EXECUTIVE SUMMARY

(INLAND WATER TRANSPORT: FERRY WHARF)

1 INTRODUCTION

Inland water transport is generally considered to be a cost-effective, relatively fuel-efficient, environmentally-friendly and employment-generating mode of transport. A number of countries are now taking initiatives to make better use of existing capacity and invest in inland water transport. Keeping in view the city's configuration which offers the possibility of water transport to augment the existing transport capacity; Government of Maharashtra (GoM) has been endeavoring to develop a inland water transport system on the eastern coast of Mumbai. In continuation of its efforts, GoM appointed Maharashtra State Road Development Corporation (MSRDC) as the implementing agency to implement the Inland Water Transport System (Passenger + Ro-Ro) project along East Coast of Mumbai vide Government Resolution 6/3/2012.

2 ABOUT PROJECT - Ferry Wharf (Bhau Cha Dhakka)

Maharashtra State Road Development Corporation (MSRDC), Govt of Maharashtra proposes to establish "Inland Water Transport (Passenger and Ro-Ro services) System along the East Coast of Mumbai" which will connect Ferry Wharf to Nerul-Belapur and Ferry Wharf to Mandwa / Rewas. The three passenger water transport (PWT) terminals proposed are 1) Ferry-Wharf 2) Nerul 3) Mandwa situated along the east coast of Mumbai.

The said Public hearing & the executive summary deals with Ferry Wharf site included in the project. The estimated construction cost of the Ferry Wharf (Terminal & Elevated Approach road) project is approximately INR 226 Crores.

3 NEED OF THE PROJECT

The increase in traffic with the increase in population is serving as an ill-factor for people travelling in and out of Greater Mumbai (i.e. Mumbai Business District & Mumbai Suburbs). This results in excess time taken to travel the distance from Greater Mumbai to Nerul and Mandwa in Alibag. As per the traffic study done at various terminals near various locations at the Belapur road and Mumbai Alibag road as well as national highway-17 shows that there is an exponential increase in the traffic to and from Mumbai to Navi-Mumbai as well as Mumbai to Alibag. This congestion in traffic can be avoided by an inland water transport

system that would facilitate people travelling from Mumbai to Alibag as well as Navi-Mumbai to take their vehicles along with them through coastal road and facilitate their travel further in a short span, saving a lot of time in a cost effective and eco-friendly way.

The proposed facility of Passenger along with Ro-Ro, termed as Roll-on Roll-Off technique shall help the people travelling from Greater Mumbai to Nerul and Mandwa to take vehicles along with them in the Water Transport System, this will drastically reduce their cost of travelling as well as their time travelling.

4 PROJECT LOCATION

The project is an inland water transport system connecting Greater Mumbai (i.e. Mumbai Business District & Mumbai Suburbs) to Navi-Mumbai and Alibag. The three major locations of the proposed IWT project are Ferry Wharf (Bhau Cha Dhakka/Dockyard road), Nerul (Navi Mumbai), near Sector 15/A and Mandwa.

Figure 1: Project Location

Ferry-wharf

Proposed project site at Ferrywharf is situated near the existing Fish port at Bhau Cha Dhakka (Ferry-wharf). The approach road is P'Dmello road. Site covers area of around 56,026 sq. mt. Latitude 18°57„26.92"N to 18°57„17.32" N and longitude 72°50‟56.3" E to 72°50‟58.2" E.

