

Chapter III Transport System of India

3.1 Ports in India

3.1.1 Major Ports of India

There are 11 major ports in the country viz. Calcutta (including Haldia), Paradip, Visakhapatnam, Madras and Tuticorin on the East Coast and Cochin, New Mangalore, Mormugao, Jawaharlal Nehru, Mumbai and Kandla on the West Coast, which are under the control and supervision of the Ministry of Surface Transport¹⁾. Development of major ports is constitutionally the responsibility of the Government of India.

Import and export cargo handled by major ports are shown in Table 3.1.1 and Figure 3.1.1. Total cargo volume handled in major ports in 1995-96 is 215 million tons. As to the balance between import and export, import volume of 120 million tons exceeds export volume of 86 million tons by 34 million tons. Total cargo volumes by major commodities by major ports in 1995-96 are also shown in Table 3.1.2

The strategy and perspective for the 9th Five-Year Plan for the development of Port Sector are proposed by the Working Group²⁾. The summaries of them are as follows:

- (1) The Development of transport infrastructure like Ports should move with and subserve the overall economic growth.
- (2) Increasing volume of "containerizable" cargo and also level of "containerization" have to be kept in view for the development of proper container handling facilities at Ports.
- (3) Port development should keep pace with change in shipping scenario especially in respect of size of ships, specialization and automation which are exerting pronounced effect on port development.
- (4) The future iron ore export scenario has to be realistically assessed and in the light of that whether further investments in port facilities like further deepening of ports,

¹⁾ "Annual Report 1996-97", p.38, Ministry of Surface Transport, Government of India

²⁾ "Report of the Working Group for Port Sector for the Ninth Five Year Plan (1997-2002)", pp.74-77, September 1996, Ministry of Surface Transport, Government of India

modernization of already old ore handling facilities etc. are required and economically justified has to be carefully considered.

- (5) Mechanized loading and unloading facilities have to be developed at the existing ports and possibly at certain new locations to handle the coal requirements for the expansion of the existing power stations as well as New Power stations which are likely to come up during the 9th Five-Year Plan and later.
- (6) Fertilizer traffic may be aggregated as far as possible at a few selected ports and fully mechanized facilities may be provided at such ports by the user agencies.
- (7) The planning of POL handling facilities should, among other things, be based on the specific conditions.
- (8) Before embarking on any major investment on creation of additional infrastructural facilities, the development and modernization of the existing port facilities should receive top priority to improve overall efficiency and cargo handling productivity.
- (9) Ports may be delegated more financial and administrative powers so as to enable them to be quickly responsive to meet the requirements of the user agencies.
- (10) Maintenance of the existing facilities, including notified drafts in the ports and allocation of adequate resources for such maintenance and replacement purposes, should receive utmost attention.
- (11) With the dredging activity having been thrown open to private sector, it is hoped that it will foster healthy competition between Dredging Corporation of India, private dredging companies and Ports should be able to meet their dredging needs through DCI, private dredging companies and their own dredgers.

Table 3.1.1 Major Port Cargo Volume Handled in 1995-1996

(Unit: thousand tons)

Name of Port	Import	Export	Tranship	Total
Calcutta	4,250	1,874	-	6,124
Haldia	10,865	4,526	-	15,391
Paradip	4,196	7,059	4	11,259
Visakhapatnam	14,738	13,046	5,033	32,817
Madras	19,571	9,430	1,719	30,720
Tuticorin	7,955	1,331	-	9,286
Cochin	9,111	2,380	-	11,491
New Mangalore	1,883	7,001	-	8,884
Mormugao	1,948	15,276	871	18,095
Mumbai	17,064	16,617	367	34,048
JNP	4,139	2,558	176	6,873
Kandla	24,658	4,466	1,214	30,338
Total	120,378	85,564	9,384	215,326

Source) "Major Ports of India, A Profile:1995-96", Indian Ports Association

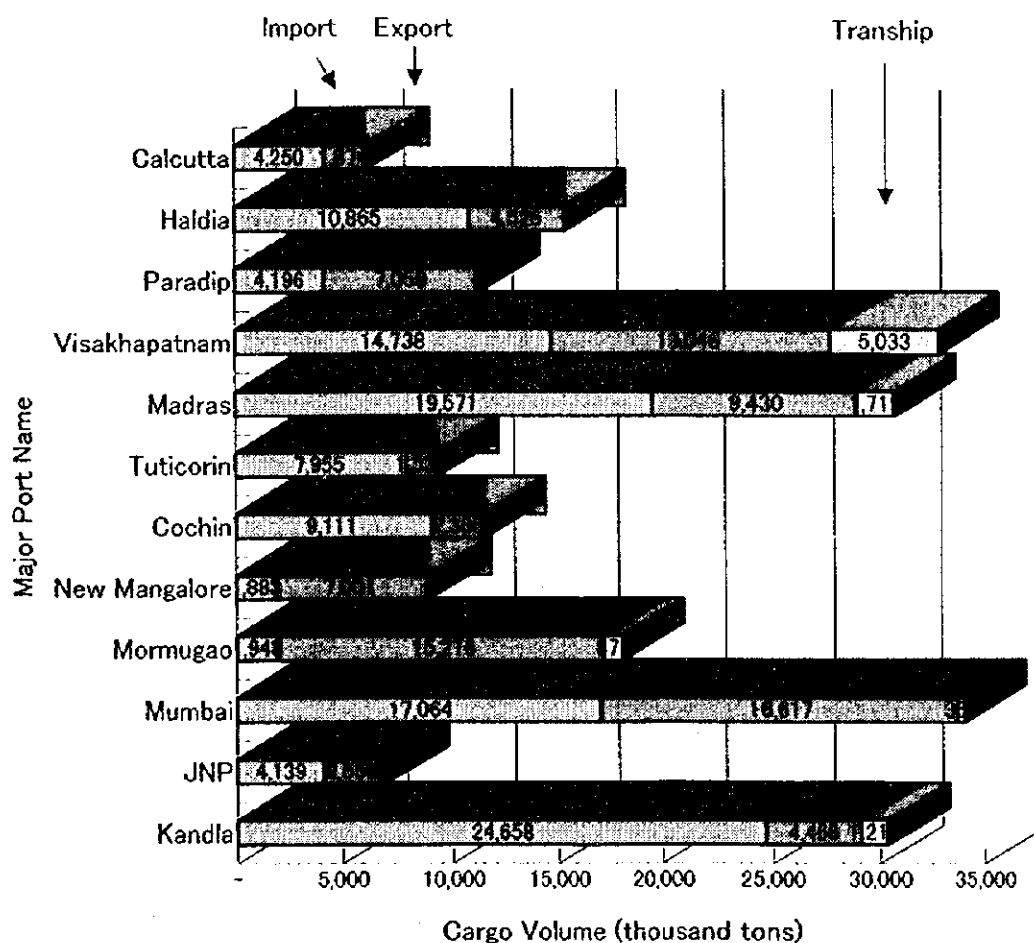


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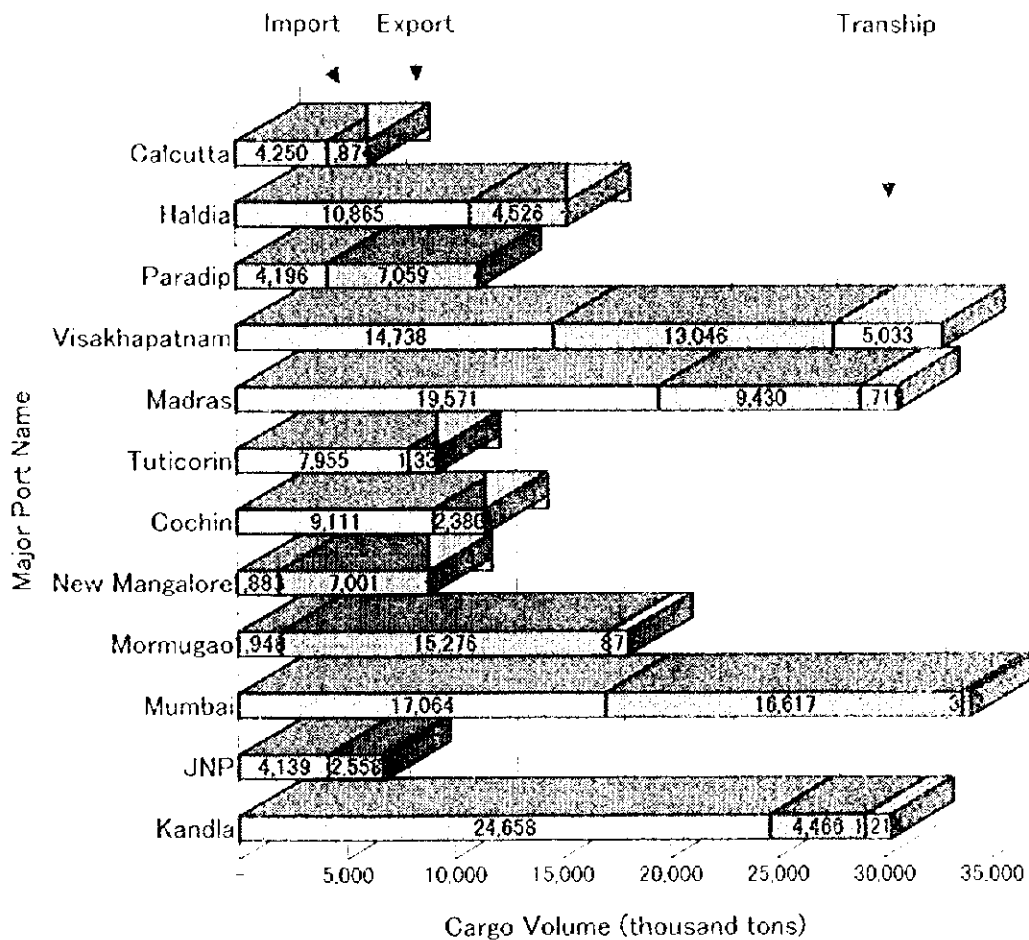


Figure 3.1.1 Major Port Cargo Volume Handled in 1995-96

Table 3.1.2 Total Cargo Volume by Major Commodities by Major Ports in 1995-96

Port	(Unit: thousand tons)									
	POI. and Crude Oil	Iron Ore	Finishe Fertilizer	Raw Facertilizer	Thermal Coal	Coking Coal	Container (tons)	Container (TEUs)	Others	Total
Calcutta	2,524	-	119	88	-	-	1,814	121	1,579	6,124
Haldai	8,218	-	43	276	3,117	2,626	51	4	1,060	15,391
Paradip	1,066	1,691	163	335	4,232	1,833	-	-	1,939	11,259
Visakhapatnam	12,535	5,710	1,132	846	3,045	5,099	94	8	4,356	32,817
Madras	11,568	4,905	954	387	5,122	475	2,308	227	5,001	30,720
Tuticorin	441	-	412	241	5,465	17	758	69	1,952	9,286
Cochin	9,356	-	225	338	-	-	784	96	788	11,491
New Mangalore	956	6,639	205	16	-	-	-	-	1,068	8,884
Mormugao	1,911	14,923	56	-	-	-	19	2	1,186	18,095
Mumbai	20,518	-	78	730	-	-	6,748	518	5,974	34,048
JNP	-	649	1,716	179	-	-	4,069	339	260	6,873
Kandla	22,339	-	676	399	-	23	961	65	5,940	30,338
Grand Total	91,432	34,517	5,779	3,835	20,981	10,073	17,606	1,449	31,103	215,326

Source) "Major Ports of India, A Profile: 1995-96", Indian Ports Association

3.1.2 Minor Ports in Maharashtra State

There are 48 minor ports in Maharashtra State along the coastline of 720 km running in the north-south direction from the State of Gujarat to Goa. The cargo volume handled by 48 minor ports in 1994-95 is 2.6 million ton. Total amount of cargo is not large when compared with major ports such as Mumbai and JNP in Maharashtra State.

Table 3.1.3 List of Minor Ports in Maharashtra State

1.Dahanu	11.Kalyan	21.Alibag	31.Kelshi	41.Vijaydurg
2.Alewadi	12.Versova	22.Revdanda	32.Harne	42.Deogad
3.Satpati	13.Ulva-Belapur	23.Borli-Mandla	33.Dabhol	43.Achra
4.Kelva-Mahim	14.Bandra	24.Nandgaon	34.Pabhol	44.Malwan
5.Arnala-Dative	15.Trombay	25.Murud-Janjira	35.Boriya	45.Nivti
6.Vasai	16.Panvel	26.Rajpuri-Dighi	36.Jaigad	46.Vengurla
7.Uttan	17.Mora	27.Madad	37.Tiwri	47.Reddi
8.Manori	18.Karanja	28.Kumbharu	38.Ratnagiri & Pawas	48.Kiranpani
9.Bhiwandi	19.Revas	29.Shriwardhan	39.Purnagad	-
10.Thane	20.Dharamtar	30.Bankot	40.Jaitapur	-

Source) "Opportunities for Private Investment in Ports in Maharashtra", SICOM, Ltd.

However, the State government has decided to develop all the 48 minor ports in the State through private participation. It has been decided to invite competitive bids from Indian companies for the development of the following seven minor ports;

- 1) Alewadi
- 2) Dighi
- 3) Dabhol
- 4) Jaigad
- 5) Ratnagiri
- 6) Vijaydurg
- 7) Redi

3.2 Port Administration System in India

3.2.1 General

The Government of India owns all port properties. In India there are 11 major ports and some 139 intermediate and minor ports. The Indian Port Act 1908 applies to all ports in India regardless of the category of port. Major ports are Calcutta, Pradeep, Visakhapatnam, Chennai, Tuticorin, Cochin, New Mangalore, Mormugao, Jawaharlal Nehru, Mumbai and Kandla. Major ports fall under the Ministry of Surface Transport (MOST) with management through Port Trusts established under the Major Port Trust Act 1963. Figure 3.2.1 shows the locations of the major ports in India.

Minor and Intermediate Ports fall under the jurisdiction of the maritime states in which these ports are located and are administered through a department of state government headed by a Director of Ports or other Port Officer. In Gujarat and Maharashtra state, the Maritime Boards administer ports of respective state.

Port Trusts are administered by the Boards of Trustees appointed for two year terms by the Government of India. Board members are selected from government departments, port labor and industry. In addition to infrastructure planning and construction, Port Trusts have the power to operate ship and cargo handling facilities and services and to make port regulations and to establish the level of port charges. They are required to submit to the Central Government, each year, budget estimates of revenue and expense but may not implement regulations or charges without the approval of the Government.

Figure 3.2.2 shows the organizational set-up of MOST. MOST has exercised tight control over the Port Trusts through appointment of Chairman and Board members, prior approval of port contracts (Rs.5 crores) and tariff revision. But MOST delegated enhanced financial powers to the Port Trusts with respect to award of contracts. This raised the limit of contracts approvals to Rs.50 crores for additions, modification and new investments and to Rs.100 crores for replacement of existing assets. The Government amended the Indian Ports Act, 1908 and the Major Port Trust Act 1963. The feature of this amendment is to establish the independent Tariff Authority with power to approve new tariffs or changes to existing tariffs.

3.2.2 Private Participation in the Port Sector

MOST recognizes that it is necessary to construct new facilities, modernize existing facilities, and expand cargo handling capacity to meet increasing amount of trade, especially exports. It also recognizes that it is imperative to secure private sector participation in the port sector without relying on financial resources of the Government. New guidelines have been published for private participation in ports for both leasing out of existing assets and construction and operation of new assets such as container terminals, cargo berths, warehousing, dry docking and ship repair. Private investment in ports will be on a BOT (Build-Operate-Transfer) basis. The salient features of the guidelines are as follows:

- (1) The existing legislative framework permits private sector participation in ports.
- (2) An independent Regulatory Authority to fix and revise ports tariffs has been established.
- (3) BOT model will be generally used for private sector participation with the assets reverting free to the port after the concession period.
- (4) A concession period of up to 30 years will be permitted.
- (5) The tariff will be revised suitably, whenever considered necessary, on the basis of rise in wages, operational cost, inflation etc.
- (6) There will be no adverse effect on port labor. No retrenchment will be done without the concurrence of labor and only in accordance with the Industrial Disputes Act and relevant labor laws. Lessee will be bound by all the labor laws of the country.

3.2.3 Development Plan of Container Terminal in JNP

JNP has planned to develop a new container terminal as an extension to the existing facilities through private investment on BOT basis. This is the first large project in the port sector to be implemented through private investment in India. The proposal is to construct a 600 meter long quay and reclaim an area of about 20 hectares for container yard. The terminal will have six quay gantry cranes, two of which will be of post panamax size, 15 yard cranes and three cranes for the railway siding. Total investment of this project is estimated at about Rs. 700 crores. The license period is 30 years and after expiration of the period assets will be reverted to

the Port free of cost. Global bids for this project were invited and the project was awarded to Nhava Sheva International Container Terminal Ltd. (NSICT) established by the consortium comprising P&O Australia, Konsortium Perkapalan Berhad (Malaysia) and DBC Port Management Pvt Ltd. (India). NSICT began to construct the container terminal in November 1997. The terminal will be operational by 2000.



Figure 3.2.1 Locations of Indian Major Ports

**ORGANISATION CHART (FUNCTIONAL)
MINISTRY OF SURFACE TRANSPORT
AS ON 31-12-1996
MINISTER**

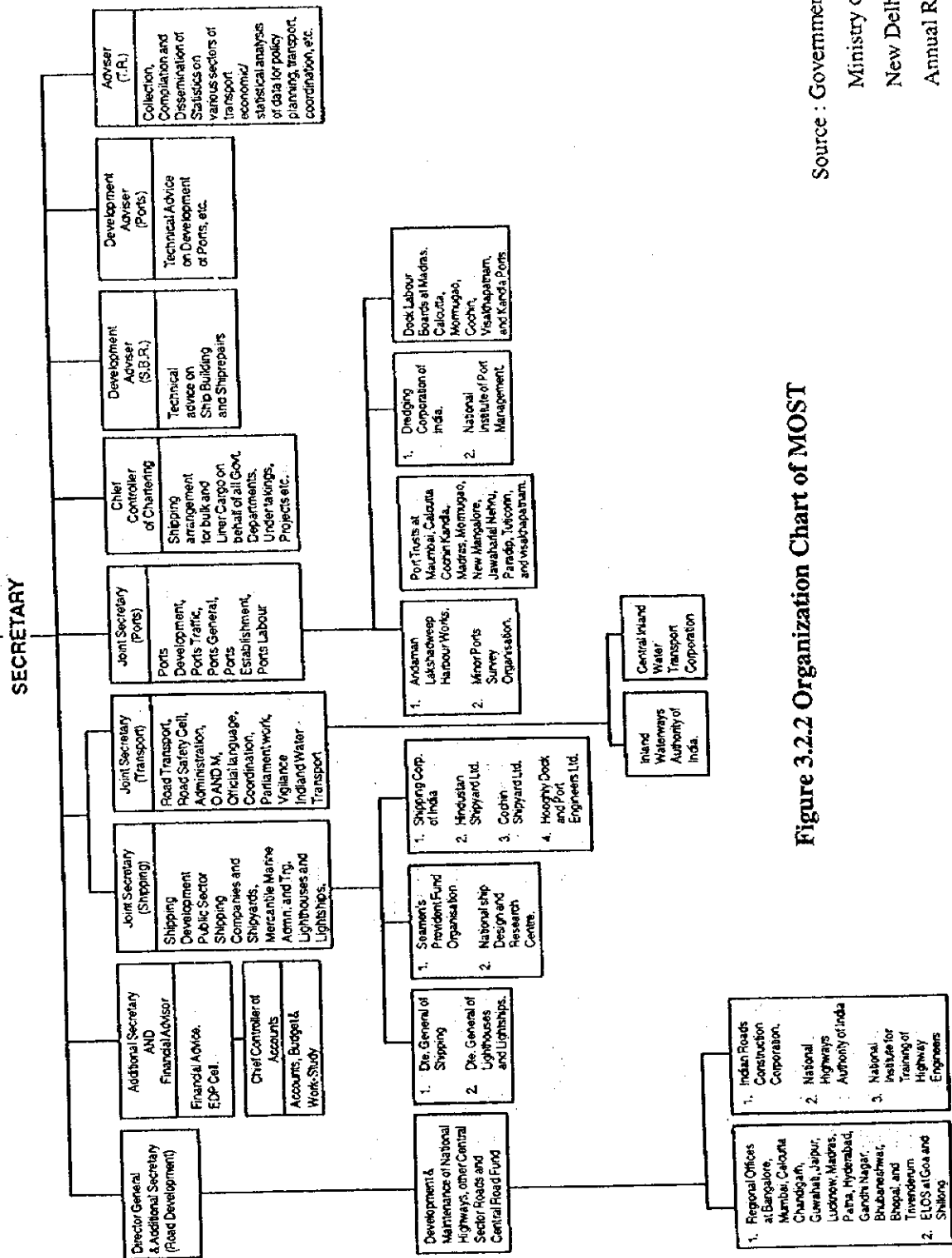


Figure 3.2.2 Organization Chart of MOST

Source : Government of India.
Ministry of Surface Transport,
New Delhi
Annual Report 1996-97

3.3 Road Network in India

India has a total road network of around 2.9 million km which makes it the third largest road network in the world. However, this network is not adequate for speedy and efficient transportation. The national highway which is comprised of arterial routes currently has a network of 34,100 km. Nearly 40% of the total goods and passenger traffic in India is carried on the national highway network, it represents less than 2% of the total road network in India. The table 3.3.1 shows the historical trend of length of roads in India (see Figure 3.3.1 and Table 3.3.1).

Road transport is the major transport mode for people and goods in India. Over 80% of passengers and over 60% of freight move by roads. It is estimated that by the year 2000 road traffic will account for 87% and 65% of passenger and goods traffic, respectively.

In Maharashtra State, as of 1994-95, the road length maintained by the PWD (Public Works Development) and ZPs (Zilla Parishads) together was about 185,000 km, consisting of the national highway (2,900 km), state highway(32,900 km),major district roads(41,600km), other district roads(41,200 km) and village roads(66,100 km)(see Table 3.3.2).

