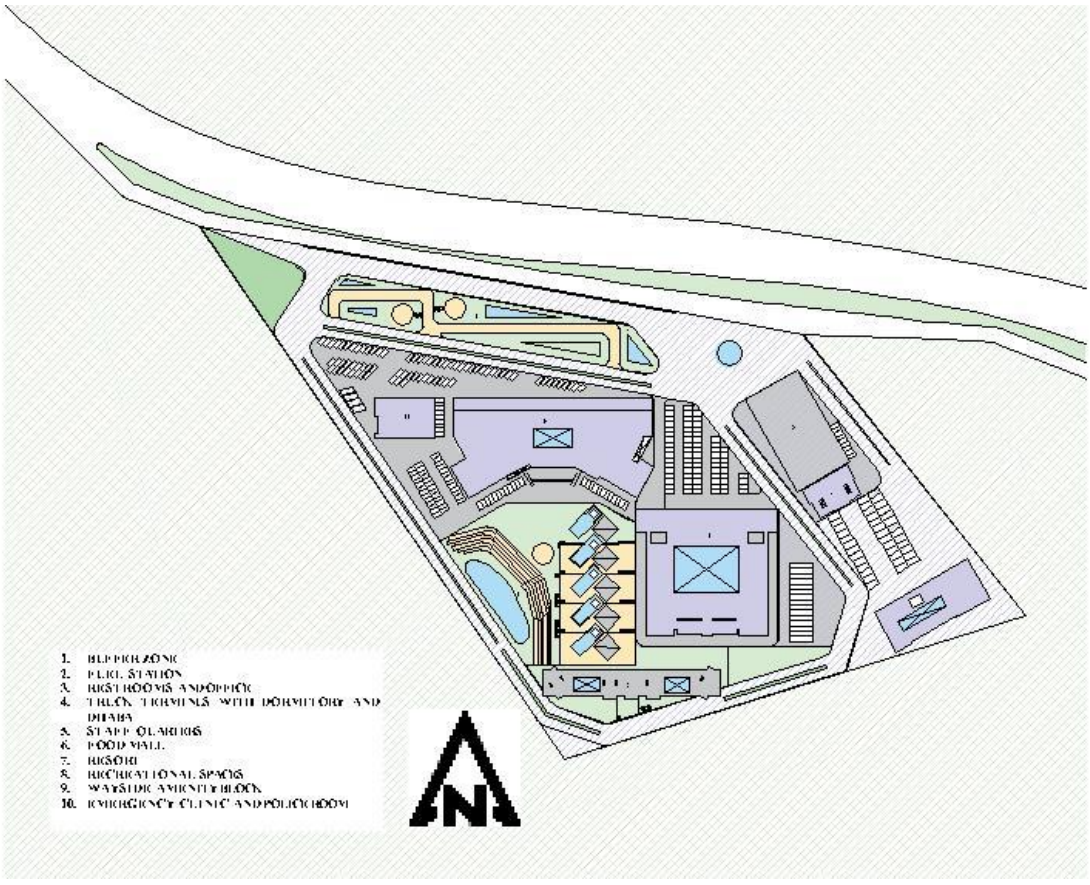
BUILTUP AREA CALCULATION:

FLOORS	GROUND FLOOR	FIRST FLOOR	SECOND FLOOR	THIRD FLOOR	FOURTH FLOOR	TOTAL
A. WAYSIDE AMENITY BUILDING	4115.67	4115.67	3353.43	2959.73	135.61	**14680.11**
B. FOODMALL	2868.36	3996.08	110.46			**6974.9**
C. RESOT	303.1	303.1				**606.2**
D. STAFF QUARTERS	624.99	273.34				**898.33**
E. TRUCKERS DORMITORY	1064.57	1226	35.57			**2326.14**
F. FUEL STATION	394.762					**394.762**
G. CLINIC AND POLICE ROOM	509.37					**509.37**
TOTAL BUILT-UP						**26389.81**
TOTAL GROUND COVERAGE	**13334.46**					