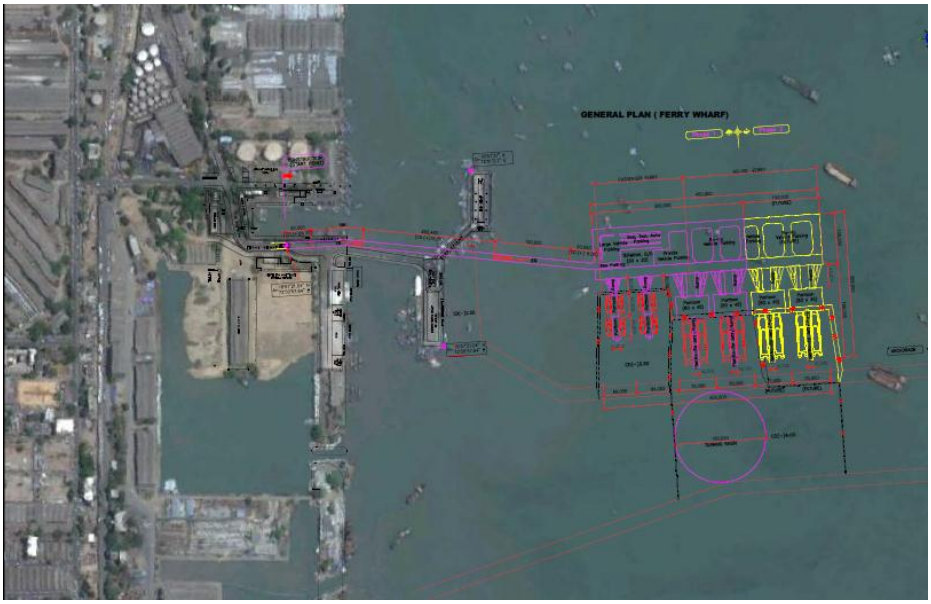

Figure 2: Google image with the project concept super imposed

The proposed site at Ferry-wharf is located at an approximate distance of 1 Km from the P'Dmello road. The selected location offers excellent tranquility as wave heights do not exceed 0.5m even in the South West Monsoon. A maintained water depth of 4.2 m is available at low tide which is sufficient for the proposed Ro-Ro Ferry Service.

5 DESCRIPTION OF THE PROJECT AT THE LOCATION

The description of the development at the location is:

Table No. 1 Area Statement

AREA		Ferry Wharf Terminal & Elevated Approach Road		
		Phase-1	**Phase-2**	**TOTAL**
Elevated Approach Road		11,300	-	11,300
Apron		2,055	2,250	4,305
Internal road		8,205	6,117	14,322
Parking lot	**Ro-Ro parking**	6,370	6,370	12,740
	Large vehicles parking	718	718	1,436

AREA		Ferry Wharf Terminal & Elevated Approach Road		
		Phase-1	**Phase-2**	**TOTAL**
	Private vehicles parking	1,845		1,845
	sum	**8,933**	**7,088**	16,021
Gas station			-	-
Repair shop			-	-
Terminal + Utilities		2,660	-	2,660
Total		**21816**	**15,455**	**37,271**
Jetty	**Ramp**	2252	1,902	4,154
	Pontoon	5,576	3,000	8,576
	Finger jetty	1,320	1,320	2,640
	Total	**9,148**	**6,222**	15,370
Grand total	**Sq. m**	**42,301**	**21,677**	**63,978**
	Hectare	**4.23**	**2.1677**	**6.39**
Water Area	**Sq. m**	**Terminal +Part of Elevated Approach Road = 58,328**		

6 CONCEPT PLAN

Ferry Wharf

The two options considered for Ferry Wharf terminal are:

Option 1: An extension of the existing passenger terminal at Ferry wharf with minimal disruption to the existing facilities

Option 2: Constructing a new terminal in the sea mid- way between the Passenger and fishing jetties

Four Concept layouts were considered taking into account both the options.

Quantifying the various parametres like design, scope for future expansion, encroachment into existing P & V channel the most prefered concept Layout with no significant disadvantage is as given below:

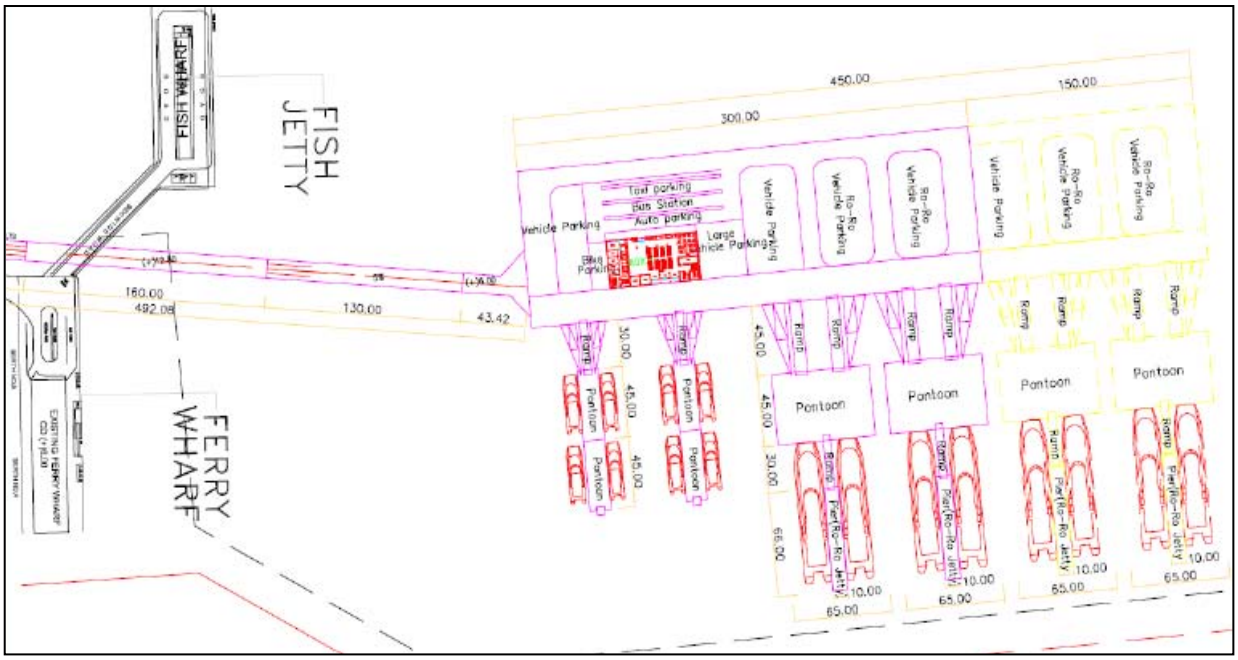

Figure 3: Concept Layout

7 VESSEL TYPE

Based on the study of various parameters the following vessel specifications have been proposed for the project.

Two types of vessels will be used a) catamaran & b) Ro –Ro Ferry

a) Catamarans will be of two types

- One is only for carrying Passengers with length 37m, beam 10m, draft 1.2 m &
- Operating speed of 25 knots with 300 passenger capacity. Other type of vessel for carrying passenger + vehicles with length 50 m, beam 17 m, draft 1.9 m & operating speed of 29 knots with capacity 300 passenger + 50 vehicles.

b) Ro –Ro Ferry:

- for carrying passenger + vehicle with length 80m, beam 17m, draft 3.0 m & operating speed of 14 knots with capacity of 400 passenger + 80 vehicles

It is proposed that the vessels shall be fitted with following navigation and communication equipments. Like GPS system, Magnetic compass, Radars Echo Sounder, Speed/Distance Log, Air horn, Search Light, VHF, EPIRB,SART

8 CONSTRUCTION METHODOLOGY

Engineering Design details

For Ferry wharf, two types of Ramps are planned; a ramp for the connection from the site to the pontoon, and a finger pier connection ramp. A total of 4 ramps for the Ro-Ro, 2 in the 1st phase. There will be 2 finger pier ramps, 1 ramp in each phase. The Ro-Ro Ferry pontoon is planned with dimensions of 45m×65m.