Table 3.3.3 shows the physical progress of road length achieved as of the end of March,1995 in the areas of national highways, state highways, major district roads and village roads in Maharashtra State under the Road Development Plan 1981-2001.

As to Mumbai Metropolis, the strategy for development of highway network is focused on the suburbs and the outer region where the majority of the population will be located during the next two decades. There are eight projects within Greater Mumbai as follows.

1. Anik to Panjrapol expressway.
2. Completion of the Wadala road-over-bridge and link to the east to connect with Anik to Panjrapol.
3. The eastern freeway extension as far south as Cotton Green.
4. Two east-west links between the eastern Express Highway and the Western Express Highway.
5. Santa Cruz to Chembur for which there is heavy demand.
6. Compression of the Western Relief Road (WRR) from Malad to Dahisar and junction improvements on WRR between Malad and Santa Cruz.

7. Airoli bridge project crossing Thane Creek connecting the north eastern suburbs with New Mumbai at Airoli.

8. Widening of Tilak Bridge at Dadar.

(see Figure 3.3.2).

ROADS

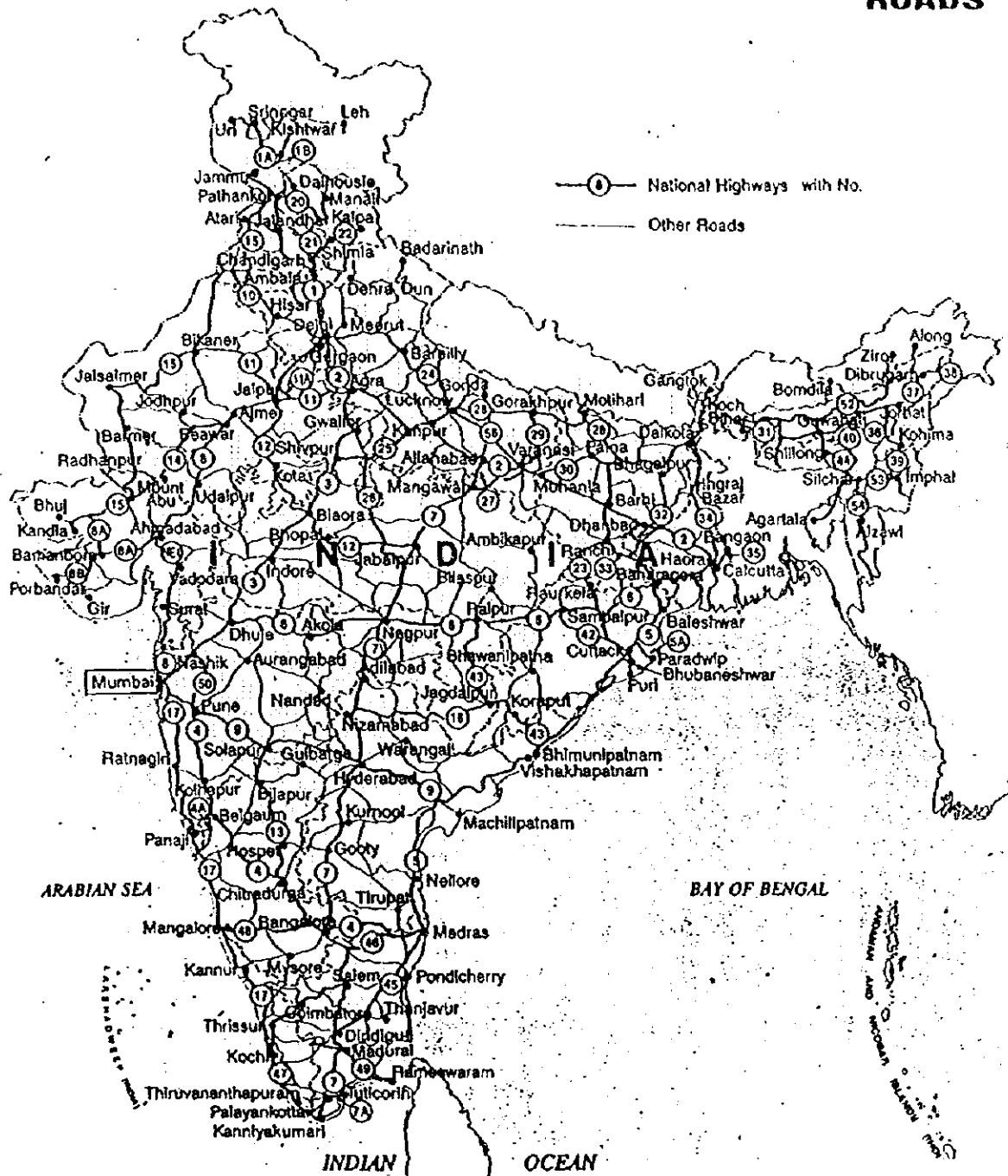


Fig 3.3.1 Road Network in India

Table 3.3.1 Length of Road in India

Items	Unit	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94	1994-95
Length of roads	thousand km							
Total		918.0	1,491.0	2,037.0	2,041.0	2,633.3	2,779.2	2,884.0
Surfaced		398.0	684.0	1,001.0	1,071.0	NA	NA	NA
Length of national highways	thousand km							
Total		24.0	32.0	33.7	33.7	34.1	34.1	34.1
Surfaced		23.0	32.0	33.7	33.7	34.1	34.1	34.1
Length of state highways	thousand km							
Total		57.0	94.0	127.0	128.6	130.8	133.0	135.3
Surfaced		52.0	90.0	122.0	126.2	NA	NA	NA

(Source: Ministry of Surface Transport)

Table 3.3.2 Road Length Type of Road in Maharashtra State
(Maintained by Public Works Department and Zilla Parishad)

(Unit: km)

Year	National highway	State highway	Major district roads	Other district roads	Village roads	All roads
1965-66	2,364	10,528	12,628	8,744	17,524	51,788
1970-71	2,445	14,203	17,684	11,012	20,020	65,364
1975-76	2,860	15,032	19,925	14,506	36,434	88,757
1980-81	2,945	18,949	25,233	25,404	68,600	141,131
1985-86	2,937	19,260	26,157	28,478	76,839	153,671
1990-91	2,959	30,975	38,936	38,573	61,522	172,965
1991-92	2,959	31,076	38,984	39,316	62,159	174,494
1992-93	2,949	31,772	39,349	38,819	63,123	177,012
1993-94	2,953	31,947	40,142	40,440	65,379	180,861
1994-95(p)	2,953	32,947	41,642	41,240	66,079	184,861

Source: Public Work Department, Government of Maharashtra, Mumbai.

Table 3.3.3 Progress of Road Length in Maharashtra State

(Unit: km)

Category	1981-2001 Target	Achievement as on 31.3.1995
National Highways	3,024	2,953
State Highways	32,881	32,947
Major District Roads	44,047	41,642
Other District Roads	50,794	41,240
Village Roads	76,602	66,079
Total Road Length	207,348	184,861

Source : Economic Survey of Maharashtra 1995-96.

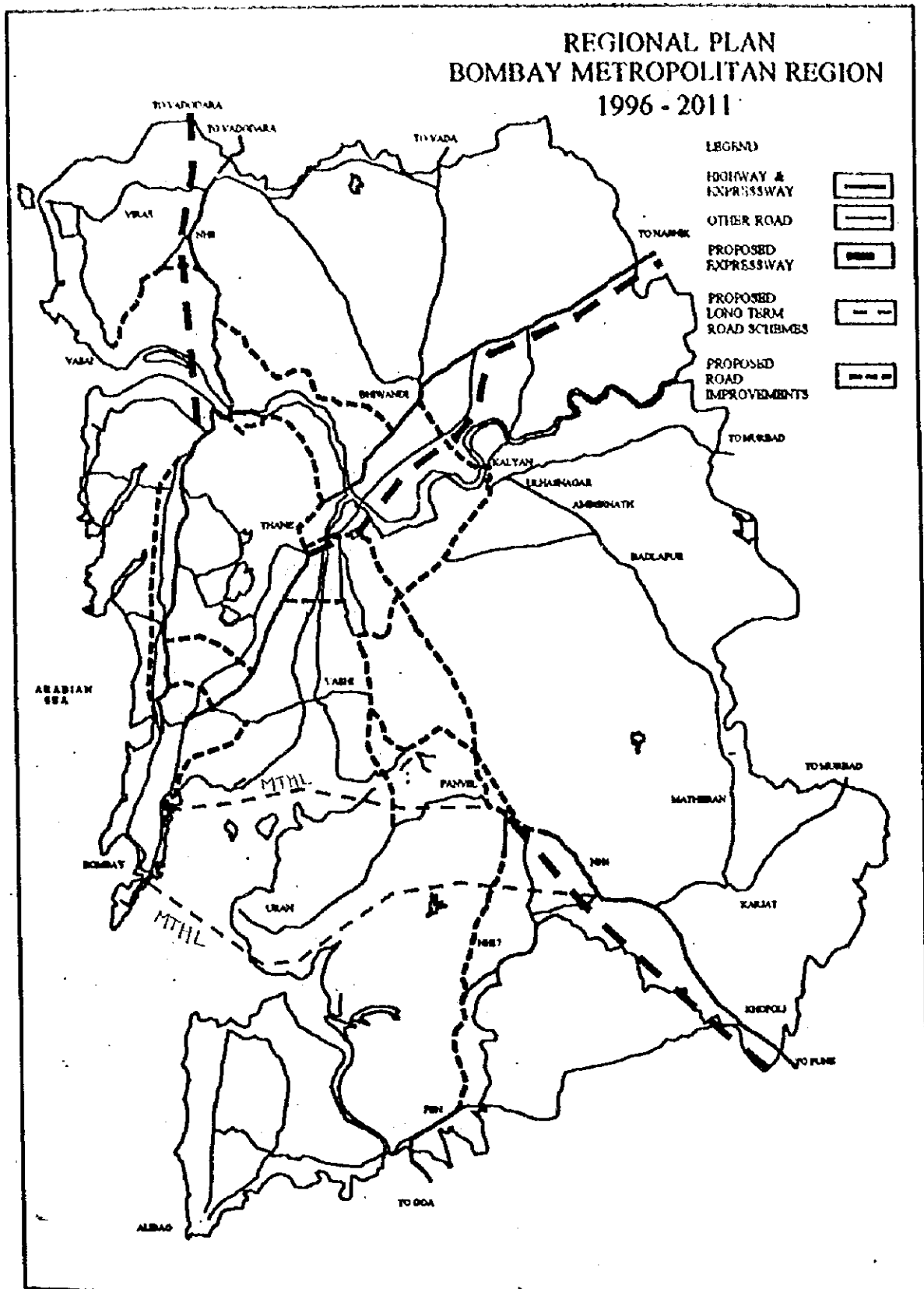


Fig 3.3.2 Proposed Road Network in Mumbai Metropolitan Region

3.4 Railway Network in India

The Indian Railway is one of the important means of transport in the country, and consists of an extensive network spread over 62.9 thousand km comprising Broad Gauge (40.6 thousand km), Metro Gauge (18.5 thousand km) and Narrow Gauge (3.8 thousand km). During the last four decades the annual growth in the railway network has been negligible. However, the Indian railway has made substantial progress in electrifying routes from 3.7 thousand km in 1950-51 to 12.3 thousand km in 1995-96 (see Table 3.4.1). Figure 3.4.1 shows the railway network in India.

The total cargo volume carried by railway in 1995-96 is 390.6 million tons, and passenger number is 4.038 billion. Volume by commodity is shown in Table 3.4.1-2. Total cargo volume increased by 7% over the previous year in 1995-96. The major commodities are coal, raw materials for steel plant, foodgrains and fertilizer (see Table 3.4.2)

The present railway network is totally inadequate to handle the volume of passenger and freight traffic, which has been increasing continuously due to a rise in population and the rapid growth of trade and industry in the country. In order to meet these requirements, the Indian railways will have to put more emphasis on construction of new railway lines, doubling of existing lines, and electrification of railway routes.

In Maharashtra State, the railway has been the life line of Maharashtra's economy. The total length of railway routes in the State has increased marginally by 0.8% from 5.4 thousand km as of the end of March, 1985 to 5.5 thousand km at the end of March 1995. The total length of the railway line in Maharashtra was just 8.7% of the total railway length in the country (62.7 thousand km).

In Maharashtra State, one of the most prestigious projects, the "Konkan Railway", is in progress. This 760km rail project will meet the long-standing demand of the people of the coastal district of Maharashtra, Karnataka, Goa and Kerala State. The project was expected to be completed by March 31, 1995. According to an official source, nearly 96% of the work of Konkan Railway has been completed.

Recent projects are shown below;

- 1) Central railway.
 - a) Diva-vasai Road
 - b) Diva-Panvel
 - c) Daund-Bhigwan and Nishatpura

- 2) Western railway.
 - a) Mumbai Central - Borivli

In the Mumbai Metropolitan Region, Mumbai is presently served by two zonal railways. Western and Central. The Western railwayline runs northward from Churchgate Terminus station in Mumbai CBD parallel to the west coast of the island towards northern and western India and Delhi. The Central railway runs from Victoria Terminus situated on the eastern side of the island and serves a large part of central India. The future scenario of the railway line as part of the development of transport infrastructure is as follows;

- 1) VT, Kurla, Vashi, Belapur existing Rail Corridor;
- 2) The underground rail corridor connecting VT to Churchgate via Fort Market, Stock Exchange and Nariman Point.
- 3) These two loops can be supported by three other peripheral loops viz, Bandra, Vasai, Kurla.

(see Figure 3.4.2)

Table 3.4.1 Length of Railway in India

Items	Unit	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
Route kilometers	(thousand km)								
Electrified		3.7	5.4	10	10.7	11.3	11.8	11.8	12.3
Total		58.8	61.2	62.4	62.5	62.5	62.5	62.7	62.9
Originating traffic	(million tons)								
Revenue-earning		167.9	195.9	318.4	338	350.1	358.7	365	390.6
Total traffic		196.5	220	341.4	360	370.9	377.5	381.6	404.9
Good carried	(billion tons-km)								
Revenue-earning		110.7	147.7	235.8	250.2	252.4	252.4	249.6	271.1
Total traffic		127.4	158.5	242.7	256.9	258.1	257.1	253	273.7

(Source: Ministry of Railways)

Table 3.4.2 Revenue Earning Passengers and Goods Traffic on Indian Railways

(Unit: million tons)

Commodity	Year	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
1 Coal		47.90	64.08	135.16	146.43	157.73	167.00	17,237.00	184.30
2 Raw materials for steel plant (excl. coal)		16.10	20.17	25.90	29.53	32.97	33.40	36.61	38.63
3 Pig iron and finished steel from steel plant		6.20	7.53	10.01	11.43	12.03	12.08	12.02	12.06
4 Iron ore for export		9.80	11.07	13.14	12.76	10.47	10.46	9.81	10.16
5 Cement		11.00	9.64	28.88	30.76	30.38	32.54	31.45	31.80
6 Foodgrains		15.10	18.88	25.35	27.38	27.30	26.68	20.73	25.81
7 Fertilizers		4.70	8.11	18.36	18.61	18.94	19.50	21.48	23.24
8 Mineral oils		8.90	14.95	24.99	25.56	26.41	25.95	27.72	28.91
9 Other goods		48.20	42.06	36.61	35.52	33.82	31.11	32.77	35.66
10 Total revenue-earning traffic		167.90	195.94	318.40	337.98	350.05	358.72	364.96	390.57
Passenger (million)		2,431.00	3,613.00	3,858.00	4,049.00	3,749.00	3,708.00	3,915.00	4,038.00

(Source: Ministry of Railways)

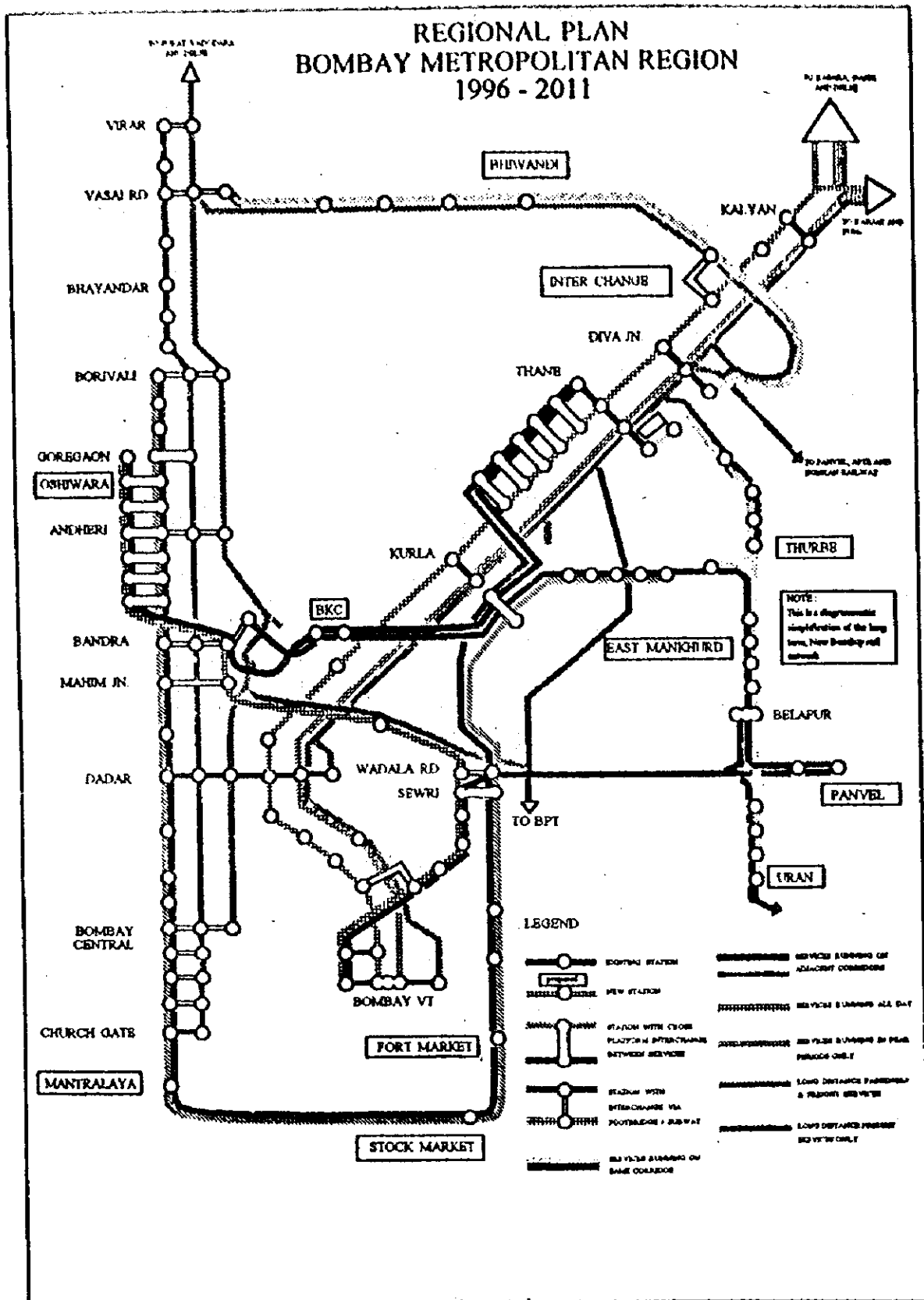


Fig 3.4.2 Proposed Railway System in Mumbai Metropolitan Region

Chapter IV Maritime Transport to/ from India

4.1 Shipping Routes to/from MBP and JNP

4.1.1 Feeder Services to/from MBP and JNP

Singapore, Colombo and Dubai are three predominant international hub ports on major routes to/from MBP and JNP. Table 4.1.1. shows feeder services to/from MBP and JNP provided during March of 1997.

Table 4.1.1. Feeder service to / from MBP and JNP

(Singapore Sector)

Shipping Line	Name of Vessel	Capacity (TEUs)	Route	Service Interval
MOL	Ocean Security	850	MBP-Port Kelang- Singapore-Dubai- Karachi-MBP	Weekly
	Ocean Lemon	1,000		
	Ocean Strength	850		
	Easter Oasis	1,000		
NOL	Mumbai Bay	1,000	JNP-Colombo-	Weekly
NYK	Cocoplise	600	Singapore-Karachi-	
P&O	Anro Gowa	1,152	JNP	
Nedlloyd	Orient Freedom	750	MBP-Penang-	Weekly
K. Line	Meghna	600	Singapore-MBP	
MISC	Vega			
XCL	Kota Chaya	784	MBP-Penang-	Weekly
(Common Services)			Singapore-MBP	
ACL	Trade East	784	MBP-Cochin-	Weekly
(Common Services)	M. Kurako	784	Singapore-MBP	
Bombay Express	Sea Success	784	MBP-Cochin-	Weekly
(Common Services)	M. Kurako	784	Singapore-MBP	
Sumudera	Sinar Toba	684	MBP-Singapore-	Weekly
(Common Services)	Leeport	558	MBP	
	Nordkap	846		

(Colombo Sector)

Shipping Line	Name of Vessel	Capacity (TEUs)	Route	Service Interval
XCL	Susak	336	MBP-Colombo- MBP	Weekly
	(Common Services) X-Press Trisui	350		
	Lamphum Navee			
Sea Service	StarLight	440	MBP-Cochin-	10 days
(Common Services)			Colombo-MBP	
OEL	Orient Challenge	440	MBP-Colombo-	4/5 days
(Common Services)	Trade Bliss	458	MBP	
OCT	Ultraflex Feeder	320	MBP-Colombo-	Weekly
(Common Services)	Ultraflex Orient	320	MBP	

(Gulf Sector)

Shipping Line	Name of Vessel	Capacity (TEUs)	Route	Service Interval
APL	Eagle Confidence	460	MBP-Fujairah-	Weekly
	Eagle Sky	460	MBP	
ICS	Socol-2	564	MBP-Khorfakkan-	Weekly
SCI	Jaya Maps	577	Sharjah-Dubai-	
Forbes (Common Services)	Putnl	360	-Jebel Ali- -Adu Dhabi-MBP	
OEL	Orient Shreyas	650	MBP-Khorfakkan-	4 days
XCL	Walma	650	-Dubai-Jebel Ali-	
(Common Services)	Marina-S	850	-Adu Dhabi-MBP	
IAL (Common Services)	IAL President	180	MBP-Dubai- MBP	10 days

Source) "EXIM" during March 1st To 31st, 1997

4.1.2 International Trade Liner Services for MBP

Table 4.1.2. shows international trade liner services for MBP. Number of groups and shipping lines are presented for each service intervals.

