DESIGN DESSERTATION TOPIC

INLAND PASSENGER WATER TRANSPORT TERMINAL AT BELAPUR

SUBMITTED BY

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Certificate

This is to certify that the Design Dissertation titled
Inland Water Transport Terminal at Belapur

is the bonafide work of the student **Rajat Rahul Sonawane** from Final Year B. Arch 2015 of AIKTC - School of Architecture and was carried out in college under my guidance.

Signature of the guide: _____

Date:

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College Seal
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Name of Student: Rajat Rahul Sonawane

Signature of Student: _____

Date

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(AIKTC SoA)

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Vivek Bhagat Chetan Kadam Micheal Sankati Aroh Thombre,
Rasika mahajan, Nikhil Balachandra, Akshay Jadhav Kalpesh Kumbhar
Deepti Mam Vibhavari mam Bhavika mam Pooja mam.

INDEX

PREFACE

Question: Why can't we have a workable water Transport system in Mumbai

Concern:

To connect navi Mumbai to South Mumbai

Hypothesis:

Can Public Transport Be As Comfortable As Private Transport.

INTRODUCTION

Topic: Passenger Water Transport Terminal at Belapur

THE HISTORY OF MUMBAI

Mumbai was a cluster of 7 islands, but subsequent land reclamation has turned all of them into a single land mass.Mumbai being a natural port with a sheltered harbour developed further into its own manufacturing centre, with the coming of the steam ships in the 1830's and the opening of the Suez Canal a generation later.

When the Portuguese first arrived on the scene the main inhabitants of the islands were the simple fisherfolks known as the kolis, whose hamlets developed in coastal localities like Kolbhat or Colaba, PalvaBunder later known as Apollo Bunder, Dongri, Mazgaon, Naigaon and Worli. A shrine of their patron goddess, Mumbadevi, was built to the south of Dongri and gave the main island its name Mumbai. Now, it is the fastest moving, most affluent and most industrialized city of India. It has the country's busiest airport and port, handling 50% of the country's trade. It is the stronghold of free enterprise in India; a major manufacturing centre for almost everything from cars, bicycles, petrochemicals to pharmaceuticals. It is the centre for India's important textile industry as well as a financial centre and as important base for overseas companies. Nariman Point in South Mumbai has within a short period of time turned into a mini-Manhattan housing many a tall buildings. Along with such rapid urbanization come a host of problems like traffic congestion, pollution, population explosion and a high level of immigration. Hence, it is not surprising that Mumbai plays host to the biggest slum area of Asia i.e. Dharavi.

REASONS FOR DECLINE OF PORT ACTIVITIES:

EVENTS FROM 1980 - 2000:

MUMBAI - GLOBAL CITY

Shifting of industries to the peripheries and decline in port activities

1980: Industrial relocation policy passed new industrial locations in the metropolitan peripheries.
1980's: Cotton mills shut down.
1980's: Warehouses shifted outside the city. Infrastructure in the docklands becomes under used.
1989: New port started at Nhava Sheva.
1995: 'Bombay' renamed to I 'Mumbai'.MbPT activity starts declining.

The economic opportunities provided by the city led to a tremendous increase in the population of Mumbai — causing overcrowding and the over burdening on its infrastructure. The Mumbai Metropolitan Regional Plan 1970-1991 attempted to address these by articulating three strategies to develop an alternative

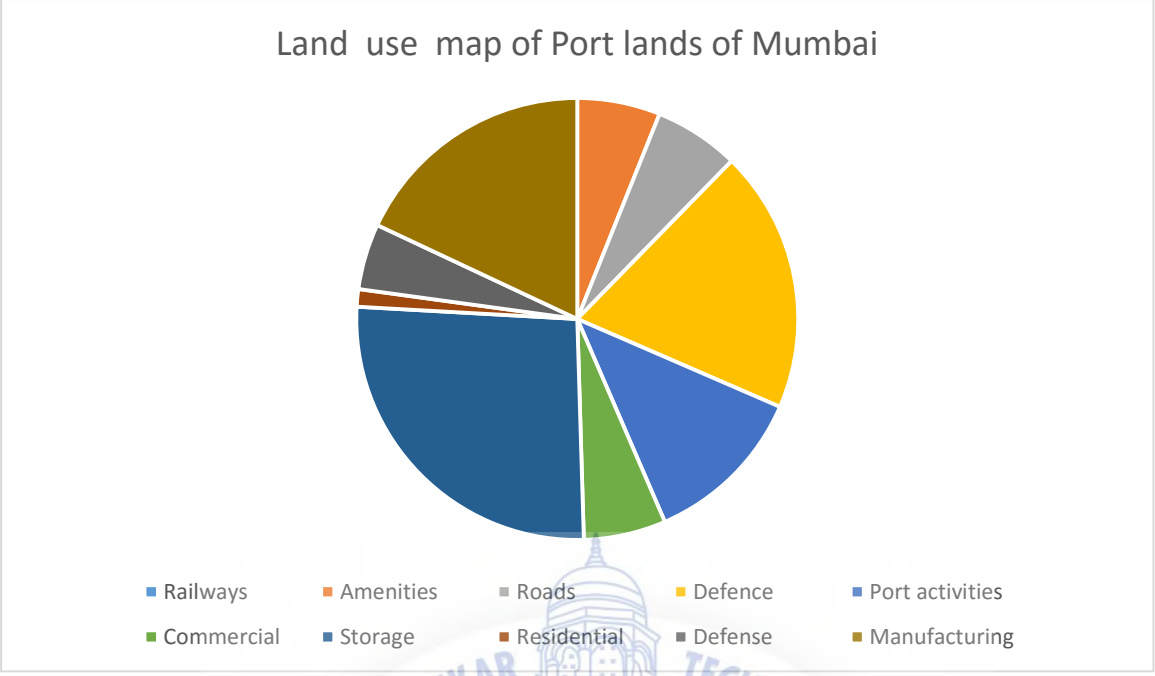
structure for the region:

1) Through the internal reconstruction of the metropolis and dispersal of economic activities to the suburban areas by developing new
commercial centres
2) By developing a multi-town structure
3) Forming a single new counter magnet of
metropolitan size on the counter side of the Mumbai harbour.

The Regional plan suggested the role of Mumbai city as a highly specialized administrative, financial and commercial centre, whereas the peripheries and the surrounding hinterland would undertake industrial and other related activities.

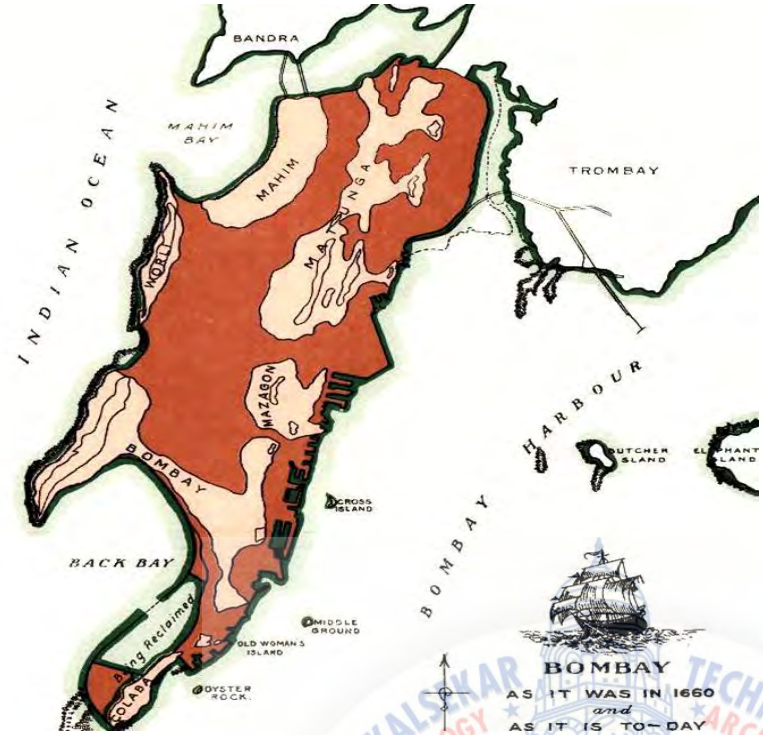
By 1980 a large number of manufacturing industries in the city had already shut down due to the lack of modernization and increasing global competition. This industrial closure brought about a decline in the activities of the Mumbai Port.