- The passenger pontoons are planned with dimensions of 14m×46m at Ferry wharf

Table 3: Facility Description of Ferry Wharf

Item	Phase - 1	Phase - 2	Total
Pier	300m × 100m = 30,000m^2	150m × 100m = 15,000m^2	4,5000m^2
Ramp	8m × 48.5m : 4units	8m × 48.5m : 4units	8m × 48.5m : 8units
	4.7m × 34m : 4units	4.7m × 34m : 2units	4.7m × 34m : 6units
Pontoon	14m × 46m : 4units	-	14m × 46m : 4units
	45m × 65m : 2units	45m × 65m : 2units	45m × 65m : 4units
Approach Road	PSC-Beam : 510m Pier-TYPE : 103m	-	PSC-Beam : 510m Pier-TYPE : 103m
Terminal Building	1EA	-	1EA
Water Supply	1 set	1 set	1 set
Subsidiary Facilities	1 set	1 set	1 set

Pier:

0.1% slope is applied for considering natural drainage of the superstructure and the top elevation of pier is planned to be CD.(+) 6.00m. The pier's structure type is a two way slab type, and Bored Cast in-situ RC pile is applied for the pile substructure. A level of CD.

(-)10.00m is assumed as the bearing layer, and it must be ensured that Bored Cast in-situ RC pile is socketed in Hard Rock.

Revetment

Top elevation of revetment is planned to connect facility, therefore terminal parking lot is planned as CD. (+) 10.00m, and revetment of Ro-Ro at Ferry Wharf as CD. (+) 8.00m.

Ro-Ro

The Roll On-Roll Off technique comprises of a Ramp, Pontoon and finger-wharf. The ramp structure shall be stable against both deflection and shear loads since the major load on this structure is the dead load, due to there being a 48.5m distance between the support points. The width of the bridge is a total of 8.0m, consisting of a 3.5m single-lane road and two sidewalks. A Tripod type is selected as the fastening device for a pontoon because it is resistant to wave and tidal current. A Finger pier is a necessary facility to provide oil, water and to remove sewage when a ship approaches for berthing and mooring.

Passenger Wharf:

The passenger Wharf at Ferry-wharf is proposed to be of Plate Girder Type, more specifically an open plate girder type. The width of the ramp is planned for 4.7m so that it will be easy for emergency vehicles to pass.

Approach roads to the Terminal: Flyover at Ferry-Wharf:

The design and the concept plan include the approach road to Ferry wharf terminal. The approach road to the proposed terminal at Ferry wharf would start from the proposed Rotary junction near to Orange gate. The length of the road extension from P.D Mello road to the Proposed Terminal at Ferry wharf is around 1070m, and includes a length of around 520m on land and a length of around 550m on water. The bridge planned is of PSC –Beam type. The height of the new bridge is planned to be 5.5m from the existing bridge. A 2% slope is applied for the transverse direction of the bridge and the width of it includes two-lanes of traffic and two 2.5m wide sidewalks.

Table 4: Approach road – Ferry Wharf – Division of Zone

Chainage Section	Length	Slope	Top Elevation
-519.8 ~ +42.5m	562.4m	Level	CD.(+)16.40m
+42.5m ~ +230m	187.5m	-0.78%	CD.(+)16.40m ~ CD.(+)15.00m

Chainage Section	Length	Slope	Top Elevation
+230m ~ +342.5m	112.5m	Level	CD.(+)15.00m
+342.5m ~ +530m	187.5m	-4.8%	CD.(+)15.00m ~ CD.(+) 6.00m
+530m ~ +551m	21m	Level	CD.(+) 6.00m

The elevated road would connect the proposed IWT terminal and Eastern Freeway. A rotary has been proposed at Mallet Bandar Road and P 'Dmello Road junction joining the Eastern Freeway.

Figure 4: Elevated road – Ferry Wharf

9 MAJOR COMPONENTS OF THE PROJECT

9.1 Water Supply:

Water supply is planned with 60 inch water supply pipe at the existing ferry wharf and would be supplied to the project yard along the approach road.

Source of Water: Municipal Corporation of Greater Mumbai (MCGM).

Water Requirement: The water requirement during construction phase will be 100 m^3/day for construction purpose and 10 m^3/day for domestic purpose. The domestic waste water generated during construction phase shall be treated in septic tank system.

During Operation Phase 10 m3/day water will be required for the proposed development for domestic purpose. The sewage generated will be treated in an onsite Compact sewage treatment plant (STP) of 10 m^3/day.

9.2 Drainage System:

An adequate drainage system and drainage plan as per the slope has been sketched out for the terminal. The drainage pipeline shall be fitted with oil & grease traps so as to remove any oily material from the run-off water.