Table 4.1.2 International Trade Liner Services for MBP

Region of Origin and Destination Ports	Service Interval	No. of Groups	No. of Shipping Lines
1. U.K., North Continent, Scandinavia	1) 5 days	2	6
	2) weekly	5	24
	3) bi-weekly	4	8
	4) monthly	1	1
2. Red Sea	1) 4/5 days	18	18
	2) weekly	3	3
	3) bi-weekly	3	5
	4) unfixed	1	4
3. Black Sea, Eastern Europe	1) 4/5 days	3	15
	2) weekly	3	6
	3) bi-weekly	3	6
	4) monthly	3	3
4. Mediterranean Sea	1) 5 days	4	14
	2) weekly	3	6
	3) bi-weekly	2	3

Source) "EXIM" during March 1st To 31st, 1997

Remarks) NVOCC (Non Vessel Operate Common Carrier) and common feeder services are included.

Table 4.1.2 International Trade Liner Services for MBP (continued)

Region of Origin and Destination Ports	Service Interval	No. of Groups	No. of Shipping Lines
5. West Asia and Gulf	1) 4/5 days	2	45
	2) weekly	2	2
	3) 10 days	1	6
	4) bi-weekly	3	8
	5) monthly	1	1
	6) unfixed	1	6
6. Australia, New Zealand and South Pacific Islands	1) weekly	6	40
	2) bi-weekly	1	1
	3) monthly	2	2
7. South East Asia, China and Japan	1) 4 days	1	48
	2) weekly	5	28
	3) bi-weekly	7	7
	4) monthly	1	1
8. USA and Canada	1) 5 days	2	23
	2) weekly	7	14
	3) bi-weekly	4	6
	4) monthly	1	1
9. East Coast of Africa	1) 5 days	2	15
	2) weekly	3	11
	3) 10 days	1	2
	4) bi-weekly	5	7
	5) monthly	4	6
10. West Coast of Africa	1) 5 days	1	3
	2) weekly	3	5
	3) 10 days	1	2
	4) bi-weekly	5	8
	5) monthly	1	1

Source) "EXIM" during March 1st To 31st, 1997

Remarks) NVOCC (Non Vessel Operate Common Carrier) and common feeder services are included.

4.1.3 International Trade Liner Services for JNP

Table 4.1.3. shows international trade liner services for JNP. Number of groups and shipping lines are presented for each service intervals.

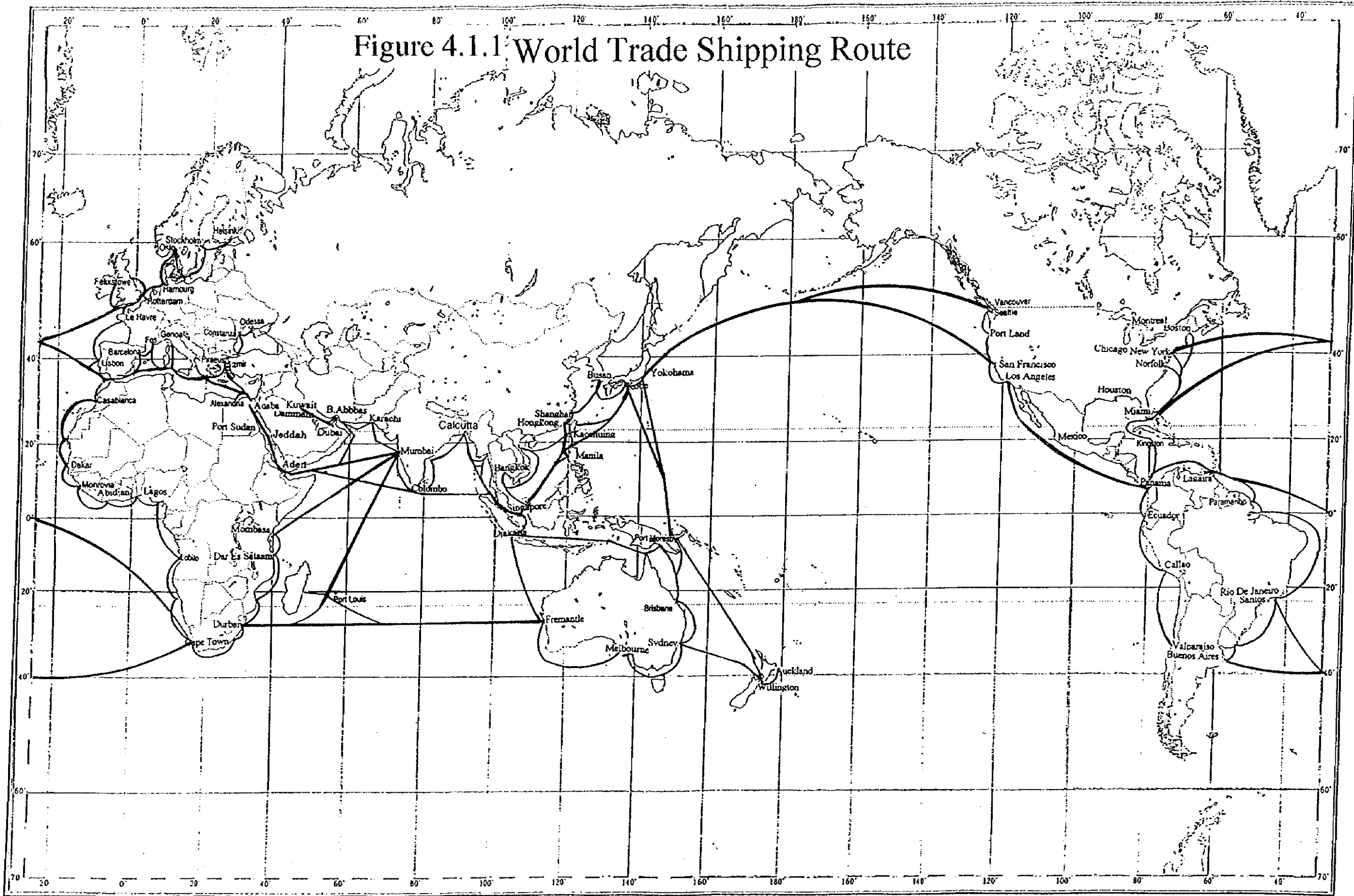
Table 4.1.3 International Trade Liner Services for JNP

Region of Origin and Destination Ports	Service Interval	No. of Groups	No. of Shipping Lines
1. U.K., North Continent, Scandinavia	1) weekly	2	11
	2) 10 days	2	27
	3) bi-weekly	5	8
2. Red Sea and Mediterranean Sea	1) weekly	3	14
	2) 10 days	1	10
	3) bi-weekly	3	6
	4) monthly	1	1
3. Black Sea, Eastern Europe	1) weekly	3	9
	2) 10 days	1	6
	3) bi-weekly	2	3
4. South East Asia, China and Japan	1) weekly	3	7
	2) bi-weekly	3	5
5. East Coast of Africa	1) weekly	3	7
	2) 10 days	1	4
	3) bi-weekly	3	5
	4) monthly	1	1
6. USA, Canada, west Indian Islands	1) weekly	4	12
	2) 10 days	1	8
	3) bi-weekly	2	2
	4) monthly	1	1
7. West Asia and Gulf	1) bi-weekly	1	8
8. Australia, New Zealand and South Pacific Islands	1) weekly	1	1
	2) 10 days	1	1
	3) bi-weekly	2	3

Source) "EXIM" during March 1st To 31st, 1997

Remarks) NVOCC (Non Vessel Operate Common Carrier) and common feeder services are included.

Figure 4.1.1 World Trade Shipping Route



1 : 54,000,000 世界地图 比例尺

4.2 Maritime Traffic to / from India and MBP

As for International trade of India, in 1950, India accounted for about 1.8% (1.85% of export and 1.71% of import) of the total world trade, and then decreased to 0.61% in 1994. Historically, major export commodities of India have been in the world market coffee, tea, leather and spices. On the other hand, major import commodity of India were edible oils, cashewnuts, pulses, fertilizers and machinery. As to commodity in export of Mumbai port, rice, oil cake, foodstuffs, chemicals, metal products and textiles were major commodities and steel products, paper goods, edible oil, foodstuff, fertilizer, sulphur and chemicals, in import, in 1995. The major trade partners of Mumbai, in export are East and West Asia, East Africa, West Europe and USA ~ Canada. In import, East and West Asia, other African country, USA ~ Canada and West Europe are its major trade partners (see Table 4.2.1, Table 4.2.2).

Table 4.2.1 Principal Exports Country Wise of MBP (1995-96)

(Unit: hundreds tons)

No	Region Commodity	East Asia Japan	West Asia Middle East	East Africa	West Africa	Other African Country	USSR (CIS) Country	East Europe	West Europe	USA Canada	Other American Country	Oceania Country	Other Country	Total
1	Bicycle Parts	81	10	82	26	5	2	1	12	2	19	1	26	267
2	Building materials	68	106	41	0	1	0	2	12	18	2	12	3	265
3	Steel Material	692	656	278	45	28	0	1	88	76	2	24	31	1,921
4	Metal Products	775	685	241	75	43	1	1	116	202	24	30	50	2,243
5	Machinery	169	126	83	88	13	6	2	44	31	5	9	20	596
6	Vehicle and Auto parts	130	51	150	10	29	1	1	26	42	16	15	25	496
7	Chemical	706	546	213	23	48	14	25	204	137	56	94	33	2,099
8	Earthen Ware	78	58	48	6	8	0	4	7	9	0	7	12	237
9	Instrument	106	102	38	14	5	6	6	26	16	4	19	12	354
10	Glass Ware etc.	158	247	116	4	95	0	0	5	3	0	0	5	633
11	Textile	165	194	120	19	22	15	10	162	217	14	38	35	1,011
12	Dyes and Colors	193	26	15	5	7	1	10	71	60	19	2	4	413
13	Raw Cotton	38	1	2	0	0	0	4	33	0	0	1	4	81
14	Cotton Goods	404	69	187	1	6	3	11	85	5	2	27	9	809
15	Synthetic Fiber	159	278	257	17	21	8	13	98	31	10	15	11	918
16	Medicine	135	53	63	43	10	11	3	70	85	15	12	20	520
17	Foodstuff	3,164	2,103	223	5	51	41	6	1,520	210	6	12	100	7,411
18	Foodgrains	336	534	11	0	4	30	190	40	71	0	3	14	1,233
19	Rice	1,943	1,198	852	341	1,169	255	186	91	26	0	64	332	6,457
20	Rubber Goods	35	73	167	9	4	12	0	8	60	3	6	12	389
21	Oil Cake(Fodder)	3,328	1,077	77	0	67	91	0	64	2	0	0	31	4,737
22	Edible Oil	173	15	2	0	15	7	4	372	136	14	5	20	763
23	Spice	98	300	15	4	37	1	0	35	20	1	2	5	518
24	Toilet Preparation and	45	53	30	9	4	32	1	18	13	5	3	16	229
25	Leather Manufactures	161	361	52	25	37	13	3	208	181	28	53	47	1,169
26	Miscellaneous	5,753	1,738	257	24	146	29	6	753	181	82	39	115,513	124,521
	Total	19,103	10,660	3,624	793	1,863	579	490	4,168	1,834	327	493	116,388	160,322

(Source : Administration Report, MBPT 1995-96)

Table 4.2.2 Principal Imports Country Wise of MBP (1995-96)

(Unit: hundreds tons)

No	Region Commodity	East Asia Japan	West Asia Middle East	East Africa	West Africa	Other African Country	USSR (CIS) Country	East Europe	West Europe	USA Canada	Other American Country	Oceania Country	Other Country	Total
1	Sulphur	146	3,050	0	0	0	263	0	35	0	0	0	224	3,718
2	Fertilizer etc.	108	2,784	0	112	536	0	14	178	180	0	0	763	4,675
3	Chemical Nos	1,978	103	28	27	27	51	216	1,196	602	120	51	320	4,719
4	Metal Products	534	562	119	97	93	470	188	595	281	438	382	658	4,417
5	Steel Products	1,883	717	2	27	952	2,677	540	4,886	994	1,101	665	4,653	19,097
6	Scrap Brass	60	23	2	0	1	146	111	771	298	0	34	283	1,729
7	Instrument	258	24	0	2	0	3	1	91	35	220	5	53	692
8	Machinery	291	12	5	1	3	96	19	1,096	396	13	16	220	2,168
9	Vehicle and Auto parts	73	2	0	0	2	4	14	139	77	1	3	58	373
10	Asbestos	2	6	18	0	35	105	3	15	113	147	1	150	595
11	Wood pulp	211	6	0	2	160	238	0	158	785	29	31	84	1,704
12	Wooden products	189	21	45	269	50	1	1	79	30	11	0	397	1,093
13	Timber Log	1	0	0	1	0	0	0	0	2	0	0	0	4
14	Glass Products	44	4	0	0	0	0	0	20	10	1	1	7	87
15	Paper Goods	428	944	2	1	58	1,034	38	527	2,385	39	75	267	5,798
16	Rubber Goods	464	10	0	1	5	9	17	112	46	1	0	37	702
17	Earthen Ware	2	48	0	1	10	1	0	254	28	0	1	49	394
18	Textile	244	9	2	3	5	1	3	350	245	7	55	35	959
19	Synthetic Fiber	1,883	786	3	1	7	17	34	507	368	84	153	281	4,124
20	Food Stuff	53	764	12	8	0	0	4	29	192	432	3	44	1,511
21	Food Grains	1,920	227	173	0	8	4	197	43	892	9	12	976	4,461
22	Edible Oil	4,412	35	0	0	10	1	0	16	28	979	30	233	5,744
23	Miscellaneous	1,772	73,260	323	510	149	541	80	2,966	1,011	146	297	18,122	99,177
	Total	16,956	83,397	734	1,063	2,111	5,662	1,480	14,063	8,998	3,778	1,815	27,914	167,971

(Source: Administration Report, MBPT 1995-96)

4.3 Indian Mercantile Fleet

At 1st of September in 1996, India had a fleet strength of 479 ships aggregating 7.02 million gross tons (see Table 4.3.1). Indian vessels carried about 30% of the total overseas sea-borne cargo during 1994 - 1995. While the share of Indian vessels in transporting crude oil and refined oil was 54.3% , the share in bulk cargo and liner cargo were 17% and 9% respectively.

There are 81 shipping companies including government enterprise, "Shipping Corporation of India (SCI)" in the country. Of these, 13 principal private companies own a fleet of 261 ships with a tonnage of 5,595 million gross tons accounting for 74.0% of the total Indian tonnage. The remaining 68 private companies own a fleet of 205 vessels with a tonnage of 1,968 million gross tons accounting for 26.0%. The largest shipping company is SCI, which owns 123 ships with a tonnage of 3,226 million gross tons accounting for 42.7% of the total Indian tonnage(see Table 4.3.2). SCI improved its financial performance in 1995-1996 ; its net profit after tax was Rs. 3,230 million.

Table 4.3.1 Indian Fleet of Coastal and Overseas Ships by Vessel Type

Type of Vessels	(Unit: thousand)					
	Coastal		Overseas		Total	
	Number of Vessels	GRT	Number of Vessels	GRT	Number of Vessels	GRT
Dry Cargo Liner	84	100	45	547	129	647
	37.2%	14.2%	17.8%	8.7%	26.9%	9.2%
Dry Bulk Carrier	12	226	125	2,926	137	3,152
	5.3%	32.2%	49.4%	46.3%	28.6%	44.9%
Oil Tanker	17	151	76	2,651	93	2,802
	7.5%	21.5%	30.0%	42.0%	19.4%	39.9%
Ore/Oil Bulk Carrier	0	0	3	171	3	171
	0.0%	0.0%	1.2%	2.7%	0.6%	2.4%
Passenger Cargo Combination	15	53	1	8	16	61
	6.6%	7.5%	0.4%	0.1%	3.3%	0.9%
Offshore Supply Vessel	71	86	0	0	71	86
	31.4%	12.3%	0.0%	0.0%	14.8%	1.2%
Specialized Vessel	26	82	0	0	26	82
	11.5%	11.7%	0.0%	0.0%	5.4%	1.2%
Timber Carrier	1	4	3	11	4	15
	0.4%	0.6%	1.2%	0.2%	0.8%	0.2%
Grand Total	226	702	253	6,314	479	7,016
	100%	100%	100%	100%	100%	100%

Source) Indian Shipping statistics

Remarks) As of September 1st, 1996

Table 4.3.2 Indian Major Shipping Line Fleet by Vessel Type by Major Companies

		Dry Cargo Liner	Dry Bulk	Oil/Ore Bulk	Oil Tanker	Passenger and Cargo Combi.	Offshore and Timber	Total
1) Shipping Corporation India Ltd.	No. of Vessels	32	28	2	48	2	11	123
	GRT	421	747	133	1,898	10	17	3,226
2) Great Eastern Shipping Corp.	No. of Vessels	2	18	0	14	0	9	43
	GRT	3	409	0	374	0	9	795
3) Essar Shipping Corp.	No. of Vessels	4	1	1	0	0	6	12
	GRT	1	17	38	0	0	16	71
4) South Indian Shipping Corp.	No. of Vessels	0	9	0	0	0	0	9
	GRT	0	209	0	0	0	0	209
5) Chowgule Steamship Corp.	No. of Vessels	5	6	0	0	0	0	11
	GRT	8	191	0	0	0	0	199
6) Centur Shipping Corp.	No. of Vessels	7	0	0	3	0	0	10
	GRT	143	0	0	36	0	0	178
7) Surrender Overseas Shipping Corp.	No. of Vessels	0	8	0	0	0	0	8
	GRT	0	156	0	0	0	0	156
8) India SteamShip Corp.	No. of Vessels	8	3	0	0	0	0	11
	GRT	84	69	0	0	0	0	152
9) Totani Shipping Corp.	No. of Vessels	0	7	0	0	0	0	7
	GRT	0	149	0	0	0	0	149
10) India Cement Ltd. Bombay	No. of Vessels	0	4	0	0	0	0	4
	GRT	0	119	0	0	0	0	119
11) Varlin Shipping Corporation	No. of Vessels	0	2	0	4	0	2	8
	GRT	0	49	0	64	0	2	115
12) Samar Shipping Madras	No. of Vessels	0	5	0	0	0	2	7
	GRT	0	113	0	0	0	2	115
13) Samar Shipping Madras	No. of Vessels	0	6	0	0	0	2	8
	GRT	0	108	0	0	0	2	110
14) Other Shipping Companies	No. of Vessels	68	31	0	16	14	76	205
	GRT	1,032	611	0	123	58	144	1,968
Grand Total	No. of Vessels	126	128	3	85	16	108	466
	GRT	1,691	2,946	171	2,495	68	192	7,563

In order to develop the Indian shipping Industry, a new shipping policy was initiated in 1991. Several policy measures initiated since then are summarized below:

- 1) Automatic approval is now given for (a) acquisition of all categories of ships except crude tankers and offshore supply vessels by private shipping companies, (b) acquisition of replacement tonnage.
- 2) No approval is required for sale of ship and acquisition of ships from an Indian shipyard.
- 3) Shipping companies given freedom to time charter out Indian ships
- 4) Shipping companies allowed to retain sale proceeds of their ships abroad and

utilize it for fresh acquisition.

- 5) Shipping companies are allowed to acquire vessels through bare boat charter-demise method.
- 6) The shipping companies are permitted to get their ships repaired in any shipyard without seeking prior approval of the government.
- 7) Quarterly block allocation scheme for repair of ships has been dispensed with entirely and Reserve bank of India now releases foreign exchange for ship repair/ dry-docking and spares for imported capital goods without any value limit.
- 8) Certain sections of merchant shipping act have been amended to facilitate India shipping companies to raise external commercial borrowing for ship acquisition from abroad.
- 9) As per the recent amendments to permission 42 of the merchant shipping act, 1958, no prior permission from directorate general of shipping is required from Oct. 1993 for sale of vessels either for further trading or scrapping by the Indian shipping companies.

Analysis of the age profile of Indian fleet shows that about 17% of Indian ships are in the age group up-to 5 years, 46% are in the age group between 6 and 15 years, 20% are in the age group between 16 and 20 years and 17% in the age group of above 20 years (see Table 4.3.3). Of the ships owned by SCI, 38% are in the age group up-to 10 years and 54% in between 11 and 20 years.

The acquisition of ships in the current year has been slow compared to the last year. The shipping industry has acquired only 10 vessels of 97,000 gross tons compared to 57 vessels of about 800,000 gross tons during April-November 1996. Government is awaiting the report of National Shipping Policy Committee, set up last year, which will cover the entire gamut of the shipping industry.

The further deregulation of the industry and proposal for increased private participation are also engaging the mind of the Government. The development of coastal shipping has also been slow despite the fact that it has great potential to relieve pressure on the surface modes of transport. It is essential to remove the various impediments (including the fiscal provision) to the growth of this mode of transport.