Also the modernisation programme of the port is constrained by its physical geography. The Mumbai Port has a draught depth of 9meters and a proposed depth of 10.5 meters. But modern shipping requires a minimum depth of 16 meters. It is this transformation that the Mumbai Port would not be able to achieve in its present location. Moreover, the activities of Mumbai port seem to have been taken over by other technologically developed ports along the West coast of India which have deeper depths.
v on the Eastern Waterfront o Mumbai UDRI



THE CURRENT SCENARIO OF MUMBAI'S PORT LANDS - LAND USE

Mumbai is home to around 10 million people and is still expanding. It is a thriving cosmopolitan multi-cultural city.. "As Mumbai expands and develops its open spaces are shrinking at an alarming rate. The cities shrinking physical open spaces are a visible manifestation as they adversely affect our very quality of life. The land running along the eastern waterfront -the historic city center of Mumbai from Colaba to Wadala can be of crucial importance in the evolution of the metropolitan region so as to provide the 'Mumbaikars' with a better quality of life. Mumbai is negotiating simultaneously its relationship with the metropolitan region as well the many potential spaces or voids that are emerging, or could potentially emerge, along the Eastern waterfront for public use. The city'seastern waterfront is particularly of great relevance, due to its position both in the geography of the city, as well as the metropolitan region. The very connection of the historic city centre to the metropolitan area is dependent on how this stretch of waterfront is recycled for urban use. The Eastern Waterfront totals to 1806 acres, interestingly only 6 per cent of this land is under reservation by the BMC for public uses and less than I per cent actually 0.85 per cent is for open spaces. This is particularly incredible in the light of the fact that there exists 16 km of virtually inaccessible waterfront along the eastern edge of
Mumbai.



Current Traspotation in Mumbai

Bus services

Mumbai's transport authority, Bombay Electric Supply and Transport, popularly called

B.E.S.T runs local buses in the city.

- These buses cover almost all the parts of the city.
- There are three types of buses:

1) Single decker.

2)dou bIc decker.

3)air-conditioned.

Public taxi/Autorickshaw services:

- There are two types of taxis in Mumbai city, Cool Cabs and the standard black and yellow taxi.
- Taxis are used for long distance journey.
- Only taxis are allowed within the city limits, but in the suburbs, the auto rickshaws are a popular means of transport.
- Problems:

1)meter hike.

2)They don't go for short distance journey.

- Strike of taxi /auto driver.

Airways transportation

- Chathrapati Shivaji domestic and international airport.
- It is the biggest international and domestic aviation hub of the country.
- Approximately ,45% of air traffic flows in the airports during peak hours
- Last year, it handled 1,80,000 landings and take-off and over 20 million passengers, with a total of 13.56 million domestic air passengers and 6.73 million international passengers.

Problems :-1)Visibility of light during

rainy season.

2)strike of aviation staff

Reasons for traffic jam in Mumbai

- There is no properdisposal system of waste
- There is no proper drainage system due to which there is water
- logging problem.

- . Hawkers at the road side.

- Increase in supply of infrastructure only draws more traffic onto the system.
- In present scenario there are many narrow roads ¡n Mumbai which leads traffic problem.
- High proportion of personal modes.
- . Parking vehicles on road side.
- .Because of rain, there are many potholes which slows down speed of Mumbai.
- There is no proper disposal system of waste
- There is no proper drainage system due to which there is water logging problem.
- . Hawkers at the road side.

- Increase in supply of infrastructure only draws more traffic onto the system.
-

Traffic woes in Mumbai

- The city seems to be heading for a trafficdisaster with at least 200 cars and 300 two-wheelers being added to its roads

every day, indicating that more people choose to travel by their own vehicles instead of using public transport.

- Data available with the state transport department reveals that until March 2010, 57,846 two-wheelers and 30,118 cars were added to Mumbai's already

congested roads.

- While the total number of vehicles inMumbai has increased by 93,432 since2009, the number of buses, taxis and autorickshaws used as public transportincreased by only 5,083 until March 2010.

Agencies and their responsibilities

- . Mumbai Metropolitan Region Development Authority (MMRDA): Co ordination and monitoring of the overall project. Implementation of Rehabilitation and Resettlement (R & R) activities for rail and non-rail components. Providing counterpart funds on behalf of the Government of Maharashtra.
- Mumbal Rail Vikas Corporation (MRVC): Implementation of all railwayprojects, including coordination of activities of CR, WR and Research Development & Standards Organization (RDSO).
- Municipal Corporation of Greater Mumbai (MCGM): Construction of ROBs, Pedestrian Subways, SATIS, and Traffic Management.
- . Maharashtra State Road Development Corporation (MSRDC):Construction of JVLR and SCLR.
- BEST: Procurement of Buses.
- . Mumbai Traffic Police: Area Traffic Control System.

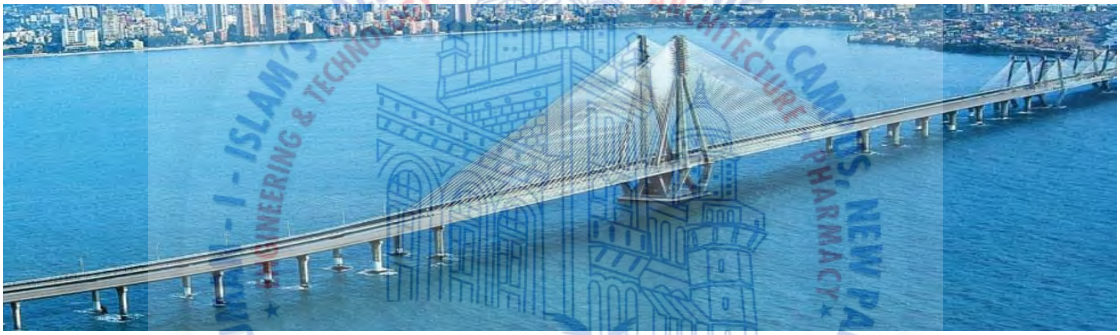
Major development by government

1) Monorail:

- Phase 1
- Expected completion by 2015
- Chembur to Jacob Circle (Ghadge Maharaj Chowk via Mahul). Lokhandwala Complex to Kanjurmarg via SEEPZ - 13.14 km
- Mulund — Borivili - 30 km.
- VirartoChikhaldongr -4.60 km.
- Phase 2
- Expected completion by 2021
- Kalyan to Dombivli via Ulhasnagar - 26.40 km.
- Chembur to KoperKhairane via Ghatkopar- 16.72 km
- Kalyan to Mahape - 21.10 km

2)Bandra — Worli Sealink:

- Additional connectivity from city to suburbs.
- Reduces travel time from 1 hour+ to only 7 minutes.
- Around 1,25,000 vehicles travels through bandra — worli sealink
- Avoids 29 traffic lights
- Save Rs 100 crore a year in vehicle operating costs.



SOLUTION

To Create a convenient water ways

Water Transport — An Alternative

with public rail and road transport systems reaching their saturation point. there is no option but to look for an alternative before it is too late. Mumbai, in this respect is fortunate to have water transport as an alternatives due to its vast coastline. It may be paradoxical to consider water transport as an alternative at this stage as It has not been developed to any meaningful level in the country as on date. The reason for this is that Indians are not very water friendly people. The navy has an interesting definition for a persistent malady that has affected this country the ages its called the Continental Theory, a land- locked mind set that results in sea-blindness. This is also the reason

for lack of infrastructure for water transport has.

Though the and medium speed water transport has been in existence for long in some of the coastal areas ,it has never been seriously considered as an alternate means of transport. In the recent a number of entrepreneurs have come forward to introduce high-speed water transport for the daily commuters in Mumbai ,but the service faced teething problem for the lack of infrastructure. Also,so far it has been affordable to only those masses. transport can have a bright future provided justice is Done.
For example,

Providing service like water transport between Mumbai and navi Mumbai.
Mumbai's linear geographical profile perhaps makes it the one in the world With the centre the scattered at two ends- But island character also.
Admiral Duta Committee in 1933, have sea offered fantastic potential a-Z the city. The percentage of people in Mumbai utilizing the service of public transport in Mumbai is the highest amongst all the metropolises.
The cost of this entire west island freeway could easily be in the region of RS 1 ,000 crore.

A fast passenger sea craft could take somebody distance in nearly the same time and at ales cost.
An entire scheme to build jetties with access roads and buy the craft could be accomplished in half the cost of the freeway.
The bane of al urban traffic congestion and pollution has been motor car, With the aim of all public transport being to remove the maximum number of cars off the roads.

SURVEYS CARRIED OUT
Overall forecast of total peak period travel demands

	1993	2011
Total trips(peak period)	2154860	3260431
-Public transport	1893751	2770691
-Private Vehicles	148167	283516
-Taxi	112942	200224

Overall forecast of Total Peak Period Travel Demands 2010

The overall public transport demand is expected to increase by 47% and demand for private vehicles and taxi travel could rise by some 88%by 2011 .This has resulted in the urgent need for augmenting the existing transportation network.