ZONING:



SITE PLAN:



SERVICES CALCULATIONS:

1. Electricity Load Calculations:

- Average Connected Load/ Consumer: 3 KW (Commercial)
- Maximum Population of the Facility at a time: A. Wayside Amenity Building (1050 Guest + 50 Staff) + B. Food Mall (1200 Guest + 50 Staff) + C. Resort (20 Guest + 5 Staff) + D. Staff Quarters (25) + E. Truckers Dormitory (200 Guest + 10 Staff) + F. Fuel Station (30 Staff) + Clinic and Police Room (10)
- Total Population: 2650
- Total Electricity Load Consumption in a day: 7950KW

2. Transformer:

1. Diversity Factor = 80%

   7950 (80%) = 6360KW

2. Power Factor = 0.85

   6360/0.85 = 7482 KVA

3. 10% Future Requirement

   7482 + 10% = 8230 KVA

3 Distribution Transformer of 2800 KVA required.

3. DG Set:

1. Diversity Factor = 80%

   7950 (80%) = 6360KW

2. 10% Future Requirement

   6360 + 10% = 6996 KVA

3 DG Sets of 2400 KVA required.

Power Factor: Power Factor is an expression of Energy Efficiency. It is expressed as a percentage. Power Factor (PF) is the ratio of Working Power, measured in kilowatts (KW), to Apparent Power, measured in Kilovolt Amperes (KVA).

Diversity Factor: Diversity Factor is defined as the ratio of the sum of the maximum demands of the various part of a system to the coincident maximum demand of the whole system. The maximum demands of the individual consumers of a group do not occur simultaneously. Thus, there is a diversity in the occurrence of the load. Due to this diverse nature of the load, full load power supply to all the consumers at the same time is not required.

WATER DEMAND CALCULATIONS:

1. Average Water Consumption: (As Per CGWA, Govt. Of India (Authority, 2016))
   - Hotel (Up to 3-Star): 180 LPCD (Excluding Laundry, Kitchen and Staff)
   - Laundry: No. of Rooms x 5kgs x 60 L/Kg/Wash
   - Restaurants: 70 LPCD
   - Food Court: 35 LPCD
   - Retail: 45 LPCD (Staff) And 15 LPCD (Visitor)
   - Staff: 45 LPCD
   - Visitors: 15 LPCD
2. **Total Water Consumption by all consumers (L):**

   Wayside Amenity Building: 27000 + 63000 + 2250 + 11400 = 103650

   Food Mall: 4200 + 2250 = 44250

   Resort: 1800 + 225 + 3000 = 5025

   Staff: 3375

   Truckers: 8400 + 9000 + 15000 = 32400

   Fuel Station: 1350 + 30000 = 31350

   Clinic and Police Room: 450 + 10000 = 10450

   Total: 230500
3. **Since, 1 Cubic Meter =1000 L**

   Therefore, space required to store the water = 230.5 Cum.

   66.6% For UGT and 33.3% For OHT: 152.13 Cum. (UGT) + 76.06 Cum. (OHT).

   Based on the requirement and distribution of population density, provision of more than one water storage tank will be a more feasible option.

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- https://projectreporter.co.in/prcontentdetail.aspx?Id=4452
- https://www.scribd.com/document/360844472/Executive-Summary-Inlcuding-Annexure-A

ANNEXURE:

1. **No. RW/NH-33044/14/2003-S&R(R)-Pt. GOVERNMENT OF INDIA MINISTRY OF ROAD TRANSPORT & HIGHWAYS (S&R(P&B) Section) Transport Bhawan, 01, Parliament Street, New Delhi-110 001 Dated: 11" February, 20212.**

2. **No. 8-TH-I (3)/2013-Pt- 1 Government of India Ministry of Tourism (H&R Division) C-1 Hutments Dara Shukoh Road New Delhi - 110 011 Tel: 011-23012810 Dated: 19.01.2018**