Table 4.3.3 Ship Age-wise Share of Indian Fleet in terms of Tonnage

Year	Age	under 5 years	6 to 15 years	16 to 20 years	over 20 years	Total
1991	Coastal	12.7%	53.6%	26.6%	7.1%	100%
	Overseas	8.5%	52.8%	34.6%	4.1%	100%
	Total	16.1%	52.9%	33.8%	4.4%	100%
1992	Coastal	16.1%	47.7%	27.3%	8.9%	100%
	Overseas	11.8%	48.2%	36.3%	3.7%	100%
	Total	12.2%	48.2%	35.4%	4.2%	100%
1993	Coastal	10.9%	50.9%	25.9%	12.3%	100%
	Overseas	14.0%	44.5%	34.9%	6.6%	100%
	Total	13.7%	45.2%	34.0%	7.1%	100%
1994	Coastal	8.7%	48.3%	18.5%	24.5%	100%
	Overseas	18.3%	44.1%	28.3%	9.3%	100%
	Total	17.3%	44.5%	27.2%	11.0%	100%
1995	Coastal	7.4%	48.9%	10.3%	33.4%	100%
	Overseas	18.1%	45.8%	21.3%	14.8%	100%
	Total	17.2%	46.1%	20.2%	16.6%	100%

Source) Indian Shipping Statistics 1996

Remarks) As of September 30th, 1996

Chapter V Present Conditions of the Port of Mumbai (MBP)

5.1 Port facilities

5.1.1 General

The port of Mumbai is a naturally blessed port with a spacious expanse of calm waters of Mumbai Bay protected on the east by mainland India and sheltered on the west by Mumbai Peninsula. The bay, nearly rectangular in shape, measures about 20 km north to south and about 9 km east to west and covers a total surface area of 180 km². Figure 5.1.1 shows the location of the port.

The central port of Mumbai, where general cargo is handled, is situated on Mumbai Peninsula and consists of three enclosed wet docks and several open wharves abutting on tidal waters.

Crude oil, oil products, LPG and chemical products are handled at Marine Oil Terminal of the Jawahar Dweep, which is located in front of Butcher Island in the middle of Mumbai Bay, and Pir Pau Terminal in the innermost part of the bay.

In the Nhava Sheva area at the eastern end of Mumbai Bay is located Jawaharlal Nehru Port (JNPT) which came into cargo service in 1989 as a new port.

The Main Approach Channel providing access to Mumbai Port from the Indian Ocean starts in the southwest of the Bay and, running in the northeastern direction, ends at Pir Pau Terminal. The Indira Dock Approach Channel branching off from the Main Approach Channel provides access to Central Mumbai Port. Ship traffic to and from JNPT is also served by the Main Approach Channel.

5.1.2 Central Mumbai Port

(1) Berthing Facilities

1) Wet Docks

The three enclosed Wet Docks, where general cargo and containers are handled, are called Indira Dock, Victoria Dock and Prince's Dock respectively.

Indira Dock has 21 berths measuring 3500 m long in total where the water depth alongside is maintained at 9.2 m or more. These depths can be increased to more than 10 m when the need arises by raising the inner water level by 1.2 m through pumping operations. Indira Dock has

an entrance lock measuring 229 m long and 30.5 m wide which is accessible to ships at any tide level.

Victoria Dock has 15 berths with a combined length of 1,700 m where the depth alongside is maintained at 7.0 m or more. This dock is separated from natural water surface by a 24 m wide gate door. The gate is opened at high water level only to allow ship to pass.

Prince's Dock has 14 berths with a total length of 1,700 m where the depth alongside is maintained at 6.4 m or more. This dock also separated from natural water surfaces by a 20 m wide gate door.

In Mumbai Port, where MHWS is +4.42 m and MHWN is +3.30 m, the approach channels and the locks are so designed as to provide water levels +3.10 m above Chart Datum to enable ships to enter and leave the port taking advantage of these relatively high water levels. Figure 5.1.2 is the plan view of the three wet docks and Figures 5.1.3 (1) and 5.1.3 (2) show the relationship between the cross sections of the berth and tide levels. Detailed berth data are given in Tables 5.1.1 (1) and 5.1.1(2) and similar data on the locks and approach channels in Table 5.1.2.

2) Open Berth

Two large berths, each measuring 244 m long, are provided at Ballard Pier located at the southern end of Central Mumbai Port. One of the two berths, the one on the north side, -9.1 m deep alongside, serves container ships and is equipped with two container cranes and backed by a 33,000 m² container yard. The other berth on the south, -9.7 m deep alongside, handles passenger ships and is backed by a passenger terminal building.

On the east of Indira Dock is located an open wharf structure where a general cargo berth, measuring 700 m long and ranging in depth alongside from -6.0 to -7.0 m, and berths with a total length of 300 m for harbour service craft, such as dredgers, barges, launches and tugboats, are provided. Figures. 5.1.4 (1) and 5.1.4 (2) show the typical cross sections of the open wharf structure and Tables 5.1.1 (1) and 5.1.1 (2) present relevant berth data.

3) Northern Area of Central Mumbai Port

On the north of Prince's Dock are located open berths (called bunder) with limited depths alongside which continue along nearly 5 km of shoreline. These open berths handle cabotage vessels. Between these cabotage berths are located a harbour service craft basin, shipyard, fishery harbour, ferry berth and other facilities.

(2) Container Yard and Storage Yard

Central Mumbai Port has grown side by side with the urban facilities of the city and rear part of the port area adjoins crowded sections of the city. The port facilities are arranged in a long, narrow strip along the coastline of the city.

Cargo handling yards and warehouses are provided on the large berths located in the south of the port area. It is difficult, however, to secure wide spaces immediately behind the large berths for storage of general cargo and containers. The location of existing container parking yards in Docks Area are shown in Fig 5.1.5.

Container freight stations, container depots, warehouses and customs yard are located 3 to 10 km north of the large berths. Tables 5.1.3 (1), 5.1.3 (2) and 5.1.4 summarize the data on the storage and warehousing facilities of MBPT and Fig. 5.1.6 shows the location of the container yard and storage yard in the north of the port area.

(3) Approach Channels

The Main Approach Channel giving access to MBPT extend nearly 20 km from the southwest end of Mumbai Peninsula to Pir Pau Terminal located in the innermost part of the Mumbai Harbour.

At a point about 10 km away from starting point of the Main Approach Channel, the Indira Dock Approach Channel branches off from it to reach Central Mumbai Port. The Main Channel continues to Pir Pau Terminal by way of Jawahar Dweep.

Another Approach Channel about 4 km long branching off to the right from main channel at Jawahar Dweep provides access to JNP.

The Main Approach Channel is maintained at about -11.0 m at all time, but it suffers from chronic siltation induced by strong tidal currents generated in Mumbai Bay due to the tidal range of about 4 meter and fine-grained marine clays deposited in the harbour.

For this reason, annual maintenance dredging is undertaken in the Main Approach Channel. The channel data are summarized in Figure 5.1.1 and Table 5.1.2.

5.1.3 Oil Terminal

(1) Marine Oil Terminal

On the east of Butcher Island is found a natural depth where four dolphin berths are built to form an oil terminal. These dolphin berths lie at depths ranging from -10.0 to -14.0 m to permit the mooring of tankers in the classes ranging from 40,000 to 80,000 DWT. This oil terminal is connected to two oil refineries and a thermal power plant located at Trombay on Mumbai Peninsula by a submerged pipeline.

Table 5.1.1 (2) summarizes the berth data of the Marine Oil Terminal.

(2) Pir Pau Terminal

The Pir Pau area has a dolphin type oil berth -5.9 m alongside which was constructed in prewar days of year 1920. This oil berth has been used primarily for handling LPG and chemical products since the completion of Jawahar Dweep in 1955. In addition, a large dolphin berth with a depth alongside of -12.0 m was completed in 1996. With these berthing facilities Pir Pau Terminal has now been turned into a modern oil terminal.

Table 5.1.1 (1) EXISTING BERTHING FACILITY

(1) INDIRA DOCK AND BALLARD PIER				Unit : Meter			
No.	Name of Berth	Berth Length	Crown Height	Elevation of Berth Bottom (Below Chart Datum)		Water Level	Water Depth
				Designed	Maintained	Lowest	Quay Front
			(1)	(2)	(3)	(4)	(3)+(4)
BP	Ballard Pier	726					
BP-01	Passenger Terminal	232	+ 6.71	-10.66	- 9.70	+0.76	10.46
BP-02	Container Berth	244	+ 6.71	-9.75	- 9.10	+0.76	9.86
BP-03	East Mole	250	+ 6.71	-8.53	- 7.60	+0.76	8.36
IDB	Indira Dock Basin Berth	3,522					
IDB-01	No.1	180	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-02	No.2	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-03	No.3	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-04	No.4	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-05	No.5	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-06	No.6	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-07	No.7	152	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-08	No.8	152	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-09	No.9	152	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-E	Jetty End	130	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-10	No.10	152	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-11	No.11	152	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-12	No.12	152	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-13	No.12A	180	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-14	No.12B	180	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-15	No.13B	180	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-16	No.13A	180	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-17	No.13	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-18	No.14	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-19	No.15	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-20	No.16	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDB-21	No.17	158	+ 6.71	- 7.62	-6.71	+ 3.10	9.81
IDH	Indira Dock Harbour Wall	1,007					
IDH-01	No.18	183	+ 6.71	- 8.53	- 7.01	+0.76	7.77
IDH-02	No.19	168	+ 6.71	- 8.53	- 7.01	+0.76	7.77
IDH-03	No.20	168	+ 6.71	- 8.53	- 7.01	+0.76	7.77
IDH-04	No.21	168	+ 6.71	- 8.53	- 5.80	+0.76	6.56
IDH-05	No.22 (Ship Repair)	168	+ 6.71	- 8.53	- 4.50	+0.76	5.26
IDH-06	No.23 (Tug Berth)	122	+ 6.71	- 3.96	- 3.35	+0.76	4.11
IDH-07	MBPT Launches	30	+ 6.71	- 3.96	- 3.35	+0.76	4.11

Table 5.1.1 (2) EXISTING BERTHING FACILITY

(2) VICTORIA, PRINCE'S DOCK, OIL TERMINAL AND OTHERS

Unit : Meter

No.	Name of Berth	Berth Length	Crown Height	Elevation of Berth Bottom (Below Chart Datum)		Water Level	Water Depth
				Designed	Maintained		
			(1)	(2)	(3)	(4)	Quay Front (3)+(4)
VD	Victoria Dock	2,014					
VD-1	No.1	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-2	No.2	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-3	No.3	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-4	No.4	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-5	No.5	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-6	No.6	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-7	No.7	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-8	No.8	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-9	No.9	122	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-10	No.10 / 11	183	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-11	No.12	100	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-12	No.13	100	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-13	No.14	100	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-14	No.15	130	+ 5.79	- 5.79	- 4.87	+ 2.13	7.00
VD-15	Dredger Berth	203	+ 5.79	- 5.18	- 4.26	+0.76	5.02
VD-16	Barge Berth	100	+ 5.79	- 5.18	- 4.26	+0.76	5.02
PD	Prince's Dock	1,767					
PD-01	No.A	138	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-02	No.B	138	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-03	No.C	140	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-04	No.D	140	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-05	No.E	140	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-06	No.G	100	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-07	No.N / O	212	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-08	No.P / Q	212	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-09	No.H	116	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
PD-10	No.K / L / M	431	+ 5.79	- 5.18	- 4.26	+ 2.13	6.39
FW	New Ferry Wharf						
FW-01	Ferry Jetty	312	+ 6.00	- 5.18	- 4.26	+0.76	5.02
FW-02	Berth for Ferry	249	+ 5.79	- 5.20	- 3.10	+0.76	3.86
BI	Butcher Island Oil Terminal						
BI-01	Jawahar deep -1	229*	+7.62	- 11.6	- 11.0	+0.76	11.76
BI-02	Jawahar deep -2	213*	+7.62	- 11.0	- 10.2	+0.76	10.96
BI-03	Jawahar deep -3	229*	+7.62	- 11.6	- 11.2	+0.76	11.96
BI-04	Jawahar deep -4	280*	+8.00	- 14.3	- 14.3	+0.76	15.06
PP	Pir Pau Oil Terminal						
PP-01	Pir Pau Jetty	171*	+5.70	- 9.7	- 5.9	+0.76	6.66
PP-02	New Pir Pau Jetty	198*	+8.62	-12.0	-11.7	+0.76	12.46

Note : Figure with * indicates maximum ship length.

Table 5.1.2 INFORMATION OF HARBOUR CHANNELS AND ENTRANCE LOCKS

HARBOUR CHANNEL

Unit : Meter

No.	Name of Channel	Length	Width	Depth below Chart Datum		Remarks
				Designed	Maintained	
HC-1-1	Main Harbour Channel	16,400	350-450	-11.50	-10.90	Section 1 to Section 4
HC-1-2	Main Harbour Channel	6,730	450-600	-11.40	-10.80	Section 5 and Jawahar Dweep
HC-1-3	Main Harbour Channel (Total)	23,130				
HC-2	Indira Dock Approach Channel	2,700	360	-8.53	-7.62	Rock was removed during the capital dredging
HC-3	Indira Dock Entrance Channel	500	400	-8.23	-7.62	
HC-4	Indira Dock Harbour wall Channel	853	76	-7.31	-6.09	
HC-5	Prince's and Victoria Docks Channel	900	180	-5.18	-4.26	Dredging of 2.7 m depth of silt annually
HC-6	Pir Pau Channel	2,000	180	-6.09	-5.50	
HC-7	JNPT Approach Channel	7,000	300	-11.00	-11.00	

ENTRANCE LOCK

Unit : Meter

No.	Name of Lock	Length	Width	Depth below Chart Datum		Operational Water Level	Operational Water Depth
				Designed	Maintained		
EL-1	Indira Entrance Lock (Outer sill is at a level of - 8.2 m)	229.0	30.5	-8.23	-7.62	+3.10	-10.72
EL-2	Victoria Entrance Lock	-	24.4	-4.85	-4.30	+2.10	-6.40
EL-3	Prince's Entrance Lock	-	20.1	-4.25	-4.26	+2.10	-6.36

Table 5.1.3 (1) EXISTING STORAGE AND WAREHOUSE OF INDIRA DOCK AND BALLARD PIER

Storage

No.	Berth Number	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Yard Slots (TEU's) Area (sq.m)
BP	Ballard Pier			
BP-01	Ballard Pier Extension	6,117	3,200	-
BP-02	Container Berth	-	32,800	516 17,500
IB	Indira Dock Basin Berth			
IDB-01	No.1	-	9,000	1,710 5,400
IDB-02	No.2	-	12,640	From No.1 to No.5 10,270
IDB-03	No.3	-	21,330	Including West 18,900
IDB-04	No.4	-	21,330	Yard 21,330
IDB-05	No.5	-	8,800	6,500
IDB-06	No.6	9,144	3,340	-
IDB-07	No.7	-	6,240	-
IDB-08	No.8	-	6,240	-
IDB-09	No.9	-	5,600	-
IDB-10	Jetty End	-	2,240	-
IDB-11	No.11	4,876	2,690	-
IDB-12	No.12	4,876	650	145 (No.12 North)
IDB-13	No.12A	7,665	590	-
IDB-14	No.12B (Groupage Shed)	3,109	19,500	230 19,500
IDB-15	No.13B	8,361	-	-
IDB-16	No.13A	9,290	15,200	-
IDB-17	No.13	-	2,443	-
IDB-18	No.14	-	1,460	-
IDB-19	No.15	8,990	-	-
IDB-20	No.16	6,196	1,530	-
IDB-21	No.17	5,400	1,250	-
III	Indira Dock Harbour Wall			
IDH-01	No.18	2,542	690	-
IDH-02	No.19	2,259	600	-
IDH-03	No.20	5,946	440	-
IDH-04	No.21	5,946	1,560	-

Warehouse

No.	Area	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Slots (TEU's)
ID	Indira Dock Zone			
ID-01	No.1 Uncleared Warehouse	17,983	-	-
ID-02	No.7 ID Warehouse	7,376	-	-
ID-03	No.21 ID Warehouse	2,973	-	-

Table 5.1.3 (2) EXISTING STORAGE AND WAREHOUSE OF VICTORIA AND PRINCE'S DOCK

Storage

No.	Berth Number	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Slots (TEU's)
VD	Victoria Dock			
VD-01	No.1	-	298	-
VD-02	No.2	8,919	298	-
VD-03	No. 3/4	7,804	2,832	-
VD-04	No. 5/6	7,804	586	-
VD-05	No. 7/8	7,804	1,932	-
VD-06	No. 9/10/11	-	3,689	-
VD-07	No.12	2,581	279	-
VD-08	No.13	-	279	-
VD-09	No.14	5,203	1,022	-
VD-CY	Container Park	-	8,000	390
Total		40,115	19,215	390
PD	Prince's Dock			
PD-01	No.A	-	1,881	-
PD-02	No.B	8,919	1,881	-
PD-03	No.C	7,804	323	-
PD-04	No.D	7,804	298	-
PD-05	No.F	2,397	-	-
PD-06	No.G	2,434	91	-
PD-07	No.N/O & No.P/Q	12,821	1,815	-
PD-CY	Container Park	-	2,100	-
Total		42,179	8,389	-

Warehouse

No.	Area	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Slots (TEU's)
VC	Victoria Zone			
VC-01	No.5/6	2,759	-	-
VC-02	No.14	2,602	-	-
VC-03	No.15	1,558	-	-
PR	Prince's Zone			
PR-01	No.B	4,459	-	-
PR-02	No.D	3,902	-	-
PR-03	No.3	719	-	-
PR-04	No.4	1,003	-	-
PR-05	No.5	6,689	-	-
PR-06	No.6/7	3,388	-	-

Table 5.1.4 EXISTING CONTAINER FREIGHT STATION AND WAREHOUSE
AROUND MUMBAI PORT

Container Freight Station

No.	Name of Area	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Slots (TEUs)
FB-CFS	Frere Basin	10,336	32,180	676
FB-01C	Shed No.1	2,414	-	-
FB-02C	Shed No.2	2,414	-	-
FB-03C	Shed No.3	3,004	-	-
FB-04C	Shed No.5	1,815	-	-
FB-05C	Shed No.6	669	-	-
MD-CFS	Manganese Ore Depot	10,238	125,200	1,200
MD-01C	Shed No.1	2,170	-	-
MD-02C	Shed No.2	2,709	-	-
MD-03C	Shed No.3	2,709	-	-
MD-04C	Shed No.4	2,650	-	-
CD-CFS	Cotton Depot	11,003	28,850	200
CD-01C	Cotton Depot R.L.Y. Platform (I,G,H)	1,968	7,600	90
CD-02C	M Jetha (Open Hatch)	-	9,000	-
CD-03C	M 178/180	1,120	-	-
CD-04C	M 170/173	1,515	-	-
CD-05C	E Shed (Grain Depot)	6,400	12,250	110
IP-CFS	Timber Pond	14,020	185,990	2,565
IP-01C	Shed No.1	3,875	-	-
IP-02C	Shed No.3	3,410	-	-
IP-03C	Shed No.4	3,410	-	-
IP-04C	Shed No.5	3,325	-	-
WD-CFS	Wadala Area	-	-	-
WD-01C	Wadala Incinerator R. Plot	2,890	57,960	820
Total			430,180	

Warehouse

No.	Area	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Slots (TEUs)
FB-WH	Frere Area	-	-	-
FB-01W	New Frere Basin	8,387	-	-
FB-02W	Frere basin No.4	1,815	-	-
FB-03W	Disposal Yard of COS	-	12,400	360
FB-04W	Wadi Bunder No.2 Warehouse	608	-	-
FB-05W	Wadi Bunder No.3 Warehouse	2,408	-	-
MD-WH	Manganese Ore Depot	-	-	-
MD-01W	South of CFS Sewer	-	37,635	-
CD-WH	Cotton Depot Area	-	59,325	-
CD-01W	K Block	-	4,000	-
CD-02W	RCD Extension	-	47,150	490
CD-03W	A Shed (Grain Depot)	2,090	375	-
CD-04W	B Plot	-	7,800	-
CD-05W	H124, H126	834	-	-
IP-WH	Timber Pond	-	-	-
IP-01W	New Sewer Warehouse	34,000	26,940	-
HY-WH	Hay Bunder Warehouse	6,375	14,300	220
HJ-WH	Haji Bunder Rail Way Yard (hazardous Cargo)	-	18,100	280
WD-WH	Wadala Area	-	95,670	1,360
WD-01W	Domestic Container Terminal (Triangular Plot)	-	13,000	-
WD-02W	Wadala Up Departure Yrd (Golden Yard)	-	30,650	-
WD-03W	Wadala Bond	-	27,300	-
WD-04W	Other Area	-	24,720	-
Total			264,370	