Road Transport System

Mumbai has suffered inadequate transport with respect to roads that today are totally saturated. Though the road has Seen extended and improved by widening roads, building over bridges and links roads in the suburbs, the situation is so far satisfactory. The road traffic has to be intensively managed by police, aided by linked traffic signal systems, to maximise the throughtput aggravated

during monsoon period.
Furthermore, some of the available alternatives of improvement have dried up or are impeded by involvement of land
Of hutment and slum dwellers. These impediments can delay project implementations by years. The final scenario is that the average speed is slightly less than 20 kph.

Railway network

The suburban "local" trains comprise 9 car rakes designed to carry 1700 passengers. The crush capacity of these tars 2SCO.Haweaerv during peak hours, these trains are now carrying 4000 passengers.

The subsidized fares make this mode of transport highly patronized. However, the duration of travel and inhuman of traving compels people to travel by road even at the cost of paying far in excess.

ARTICALS

INLAND PASSENGER WATER TRANSPORT

WHAT IS THE PROJECT?

Inland Passenger Water Transport Project (IPWT) aims to provide connectivity between south Mumbai's busy commercial hub and the suburbs through ferries.

₹1,300 CRORE to be spent on the project. It is seen as a cheaper alternative to cost-heavy sea links and coastal roads which are pending for want of environment clearances.

Under the plan, the water transport will be started from Nariman Point to Borivli on the western coast and Ferry Wharf to Nerul on the eastern coast.

Officials from the nodal agency Maharashtra State Road Development Corporation (MSRDC) say the project can be operational in **2 to 3 years.**

10 Catamarans
4 Hovercrafts
are expected to be operated on the west coast.

15-20 Minutes The frequency that the water transport project will be operated on initially.

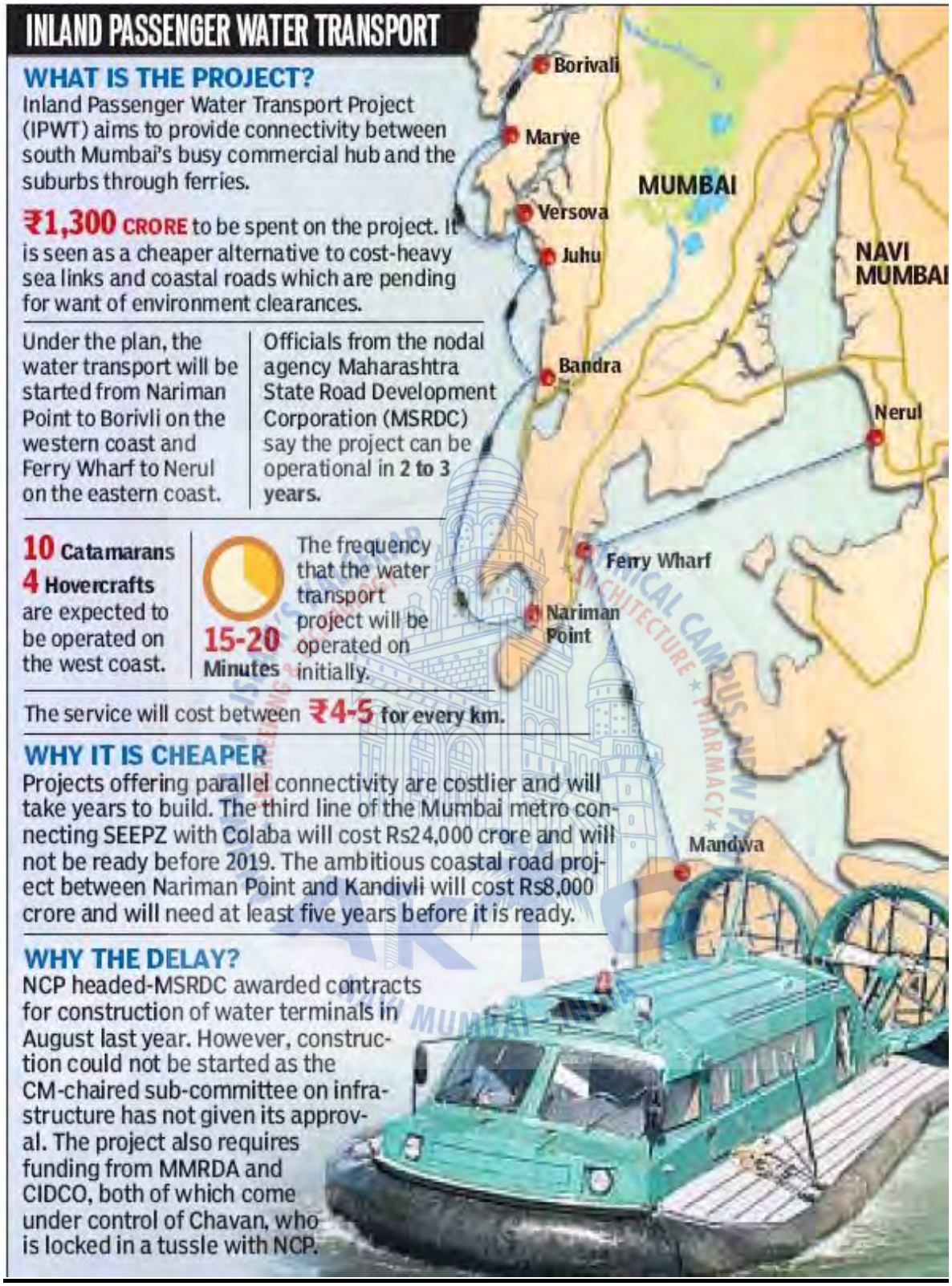
The service will cost between **₹4-5** for every km.

WHY IT IS CHEAPER

Projects offering parallel connectivity are costlier and will take years to build. The third line of the Mumbai metro connecting SEEPZ with Colaba will cost Rs24,000 crore and will not be ready before 2019. The ambitious coastal road project between Nariman Point and Kandivli will cost Rs8,000 crore and will need at least five years before it is ready.

WHY THE DELAY?

NCP headed-MSRDC awarded contracts for construction of water terminals in August last year. However, construction could not be started as the CM-chaired sub-committee on infrastructure has not given its approval. The project also requires funding from MMRDA and CIDCO, both of which come under control of Chavan, who is locked in a tussle with NCP.



Ro-Ro boat to work, passenger water transport plan ready

Commuters will be riding in air-conditioned hovercrafts or catamarans if the CM approves MSRDC's plan

Project Timeline

1983: First suggested in report on "Development of waterways around Bombay Harbour for Commuter Traffic" prepared by Expert Group of Home (Transport) Department

1992: Techno Economic Feasibility for Passenger Water Transport Service made by Kirloskar Consultants for CIDCO

1992: Navi Mumbai-Gateway of India hovercraft services sail for a brief period

1995: CES prepares report for CIDCO titled "Water Transport System between South Bombay & New Bombay"

1995: Report on "Construction of landing points for Hovercrafts & Piers for Catamaran services on west coast of Mumbai"

1996-1998: Hovercrafts ferried Mumbai citizens between Juhu Beach & Girgaum Chowpatty

2000: Kachnar Consultants makes a report for Mumbai Maritime Board titled "Frame work for commuter ferry system on Mumbai's Western water front"

December 2003: Satyagiri Shipping awarded contract for western coast, but in 2008, it's scrapped on 'technical grounds'

2010: Sole bidder Pratibha Industries awarded the work by MSRDC, but the bid duration gets lapsed

July 2011: MSRDC Board approves consultant for a detailed feasibility report for cash contract

March 2012: MSRDC refloats bids as a cash contract in packages

August 2012: Awards tenders to various bidders

October 2013: Still awaits clearance from Chief Minister chaired Cabinet Sub-Committee on Infrastructure

PASSENGER FACILITIES

Lounge & Sitting Areas, Cafeteria, Lifts, Rest Rooms, Stalls, Parking Areas, Administrative Offices, Ticket Windows, ATM, Kiosks

Ferry Wharf-Nerul ₹308.28 cr
J. Kumar-Foundation Specialist

Mandwa ₹63.71 cr
DBM-Supreme Infrastructure

Ferry Wharf to Orange Gate Elevated Road ₹68.74 cr
J. Kumar

EASTERN COAST

Nerul

Boriwali Terminal

Marve Terminal

Varsova Terminal

Juhu Terminal

Bandra Terminal

Bhaucha Dhakka

Nariman Point Terminal

Mandwa

Catamarans/ Ro-Ro Crafts

Speed: 25-29 knots/hour
Vehicle capacity: 50-80 cars
Passenger capacity: 300
Frequency: 10-15 mins (Peak) & 20-30 mins (Non-Peak)

FARE ₹125-150

WESTERN COAST

Catamarans, Hovercrafts

Speed: 25-35 knots/hour
Passenger capacity: 75, 150 & 300
Frequency: 10-15 mins (Peak) & 20-30 mins (Non-Peak)

FARE ₹250-300

Nariman Point-Juhu ₹354.07 cr
J. Kumar-Foundation Specialist

Bandra-Versova ₹241 cr
DBM-Supreme Infrastructure

Marve-Borivali ₹319 cr
HCC-Sadbhav

Compiled by Ateeq Shaikh
Graphic: Ravi Jadhav

SELECTION OF SITES

LANDING SITES

Based on the study maps and development plans site of Belapur was identified.

