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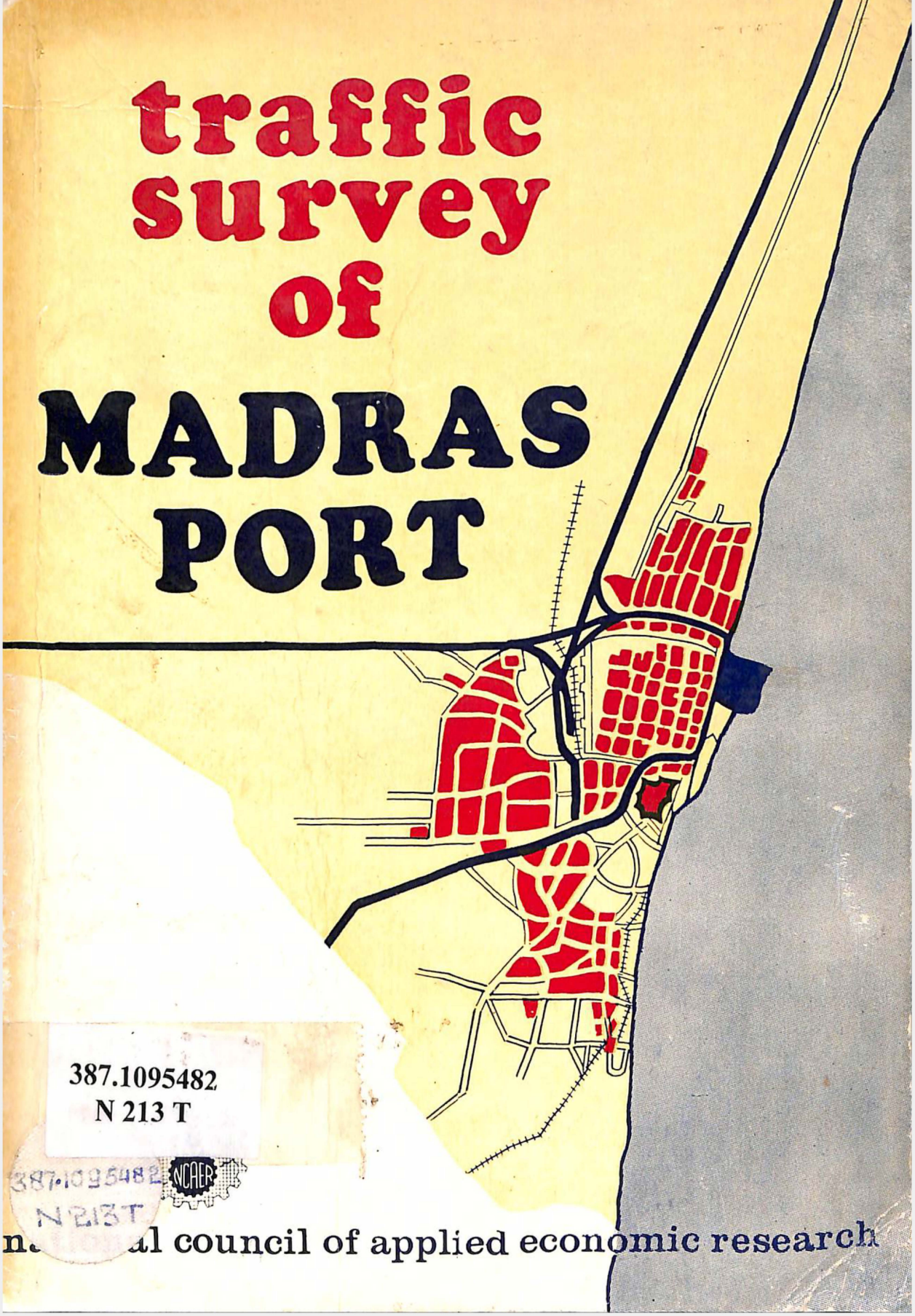

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Traffic Survey of Madras Port

National Council of Applied Economic Research
New Delhi

SEPTEMBER 1968

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Preface

IN 1963, THE National Council of Applied Economic Research undertook at the request of the Planning Commission, a pioneering study on the Regional Transport Planning of the nine districts of the Madras State. The Council's report served as a model for the other regional transport surveys which were taken up by different States later on. Subsequently, the Council was asked to conduct the Regional Transport Survey of the remaining four districts of the Madras State. In view of the great importance of the port of Madras in the economy of the region a separate comprehensive survey of its traffic potential and matching facilities was considered necessary. This Report critically examines the existing port facilities for meeting the present and the anticipated traffic and suggests the additional facilities that may have to be provided, and the approximate investments involved. Within the many limitations inherent in such a task it has been approached conscientiously and with thoroughness.