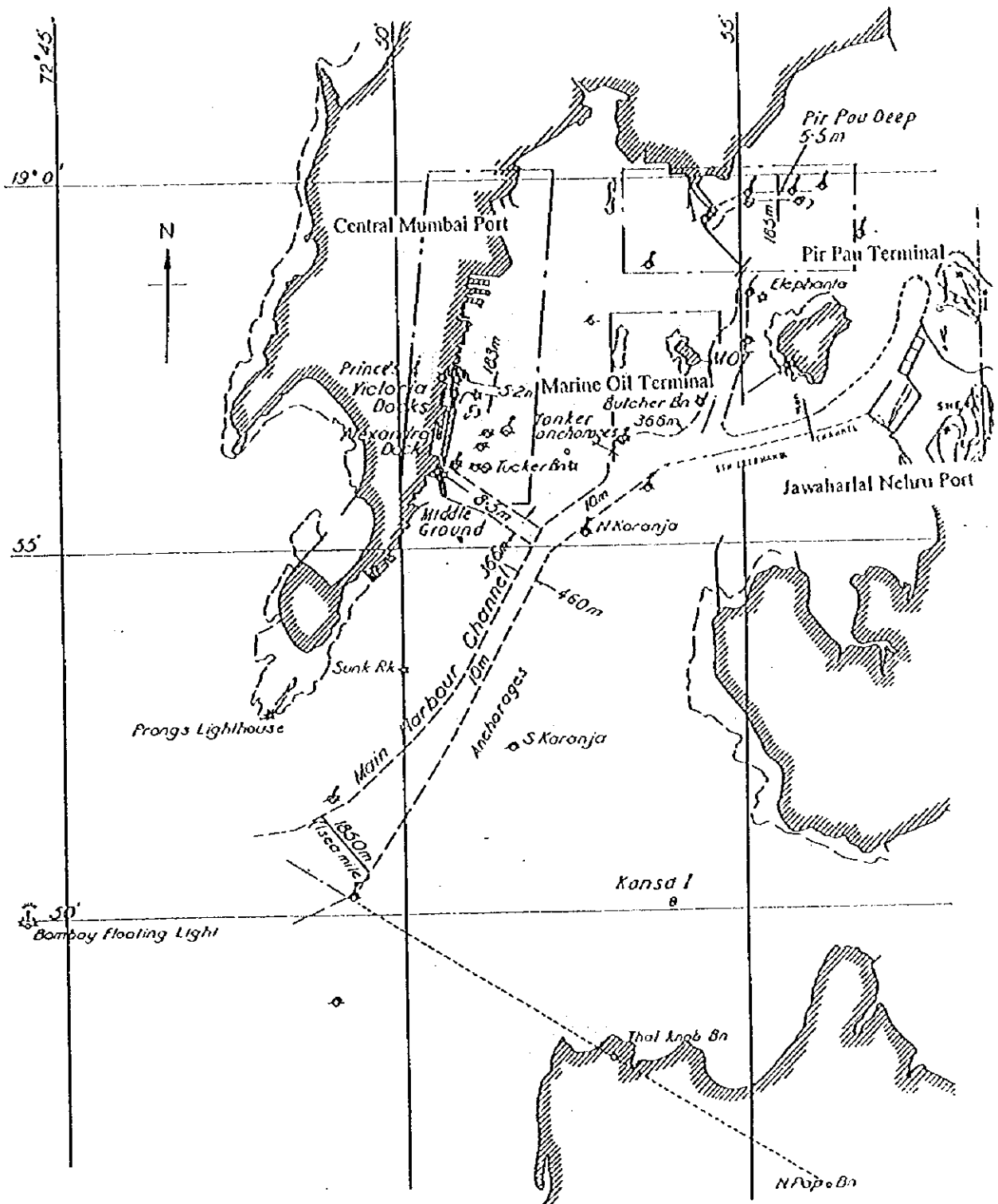


Figure 5.1.1 LOCATION MAP OF MUMBAI PORT

Scale ; 1:110,000

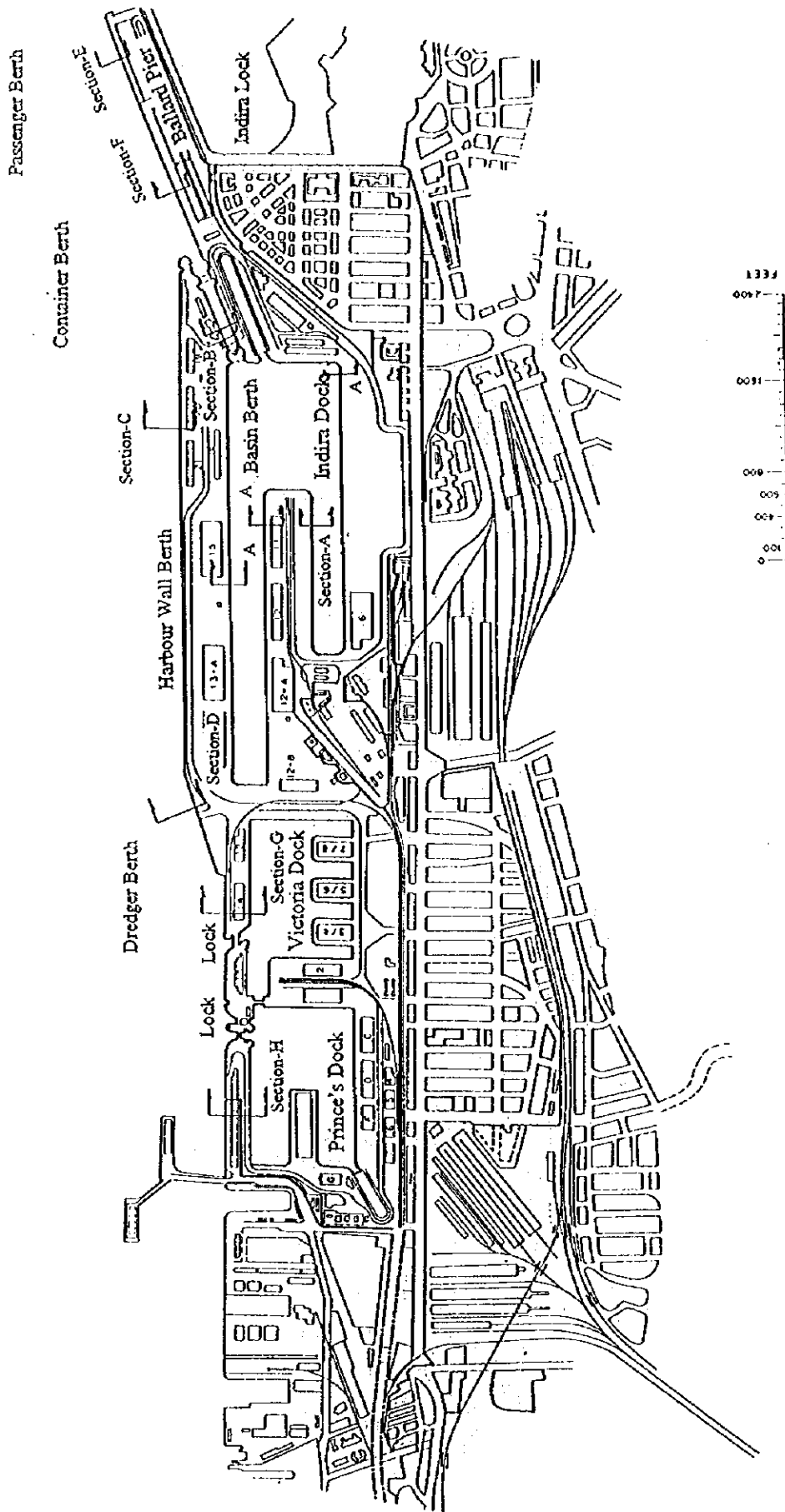
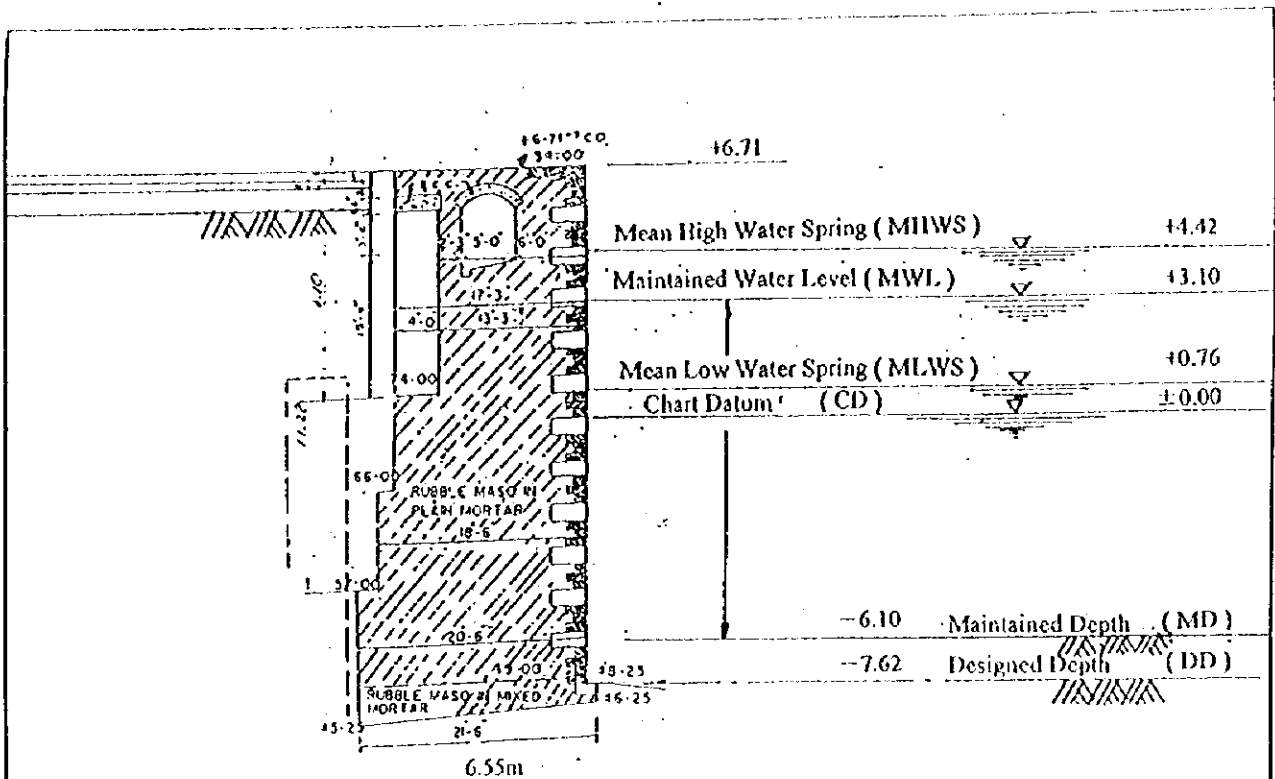
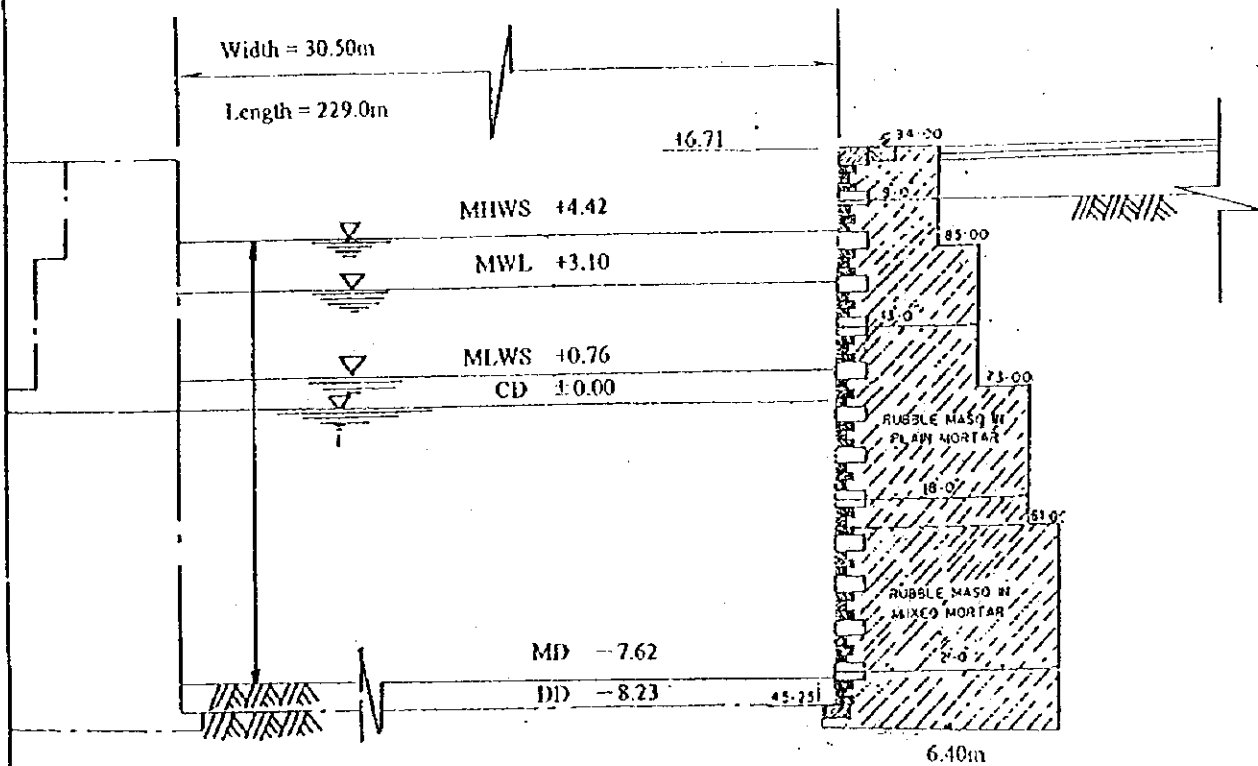


Figure 5.1.2 PLAN OF DOCK AREA IN CENTRAL MUMBAI PORT



Section - A Cross Section of Indira Dock Basin Berth

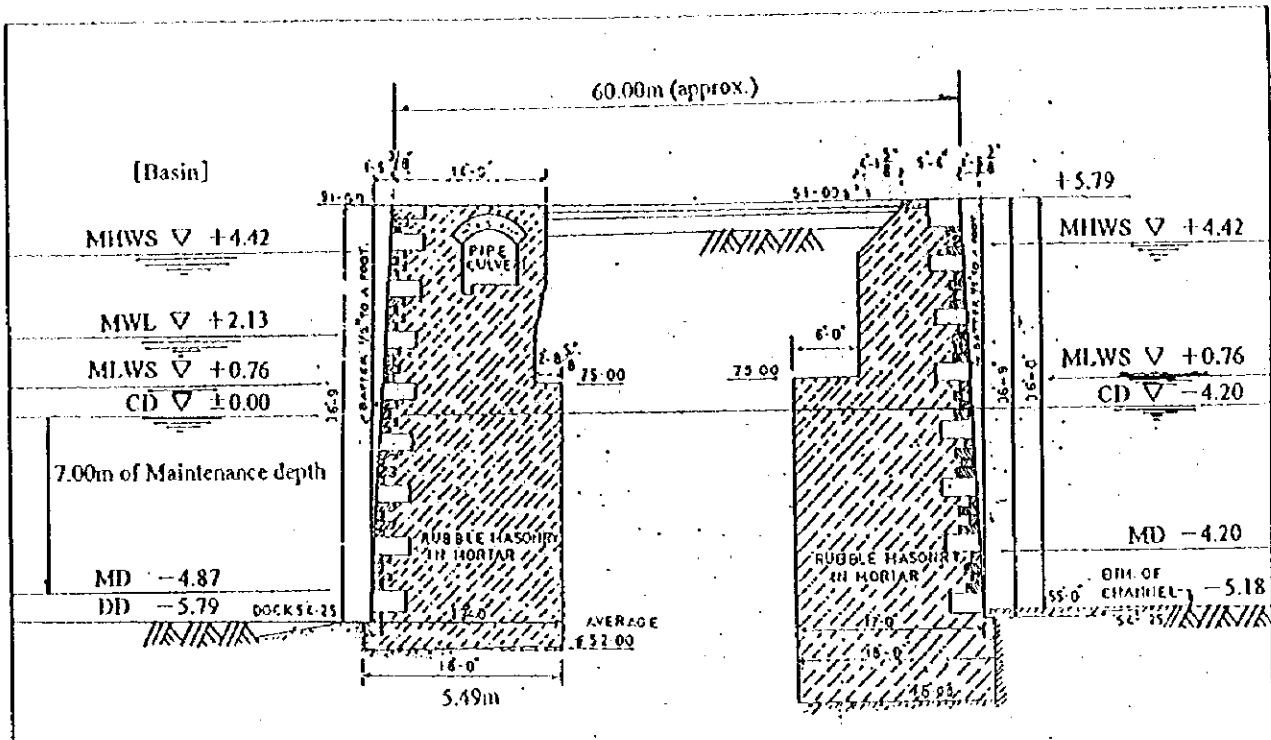


Section - B Cross Section of Indira Dock Lock

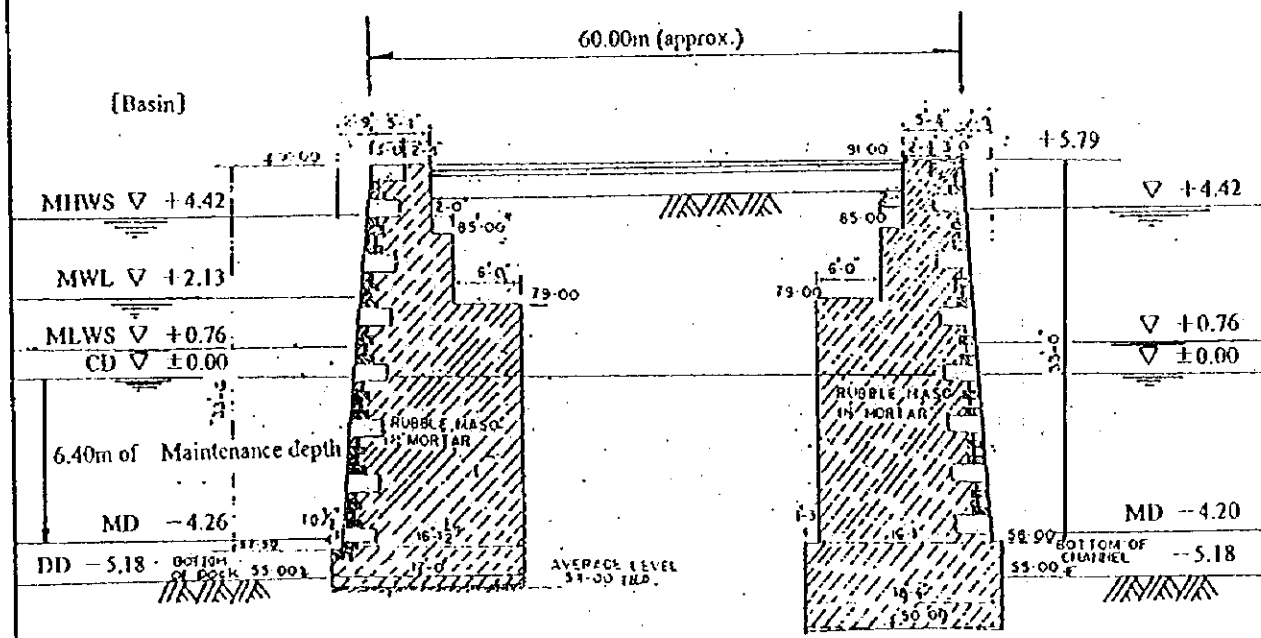
Figure 5.1.3 (1)

EXISTING BERTHING STRUCTURE OF INDIRA DOCK AND LOCK

Scale ; 1:200 Unit ; meter and feet

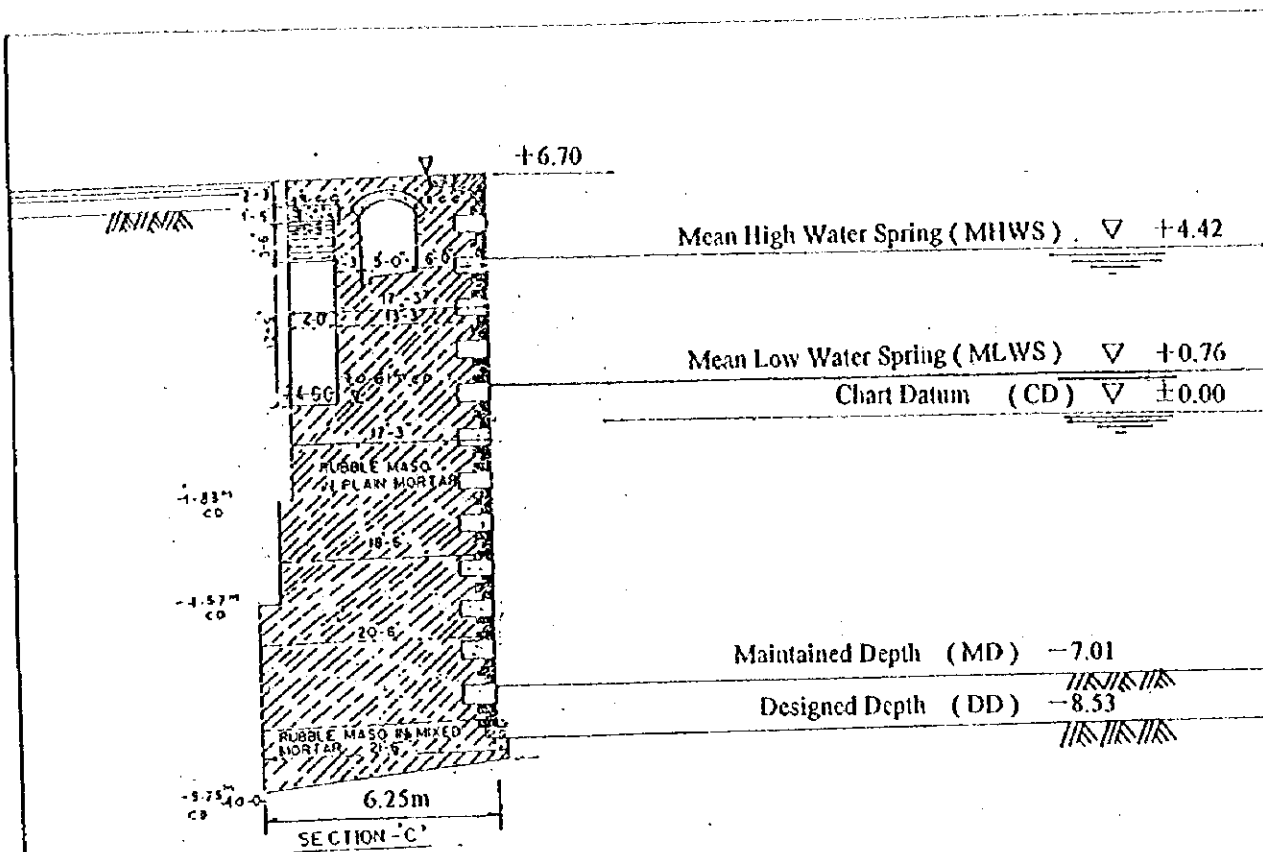


Section - G Cross Section of Victoria Dock

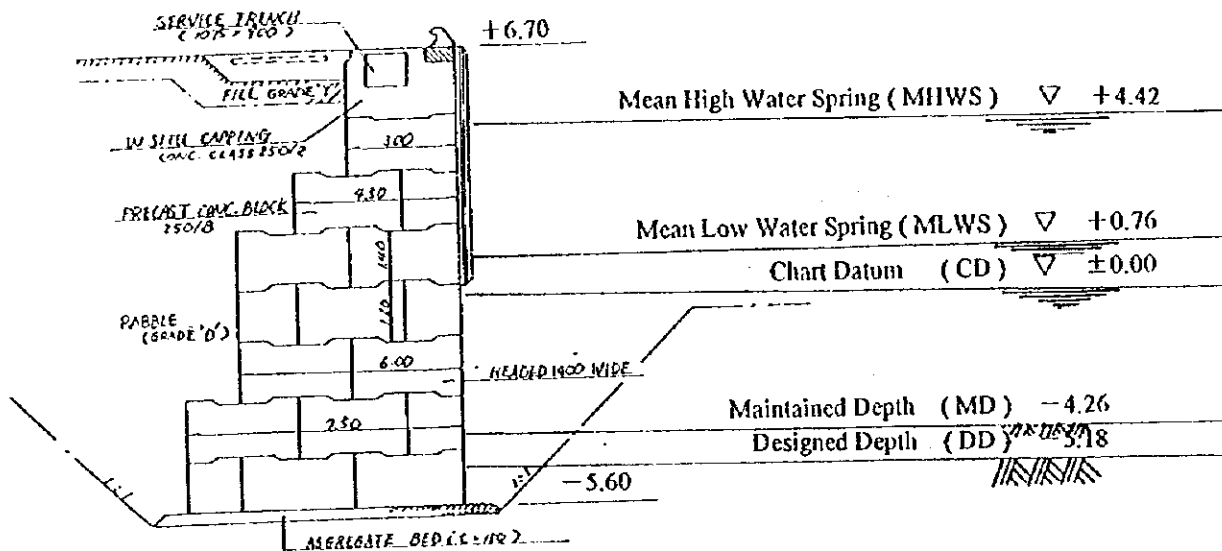


Section - H Cross Section of Prince's Dock

Figure 5.1.3 (2)
 EXISTING BERTHING STRUCTURE OF VICTORIA & PRINCE'S DOCK
 Scale ; 1:200 Unit ; meter and feet