'The short listed sites have been evaluated for selection using the following criterion

- Stable waterfront
- Adequate depth of waterway.
- Adequate waterway and backup area
- Sheltered location aid tranquil berthing system.
- Adequate protection from wave and swell action.
- Capability to cater to the special requirement of non-conventional crags.
- Accessibility to communication networks.
- Accessibility to essential md emergency services.
- Prospect of the future.

SURVEY AND INVESTIGATION

TOPOGRAPHIC STUDIES

The total area of the site is 80,000sqm .. A part of the area existing road to the NRI colony is being reclaimed by CIDCO.

The Belapur terminal plot is bounded by :

l. North side palm beach marg .
2. Eastside by proposed thane - Uran railway line.
3. South side by proposed water front of Panvel creek .
4. West side by proposed 100 m wide channel.

CASE STUDY

PASSENGER TERMINAL, SHANGHAI

- Located along the 880-metre stretch of the western bank of the Huangpu River, the Shanghai Port International Cruise Terminal is close to the Bund, in close proximity to two Shanghai Metro lines and directly across the river from the Oriental Pearl TV Tower.

- The Shanghai Port International Cruise Terminal is an integrated commercial area comprising a cruise terminal and business offices in the heart of Shanghai city, including relating structures and facilities, such as an international passenger transport terminal, a port administration building, an office building, an art gallery and a music and cultural center.

- Covering an area of 20,000 square meters, and reaching 9 - 13 meters in depth, the international passenger transport terminal can hold 3 luxury cruisers at the same time.

- The terminal is designed with a turnover of 1 million people each year, with its main facilities scattering under a stretch of greenland of 50,000 square meters,

- while the rest of it above the ground is an irregular glass sphere "floating" over the greenland, making it a beautiful landscape along the banks of Huangpu River as well as a great ferry facility.

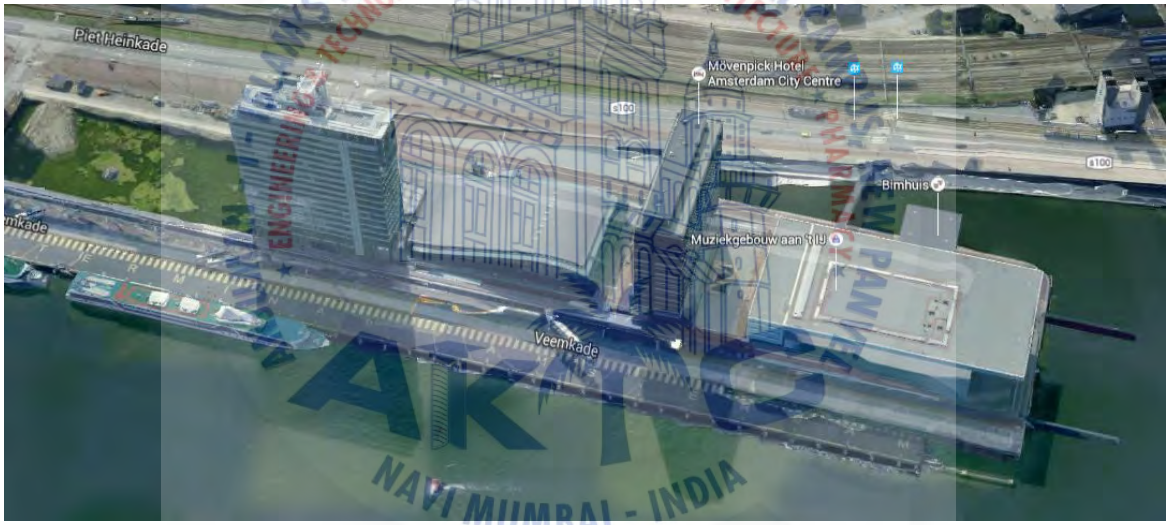
PASSENGER WATER TERMINALS

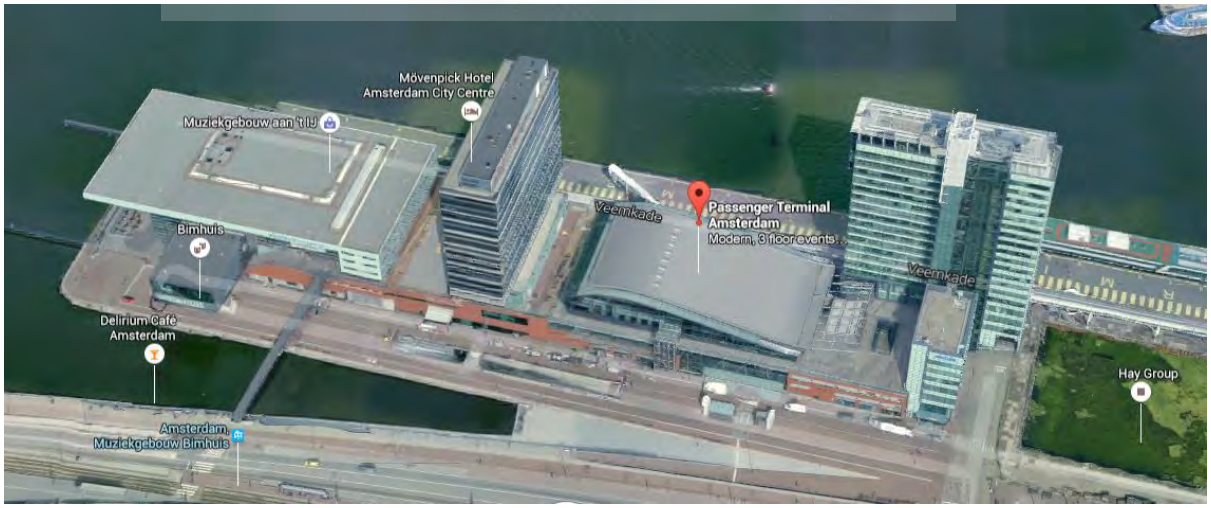
The parcel of land is split into two parts for two different projects, one on Site A, and the other on Site B, connecting to each other closely and together making up the whole of Shanghai Port International Cruise Terminal.

- Site A is intended for the International Passenger Transport Terminal and the Port Administration Building, while Site B is reserved for related structure groups such as the office buildings, galleries and musical art center.
- The Group plans to build nine office buildings (two buildings originally intended for serviced apartment have been changed into office buildings), music and cultural center and an art gallery on Site B.
- The six office buildings on the front are individual buildings which integrate functions and sights with an area of 15,000 to 20,000 square meters, each has an independent naming right, great to be used as headquarters or regional headquarters of international enterprise
- Site B of the Shanghai Port Internationa! Cruise Terminal Project occupies a total area of approximately 85,089 square meters.
- Upon completion, Site B will comprise a total gross floor area of approximately 320,080 square meters.
- The matter of scale is a large factor especially when what you're designing will have to sit at ease beside three 80,000 ton cruise ships that will dock alongside.
- Scale factor is also critical in terms of how the design is perceived from Shanghai's famous Bund to the south.

PASSENGER TERMINAL, AMSTERDAM

- Many cruise ships arriving in the Dutch capital berth at the unique premises on the banks of the IJ in Amsterdam.
- Passenger Terminal Amsterdam team welcomes over 200,000 passengers on an annual basis and efficiently docks the approx.
  100 ships carrying these passengers.
- Passenger Terminal Amsterdam also hosts a large number of events, small and large, and always spectacular.
- An aesthetically pleasing example of modern architecture located within easy walking distance of the city Centre where events can be held to their full advantage.
- Its glass structure creates a transparent and open ambiance, but has options to create a darker environment.





Passenger Terminal Amsterdam provides

many different options for Meetings &Conventions, Exhibitions, Product Launches, Presentations, Dinners, Celebrations,

The three levels in PTA can be used independently of one another, but can also be used in conjunction. These levels are the Main Deck, the Promenade Deck and the Panorama Deck. PTA also has smaller rooms available and an outdoor terrace with a magnificent view, and is easy to reach by car or public transport.