The port of Madras handled only 2.1 million tonnes of traffic in 1950-51. The growth of traffic in the subsequent years showed a steady increase to 4.9 million tonnes by 1965-66. As a result of the Government's decision to establish an oil refinery at Madras by 1969 with an annual capacity of 2.5 million tonnes initially and with a provision for its expansion to 4.0 million tonnes, the oil traffic is expected to increase substantially. The total traffic expected to be handled by the port of Madras in 1970-71 is 8·73 million tonnes, out of which metallic ores would account for 3.1 million tonnes and petroleum products 2.5 million tonnes. By 1975-76, the metallic ore would further increase to 5.0 million tonnes and petroleum products to 5.1 million tonnes. The increase in other commodities is expected to be only marginal. The total traffic in 1975-76 is likely to be 13.13 million tonnes.

The existing port facilities include 18 along side berths besides, three mooring berths for petroleum, and one mooring berth for general cargo, shore cranes, warehouses and floating crafts. The port maintains its own railways of 59 kilometres track length which is connected with the Southern Railways on the broad gauge at Royapuram and on the metre gauge at the Madras Beach Stations. Facilities such as signal station, pilotage, light

house, bunkering and navigational aids, etc., exist at the port. Though the port facilities in the recent past have been more than doubled but it has not eased the situation much as the total cargo traffic has also doubled over the three Plan periods.

The metallic ore and petroleum products which are likely to be the two major components of traffic at the port of Madras in future may, according to the latest trends in international shipping, be transported by giant super carriers or tankers. The port of Madras cannot at present receive such vessels due to the inadequacy of the existing depths in the harbour basin, and in the Jawahar Dock. On technical considerations, it is not possible to improve depths in these two water areas to the levels required by supertankers or ore-carriers. The solution to the problem lay in developing an oil-cum-ore cargo dock in the Royapuram Bay area to the immediate north of the present harbour. This integrated oil and ore dock will fully take care of the needs of the oil and ore traffic, leaving the present 18 quay berths to cater to the needs of the increases in the remaining traffic. Further, two high capacity tugs for handling ships in the oil dock, an additional dredger, adequate mechanical handling facilities for ores, etc., may be needed for efficiently meeting the requirements of the anticipated level of traffic. A fishing harbour at the Cassimode Bay north of Madras Harbour also needs to be developed.

An investment of Rs. 22.28 crores for expansion of the existing port facilities and Rs. 3.20 crores for the fishing harbour have been suggested by 1970-71. Should the traffic in petroleum and iron ore develop to five million tonnes each by 1975-76, the additional investment needed would be Rs. 5 crores for dredging and Rs. 1.50 crores for the additional ore handling capacity. The construction of a new dry dock at a cost of Rs. 8 crores may be called for to take the large sized tankers/ore carriers expected to use the port by them, besides an overbridge at the rail-road level crossing at the cost of Rs. 46 lakhs.

The project was the responsibility of the Transport Division of the Council under the overall guidance and supervision of the then Director-General, Dr. P.S. Lokanathan with the able assistance of Mr. S.R. Kalyanaraman and Prof. L.A. Natesan. I would like, however, to make a special mention of Shri T.S. Parasuraman, Consultant, who shouldered the major burden of preparing this Report on the Port of Madras with the assistance of Shri P. Ramakrishnan, Research Assistant in data analysis.

NEW DELHI
September 12, 1968

S. BHOOTHALINGAM
Director-General

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Chapter 1

Introduction

THE STUDY OF the port of Madras was commenced on 10-2-1966 with the following as the terms of reference :

(*i*) To make a study of the port of Madras from the point of view of the present and prospective economic requirements of the State of Madras. (The metropolitan transport is outside the scope of the study, but the traffic moving to the port from outside the metropolitan area and moving from the port to destinations beyond the metropolitan area should be covered by the study.)