Section - C Cross Section of Harbour Wall Berth



Section - D Cross Section of Dredger Berth

Figure 5.1.4 (2)

EXISTING BERTHING STRUCTURE OF INDIRA DOCK HARBOUR WALL

Scale ; 1:200 Unit ; meter and feet

No.	Berth Number	Total Area (sq. meter)	Container Yard	
			Slots (TEUs)	Area (sq m)
BP	Ballard Pier			
BP-02	Container Berth	32,800	516	17,500
IDB	Indira Dock Basin Berth			
IDB-01	No.1	9,000	1,710	5,400
IDB-02	No.2	12,640	(total No.1 to No.5)	10,270
IDB-03	No.3	21,330		18,900
IDB-04	No.4	21,330	(204 slots for No.1)	21,330
IDB-05	No.5	8,800		6,500
IDB-12	No.12	10,500	145 slots for No.12	10,500
IDB-14	No.12B	9,000	230	9,000
VD	Victoria Dock			
VD-CY	Container Park	8,000	390	8,000
PD	Prince's Dock			
PD-CY	Container Park	2,100		2,100

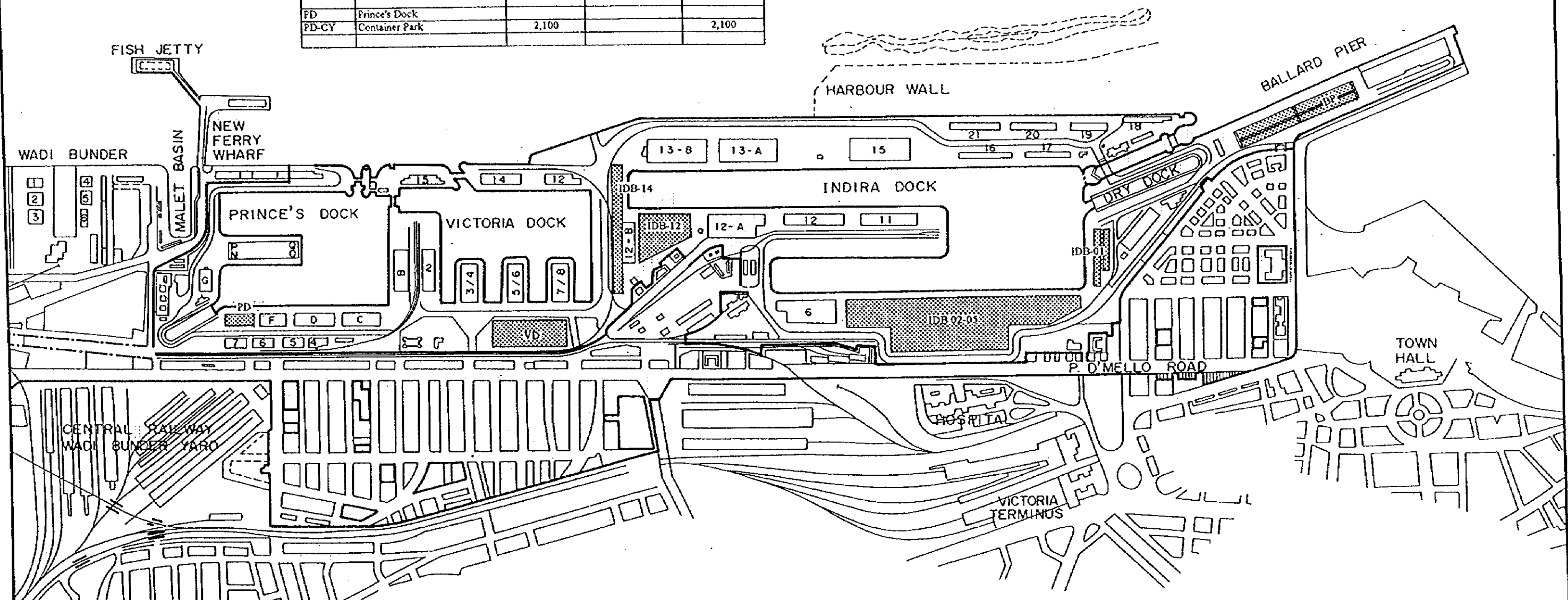
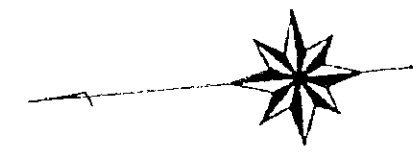


Figure 5.1.5.
LOCATION OF EXISTING CONTAINER PARKING YARD IN DOCKS AREA

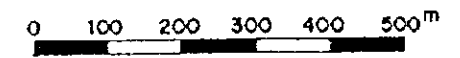
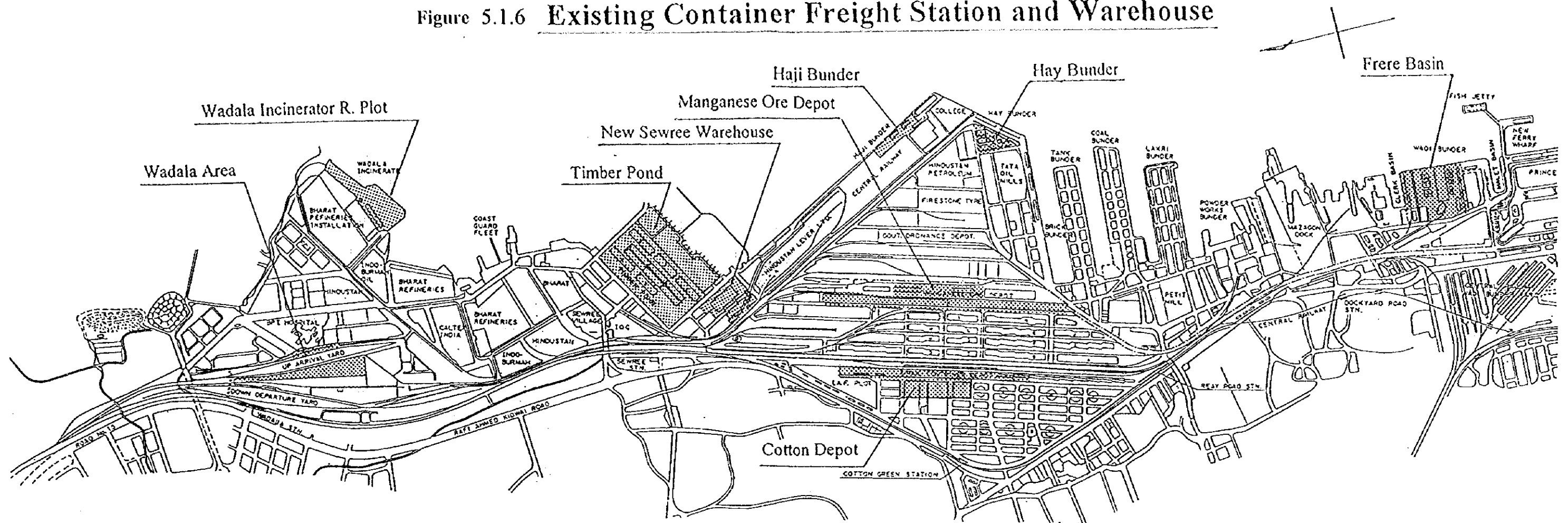


Figure 5.1.6 Existing Container Freight Station and Warehouse



Container Freight Station

No.	Name of Area	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Slots (TEUs)
FB-CFS	Frere Basin	10,336	32,180	676
FB-01C	Shed No.1	2,414	-	-
FB-02C	Shed No.2	2,414	-	-
FB-03C	Shed No.3	3,004	-	-
FB-04C	Shed No.5	1,815	-	-
FB-05C	Shed No.6	689	-	-
MD-CFS	Manganese Ore Depot	10,238	125,200	1,300
MD-01C	Shed No.1	2,170	-	-
MD-02C	Shed No.2	2,709	-	-
MD-03C	Shed No.3	2,709	-	-
MD-04C	Shed No.4	2,650	-	-
CD-CFS	Cotton Depot	11,003	28,850	200
CD-01C	Cotton Depot RLY Platform (I.G.H)	1,968	7,600	90
CD-02C	Mt Jeeho (Open Plinth)	-	9,000	-
CD-03C	M 176/110	1,120	-	-
CD-04C	M 170/173	1,315	-	-
CD-05C	E Shed (Grain Depot)	6,400	12,250	110
TP-CFS	Timber Pond	14,020	185,990	2,565
TP-01C	Shed No.1	3,875	-	-
TP-02C	Shed No.3	3,410	-	-
TP-03C	Shed No.4	3,410	-	-
TP-04C	Shed No.5	3,325	-	-
WD-CFS	Wadala Area	-	-	-
WD-01C	Wadala Incinerator R. Plot	2,890	57,960	820
Total			430,180	

Warehouse

No.	Area	Covered Area (sq. meter)	Open Area	
			Yard Area (sq. meter)	Container Slots (TEUs)
FB-WH	Frere Area	-	-	-
FB-01W	New Frere Basin	8,387	-	-
FB-02W	Frere basin No.4	1,815	-	-
FB-03W	Disposal Yard of COS	-	12,400	360
FB-04W	Wadi Bunder No.2 Warehouse	608	-	-
FB-05W	Wadi Bunder No.3 Warehouse	2,406	-	-
MD-WH	Manganese Ore Depot	-	-	-
MD-01W	South of CFS Sewree	-	37,635	-
CD-WH	Cotton Depot Area	-	59,325	-
CD-01W	K Block	-	4,000	-
CD-02W	RCD Extension	-	47,150	490
CD-03W	A Shed (Grain Depot)	2,090	375	-
CD-04W	B Plot	-	7,600	-
CD-05W	M 124, 11128	874	-	-
TP-WH	Timber Pond	-	-	-
TP-01W	New Sewree Warehouse	34,000	26,940	-
HY-WH	Hay Bunder Warehouse	6,375	14,300	220
HJ-WH	Haji Bunder Rail Way Yard (hazardous Cargo)	-	18,100	280
WD-WH	Wadala Area	-	-	-
WD-01W	Domestic Container Terminal (Triangular Plot)	-	13,000	-
WD-02W	Wadala Up Departure Yard (Golden Yard)	-	30,650	-
WD-03W	Wadala Dand	-	17,300	-
WD-04W	Other Area	-	14,720	-
Total			264,370	

5.2 Port Traffic

5.2.1 Cargo Traffic

Trends of import and export cargo volumes are shown in Table 5.2.1 and Figure 5.2.1. The volume of cargo handled in Port of Mumbai dropped 27 million tons from 30 million tons in 1991-92 soon after Jawaharlal Nehru Port had started its operation in 1989. Since then the volume of cargo has increased steadily for five years reaching 34 million tons in 1995-96. As to the balance between import and export, volume of import cargo had been greater than that of export cargo until 1991-92. As the total cargo volume started increasing since 1991-92, the import cargo volume became greater than the export volume.

Table 5.2.1 Trends of Import and Export Cargo Volume in MBP

	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
Import	13,840,345	13,889,432	13,910,125	14,450,120	12,324,345	14,927,583	17,140,580	16,886,606	17,319,839
Export	15,796,175	15,396,353	14,637,492	15,408,681	14,888,331	13,772,809	13,604,420	15,161,330	16,728,450
Total Port Traffic	29,636,520	29,285,785	28,547,617	29,858,801	27,212,676	28,700,392	30,745,000	32,047,936	34,048,289

(Unit: tons)

Source) "Port of Mumbai Basic Port Statistics 1995-96", Planning and Research Department, MBPT

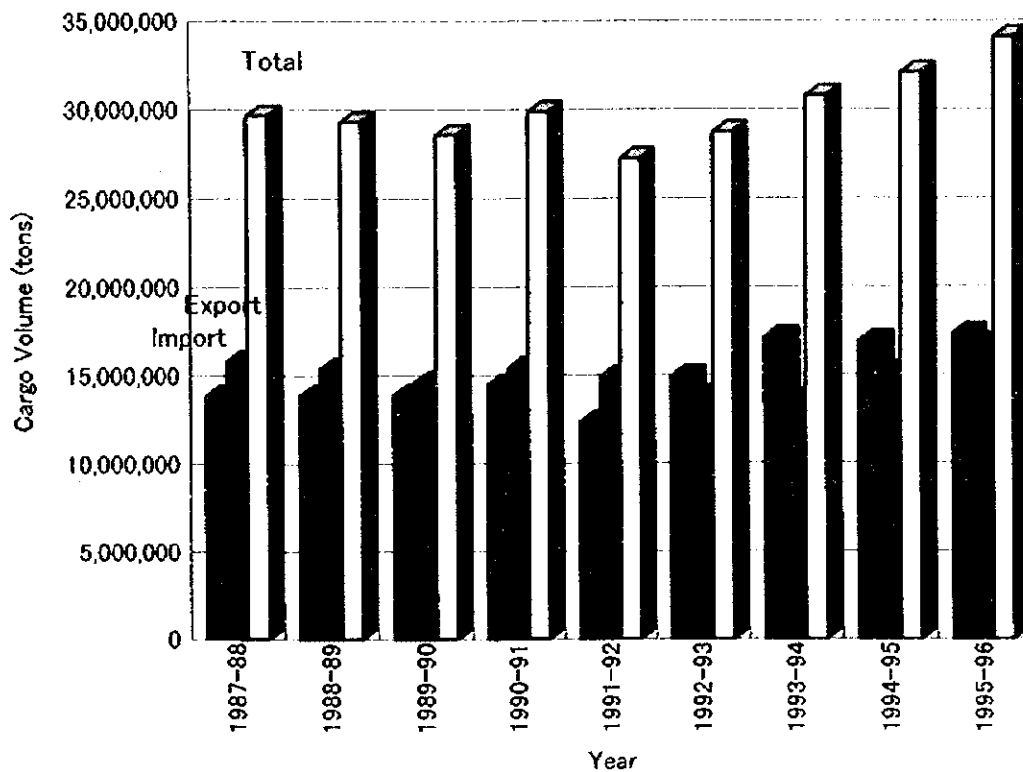


Figure 5.2.1 Trend of Import and Export Cargo Volume in MBP

Trends of import and export cargo by major commodities for the last 10 years are shown in Table 5.2.2 and 5.2.3. Container cargo accounts for 6.75 million tons (19.8%), Non-container cargo excluding Liquid Bulk accounts for 5.68 million tons (16.6%) and Liquid Bulk cargo accounts for 21.64 million tons (63.6%) in 1995-96. Commodity-wise cargo volume is available only for Non-container cargo excluding Liquid Bulk.

Major cargoes among import commodities are "POL" (8.7 million tons in 1995-96) and "Vegetable Oil" (0.5 million tons) as Liquid Bulk, "Iron and Steel" (1.7 million tons) and "Chickpeas-Pulses" (0.4 million tons) as Break Bulk, and "Rock Phosphate" (0.3 million tons) and "Sulfur" (0.4 million tons) as Dry Bulk.

Major cargoes among export commodities are "POL" (11.5 million tons in 1995-96) as Liquid Bulk, and "Oil Cakes" (0.4 million tons) as Break Bulk.

Table 5.2.2 Trends of Import Cargo by Major Commodities in MBP

		(Unit: tons)									
Import	Commodity	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	
Container											
1	Container	1,770,416	1,913,215	2,102,670	2,285,740	1,614,969	1,875,987	2,697,462	3,271,493	3,506,097	
Break Bulk											
2	Iron & Steel	1,094,084	1,135,479	893,922	765,139	662,748	957,292	1,059,989	2,037,651	1,737,742	
3	Foodgrains	22,629	195,359	41,707	2,671	28,462	222,415	62,297	1,127	4,546	
4	Chickpeas-Pulses	130,886	202,549	43,385	87,437	60,979	262,011	378,361	385,467	359,892	
5	Sugar	95,698	15,069	16,932	-	-	-	-	4,835	43,016	
6	Salt	-	-	-	-	-	19,032	14,654	4,835	18,833	
7	Cement	30,498	52,626	30,079	176	3,894	28,795	20,432	33,354	11,126	
8	Newsprints	23,267	24,334	14,017	16,257	36,346	152,464	191,847	199,762	217,562	
9	Woodpulp	38,649	32,941	9,495	88,114	28,718	117,575	162,935	92,823	87,510	
10	Cotton	445	3,394	-	26	-	748	-	-	-	
11	Miscellaneous	1,411,048	1,406,031	1,380,947	1,524,737	860,087	359,767	280,755	582,126	591,377	
Dry Bulk											
12	Fertilizer	173,517	132,050	135,872	35,781	22,433	24,363	52,532	64,359	77,711	
13	Rock Phosphate	529,703	617,671	595,549	354,421	297,477	427,671	376,933	390,687	328,595	
14	Sulphur	462,352	604,695	560,742	269,438	196,678	515,686	499,270	473,737	401,579	
15	Metals & Metal Pds., Other than Iron & Steel including Scrap	706,552	774,472	835,809	982,616	464,133	896,083	302,470	348,566	182,830	
Liquid Bulk											
16	Vegetable Oil Bulk	718,791	466,292	197,014	249,160	70,752	46,934	80,024	148,034	515,319	
17	Chemicals	60,254	45,040	20,733	44,277	27,203	52,019	58,101	91,687	94,135	
18	Miscellaneous	406,487	335,247	384,811	500,769	334,780	188,099	106,596	167,196	183,425	
19	POL (Lub. Oil)	103,555	121,013	120,598	121,134	168,065	123,093	155,052	245,813	298,543	
20	POL	6,061,514	5,811,955	6,525,843	7,122,227	7,446,621	8,657,549	10,640,870	8,343,054	8,660,011	
Total		13,840,345	13,889,432	13,910,125	14,450,120	12,324,345	14,927,583	17,140,580	16,886,606	17,319,849	

Source) "Port of Mumbai Basic Port Statistics 1995-96", Planning and Research Department, MBPT

Table 5.2.3 Trends of Export Cargo by Major Commodities in MBP

Export	Commodity	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
(Unit: tons)										
Container										
1	Container	1,482,956	1,529,551	1,863,680	1,999,739	1,846,589	2,007,901	2,715,539	2,923,598	3,241,961
Break Bulk										
2	Foodgrains	2,270	4,384	4,820	812	24,941	39,109	252,324	99,294	94,628
3	Fruits, Veg. including Onions and	37,138	46,285	30,011	40,463	63,862	70,102	58,399	83,769	39,033
4	Oil cake	160,184	239,987	169,903	105,878	125,859	175,283	264,405	293,080	444,990
5	Sugar	16,450	13,856	10,000	21,624	100,592	59,228	37,853	24,203	43,476
6	Cotton	6,938	493	1,953	27,706	10,106	70,091	28,093	649	1,293
7	Piece Goods Textiles	-	-	138	2,601	-	958	1,305	266	100
8	Fodder	-	-	-	1,090	2,691	25	-	-	-
9	Iron & Steel	12,153	8,090	12,778	7,064	15,839	-	147,322	101,554	148,829
Metals & Metal Products other than										
10	Iron & Steel	9,457	5,779	15,403	527	18,444	19,088	5,736	829	5,597
11	Miscellaneous	128,588	227,200	295,181	214,151	187,200	153,068	32,437	0	837,853
Dry Bulk										
12	ORES (Iron, Manganese, Others)	-	-	4,460	2,536	2,067	309	14,073	-	-
Liquid Bulk										
13	Bitumen & Asphalt	-	-	-	449	-	65	-	-	-
14	Chemicals	384	177	323	1,732	184	932	4,355	6,699	5,048
15	Vegetable Oil Bulk	61,523	54,039	81,385	61,937	46,027	34,147	40,107	34,256	57,007
16	Molasses	-	52,162	121,336	150,645	203,523	77,500	2,303	730	129,982
17	Miscellaneous	69,718	79,762	98,055	94,980	97,123	85,460	94,285	148,978	119,060
18	POL(Bunkers)	83,821	110,294	102,031	70,972	33,914	1,809	95,069	95,112	31,854
19	POL	13,724,595	13,024,294	11,826,035	12,603,775	12,109,370	10,977,734	9,810,815	11,348,313	11,527,739
Total		15,796,175	15,396,353	14,637,492	15,408,681	14,888,331	13,772,809	13,604,420	15,161,330	16,728,450

Source) "Port of Mumbai Basic Port Statistics 1995-96", Planning and Research Department, MBPT

5.2.2 Container Cargo Traffic

(1) Outline of Container Cargo

Historical trends of container cargo volume and TEUs are shown in Table 5.2.4. The container cargo volume and TEUs handled in Port of Mumbai dropped 2.55 million tons and 280 thousand TEUs respectively in 1991-92 soon after Jawaharlal Nehru Port had started its operation in 1989. Since then the container cargo volume and TEUs have been increasing rapidly reaching 6.56 million tons and 518 thousand TEUs respectively.