- The area where the Passenger Terminal Amsterdam is situated on the south bank of the IJ has been a part of Amsterdam's seafaring history since 1875.
- In those days, this area was a 1-mile long island built to provide moorings for increasingly larger ocean liners.
- The wave-shaped building has a very nautical appearance and extensive use of glass provides a spectacular view across the IJ harbor and the city.
- In March 2000, the terminal was opened to become the first successful, multi-functional terminal in Europe.
- A beautiful example of modern architecture set in a historical location.

SAGAR VIHAR HOVERCRAFT

TERMINAL VASHI, NAVI

MUMBAI.

SagarVihar Terminal is the first water transport terminal in Nevi Mumbai, for faster public transport from the main island city of Mumbai to Nevi Mumbai. Located on the eastern coast of Mumbai, it is only a 5mins, distance from the Vashi Railway station.

LOCATION:

This terminal is located in sector 7 of Vashi near the Thane creek. The location of the terminal is very advantageous as it is situated amidst residential colonies, which are at a walkabledistance. The maintenance workshop is just a few blocks away in sector 8, so the Hovercraft can be guided along the sea coast to the shed. As the site was marshy, the best option was to use hovercrafts for service. The entire area of this site is 4717sq.m,

STRUCTURE:

All the built forms are in R.C.C. The booking office roof is made of corrugated fibre glass, flooring of poiished granite with well decorated walls. The pathways are covered with non- slippery interlocking cement tiles. The gardens are well landscaped with few seating provisions. The maintenance workshop shed structure is a structure of exposed steel, corrugated asbestos sheets for the roof and is open on all sides. At a time, the shed can take care of 4-5 hover-crafts.

SERVICES:

The first phase that is operational is from Vashito Gateway, while the second phase is from Vashi to Gateway (on the east coast) to CuffeParade to Borivali (on the west coast). The service from Vashi to Gateway is every 30 minutes. Mini bus services were started in Vashicomplimentary for the hovercraft passenger in Vashi. These will cover a 5km distance before returning to the loading site. The booking office hall which is also the company's office is the only waiting area for the people. This waiting space is air-conditioned and can accommodate 12 people. Kiosks, cold-drinks stalls, books,etc. are out in the open with beautiful landscaped gardens, A restaurant is located just outside the terminal, which operates from morning to evening. Provision for both, temporary and permanent car parks are provided for. There are provisions for private and local bus services.

SAGAR VIHAR

ADVANTAGES AND DISADVANTAGES:

The design has been carried out elegantly and importance is given to proper landscaping. Good drainage and power lighting is also accounted for. One thing that is prominently observed is that though parking space is provided, it is not at all adequate. No proper waiting space, no toilet facilities at all, no defined booking and administration offices.
Recently, a full development of the scheme has been proposed by the planning authorities, which is to be implemented soon.

FERRY WHARF (bhahu cha dhakka)

Location:

The new Ferry Wharf is Located on the east coast of Bombay where waters are calm throughout the year and there is little wave action.

The terminal is situated approximately 2-3 miles away to get the adequate dept.

On either side of terminal lies the harbour facilities of mazgaon and mora port

Ferry service :

From this terminal cross harbour service are facilitated to Mora Rewa Mandwa etc.

The crafts in use of the conventional type having passenger capacity of 40-50 people.

Time taken from the terminal to another is approximately half an hour.

Daily Traffic:

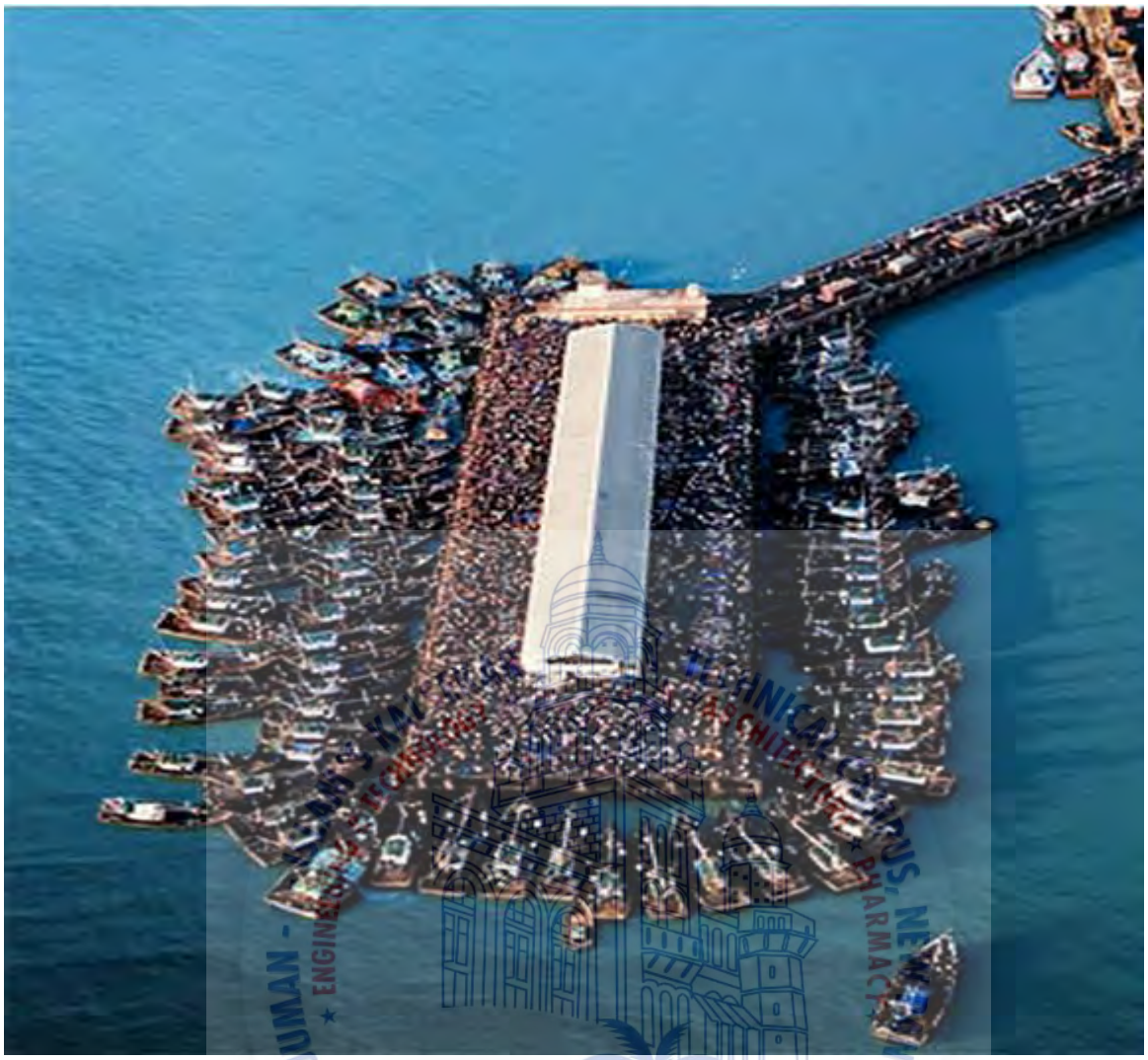
Mora- 1160/day (7lakh passenger per year)

Frequency of trips -30 min

Working hours- 7.30am to 7.30 pm

Trips: 24 from each end

Passenger capacity : 40



1. Public buses bring passengers to the terminal
2. A parking place has been provided for 15cars
3. A waiting space of wooden benches
4. Kiosk for tea and snaks have been provided
5. Ticket windows at the side of waitng area
6. Toilets are provided

   Note :

   Not appropriate design

CONCLUSIONS OF CASE STUDIES

All the case studies selected have achieved excellence in some way, some have developed retail outlets as their central feature; others have successfully incorporated leisure or residential components into their fabric; several have incorporated commercial and corporate real estate and a number have integrated all these elements and in doing so they have created thriving mixed-use water- front developments.

Based on a seminal Urban Design

book Responsive Environments:Amanual for Designers, will explain the urban design qualities that provide for choice at many levels:-

Where people can go - the quality of Permeability; The range of uses available to people - the quality of variety;

How easily people can understand a place - the quality of legibility;
The flexibility to use a place for a variety of purposes - the quality of robustness;

The appearance and enjoyment of places - the Qualities of visual appropriate-ness, and richness;
How comfortable and familiar is the place - the quality of Persona/isation.
In this era of neo-urbanism the old port design as a functional entity seems

ANALYSIS:

While cornparing the various following results. The results of the analysis produce very different coefficients but we observe that all the results are tending towards a generic growth pattern.