(*ii*) The study should include:

(*a*) the examination of the trends of the traffic of the port since 1950-51 to date and the facilities provided to handle the shipping and the tonnage;

(*b*) a critical appraisal of the adequacy of capacity of the port, during recent years and at present;

(*c*) an estimate of the trends of traffic the port may be expected to handle by 1970-71 and by 1975-76 in terms of exports, imports and re-exports, and their impact on transport facilities in the region, (also the assessment of possible diversion of traffic to other intermediate and major ports, which are under development);

(*d*) the additional berths, terminal equipment and facilities, transit sheds and other physical assets that may have to be provided to cope with the anticipated increase in traffic by 1970-71 and by 1975-76; and

(*e*) the probable capital investment required in connection therewith.

(*iii*) The study should also deal with the methods of working of the port in the past and at present and proposals, if any, to improve them in the future.

The Report on this study is made after two visits to the port of Madras,

the first from 28-2-66 to 14-3-66 and the second from 25-4-66 to 3-5-66. During these visits all the port installations and equipment were personally inspected in company with senior officials in the engineering and traffic departments of the Port Trust by day and by night as necessary to watch operations under different conditions.

Discussions were held at Madras with the Chairman and heads of departments of the Port Trust, with representatives of the port-users and of the State Government.

The arrangement of the chapters in the Report generally follows the order of the subjects mentioned in the terms of reference.

The factual and statistical material in the Report is based on information supplied by the Madras Port Trust, the Ministry of Transport, the published Administration Reports as well as unpublished reports made available for the purpose of this study.

Coming to the substantive part of the Report, it will be seen that the development works that are being planned, as part of an integrated master plan for the port, were generated principally by the decision to establish an oil refinery at Madras. This has provided an opportunity to enlarge the capacity of the port to a size never thought possible before, and in particular to enable the harbour to cater to deep drafted (upto 13.7 metres draft) oil tankers, super ore carriers and other bulk cargo carriers of DWT up to 70,000 tonnes. The future lines of development of the port are now clearly visible and no one need shy away from the port in the foreseeable future due to doubts of lack of port capacity.

The projections of future traffic with regard to the major components are made on fairly firm facts.

As regards other trade, such as, general cargo traffic, which now constitutes about 23 per cent of the total attempt, making sustainable projections fare many difficulties. No mathematical projections extra-polating from past trends have been attempted because the trade is passing through a transitional stage and new patterns are still to emerge resulting from the Southern region growing as an industrial area. Estimation of future traffic in non-traditional items (such as manufactured goods) is, therefore, largely based on hopes for the future. The difficulty is in visualising this traffic in terms of *tonnage* of cargo. An ad hoc figure of 100,000 tonnes of such cargo has been assumed as the addition that may occur on this account. Estimates of the traffic on traditional items (groundnut, hides and skins, tobacco, etc.) have been made on a conservative basis.

The assessment of the capacity of the port leaves one in no doubt as to the ability of the port to deal with "general cargo traffic, even if it were to be

doubled or trebled" by 1970-71 because the new oil dock when developed will leave practically the whole of the present harbour to general cargo.

There is no doubt also that the port of Madras is one of the very few major ports in India that can look forward to the future in confidence of its ability to serve the economic requirements of its hinterland which embraces regions far beyond the State of Madras.

Chapter 2

Location, History and Special Features

Location

THE PORT OF Madras is located on the east coast of India in the capital of the State of Madras at latitude 13°-03′-046″ N and longitude 80°-17′-48″ E. The location is not on a site for a natural harbour but on a straight beach along the coast. The relative steaming distances of the port from the other ports in India and from other countries are given in Table 14.

History

Madras was an important centre of South India's seaborne trade ever since a trading centre was established there in 1639 by the British East India Company. Ships engaged in that trade had, however, no harbour facilities for well over two centuries. They used to anchor in the open sea about a mile to three miles off shore, opposite Fort St. George. Small boats and lighters were employed to carry passengers and cargo between ship and shore. Under these conditions, cargo, lighters and ships, all were subject to much damage from the surf, rough seas and cyclonic storms.

It was not until 1876 that the commercial community of Madras successfully moved the Government to construct a harbour which would afford protection to ships during all seasons of the year. Here was a case of port facilities being put up in answer to the demands of trade which had established itself at a location which did not provide the marine and land features regarded as pre-requisite for a natural harbour. An artificial harbour alone was feasible. Construction of the artificial harbour was taken up in 1876. By 1890, two concrete arms each projecting from the shore eastwards to the sea to a length of 2,500 ft. (762 metres) were constructed. The third side, the eastern breakwater, was begun in 1890 and completed in 1896. This breakwater was provided with an opening, 515 ft. (157 metres)

wide, which was the entrance to the harbour basin. The fourth side was the seashore between the two projecting arms. No quayside berths were provided. Ships lay within the shelter of this 'box' type of harbour which had a water area of about 200 acres (81 hectares) and discharged their cargo into small boats which, in turn, plied between the ships and a pier running at right angles to the beach inside the protected area.