Table 5.2.4 Trends of Container Cargo Volume and TEUs in MBP

Year	Container Cargo					
	Import (^{'000} tons)	Export (^{'000} tons)	Total (^{'000} tons)	Import (TEUs)	Export (TEUs)	Total (TEUs)
1986-87	1,702	1,424	3,126	120,474	123,101	243,575
1987-88	2,030	1,620	3,650	128,352	128,266	256,618
1988-89	2,040	1,460	3,500	137,169	140,189	277,358
1989-90	2,350	1,500	3,850	154,425	155,473	309,898
1990-91	2,455	1,423	3,878	160,424	163,792	324,216
1991-92	1,551	999	2,550	141,910	137,662	279,572
1992-93	2,027	466	2,493	161,970	153,430	315,400
1993-94	3,341	1,750	5,091	226,666	200,964	427,630
1994-95	3,275	2,635	5,910	263,580	223,413	486,993
1995-96	3,706	2,857	6,563	285,664	231,869	517,533

Source) "Statistics Report" prepared by MBPT

(2) Classification of Port Cargo Containerizability

Port cargo is divided into two categories. One is "Containerizable" cargo which is already containerized or has a potential to be containerized as containerization progresses. The other is "non-Containerizable" cargo which has no possibility to be containerized even in the future; such as long, heavy and bulky cargo (some types of steel products), liquid bulk (petroleum) and dry bulk (iron ore).

To estimate the percentage of containerization in the future, it is necessary to categorize port cargo into two groups mentioned above using the existing port statistics. In this report, "108th to 117th Administration Report of MBPT", which gives commodity-wise items, are used to classify the port cargo into two groups. Some items, however, include both "Containerizable" and "Non-containerizable" cargo. Hence, those cargo items make the third category, "Statistically mixed cargo in containerizability".

The result of the classification is shown in Table 5.2.5 (a) and (b). Trends of Percentage of containerization for "Containerizable Cargo" and "Statistically Mixed Cargo in Containerizability" are shown in Table 5.2.6 and 5.2.7 respectively.

As to "Containerizable Cargo", the total volume of containerized cargo has increased from 2.4 to 4.5 million tons at an annual growth rate of 6.3% on average, whereas an annual growth rate of total volume of "Containerizable Cargo" remains 3.3%, clearly showing the progress of containerization.

Total volume of "Statistically Mixed Cargo in Containerizability" has been fluctuating approximately within a range of 4.5 to 6 million tons for the last 10 years. Percentage of containerization in this category has been fluctuating without indicating a straight upward trend.

(3) Empty Container Ratio to Total TEUs

Empty Container Ratio to Total TEUs is shown in Table 5.2.8. Empty Ratios for import and export container cargo in 1995-96 are 26.4% and 8.0% respectively.

(4) 20 Foot Container Ratio to Total TEUs (Table 5.2.9)

20 Foot Container Ratio to total TEUs has been decreasing steadily for the last 10 years reaching about 60%. However, the number of 20 Foot containers is still greater than that of the 40 Foot.

Table 5.2.5 (a) Classification of "Containerizable Cargo" and "Statistically Mixed Cargo in Containerizability"
[Import]

"Containerizable Cargo" (Import)	
Foodstuff,N.O.S	Textiles: Cotton ,Silk,Woolien Synthetic etc
Ores,N.O.S	Twist &Yarn
Ingots-Aluminium	Machinery, N.O.S
Ingots-lead	Motor Vehicle Parts
Ingot-Zinc	Chemical, N.O.S
Ingots-Others	Drugs and Medicines
Wire and Cables	Dyes and Colores
Metal and Metal Ploducts,N.O.S	Fibers-Synthetics
Asbestos and Asbestos material	Industrial Alcohols and Spilitis
Carbon Black	Lac, Gum, Resins
Moulding Powder	Paints and Painters' Material
Rubber Manufactures	Plastic & Plastic Manufactures
Earth and Earthenware	Synthetic Resins
Glass and Glass Products	Paper and Paper Product
Hair and Wool	Passenger's Baggage
Instruments etc	Containers Cargo Commodity Unknown
	Miscellaneous
"Statistically Mixed Cargo in Containerizability" (Import)	
Rice	Sulphur
Foodgrains,N.O.S	Oil and Fats,N.O.S
Vegitables & Dates	Salt
Sugar	Iron and Steel Material
Wood Pulp	Scrap and Dross
Wood and Timber-Other sorts	Tin Plates
Fodder (incl. oil cakes)	Motor Vehicles weighing 1.5t or more
Rock Phosphate	Miscellaneous
Fertilisers, N.O.S	

Table 5.2.5 (b) Classification of "Containerizable Cargo" and "Statistically Mixed Cargo in Containerizability"
[Export]

"Containerizable Cargo" (Export)	
1 Agricultural,Fishery & Forest Products	2 Light Indusy Products (2)
Raw Cotton	Glass and Glass Products
Cotton Twist Yarn	Hoisery, Millinery, Haber Dashery etc.
Fruits-Fresh & Dried	Instruments
Hides and Skin	Leather and Leather Manufactures
Molasses	Rubber Manufactures
Oil Seeds	Textiles: Cotton ,Silk,Woolien Synthetic etc
Seeds of all kinds	Tobacco-Manufactures
Spices including pepper	Toilet Preparation and Perfumes
Tea	Beverages and Drinks non-alcoholic,NOS
Raw Tabacco (Country)	Bicycles and bicycles Parts
Fesh Fish	Machinery, N.O.S
Wooden Products N.O.S.	Moter Vehicles weighing 1.5 tonnes or more
Foodstuff,N.O.S	Moter Vehicle Parts
2 Light Indusy Products (1)	Chemicals, N.O.S
Building Materials,N.O.S	Drugs and Medicines
Foodstuff,N.O.S	Dyes and Colores
Ingots-Aluminium	Synthetic Fibres
Other Ores	Paints and Painters' Material
Wire and Cables	Plastic & Plastic Manufactures
Metal and Metal Ploducts,N.O.S	Lac, Gums and Resins
Antiqucs & Artware	Containers Cargo Commodity Unknown
Earth and Earthenware	Miscellaneous
"Statistically Mixed Cargo in Containerizability" (Export)	
Vegitables-Dried and Fresh	Bones and Bonemeal
Rice	Oil & Fats, N.O.S
Foodgrains,N.O.S	Iron and Steel Material
Sugar	Scrap & Dross
Fodder incl. oil-cakes	Miscellaneous

Table 5.2.6 Trends of Percentage of Containerization for "Containerizable Cargo" in MBP

Year	Containerized Cargo			Non-Containerized Cargo			Containerizable Cargo			% of Containerization		
	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)	Import (%)	Export (%)	Total (%)
1986-87	1,296	1,149	2,445	1,248	223	1,471	2,544	1,372	3,916	50.9%	83.7%	62.4%
1987-88	1,660	1,440	3,100	1,160	190	1,350	2,820	1,630	4,450	58.9%	88.3%	69.7%
1988-89	1,430	1,280	2,710	770	400	1,170	2,200	1,680	3,880	65.0%	76.2%	69.8%
1989-90	1,450	1,270	2,720	700	550	1,250	2,150	1,820	3,970	67.4%	69.8%	68.5%
1990-91	1,572	1,228	2,800	641	687	1,328	2,213	1,915	4,128	71.0%	64.1%	67.8%
1991-92	1,053	847	1,900	477	795	1,272	1,530	1,642	3,172	68.8%	51.6%	59.9%
1992-93	1,153	399	1,552	657	757	1,414	1,810	1,156	2,966	63.7%	34.5%	52.3%
1993-94	1,873	1,337	3,210	480	449	929	2,353	1,786	4,139	79.6%	74.9%	77.6%
1994-95	2,401	1,967	4,368	834	144	978	3,235	2,111	5,346	74.2%	93.2%	81.7%
1995-96	2,429	2,065	4,494	632	306	938	3,061	2,371	5,432	79.4%	87.1%	82.7%

Source) "108 th to 117 th Administration Report", MBPT

Table 5.2.7 Trend of Percentage of Containerization for "Statistically Mixed Cargo in Containerization" in MBP

Year	Containerized Cargo			Non-Containerized Cargo			Containerizable Cargo			% of Containerization		
	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)	Import (%)	Export (%)	Total (%)
1986-87	406	275	681	4,488	500	4,988	4,894	775	5,669	8.3%	35.5%	12.0%
1987-88	370	180	550	4,420	480	4,900	4,790	660	5,450	7.7%	27.3%	10.1%
1988-89	610	180	790	4,760	580	5,340	5,370	760	6,130	11.4%	23.7%	12.9%
1989-90	900	230	1,130	3,080	474	3,554	3,980	704	4,684	22.6%	32.7%	24.1%
1990-91	883	195	1,078	3,378	397	3,775	4,261	592	4,853	20.7%	32.9%	22.2%
1991-92	498	152	650	2,066	641	2,707	2,564	793	3,357	19.4%	19.2%	19.4%
1992-93	874	67	941	2,961	671	3,632	3,835	738	4,573	22.8%	9.1%	20.6%
1993-94	1,468	413	1,881	2,036	898	2,934	3,504	1,311	4,815	41.9%	31.5%	39.1%
1994-95	874	668	1,542	3,548	343	3,891	4,422	1,011	5,433	19.8%	66.1%	28.4%
1995-96	1,277	792	2,069	3,001	878	3,879	4,278	1,670	5,948	29.9%	47.4%	34.8%

Source) "108 th to 117 th Administration Report", MBPT

Table 5.2.8 Trends of Empty Container Ratio to Total TEUs handled in MBP

Year	Import				Export				Total			
	Empty (TEUs)	Loaded (TEUs)	Total (TEUs)	Empty Ratio (%)	Empty (TEUs)	Loaded (TEUs)	Total (TEUs)	Empty Ratio (%)	Empty (TEUs)	Loaded (TEUs)	Total (TEUs)	Empty Ratio (%)
1979	13,882	25,523	39,405	35.2%	3,926	34,474	38,400	10.2%	17,808	59,997	77,805	22.9%
1980	25,409	25,728	51,137	49.7%	6,662	43,482	50,144	13.3%	32,071	69,210	101,281	31.7%
1981	24,144	44,492	68,636	35.2%	9,215	54,049	63,264	14.6%	33,359	98,541	131,900	25.3%
1982	21,769	42,783	64,552	33.7%	13,173	52,970	66,143	19.9%	34,942	95,753	130,695	26.7%
1983	23,838	46,351	70,189	34.0%	12,890	58,249	71,139	18.1%	36,728	104,600	141,328	26.0%
1984	18,286	69,059	87,345	20.9%	21,696	66,056	87,752	24.7%	39,982	135,115	175,097	22.8%
1985	18,459	89,036	107,495	17.2%	40,287	66,909	107,196	37.6%	58,746	155,945	214,691	27.4%
1986	17,073	103,401	120,474	14.2%	33,038	90,063	123,101	26.8%	50,111	193,464	243,575	20.6%
1987	17,546	110,806	128,352	13.7%	27,249	101,017	128,266	21.2%	44,795	211,823	256,618	17.5%
1988	17,302	119,867	137,169	12.6%	32,939	107,250	140,189	23.5%	50,241	227,117	277,358	18.1%
1989	24,707	129,718	154,425	16.0%	29,897	125,576	155,473	19.2%	54,604	255,294	309,898	17.6%
1990	22,523	137,901	160,424	14.0%	28,094	135,698	163,792	17.2%	50,617	273,599	324,216	15.6%
1991	51,053	90,857	141,910	36.0%	12,137	125,525	137,662	8.8%	63,190	216,382	279,572	22.6%
1992	53,396	108,574	161,970	33.0%	14,940	138,490	153,430	9.7%	68,336	247,064	315,400	21.7%
1993	74,853	151,813	226,666	33.0%	14,507	186,457	200,964	7.2%	89,360	338,270	427,630	20.9%
1994	72,757	190,823	263,580	27.6%	22,007	201,406	223,413	9.9%	94,764	392,229	486,993	19.5%
1995	75,423	210,241	285,664	26.4%	18,433	213,436	231,869	7.9%	93,856	423,677	517,533	18.1%
1996	85,933	231,583	317,516	27.1%	22,507	243,392	265,899	8.5%	108,440	474,975	583,415	18.6%

Source) "Statistics Report" prepared by MBPT

Table 5.2.9 Trends of 20 Foot Container Ratio to Total TEUs handled in MBP

Year	Import				Export				Total			
	20 Foot (TEUs)	40 Foot (TEUs)	Total (TEUs)	20 Foot Ratio (%)	20 Foot (TEUs)	40 Foot (TEUs)	Total (TEUs)	20 Foot Ratio (%)	20 Foot (TEUs)	40 Foot (TEUs)	Total (TEUs)	20 Foot Ratio (%)
1979	29,603	9,802	39,405	75.1%	28,712	9,688	38,400	74.8%	58,315	19,490	77,805	75.0%
1980	38,677	12,460	51,137	75.6%	37,780	12,364	50,144	75.3%	76,457	24,824	101,281	75.5%
1981	55,014	13,622	68,636	80.2%	49,506	13,758	63,264	78.3%	104,520	27,380	131,900	79.2%
1982	52,498	12,054	64,552	81.3%	53,799	12,344	66,143	81.3%	106,297	24,398	130,695	81.3%
1983	52,131	18,058	70,189	74.3%	54,735	16,404	71,139	76.9%	106,866	34,462	141,328	75.6%
1984	62,679	24,666	87,345	71.8%	63,884	23,868	87,752	72.8%	126,563	48,534	175,097	72.3%
1985	72,807	34,688	107,495	67.7%	72,582	34,614	107,196	67.7%	145,389	69,302	214,691	67.7%
1986	75,562	44,912	120,474	62.7%	80,993	42,108	123,101	65.8%	156,555	87,020	243,575	64.3%
1987	84,872	43,480	128,352	66.1%	86,160	42,106	128,266	67.2%	171,032	85,586	256,618	66.6%
1988	85,721	51,448	137,169	62.5%	90,803	49,386	140,189	64.8%	176,524	100,834	277,358	63.6%
1989	97,989	56,436	154,425	63.5%	98,917	56,556	155,473	63.6%	196,906	112,992	309,898	63.5%
1990	100,084	60,340	160,424	62.4%	102,334	61,458	163,792	62.5%	202,418	121,798	324,216	62.4%
1991	91,566	50,344	141,910	64.5%	88,904	48,758	137,662	64.6%	180,470	99,102	279,572	64.6%
1992	103,212	58,758	161,970	63.7%	101,542	51,888	153,430	66.2%	204,754	110,646	315,400	64.9%
1993	137,640	89,026	226,666	60.7%	126,890	74,074	200,964	63.1%	264,530	163,100	427,630	61.9%
1994	152,822	110,758	263,580	58.0%	139,475	83,938	223,413	62.4%	292,297	194,696	486,993	60.0%
1995	170,928	114,736	285,664	59.8%	146,927	84,942	231,869	63.4%	317,855	199,678	517,533	61.4%
1996	186,240	131,276	317,516	58.7%	161,769	104,130	265,899	60.8%	348,009	235,406	583,415	59.7%

Source) "Statistics Report" prepared by MBPT

5.2.3 Container Cargo Flow in and around MBP

Statistics of container movement in and around MBP in 1995-96 are shown in Table 5.2.10. A very limited space is available for container handling in Port of Mumbai so that CFS and RCD are located 10 to 15 km away from the container berths. The container cargo flow in and around MBP is illustrated in Figure 5.2.2.

As to Import cargo, approximately 85% of laden containers directly go to CFS and get customs clearance, the remaining 15% go to ICD (through RCD). Sixty-five percent of CFS containers are de-stuffed at CFS then transported to final destination as a loose cargo. The remaining 35% is transported to final destination by laden container and de-stuffed at factory / house.

As to export container, 83% of laden container cargo come from CFS to quay side after completing customs clearance. The remaining 17% directly comes from ICD (through RCD). Approximately half of CFS containers are stuffed at factory / house and the other half come to CFS as loose cargo.

Table 5.2.10 Statistics of Container Traffic Movement in and out of MBP in 1996-97

	20 Foot (boxes)	40 Foot (boxes)	Total (boxes)	TEUs (TEUs)
Import				
FCL	129,977	44,864	174,841	219,705
LCL	6,068	2,905	8,973	11,878
Empty	50,195	17,869	68,064	85,933
Total	186,240	65,638	251,878	317,516
Export				
Loaded	153,072	45,160	198,232	243,392
Empty	8,697	6,905	15,602	22,507
Total	161,769	52,065	213,834	265,899
Grand Total	348,009	117,703	465,712	583,415
Quay side to ICD				
Loaded	19,962	5,523	25,485	31,008
Empty	1,258	451	1,709	2,160
Total	21,220	5,974	27,194	33,168
ICD to Quay side				
Loaded	33,660	5,709	39,369	45,078
Empty	647	451	1,098	1,549
Total	34,307	6,160	40,467	46,627
House Destuffing	68,896	21,391	90,287	111,678
House Stuffing	56,902	27,900	84,802	112,702

Source) "118 th Administration Report 1996-97", MBPT

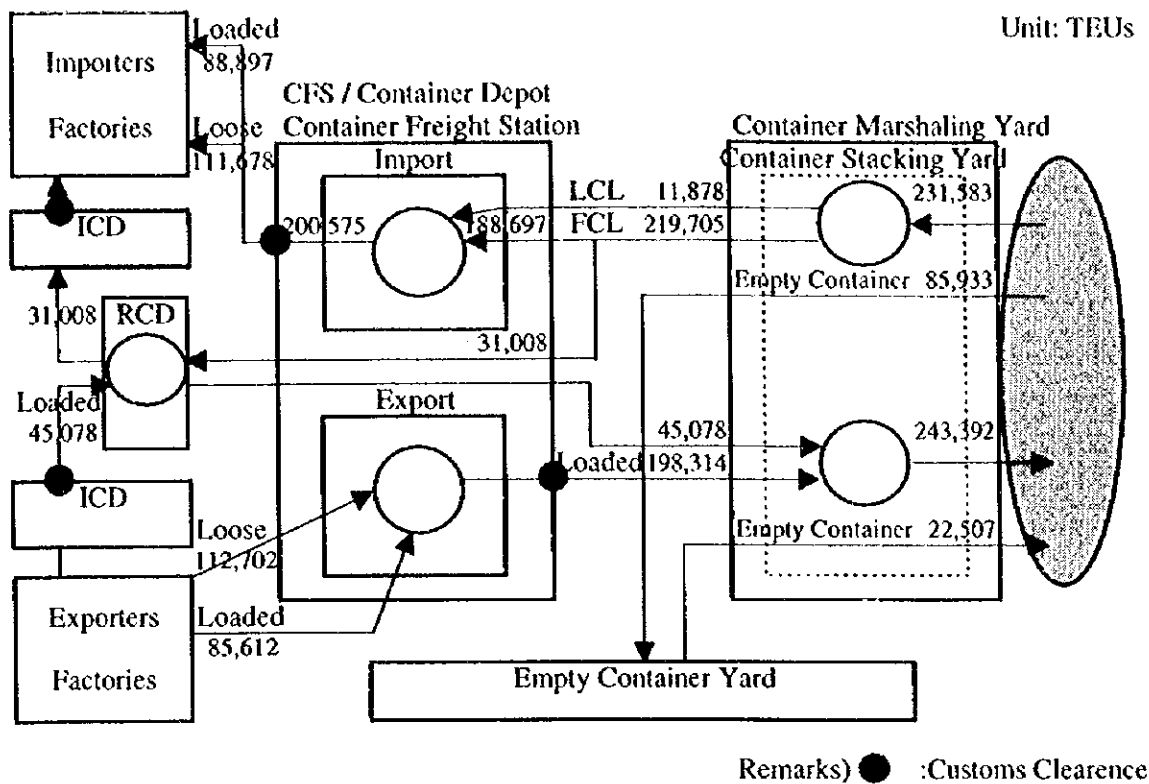


Figure 5.2.2 Illustration of Container Traffic Movement in and around MBP in 1995-96

Dwelling Time distribution of containers at container stacking yard and CFS are shown in Table 5.2.11.

Table 5.2.11 Distribution of Dwelling Time of Containers at Container Stacking Yard and CFS

Container Stacking Yard			CFS		
	Dwelling Time	(%)		Dwelling Time	(%)
Export	Cut-off time (12 hours	-	Export	Cut-off time (12 hours)	-
	24-48 hours	40		24-48 hours	30
	48-72 hours	20		48-72 hours	30
	72-96 hours	20		72-96 hours	20
	96-120 hours	10		96-120 hours	10
	120-144 hours	5		120-144 hours	5
	144-Maximum dwelling time (hours)	5		144-Maximum dwelling time (hours)	5
Import	24-48 hours	10	Import	24-48 hours	7
	48-72 hours	25		48-72 hours	8
	72-96 hours	25		72-96 hours	10
	96-120 hours	20		96-120 hours	12
	120-144 hours	10		120-144 hours	13
	144-Maximum dwelling time (hours)	10		144-Maximum dwelling time (hours)	50

Source) Provided by the expert of MBPT

5.2.4 Break Bulk and Dry Bulk Cargo Traffic

Dwelling time of major commodities such as "Pulses", "Rice", "Wheat", "Sugar", "Oil Cakes", "Wood Pulp", "Wood Logs", "News Print", "Iron and Steel" and "Miscellaneous" of Break Bulk cargo are shown in Table 5.2.12.

Average dwelling time of major commodities such as "Rock Phosphate" and "Sulphur" of Dry Bulk Cargo are also shown in Table 5.2.12.

Table 5.2.12 Distributions of Dwelling Time of Break and Dry Bulk Cargo by Major Commodities at Storage

		(Unit:days)	
	Detail Item	Export (days)	Import (days)
Break Bulk	Pulses	-	15
	Rice	5	-
	Wheat	-	-
	Sugar	-	7
	Oil Cakes	5	-
	Wood Pulp	-	9
	Wood Logs	-	14
	News Print	-	8
	Iron and Steel	-	5
	Miscellaneous	8	10
	Dry Bulk		
Rock Phosphate		-	-
Sulphur		-	-

Source) Provided by the expert of MBPT

5.2.5 Liquid Bulk Cargo Traffic

(1) Crude Oil

Crude oil volume for export (mainly coastal) has fluctuated for the last 10 years and stayed in a range of 7 to 10 million tons. Import volume of crude oil has fluctuated within a range of 4 to 9 million tons. However, total volume of the import and export volume of crude oil has been very stable, ranging from 14 to 16 million tons.