The need for the master plan is clear, to transform the fortunes of the seaside from a current position of slow and steady functional activity to a future of achievable and sustained hybrid growth.

The master plan can incorporate a physical strategy to deliver bold andprogressive change, together with regeneration strategies to ensure that the economic, social and cultural opportunities delivered as a result of the design change were accessible. The master plan can be an opening for many port design and can be based on many themes like the 'PORT-MARITIME HUB- BUSINESS AND LEISURE DISTRICT- NEW DOWNTOWN' 'NEW CBD OF THE SEASIDE- EDGE CITY, ETC...

Types of Craft:

Type	Max speed (knots)	Capacity	Max.size (L*B)m	Draught(m)	No.of crafts 2004	Required 2011
Catamaran	14	250	34.0*9.5	1.2	4	8
Catamaran	20	100	20.0*6.0	0.8	4	8
Catamaran	30	80	27.5*5.4	0.6	2	5
Hovarcraft	50	100	24.5*11.0		2	4

Why choose a hovercraft?

In choosing a craft for a new transportation service many factors will have to be evaluated, including acquisition, operating and infrastructure costs, weather and sea characteristics, land price and availability, potential traffic and others. The amphibious capability of the craft can be exploited in a number of ways:

- Reducing of infrastructure costs such as channel dredging and lower cost of shore sides over ports compared with conventional ferry terminal.
- Greater flexibility in siting ferry termini.
- Reduced operating costs through exploiting direct routes across sandbanks, mudflats etc.
- Continued operation in sea, lake or river ice conditions.
- Negligible risk of damage through collision with floating sea andharbour debris, such as logs.
- High speed enables the craft to be utilised more intensively, i.e. more route miles per craft per day.
- Passenger appeal, i.e. time is a valuable commodity and the fastest route has a competitive edge.
- Crafts must have very high mechanical reliability to avoid sailing cancellations due to defects.
- Crafts must be matched to the year round weather conditions over its route.

DESIGN

DESIGN CONCEPT

For a thesis project, the interest was more on site specific topics which concerned with the city at large and indulged in solving problems, the vast stretch of land around city's waterfront are not develop properly to the benefits of the city

DESIGN ATTEMPTS TO INITIATE THIS REGENERATION PROCESS.

CREATING PUBLIC DOMAIN AND TOURIST DESTINATION

To rationalize the existing fabric, reinforcing a sense of identity among the community in that area to comply with their needs, thus creating an architectural language. Creating public spaces will break up the monotony of the area and Perform the function of regulator of the environment.

DESIGN PROPOSAL

This is an attempt to generate a module which allows dealing with issues for an appropriate development solution and tries to evoke its own identity. The revenue earned from the activities like performance area, multifunctional open space, etc. proposed on the site is used for the maintenance of civic activities on the site, thus acting as a module in itself. It should act as a landmark. It should be a flexible, free flowing, vibrant public place with lots of activities taking place.

The need for the master plan is clear, to transform the fortunes of the seaside from a current position of slow and steady functional activity to a future of achievable and sustained hybrid growth. The master plan can incorporate a physical strategy to deliver bold and progressive change, together with supporting regeneration strategies to ensure that the economic, social and cultural opportunities delivered as a result of the design change were accessible.

SITE CIRCULATION:

ASPECTS OF TERMINAL DESIGN

The design of today's terminals tends to be different in expression from their age. Presently they are often designed in such a manner as to take advantage of existing structures that affect the spatial Planning. is greatly paid to problem solving of their interior spaces. There are main functional areas typically housed in most stations; core, transition, peripheral and administrative areas. core areas focus on processing passengers. Conceptually they can be considered as a circle surrounded by closely related areas that includes ticketing, information, baggage handling, reclaiming and waiting. Transit areas connect transit facilities in the core areas to the transportation modes. They usually include secondary, but often essential facilities like restrooms, telephones and commercial spaces. Peripheral areas support circulation outside the main buildings. They often include platforms, tracks, and vehicle service spaces.

Administrative area control both traffic and station management. Found only in some station types that provide complex arrangements for handling a large number of passengers, these areas can be isolated from other facilities or inserted among them.

The four areas described above represent the major physical and functional elements considered necessary in establishing an intermodal consequently must be included in its design. The interrelationship between the four functional areas collectively constitutes an intermodal terminal, To achieve good functional flows among the four areas and smooth connections in and of the terminals, their physical relationship needs to be linked together.
Additionally the space capacity must efficiently handle the increasing number of passengers. Clear routes to other transport modes and to Pedestrian ways should be well designed and safe to use. The width of routes reflect the functions within the building and the scale of other Significant features inside the terminal building need also to reflect functional hierarchies. As a result the main circulation space has to be expanded physically. In many cases, the different roles of the expanded area are usually defined in terms such as connected concourse, concourse, main hall and entrance hall. The voluminous concourse ace occurs to serve these complex activities. Space inside may be The clutter of shops, stalls, information displays, ticket booths and disorienting. forth can increase confusion. Thus the internal circulation reinforcing ties ds to be used in conjunction with narrower routes to help distinguish and minor spaces. The complexity of functions results in the consumption of spaces and organisation of activities. The centre will not serve a useful purpose if the design accommodates only existing elements without taking into account what is new. The design aspect has to serve more than main functions of traditional terminals which provide only normal sequences. Many supported functions therefore have been combined with
the basic ones in order to adequately meet the diverse needs of the public while in transit.

DESIGN OBJECTIVES

Terminal design will need to have regard to the following objectives for the

- An attractive welcoming image
- Urban design impact.
- A distinctive corporate image.
- Provision of links to other transportation systems.
- Provision of parking facilities.
- Provision of links to adjoining properties and foot bridges,
- Safe guard to pedestrians and adjoining properties from noise and air pollution
- Traffic safety on the roads
- No decrease in pedestrian Utility at foot path level.

PLANNING OF TERMINALS

1 With seaside infrastructure facilities form a vital element for any water transport system. Consideration of wave parameters, desired wave tranquillity for the type of crafts, currents, conditions at the proposed locations, site conditions etc., all shape up the various components i water transport system. Apart from topographical and geotechnical data, the model studies , storm wave hind casting studies and wave flume conducted by CWPRS, Pone formed a Primary input to design the respective components such as breakwater, jetties, channel, terminal building etc.

BELAPUR TERMINAL :

URBAN PLANNING :

This present location is by the side of Palm Beach Road and by the side or the existing road of NRI Complex at Nerul. By the side of this location the proposed thane Uran railway line is passing on an over bridge. Presently this land is mainly low lying and
remains under water during high tide levels.

This plot is surrounded by Palm Beach Marg on the north side, the proposed Uren railway line on the east side, the quay line on south side and proposed 100 m wide channel
on the west side.

This side delineation was developed after interactions with various and with the help of preparation of various alternative site plans.

In this process it is found that 29 ha of land will be available to CIDCO for the development of the terminal building and other facilities around the terminal facilities. total area which has been planned for various uses are as follows:

l. Terminal facilities
2. Workshop for hovercraft repairs
3. Plot of commercial activities
4. Plot for residential development.

A) Terminal Building

It has been found that for a large terminal building free and efficient movement of Passenger traffic is achieved if the departure and arrival facilities are on different levels.

The design has been further refined as described below :

It is proposed that the departure facilities such as ticketing booths, passenger concourse, cheek in, security check and departure holding across areas for both hovercrafts and catamarans will be provided in the ground floor with supporting such as restaurants, cafe And toilets. Passenger approach to the first floor level is proposed by means of a and adequate parking facilities for drop off cars, buses and taxis has been provided at level. Two numbers of departure hold have been provided for the hovercraft

passengers in the first phase.

Each hold may be let out to different private agencies.

This is also provision of expansion. The passengers can go to the ground floor by means of an elevator

Adequate provision been made on the ground level for parking of and to receive the passengers at the exits,

The bar on first floor is service from a kitchen below on ground floor and connected by a and lift.

B) Parking Arrangement

The traffic circulation system within the terminal and the entries and the exit of the terminal will be governed by the peak' traffic volume entering the system and the traffic on the surrounding roads. Based on the nodal split ad peak hourly passenger demand which has been given are described previously.

As there is space available for parking elaborate parking arrangements made for the above estimated parking demand While planning the parking arrangements importance has been given to the circulation.

C) Landscaping

Conscious attempt has been made to develop the landscaping on reclaimed land having the top soil of the reclaimed land rich with sweet earth and manure to help good shady and flower trees to create a habitable green micro climate.