In a few years, the harbour entrance at the eastern arm got silted heavily due to sand accretion. Between 1905 and 1911 this entrance was closed and a new entrance was opened at the north-eastern corner of the harbour and protection given to it by building an arm 1,600 ft. (488 metres) long, projecting northwards from the eastern side.

Meanwhile trade has grown steadily and demanded improved facilities for the berthing of ships and for the loading and shipment of goods and their transit accommodation. The port authorities, thereupon, undertook (between the years 1910 and 1916) new works consisting of quay berths, transit sheds and warehouses resulting in the provision, by the end of the First World War, of four berths known as the West Quay Berths I to IV and a fifth, along the South Groyne (South Quay I), all equipped with transit sheds and warehouses to serve them. The subsequent development of the port consisted in the construction, around the same perimeter of the harbour basin, of two new quay berths which were known as the North Quay and South Quay II, and the erection of more transit sheds and warehouses. Electric quay cranes were also provided, Madras Port being the first among the major ports in India to electrify its shore cranes.

Thus, in the middle thirties, the port had eight berths, four on the West Quay, one on the North Quay, two on the South Quay and one on the eastern arm, at the site of the original entrance to the harbour.

The port was handling a total import and export cargo traffic of about 610,000 tonnes in the middle twenties. During the boom of 1927-30, this traffic rose to 1.52 million tonnes but it fell to about a million tonnes in the depression years of the thirties. Until the middle fifties, there was no significant addition to the port facilities, except of a heavy lift berth at the centre of the West Quay in 1942, in order to facilitate the handling of heavy lifts during World War II.

At the end of the Second World War, trade at the port stood at over 2.5 million tonnes, much in excess of what the port was built for. The nature of the cargo also was changing significant. Machinery and foodgrains began to arrive in sizeable quantities and the existing facilities were strained to the utmost. Expansion schemes were formulated during the second half of the First Plan. They were completed only by the end of the Third

Plan. Broadly, the expansion programme covered (*a*) the construction of three new berths designated as South Quays III, IV and V, one for ore, and the other two for coal with mechanised handling facilities and opened in 1960, (*b*) ancillary stocking yards and rail facilities, (*c*) the conversion of two old jetty berths South Quays I and II into two solid quay berths one on either side of the entrance to a new wet dock of six berths, (*d*) the construction of passenger-cum-transit shed in the North Quay and, of course, (*e*) the completion of the six berths, in the new wet dock named the Jawahar Dock. With this expansion the original eight quay berths have been increased to 18 quay berths. Besides there are four mooring berths, one for general cargo within the harbour basin and three for petroleum. The capacity has thus been more than doubled. The total cargo traffic has also doubled over the three Plan periods.

On the east coast of India, there is littoral movement of sand northwards during the south-west monsoon period for about five months between March and September. This movement reverses during the north-east monsoon period, i.e., between October and January. The harbour's breakwaters being an intrusion into the sea, avert this drift. This results in accretion of sand south of the harbour. Since 1876 when the harbour construction started, until today, the coastline immediately to the south of the harbour was advanced into the sea by about 3,000 ft. (914 metres). In 1927, a "sand screen" was built by extending the wall of the South Arm of the harbour basin eastwards by 700 ft. (213 metres) to prevent the siltation of the approaches to the harbour entrance by the sand travel. This arm was further extended by 216 ft. (66 metres) in 1950. A sand pump has been installed at the eastern tip of the sand screen to check further accretion of sand. A 1,500-tonne capacity suction hopper dredger was acquired during the Third Plan period to effectively dredge the entrance and approaches to the harbour.

A peculiar phenomenon called "range effect" occurs in the Madras Harbour, which means that under cyclonic conditions in the Bay of Bengal, the swells entering the geometrically shaped harbour, start a harmonic motion in three dimensions of the waters inside the harbour. Under conditions of such ranging, ships start pitching, rolling and surging. It has been found necessary on such occasions to take the ships out to the open sea to prevent damage to the dock structures and to the ships themselves.

The designs for enlarging the waterspread of the enclosed harbour and the provision of additional berths had, therefore, to take into account the effects of the "littoral drift" and the "range".