9.3 Power Supply:

The source of power supply will be from BEST.

9.4 Solid Waste:

The construction waste generated during construction phase will be reused for leveling of the site at the terminal.

Approximately 20 Kg/day of Municipal solid waste will be generated during operation phase which will be segregated onsite and handed to local municipal authority.

Approximately 500 kg/month of Used Oil will be generated at site

9.5 Fire Fighting:

The following have been considered to provide fire fighting system at the proposed terminal.

Hydrant system

Sprinkler system

Pump room (Main pump and Booster pump)

Portable Extinguisher

10 BASELINE ENVIRONMENTAL STATUS

In order to assess the existing environmental status in the project area, primary and secondary data on various environmental attributes viz. air quality; noise levels, water quality, soil, ecology, land use etc. have been collected at the proposed terminal.

10.1 STUDY LOCATIONS

In order to assess the existing environmental status in the project area, primary and secondary data on various environmental attributes viz. air quality, noise levels, water quality, soil, ecology, land use etc. have been collected and presented in the following paragraphs.

Ferry Wharf (Bhau Cha Dhakka)

Ferry wharf is the Thane Creek, along the coast of Dockyard Road on the Eastern seafront of Mumbai. It serves as the port for numerous fishermen who bring in their daily catch. Ferry services link up JNPT, Uran to the west, and Rewas and Mandwa to the south. Various

Launches and Fish boats are lined up at the jetty. Fishermen bring their catch and unload it at the port. The proposed site is located near the existing fishing jetty

10.2 AIR QUALITY

The baseline Ambient Air Quality data of the region has also been obtained. Air quality monitoring was carried out at Ferry Wharf in winter season. The details of the results are depicted in the table 4 below. All the parameters are below the limits prescribed by CPCB.

Table 4: Air Quality Monitoring Data

Parameters	Units	Location	Permissible limits
$PM_{2.5}$	$\mu g/m^3$	45.83	60
PM_{10}	$\mu g/m^3$	79.17	100
SO_2	$\mu g/m^3$	21.78	80
NO_2	$\mu g/m^3$	22.59	80
NH_3	$\mu g/m^3$	4.16	400
CO	mg/m^3	<0.4	2
Lead as Pb	$\mu g/m^3$	<0.1	1
Ozone	$\mu g/m^3$	23.00	100
Ni	ng/m^3	<0.42	20
Arsenic as As	ng/m^3	<0.42	6
Benzene	$\mu g/m^3$	<2.1	5
Benzo(a) Pyrene	ng/m^3	<0.1	1

10.3 WATER QUALITY

The main drinking water source in the study area is provided through Brihanmumbai Mahanagar Palika (BMC) water supply system at Ferry-wharf.

The marine water quality along the coast is studied as the region is characterized by the presence of residential population and fishing activity along the coast. The physico- chemical and biological characteristics of the sea water along the route have been studied. The development of the water transport system will not have any adverse effect on the quality of the coastal sea water as the proper pollution control measures will be adopted to maintain water quality.

Table 5: Water Quality Monitoring Data

Parameters	Units	Location
Physical Parameters		
Turbidity	NTU	4.81
Chemical Parameters		
pH	--	7.78
Total Dissolved Solids	mg/lit	29164
Dissolved Oxygen	mg/lit as O_2	5.0
Salinity	%	25.65
Sulphates	mg/lit as SO_4	1668
Phosphates	mg/lit as PO_4	1.37
Nitrates	mg/lit as NO_3	0.16
C.O.D.	mg/lit as O_2	184
B.O.D. (27 ^oC, 3 days)	mg/lit as O_2	60
Nitrite	mg/lit as NO_2	0.121
Oil & Grease	mg/lit	<0.5
Hardness	mg/lit as $CaCO_3$	4812
Silica	mg/lit as SiO_2	6.84

10.4 NOISE QUALITY

Noise quality was analyzed in the study area. It was observed that the noise levels were near the CPCB limits for Industrial area. Proposed project of East coast passenger water transport system during operation phase will provide better option to the travelers. It will reduce the time for travelling & also provide safe & affordable mode of transport. This will definitely help to reduce the current noise level through diversion of traffic along the east coast PWT.