Water bodies with planter flowers and large lawn areas at the entrance create a very welcome sculptural effect aid add to the visual and aesthetic quality of the environment.

All the roads and parking area in the complex will be lined with shady trees and palms not
only to create visual effect but also to absorb unwanted noise generated due to the movement of a large volume of vehicles,

D Structural :

structural system has been conceived in a comprehensive manner and intevated

the requirements of architectural planing and design and the services systern

structural arrangment has been planned so as to effect maximum economy and safety

while considering the worst load combination arising out of seismic / wind imposed

loading in accordance with the prevailing codes of practices.

E) Building Materials :

Exterior finish is proposed to be of some permemant durable materials like mosaic or cerartic tiles, sand stone, granite etc. avoiding the need of periodic decorations.

External fenestration is also proposed to be of maintainance free materials like aluminium.

Services and infrastructure facilities

A] Electrical :

the electrical system has been conceived keeping in mind reliability and convenience.

Illumination of all intemal areas will be by means of recessed or surface fluorescent light fittings. All public counters will be illuminated with counter top lights.

All public areas and counters will be provided with sign boards according to intemational standards as in airport installations. Exit signs are envisaged whenever required.

A public address system is proposed for the terminus comprising facilities for playing out music and making arTangements, Vlllis system will be with noise sensing microphones in

selected public areas for automatic volume control.
However the storm drains of reqnired size and capacity shreM be provided af relevant road side so that total storm run off can be suitably collected in the respective promary / secondary dreams and the same can be suitably discharged at that outfall points adjacent to the sea creeks.

It is proposed that the stonn drain shall be in trapezoidal section and side slope horizontal :2 veiticail with suitable yadiellt to achieve self cleansing velocity of 0.9m/s or so.

Fire Protection:

Fire.protection for the safety of the property have been proposed in accordance with the stipulations of the fire authorities, national building code and best practice for multi storied buildings.

Automaiic sprinkler system caters both fire fighting and detection, therefore, no separate system for automatic fire detection send alarm is required for the proposed building In addition to the sprinkler system, wet rivers located neat the stairs in all the floors, fire hydrant system around the building and poriable for extinguishers have been proposed

In choice of fhe materials and the design of the building construction and the interiors,careful consideration will be given to aspects ofthefrehazad potential ofthe material.

Roads : 30 m wide main approach road takes off from junction no 7 of Palm Beach Marg goes south towards the terminal building and security area.This approach road is the main road mining parallel to the proposed 'Thane - Uran railway line for about 450 m, upto security area, where it ends in at a 'T' junction. 'thereafter the light aim of the road alignment guns under the railway for about 50 and fakes n right tum to go out ofthe project area.

left of the main road provides access to the Belapur terminal with commercial and terminal facilities.

A 20 m wide roads takes off from this road and encircling the residential area, provides access to smaller plots of the residential complex.

A 30 m wide road approaches the main terminal building centrally. In the front of the building is the general parking A ramp is provided by the side of parking area, by which vehicles can go up to the first floor level in front of the terminal building and can comedown by the other side of the parking area.

Fuel depot

Efficiency of the hovercraft & catamaran services in enhanced by having a facility for fueling the catamarans and hovercrafts as either of the terminals. A fuel depot for fueling hovercrafts and catamarans is proposed at Belapur terminal, at the eastern side of the hoverport. pnefiel depot and pipeline system are shown in the diagram.

The main components of the fuel depot aid fueling system are :

Storage tanks

l. Pumps

2. Pipeline system with

3. Metering system

4. Fire fighting system

5. Storage tanks are required to provide storage fuel for a weekly consumption of 2 hovercrafts which is 50 kl and weekly consumption of g catamarans which is 75 kl.

Hence a total storage of 125 kl is required.

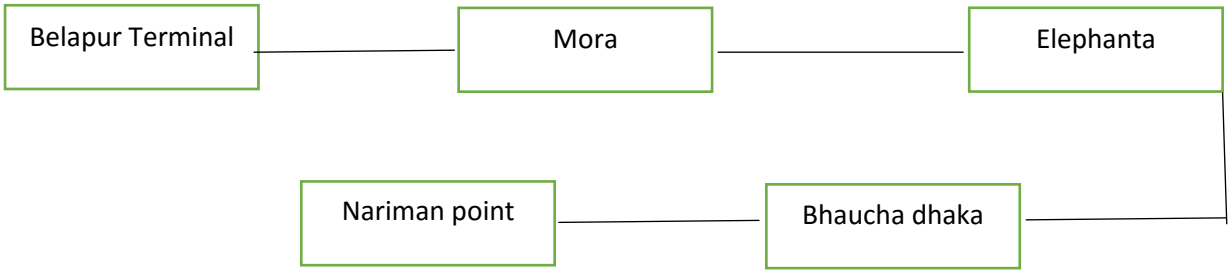
TYPES OF CRAFTS TO BE USED:

Types of craft	Capacity	Size(L*B)	Speed/hrs.
Hovercraft	60	24.5*79	50knots
Catermaran	250	40*11	20knots

Routes :

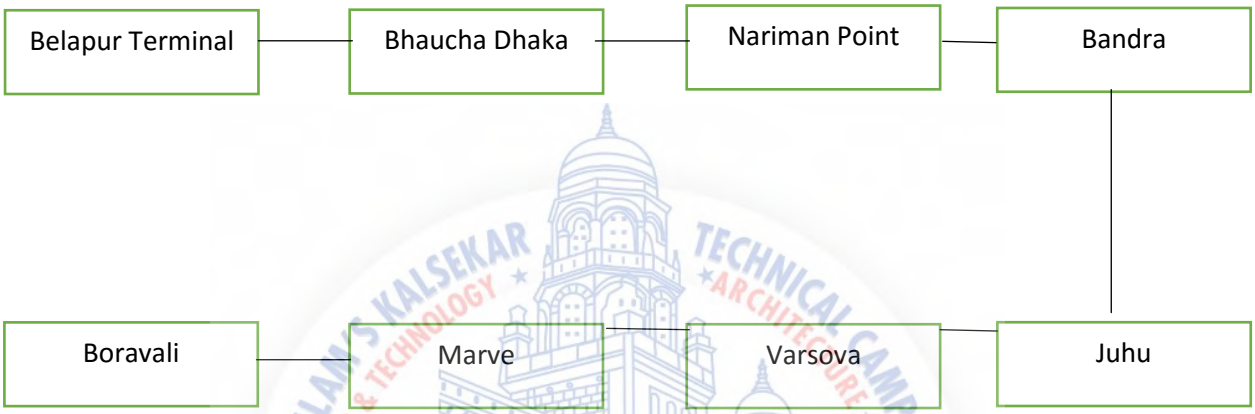
	Fare	Trips	Total Public	Traveling Time	Port
Belapur-Goa via Nariman point	250/per head	7	1750	5hrs	Goa port
Belapur-Alibhag vai Bhaucha Dhaka	60/per head	7	1750	55mins	Mandwa port

ROUTE NO:1



Ports	Fare	Time
A to B	20 rs	20 mins
A to C	20 rs	30 mins
A to D	30 rs	45 mins

ROUTE NO:2



Ports	**Fare**	**Time**
A to D	**30 rs**	**45 mins**
A to E	**40 rs**	**55 mins**
A to F	**45 rs**	**65 mins**
A to G	**53 rs**	**75 mins**
A to H	**53 rs**	**80 mins**
A to I	**55 rs**	**85 mins**
A to J	**55 rs**	**95 mins**

***Assume A as Belapur Terminal,B as Mora,C as Elephanta,D as Bhaucha Dhaka,E as Nariman Point**

F as Juhu, G as Varsova, H as Marve, I as Boravali, J as Boravali.

PROJECT COST:

The estimated project cost is decided to be 1,300 Cr

TIDAL INFORMATION

The dominant tide in the Mumbai Harbour is the semi-diurnal tide with a period of 12 hours and 40 minutes. The following are the particulars of tidal levels related to Chart Datum.