Madras is not seriously affected by the south-west monsoon and does

not, therefore, have to cope with long rainy periods which affect the Cochin and Bombay ports on the West Coast. The cyclonic storms during the north-east monsoons, however, cause heavy showers from October to December. During November and occasionally in May, October and December, the Bay of Bengal is affected by cyclonic storms, at times, intense. Their passage is normally well known in advance and ships have no difficulty in avoiding them. Ships caught by them, while at Madras, either ride them out in the enclosed harbour or get out of the port to the open sea and away from the storm. Shipping operations are, therefore, liable to interruption during these periods of cyclonic storms. In the past thirty years, the duration of such interruption has not exceeded a total of six days a year in two or three spells. In some years no interruption to shipping has occurred while in some other years the interruptions have been as low as a day or two days.

Chapter 3

Existing Port Facilities

A SKETCH PLAN showing the existing facilities in the port is put as a Frontispiece. The salient features are described below.

Depths of Water

The following depths are maintained at the places indicated. All depths shown are at I.S.L.W. (Indian Spring Low Water).

	(metres)
Harbour basin	9.1
Entrance at high water	11.3
Entrance at low water	10.4
Width of the entrance	121.9

Alongside Berths

There are eighteen alongside berths distributed as below:

West Quay: Five berths, West Quay I to IV and centre berth, for general cargo. Shore Cranes : Thirteen of three tonnes capacity, three of five tonnes and one of 60 tonnes. Five transit sheds of total area of 2.6 hectares.

North Quay: It has a double-storeyed transit shed-cum-passanger station. Shore Cranes : Two: one of three tonnes and one of five tonnes capacity.

South Quay: Five berths.

South Quay I: South Quay I after its recent reconstruction is the single longest berth in the harbour. It was commissioned in July 1965. The berth has a draft of 30 ft. (9 metres) and is so designed that it can be further deepened to 36 ft. (11 metres) with some extra fendering to meet

future traffic needs. The quay can berth one large ship together with a smaller vessel such as a floating crane, at the western end. The western end has been developed as a heavy lift yard for which it is equipped with a land based 50-tonne crane, working in conjunction with the 120 tonnes floating crane "Vaigai". The berth has been provided with all modern amenities including fuel oil bunkering, water supply, electricity and telephone. The eastern side with an adequate number of cranes and a two-storeyed transit shed serves as a general cargo berth. Transit Shed: One double -storeyed shed 2,972 square metres, on the ground floor and an equal area on the first floor and served by two electric cargo lifts.

South Quay II: No transit shed. Large quay space for dealing with bulk cargo like sulphur, rock phosphate, etc.

South Quay III: This is specially designed as an ore export berth. It is provided with three 13.2 tonnes electric cranes of 19.8 metres radius. There is an ore yard on the south foreshore with an area of 38 metres by 487·7 metres for stacking ore intended for shipment. This yard is equipped with two transporter cranes for stock-piling and for feeding the ore to the berth at South Quay III through steel trays placed on ore platform trucks.

South Quays IV and V: These are located on either side of a pier like berth 183 metres long. They are specially designed for the mechanical unloading of coal. Three 8.1 tonnes electric cranes of 22.9 metres radius have been provided at this quay.

East Quay: This is used only in periods of congestion.

The Jawahar Dock—Six Berths

This dock is located immediately to the south of the main harbour basin to which it is connected by an entrance 33.5 metres wide. It has six berths, three on each side of its length which are designed for drafts of 9.8 metres on the western side and 10.7 metres on the eastern side. The depths at present are 9.5 metres. The two southern berths on the east side (Berths IV and VI) of the dock have been provided with facilities for manual handling of iron ore. The three berths on the western side are intended for general cargo. They are served by three transit sheds of a total area of 5.5 hectares with a clear span of 30.5 metres without any columns inside which give excellent facilities for the rapid movement of cargo by use of fork lifts and other mechanical equipment. Utility services such as, fuel, oil, and water supply lines to the ships and telephone facilities at the berths have been provided according to accepted modern standards.

Mooring Berths

Before the opening of Jawahar Dock in November 1964 there were two moorings for general cargo in the harbour basin near its centre and three for petroleum. After the commissioning of the Jawahar Dock one set of moorings for general cargo vessel was removed. Three mooring berths are available for petroleum. The mooring berth for dangerous petroleum is located outside the harbour basin to the north of the North Groyne. The two mooring berths for non-dangerous petroleum cargo are located inside the harbour basin immediately to the south of the North Groyne and to the next of the harbour entrance.