(2) POL (Products)

Import volume of POL (Products) had been stable, ranging from 1 to 2 million tons until 1993-94. It has since increased sharply to 4.8 million tons in 1995-96. Export volume of POL (Products) has decreased steadily, falling to 1.6 million tons in 1995-96.

Table 5.2.13 Trends of Liquid Bulk Cargo by Major Commodities handled in MBP

Year	Crude Oil			POL		
	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)	Import ('000 tons)	Export ('000 tons)	Total ('000 tons)
1986-87	3,559	8,437	11,996	1,176	3,143	4,319
1987-88	4,728	9,629	14,357	965	4,061	5,026
1988-89	3,980	10,442	14,422	1,749	2,892	4,641
1989-90	4,706	8,703	13,409	2,157	3,103	5,260
1990-91	5,463	9,917	15,380	1,532	2,756	4,288
1991-92	5,531	9,981	15,512	1,661	2,339	4,000
1992-93	7,278	8,161	15,439	1,628	3,433	5,061
1993-94	8,891	6,940	15,831	2,089	2,730	4,819
1994-95	4,918	8,975	13,893	2,982	1,955	4,937
1995-96	4,554	9,994	14,548	4,815	1,607	6,422

Source) "Statistics Report" prepared by MBPT

5.3 Port Activities

5.3.1 Vessel Calls

The number of cargo vessels which called Port of Mumbai (MBP) has stayed around two thousand until 1993-94, revealing less effect of newly started operation of Jawaharlal Nehru Port (JNP) in 1989 (see Table 5.3.1).

Table 5.3.1 Trends of Number of Vessels called to MBP

Year	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
No. of Vessels	2,041	2,086	2,010	1,973	1,928	2,069	2,094	2,330	2,276	2,380

MBP is known as one of the busiest ports in the world. Average pre-berthing time is about 4.51 days. Vessel type-wise average pre-berthing times are shown in Table 5.4.2. Not only bulk cargo vessels but also container vessels are required to wait for a couple of days before entering the port. A long pre-berthing time is expected due to higher level of berth occupancy rate.

Table 5.3.2 Average Pre-berthing Time by Vessel Type called to MBP in 1995-96

Vessel Type	Break Bulk	Dry Bulk	Liquid Bulk			Container
			Crude Oil	POL	Chemical	
Pre-berthing Time	5.35 (days)	12.64 (days)	5.57 (days)	4.91 (days)	5.11 (days)	2.52 (days)

5.3.2 Berth Occupancy Conditions

According to the individual vessel calling records provided by MBPT, 2,301 cargo vessels called the port in 1995-96. Berth-wise occupancy rate by cargo vessels which called MBP in 1995-96 is shown in Table 5.3.3. Berth-wise occupancy conditions are analyzed. Major commodities handled at each berths are as follows:

Table 5.3.3 Berth-wise Occupancy Rate by Cargo Vessels called to MBP in 1995-96

Berth No.	No. of Cargo Vessels Called in 1995-96					Berth Occupancy by Cargo Vessel			Cargo Volume Handled in 1995-96				
	Total	Container	Break Bulk	Dry Bulk	Liquid Bulk	Total Time	Total Berth Time	Berth Occupanc	Total	Container	Break Bulk	Dry Bulk	Liquid Bulk
	(no.)	(no.)	(no.)	(no.)	(no.)	(days)	(hours)	(%)	(tons)	(tons)	(tons)	(tons)	(tons)
INDIRA DOCK													
1	68	68	0	0	0	359	7,339	85.18	629,716	629,716	0	0	0
2	72	72	0	0	0	366	6,762	76.98	622,727	622,727	0	0	0
3	69	69	0	0	0	366	6,508	74.09	750,304	750,304	0	0	0
4	59	59	0	0	0	366	7,068	80.46	483,120	483,120	0	0	0
5	53	53	0	0	0	366	5,502	62.64	407,679	407,679	0	0	0
6	25	3	18	3	1	360	6,170	71.41	228,940	29,103	171,589	22,248	6,000
7	22	2	6	14	0	346	6,844	82.42	278,444	26,394	63,318	188,732	0
8	24	6	10	7	1	351	4,653	55.24	183,265	54,255	58,222	64,792	5,996
9	54	19	16	3	16	350	6,725	80.06	390,623	133,567	96,613	24,463	135,980
J/E	75	23	20	10	22	366	11,620	132.29	699,472	173,443	152,703	101,477	271,849
10	41	3	19	4	15	366	7,906	90.00	380,484	11,226	205,595	44,846	118,817
11	49	6	27	5	11	366	9,396	106.97	439,785	45,463	246,616	46,929	100,777
12	18	2	14	0	2	366	5,933	67.54	169,787	26,247	130,135	0	13,405
12A	21	0	20	1	0	366	3,956	45.04	158,923	0	146,869	12,054	0
12B	25	5	7	11	2	353	6,503	76.76	294,343	39,546	91,540	146,257	17,000
13	35	30	0	2	3	345	6,221	75.13	253,258	220,362	0	0	32,896
13A	27	1	26	0	0	366	5,348	60.88	256,945	10,897	246,048	0	0
13B	47	2	25	0	20	366	7,948	90.48	419,475	2,450	204,991	0	212,031
14	36	4	29	0	3	352	8,257	97.74	287,154	31,728	229,610	0	25,816
15	25	2	22	0	1	351	4,974	59.05	251,994	12,061	238,433	0	1,500
16	38	5	31	2	0	352	10,154	120.19	350,392	30,562	297,292	22,538	0
17	36	6	26	2	2	366	8,124	92.49	245,463	32,806	174,477	19,190	18,990
18	48	11	29	1	7	348	7,068	84.63	343,301	72,528	209,994	9,591	51,188
20	34	4	22	4	4	364	7,349	84.12	245,402	34,927	166,350	15,536	28,589
21	43	5	25	4	9	362	8,548	98.39	333,810	26,076	213,342	27,808	66,584
BPS	143	141	2	0	0	362	7,894	90.86	1,193,860	1,179,876	13,984	0	0
BPX	105	93	12	0	0	363	9,353	107.36	980,881	794,485	186,396	0	0
TOTAL	1292	694	406	73	119	9,710	194,123	83.30	11,279,547	5,881,548	3,544,120	746,461	1,107,418
VICTORIA DOCK													
1	45	27	12	4	2	354	6,208	73.07	209,386	148,214	28,852	26,864	5,456
2	19	0	16	1	2	362	4,786	55.09	74,796	0	66,025	651	8,120
3	27	8	16	2	1	363	5,243	60.18	97,744	34,900	44,419	15,480	2,945
4	27	5	16	4	2	366	5,838	66.46	88,249	33,978	32,756	10,733	10,782
5	27	8	14	4	1	366	6,578	74.89	90,420	40,191	33,973	11,623	4,633
6	22	3	15	2	2	362	5,972	68.74	75,981	16,726	40,530	8,113	10,612
7	33	10	18	1	4	362	6,965	80.17	142,495	62,669	63,321	4,029	12,476
8	30	6	13	6	5	366	6,963	79.27	152,197	36,598	56,414	25,346	33,839
9	16	6	4	3	3	366	3,047	34.69	94,127	40,006	16,696	12,865	24,560
10/11	66	39	17	2	8	366	5,585	63.58	290,230	223,171	13,666	8,417	44,976
12	18	2	14	1	1	366	5,322	60.59	56,358	7,485	41,947	1,976	4,950
14	41	17	21	1	2	359	5,915	68.65	169,929	90,754	69,510	5,805	3,860
TOTAL	371	131	176	31	33	4,358	68,422	65.42	1,541,912	734,692	508,109	131,902	167,209
PRINCES DOCK													
A	9	1	7	1	0	358	2,324	27.05	19,175	3,475	12,400	3,300	0
B	10	0	10	0	0	360	2,880	33.33	19,563	0	19,563	0	0
C	16	0	10	3	3	366	4,613	52.52	45,534	0	21,822	14,209	9,503
D	9	0	9	0	0	366	3,547	40.38	24,926	0	24,926	0	0
N/O	5	0	5	0	0	350	880	10.48	6,047	0	6,047	0	0
P/Q	3	0	2	0	1	366	354	4.03	8,079	0	2,137	0	5,942
TOTAL	52	1	43	4	4	2,166	14,598	28.08	123,324	3,475	86,895	17,509	15,445
JAWAHARLAL DEEP													
	Liquid Bulk Cargo Type												
	Crude	POL	Chemical	Liquid Bulk Total					Crude	POL	Chemical	Liquid	
1	53	62	0	115	366	6,442	73.34	3,866,983	2,609,544	1,257,439	0	3,866,983	
2	0	97	0	97	366	5,687	64.74	1,512,632	1,512,632	0	0	1,512,632	
3	20	79	0	99	366	6,973	79.38	2,455,999	932,579	1,523,420	0	2,455,999	
4	128	0	0	128	366	6,745	76.79	11,014,934	11,014,934	0	0	11,014,934	
PIR PAU	0	114	33	147	366	7,205	82.02	1,162,034	0	963,029	199,005	1,162,034	
TOTAL	201	352	33	586	1,830	33,052	75.26	20,012,582	16,069,689	3,743,888	199,005	20,012,582	
GRAND TOTAL	No. of Cargo Vessels Called in 1995-96					Berth Occupancy by Cargo Vessel			Cargo Volume Handled in 1995-96				
	Total	Container	Break Bulk	Dry Bulk	Liquid Bulk	Total Time	Total Berth Time	Berth Occupanc	Total Cargo	Container	Break Bulk	Dry Bulk	Liquid Bulk
	(no.)	(no.)	(no.)	(no.)	(no.)	(day)	(hour)	(%)	(ton)	(ton)	(ton)	(ton)	(ton)
	2,301	826	625	108	742	18,064	310,195	71.55	32,957,365	6,619,715	4,139,124	895,872	21,302,654

Source: "Individual Calling Vessels Records in 1995-96", MBPT

(1) Container Cargo

73.5% of all container cargo handled in MBP is handled at 1-ID to 5-ID, BPS and BPX in Indira Dock, while 15.3% is handled in other berths in Indira Dock. This means that 88.8% of container cargo is handled in Indira Dock. Remaining 11.1% is handled in Victoria Dock. 1-ID to 5-ID and BPS are container berths which only handle containers. BPX is a passenger berth, however, mainly used by container vessels unless occupied by cruise vessels. In other words, 26.4% of containers is handled at multi-purpose berths in both Indira and Victoria Dock.

(2) Break Bulk Cargo

85.6% of break bulk cargo is handled at multi-purpose berths (non-container berths) in Indira Dock. "Iron and Steel" which is one of the major commodities of break bulk cargo is handled mainly at 9, J/E, 10, 11, 12A, 13, 13A, 13B, 14, 15, 16, 17, 18 and BPX-ID. Bag cargoes such as "Pulses" (6, 10, 11, 13B, 14, 16 and 17-ID), "Rice" (12, 13A, 14, 15, 18, 20 and 21-ID), and "Oil cakes" (6, 12 and 13B-ID) are handled widely handled in Indira Dock. 12.3% is handled in Victoria Dock.

(3) Dry Bulk Cargo

83.3% of dry bulk cargo is handled in Indira Dock. One major commodity, "Sulphur" is handled mainly at 6, 7, 8, J/E, 10, 11, 20 and 21-ID, and at 1, 4 and 8-VD. The other major commodity, "Rock Phosphate" is handled mainly at 7, J/E and 12B-ID. 14.7% is handled in Victoria Dock.

(4) Liquid Bulk Cargo

68.5% of Crude Oil is handled at the deepest new berth, 4-JD. The remaining 31.5% is handled at 1-JD to 3-JD. 4-JD is a berth for exclusive use of Crude Oil. POL is handled at 1-JD, 3-JD and old Pir Pau in almost equal proportions.

All Chemical is handled at old Pir Pau. New Pir Pau which is designed for both POL and Chemical started its operation in December, 1996. These statistics do not include operation at new Pir Pau.

Edible Oil is mainly handled at 9, J/E, 10, 11, 13, 13B, 18, 20 and 21-ID in Indira Dock.

5.3.3 Cargo Handling Productivity

Cargo handling productivities for each commodity are calculated in the following equation.

$$\text{Productivity (ton/hour/vessel)} = \text{Total Cargo Volume handled (tons)} / \text{Total Berth Time (hours)}$$

Productivities calculated for each commodity using berthing records in 1995-96 are shown in Table 5.3.4.

Table 5.3.4 Cargo Handling Productivity by Major Commodities in MBP

Commodity	Total Cargo Volume (tons or boxes)	Total Berth Time (hours)	Productivity (ton/ hour/vessel)
Break Bulk Cargo	3,697,450	136,495	27.1
Pulses (Bag)	373,687	13,741	27.2
Rice (Bag)	486,795	15,552	31.3
Wheat (Bag)	82,974	3,360	24.7
Sugar (Bag)	65,622	2,341	28.0
Oil Cakes (Bag)	244,950	8,800	27.8
Wood Pulp	81,687	1,730	47.2
Wood Logs	4,629	1,488	3.1
News Print	139,087	4,518	30.8
Iron and Steel	1,189,957	12,911	92.2
Miscellaneous	989,643	70,612	14.0
Dry Bulk Cargo	923,543	33,046	28.0
Borax	13,205	506	26.1
Fertilizer	69,467	3,161	22.0
Lead	11,580	772	15.0
Rock Phosphate	292,272	7,660	38.2
Salt	31,127	1,299	24.0
Scrap	118,946	3,033	39.2
Sulfur	386,946	16,615	23.3
Liquid Bulk Cargo	12,166,196	35,895	169.4
Crude Oil (discharge)	2,017,302	5,019	401.9
Crude Oil (charge)	5,552,930	4,404	1260.9
POL (discharge)	2,630,478	12,691	207.3
POL (charge)	868,416	3,152	275.5
Chemical (discharge)	191,813	1,179	162.7
Chemical (charge)	3,593	93	38.6
Container	442,340	73,843	6.0
Container(Ship Crane)	167,547	66,445	5.4
Container(Quay Crane)	33,408	7,398	11.2

Source) "Individual Calling Vessel Records 1995-96", MBPT

5.4 Present Container Handling System

5.4.1 Export Container Handling Procedures

Export container handling procedures for 1) shipping agent, 2) transportor, 3) MBPT, and 4) stevedore (tally clerk) are summarized in Table 5.4.1.

Table 5.4.1 Export Container Handling Procedures

Job Flow / Concerned Body	Shipping Agent	Transportor	MBPT	Stevedore (Tally Clerk)
1 Dispatch empty container for cargo stuffing due to pre-information of ships arrival	Prepare empty container and dispatch document and ship entering application by standard format	Arrange tractors and trailers		
2 Physical movement of empty container	Issue out-turn document to the empty container	Load empty container on trailer at container depot or container park in the port	Issue "Challan" and check condition of container and document by port security officer at gate.	
3 Stuff container at stuffing place such as CFS or Factory	Cargo condition of number of packages confirming by surveyors and tally clerks	Unload empty container from trailer to stuffing place		Cargo stuffing and sealing under the customs officers or tally clerks
4 Remove stuffed container to the container depot or container park in the port	Prepare authorized document including information; 1) Container Load Plan (CLP), 2) Customs Clearance	Transfer physically loaded container to export container stacking place (container depot or park)	Confirm shipping document and container box condition and seal number by customs or security officer.	
5 Prepare container loading document	Prepare export container loading list for ships operation	Arrange tractors and trailers for ships operation	Check export container due to container loading list or gate-pass by customs and port security officer.	
6 Container movement from CFS or container depot to the dock gate		Container movement from container depot to the dock	Check the seal number and official export container list	
7 Stack container at the container park or yard in the dock area		Unload Export container from trailer by yard equipment	Nominate stacking spot by docks department of MBPT	
8 Ships arrival (ETA)	Ship entering application to MBPT by Standard format		Berth nomination to ships by docks department of MBPT	
9 Load container on the ship	Prepare container stowage bay plan	Container movement to ship-side from stacking place	Confirm container loading data by port tally clerk	Load Container on ship by the quay side gantry crane or ships gear
10 Export shipping documentation	Issuing B/L (Bill of Lading) for each shippers	Loading record of each container movement to raise the bill to shipping agent or shipper	Loading record of each container movement and port charge to raise the bill to shipping agent	Prepare shipping document: 1) Loading report, 2) Stowage Bay Plan, 3) Hazardous cargo list, 4) Reefer Container list, 5) Exception Cargo list
11 Ship departure	Prepare sailing clearance application and sailing data to next port			

5.4.2 Import Container Handling Procedures

Import container handling procedures for 1) shipping agent, 2) transportor, 3) MBPT, and 4) stevedore (tally clerk) are summarized in Table 5.4.2.

Table 5.4.2 Import Container Handling Procedures

Job Flow / Concerned Body	Shipping Agent	Transportor	MBPT	Stevedore (Tally Clerk)
1 Prepare import document due to pre-information of ship arrival	Receive information from previous port, issue cargo delivery order, and collect container handling charges: 1) Stowage plan, 2) Copy of B/L, 3) Cargo manifest	Receive cargo manifest and container stowage data from shipping agent	Receive cargo manifest from shipping agent	
2 Prepare unloading container or cargo list	Confirm detailed data of container and cargo on ship	Arrange tractors and trailers for ship operation according to unloading container list	Prepare container and cargo movement document for unloading container operations	Confirm container cargo data and delivery places
3 Physical container and cargo operation (unloading cargo works)	Request for labours and tally clerks to MBPT and stevedoring companies	Container movement between ship and container stacking area by tractors and trailers	Check seal number and "Challan" at gate by customs officer and port security officers	Physical unloading operation of container from ship. Check container number, seal number and container box condition.
4 Physical unloading container from ship to CFS or out of container depot		Physical movement of imported container to CFS and container depot by tractors and trailers	Check container number, seal number and container movement document	
5 De-stuff cargo from container within CFS or warehouse	Survey of cargo conditions and seal number upon door by shipping agent	Empty container movement to yard stacking places after completion of destuffing	Record necessary information on tally sheet: 1) Number of cargo packages, 2) Cargo conditions, 3) Weight and measurement	Physical cargo destuffing. Stack cargo at storage spot in the warehouse
6 FCL laden container delivery to consignees or factories	Check container and cargo delivery and customs clearance document	Load container onto consignee's tractors and trailers	Check import cargo document and seal number at gate by customs and port security officer	
7 LCL cargo delivery to consignees	Check cargo delivery document and customs clearance document		Confirm cargo conditions and number of cargo packages by tally clerks and surveyors	
8 Ship departure	Withdraw original cargo delivery order	Complete loading record of each container movement and raise the bill to shipping agent	Complete loading record of each container movement and raise the port charges bill to shipping agent	

5.4.3 Present Export Container Documentation

Export container documentation procedures for each documents are summarized in Table 5.4.3.

Table 5.4.3 Present Export Container Documentation Procedures

	Job Description	Required Documents
1	Dispatch empty container	Empty container dispatch order (shipping agent)
2	Physical delivery of empty container prior to factory cargo stuffing	Empty container delivery sheets and gate-pass (off-dock depot or on-dock depot)
3	Prepare cargo to be stuffed before moving empty container to depot or container park	1) Container Load Plan (CLP) (Stuffing place clerks), 2) Gate-pass (Challan) and 3) Cargo stuffing report
4	Stuff LCL container at CFS after moving container to depot or park	1) Container Load Plan (CLP), 2) Gate-pass (Challan) and 3) Cargo stuffing report
5	Move export container from RCD to depotor container park in port	Railway container handling reports (tally sheet)
6	Adjust export container booking allocation by shipping agent	Result of container receiving reports
7	Ship arrival and require container operations labors and tally clerk	Ship entry application and cargo operation labors and tally clerks order sheet by standard format
8	Physical container loading onto ship	Loading container list and tally sheets
9	Shipment report and special cargo list	Shipment reports: 1) Stowage plan, 2) Hazardous cargo list, 3) Reefer cargo list, 4) Exception cargo list
10	Arrange ship departure applications	Ship departure application and Customs clearance by standard format
11	Shipping documentation work	B/L and loading container cargo list
12	Connection with principal and next port	Result of shipment report and ships departure condition report

5.4.4 Present Import Container Documentation

Import container documentation procedures for each documents are summarized in Table 5.4.4.

Table 5.4.4 Present Import Container Documentation Procedures

	Job Description	Required Documents
1	Prepare ship arrival application and cargo operation works	Ships entry application and labours, tally clerks arrangement by standard format
2	Withdraw original B/L and prepare unloading operation	Arrival notice and Cargo Delivery Order
3	Prepare cargo delivery and documentation work	Cargo manifest for Customs and MBPT
4	Customs clearance for unloading container and container operation list	1) Stowage plan, 2) Special container list and 3) Unloading container list
5	Physical container unloading operation	Unloading tally sheet and daily report by standard format
6	Unload import container and move it to CFS or RCD	Special document "Challan" and Gate pass
7	Direct delivery of FCL container to factory or consignee's warehouse	1) Cargo delivery order, 2) Gate pass and 3) Customs import permission
8	Physical loading of import container onto trailer	Special document "Challan" and gate pass
9	Physical examination at ICD or container park in the port	Application of examination and container movement permission
10	Receive import FCL container at ICD or RCD	Container receiving record or tally sheet
11	Physical LCL container destuffing work at CFS	Cargo destuffing report
12	Withdraw shipping document when LCL cargo delivery to consignees	1) Cargo delivery order, 2) Customs permission and 3) Tally sheet
13	Move empty container back to ICD or RCD	Empty container gate pass
14	Ship departure arrangement	1) Ships departure application, 2) Customs clearance, 3) Ships and cargo condition report
15	Cargo delivery work	B/L-wise cargo delivery record