It is envisage that there will be a slight increase in existing baseline noise level during construction period. But by adopting proper measures and care it can be mitigated to acceptable levels.

Table 6: Noise Quality Monitoring Data

Time	Noise level db (A)	Standard db (A)
Leq Day time	72.4	65

Time	Noise level db (A)	Standard db (A)
Leq Night time	57.60	55

10.5 ECOLOGY AND BIO-DIVERSITY

The project area at the terminal does not have rich ecological factor present in the vicinity. The biodiversity is almost absent at Ferry wharf it being a commercial fishing port and located in the heart of the city

Table No. 7: Marine biodiversity at Ferry Wharf

Parameter	Population density	Dominant Species
Phytoplankton Cell Count	3.2 x 10^3/l	*Nitzschia spp., Skeletonema spp., Thalassiothrix spp.,*
Zooplankton	22/l	Calanus spp, decapods larvae, Gastropod larvae
Benthos	11/ m^2	*Thias spp., Nerita spp. Trochus spp.,*

11 MITIGATION MEASURE PLAN

11.1 Air Quality

- New and properly maintained construction equipments shall be utilized
- Regular maintenance of machineries and equipments shall be carried out
- Asphalt and hot-mix plants will not be at site
- Fugitive dust entrainment will be controlled by sprinkling water
- Proper green belt area will be developed for trapping fugitive emissions
- Transportation vehicles will be covered to avoid dust emission
- Trucks carrying soil, sand or stone will be covered with traps to avoid spilling and blowing by wind from site of construction
- The use of HSD for catamarans and Ro Ro ferries shall reduce the air emissions

11.2 Noise

- All construction equipment will be duly lubricated and maintained in good working condition
- Stationery construction equipments will be placed away from habitation
- Personal Protective Equipments (PPE) for workers. Workers exposed to high noise level should user ear plugs.
- Scheduling of project activities will be adopted
- Noise barriers in terms of thick vegetation cover wherever required will be used for attenuation of noise.
- Signboards will be put so as to avoid unusual use of horns and also for avoiding idling noise
- Continuous Noise monitoring will be carried out during operational phase to collect comparative data

11.3 Solid Waste

- The construction debris generated will be disposed off immediately on same day without storing at site
- This will avoid chellate formation or spreading it in the nearby area
- It will be disposed off in MCGM approved sites in and around city
- Prior approval of these sites will be obtained

12 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) is also prepared to take care of and to counter environmental impacts. Implementation of EMP will long way to maintain good and healthy environment.

Accordingly, all the anticipated activity was thoroughly studied and the environmental impacts were identified. All the relevant base line data was collected, the existing environmental status was assessed and evaluated. In the light of this information and the prediction, the environmental: -management plan is prepared.

13 DISASTER MANAGEMENT PLAN

Disaster Management Plan (DMP), safety measures and action plan have also been prepared. Oil spill contingency plan and emergency preparedness plan has also been sketched out. It is

also included to make ground preparation for natural calamity, which is most unlikely event in the present surrounding of the site.

14 ENVIRONMENT MANAGEMENT COST

Sr. No.	ITEMS	COST (INR) DURING CONSTRUCTION	COST (INR) DURING OPERATION
1	AIR ENVIRONMENT	17 lakhs	4 lakhs
2	WATER ENVIRONMENT	26 lakhs	5 lakhs
3	NOISE ENVIRONMENT	6 lakhs	1.5 lakhs
4	GREEN BELT	17 lakhs	6.5 lakhs
TOTAL EMP COST		**66 lakhs**	**17 lakhs**
Additional <u>300 Lakhs</u> for Noise Barrier to Elevated road			

Approximate cost of the STP will be around Rs. 20 Lakhs.

15 CRZ STATUS

The proposed sites will come in CRZ – I. The detailed CRZ demarcation along with HTL, LTL and Mangroves of all the three sites has been carried out by MoEF approved 'Anna University'.