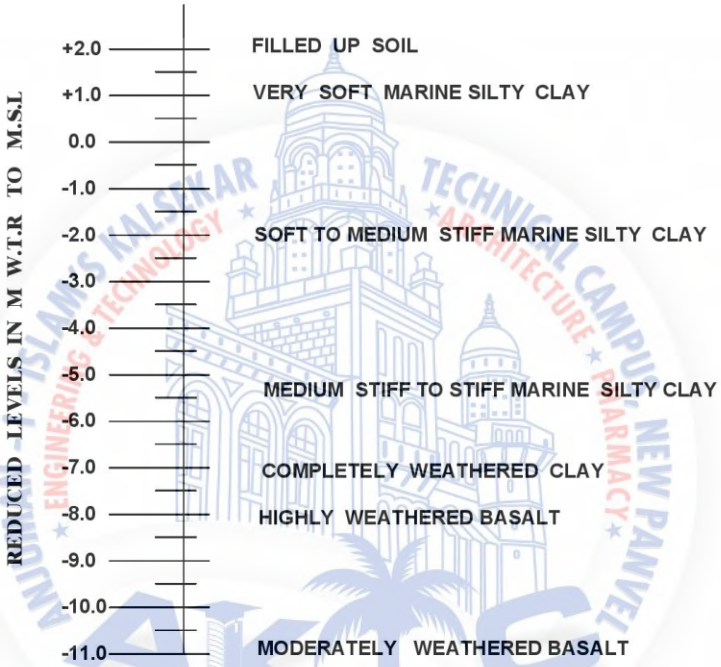
Statistical studies made indicate that :-

I) All high tides exceed + 2.70 m.

2) About 5% of all high tides would be less than + 3.20 m.

TIDE	Above(+) or Below(-) Chart Datum
Highest High Water recorded	+ 2.39 m
Mean High Water Spring Tides.	+2.12 m
Mean High Water Neap Tides.	+ 2.01 m
Mean Sea Level.	+ 2.51 m
Mean Low Water Neap Tides,	+ 1.86 m
Mean Low Water Spring Tides.	+ 0.76 m
Lowest Low Water recorded.	- 0.46 m
Highest Low Water	+2.47 m

SOIL SECTION



DEFINATIONS:

CYCLONES

These may occur in the period of May/June or October/November, The last severe cyclone off the to this the earlier cyclone occured in 1992.

CURRENTS

The currents in the harbour are essentially caused by the tides and are not influenced to any extent by monsoons etc. The tidal flow is unsteady and the magnitude and direction of the current varies with respect to location, time and depth.

WAVES

The predominant waves are the swell waves generated by deep sea storms. These mainly arise just before and during the South West monsoon. The statistical analysis indicates that most wave periods fall between 6 seconds and 10 seconds.

During the continuance of the North-East monsoon, North-Easterly winds known as "Elephantas" blow for short durations during the months of October- November, As the fetch and duration of these winds are limited, the" Significant height" of the resulting waves is not likely to exceed 1 metre with period ranging from 3 to 5 seconds.

RELATIVE HUMIDITY & TEMPERATURE

Relative humidity ranges from 61% to 87% being the highest in the monsoon period, During the winter months (Nov-Jan) relative humidity ranges from to 72%. Mean daily temperature ranges from 24 Degrees C to 33 Degrees C except during the winter period when the minimum temperature may fall to about 19 Degrees. The hotter months are March, April, May and June.

WIND

General direction of wind is from the North to the West quarter, with seasonal variations as shown
below :-

Wind Speed km/hr

Jan	Feb	Mar	Apri	May	June	July	Aug	Sep	Oct	Nov	Dec
9.0	10.3	11.6	14.2	16.4	17.3	19.8	18.4	12.8	9.0	9.7	13.1

SAILING TERMINOLOGY

WAVE

A wide ridge created by wind action on the surface of a body of water which sets up a series of orbital movements.

BREAKER

Heavy and violent ocean waves which occur as a result of a change in the wave profile. This change consists of the leading part of the wave having slowed down more quickly than the back, thus causing a steeping of the front and its eventual over timing.

SWELL

A heaving Of the sea caused by long ocean waves which generally do not break, traveling into the region of shorter local waves.

WAVE REFRACTION

Waves change their direction as well as their shape upon approaching the shores. The leading edge is slowed by the sea bed friction but the trailing is not, thus causing a curve in the wave crest known as refraction.

SWASH AND BACKWASH

Swash is the forward movement of a wave up the beach. Backwash is its retreat under the force of gravity.

TIDES

The rise and fall of the surface of the sea and of some rivers caused by attraction of the sun and the moon are known as Tides.

SPRING TIDES

At new and full moon or rather a day or two after (or twice in each lunar month), the tides rise higher and fall lower than at other times and these are called Spring Tides.

NEAP TIDES

One or two days after the moon is in her quarter (i.e. twice in a lunar month), the tides rise and fall less than at other times and are then called Neap Tides.

EQUINOXIAL TIDES

These tides occur when the sun and moon are vertically over the equator and these tides are exceptionally high.

TIDAL RANGE

The apparent variation of mean sea level is known as the Tidal Range.

TIDAL CURRENT

A directional movement of the wave, the direction of which is related to the surge and tidal range.

LONG SHORE DRIFTING
It is the flow of coastal sediment produced by approaching waves at an

TRANSIT SHEDS

These are sheds of one or two storey heights, the floor area being devoted to the handling and distribution of incoming and outgoing cargo requiring protection and used for storage of cargo for a short time.

WAREHOUSES
These are permanent structures, usually provided on shore or directly behind transit sheds for goods to be stored for longer periods of definite or indefinite

BONDED WAREHOUSES
When such warehouses are used for storing suitable cargo, remaining under O customs authority, until cleared, they are called Bonded Warehouses.

DREDGING
Dredging is defined as "Excavating under water. This excavation is carried out to increase the depth of waterways, to provide sufficient draft for ships in harbours, entrances to docks, etc.

DREDGE OR DREDGER
It is the name applied to the equipment which carries out this deepening or Dredging.

FIXED AND FLOATING LIGHT STATIONS

The light stations, when built on land, are called Fixed as in the case of permanent lighthouse structures. Alternately, where there are difficulties in establishing proper foundations, Floating light stations in the form of a light vessel may be adopted.

LITTORAL DRIFTS
sand drifts occurring in the proximity of foreshores are known as Littoral

STORM SURGE

The buildup of coastal water to an abnormally high height by the

coincidence of tide and weather is called storm surge.

SEICHE

The oscillation of mainly inland water caused by high winds blowing across the surface is known as Seiche. This raises the surface to the leeward and lowers towards the windward. Oscillation may continue after the wind has dropped.

BREAKWATERS

The protective barrier constructed to enclose harbours and to keep the harbours waters undisturbed by the effect of heavy and strong seas are called breakwaters.

DOCKS

Docks are enclosed areas for berthing ships, to keep them afloat at a uniform level, to facilitate loading and unloading cargo.

WHARVES

The landing places or platforms built near shore for vessels to berth are known as Wharves.

QUAYS AND QUAY WALLS

Wharves, along and parallel to the shore are generally called Quays and their protection walls are called Quay Walls.

PIERS

The structures which are built perpendicular or oblique to the shore of a river or sea are known as Piers.

PIERHEADS

A pierhead is at the entrance to a harbour and it is exposed on three sides. It is subject to more shocks than Breakwaters.

JETTIES

These are structures which are built out from the shore to deep water and they may be constructed either for a navigable river or in the sea.

SLIP

The space between two piers where ships are berthed is known as a Slip.

APRONS

The open space left immediately in front of a berth is known as an Apron and it is required for loading and unloading of cargo from the vessels.

Area statement – Terminal building Ground Floor

1. Entry 15m
2. Security 5*2.5m
3. Reception 5*5m
4. Ticket Counter 5.5*9.5
5. OFFICES Cabins
    1. President 5*4.5
    2. Vice president 5*4.5
    3. Harbor Manager 5*4.5
    4. Terminal Manager 5*4.5
    5. Cleaning Staff Manager 5*4.5

6. staff Toilets 1.8*1.2m
7. Common Storage 5*6m
8. Cleaning Staff Room 8*4m
9. Accounts department 30*15m
10. Lecture Room 18*10m
11. CCTV Room 9*9m
12. Public Toilets ladies/gents 4*5m
13. Tickets confirmation desk 2.5*3
14. Waiting Lounge for Arrival 23*15 180 cap
15. AHU 3*3.5

Terminal building First floor :

1. Restaurent kitchen 9*9m
2. Entertainment Section 15*15
3. Game Zone 12*14
4. Book Store 9*12
5. Internet Facility 10*12
6. Bar 18*19m
7. AHU 3*3.5m

8.Public Toilets Ladies/Gents	**4*5m**

WorkShop (Closed Workshop):

1.Cabin Workshop Manager	**5*4.5**
2.Toilets	**5*4.5**
3.Storage	**5*6**
4.Repaire	**12*6**
5.Shop for raw materials	**5*6**

Open Workshop

1.Deck for Repair	**30*30**

Rest Room Ground Floor

Reception Waiting	**12*9m**

First Floor

1. Rest rooms	**5.6*7.5**
2. House keeping	**7.5*5**
3. Cleaning Staff	**4.8*4**
4. Common Toilets	**1.8*1.2**

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