Besides the shore cranes of various capacities, including two for heavy lifts described above, there is a fleet of 48 mobile cranes with lifting capacities ranging from $3\frac{1}{2}$ to 10 tonnes. These are used for handling cargo on landing and for effecting deliveries. There is also a floating crane of 120 tonnes capacity.

Warehouses

7.2 hectares of warehouse accommodation is available for lease to exporters and importers. This includes two bonded warehouses.

A shed is set apart exclusively for the storage of dangerous and hazardous cargo.

Floating Craft

Five tugs are available. One is for towing light craft fleet. Four are for helping ships and two of these are equipped for fire fighting operations.

There is a lighterage fleet consisting of 29 craft, 25 with a carrying capacity of 51 tonnes each and four with over 51 tonnes each. The fleet includes licensed and unlicensed craft owned by the Port Trust and others.

Two dumb water barges and one power-driven water barge are available for supplying water to ships.

Loading and discharging by means of lighters is effected on a wharf frontage and partly at the West Quay berths which have cargo handling cranes.

Other Facilities

Port Railway: The port maintains its own railway system. The Port Trust railway functions as a separate railway administration under the Indian Railways Act, 1890, by virtue of Section 39 of the Madras Port Trust Act 1905, as subsequently amended. The length of the track maintained by the Port Trust railway measured in a straight line would be about 59 kms. For the purpose of settlement of claims the Port Trust railway lines are reckoned

as 16 kms. according to the agreement with the main line railway. The railway is of mixed gauge, broad gauge and metre gauge. It is connected with the Southern Railway on the broad gauge at Royapuram and on the metre gauge at the Madras Beach station. A new line has been laid via the Beach yard connecting the harbour marshalling yard by broad gauge lines with Royapuram. The new marshalling yard in the south side of the harbour is designed to serve the expanded traffic at the Jawahar Dock, the ore handling berth and the coal handling berth. All traffic is interchanged with the main line railway in the harbour yard. All wagons whether loaded or empty are handled by the Port Trust railway from and to the Southern Railway on "transfer sidings" set apart for the purpose. The rakes of wagon, as they are taken over or handed over, are accounted for. In addition to the "foreign" wagons dealt within the harbour, the Port Trust has a number of wagons of its own (with the necessary number of locomotives), employed on transferring goods for shipment from ware-houses or storage plots and vice versa, or from transit area to the overflow accommodations. The Port Trust wagons are hired to the public and charged hire and haulage charges and demurrage for detention as prescribed under the authorised scale of rates. These wagons are moved inside the harbour and are not interchanged with the Southern Railway.

The Port Trust railway accepts goods arriving by sea for booking to any station in any railway in India both broad and metre gauge. There is an agreement with the Southern Railway regarding the rendering of terminal services by the Port Trust railway.

Road Communications: The port premises have road access from the North Beach Road and the South Beach Road and also from the Springhaven Road which connect the two former roads.

For convenience of working, the berths in the harbour are grouped into sections, serving berths as shown below :

Section I	N.Q., W.Q. I & W.Q. II
Section II	Centre berth, W.Q. III & IV : S.Q., I & J.D. I, III, V
Section III	Iron dump, warehouses, etc.
Section IV	J.D. berths II, IV & VI ; S.Q. II, III, IV & V and East Quay

The main road entrances are:

Gate I	Near North Quay

(*Continued*)

(*Contd.*)

Gate II-A, II-B and II-C	Near centre berth
Gate III	Near oil farm
Gate V	South of W.Q. IV
Gate VI	Near Port Trust Hospital

There are two other road entrances on the south and north side of the marshalling yard.

Gate II-A is the main entrance for all vehicular traffic during normal working hours, i.e., from 0800 to 1800 hours. After normal hours, Gate II-A is also used as the exit gate.

In Section I all cargo vehicles enter via Gate II-A and exit via Gate I.

In Section II all cargo vehicles enter via Gate II-A and exit via Gate V, except those that pick up cargo from warehouse which are passed through Gate II-C.

Cargo vehicles to or from J.D. (West) berths enter through Gate VI and exit through Gate V.

Vehicles to and from Section III enter and exit through Gate VI except when there is weighment when they are passed through Gate V. Gates I and II are on the North Beach Road and Gates II, V and VI on the Springhaven Road.

The marshalling yard has approaches from the South Beach Road.

Since the banning of bullock-carts within the premises of the port, the above road traffic control arrangement has been effective in smoothening the flow of road traffic.

No statistics are maintained of the vehicular traffic passing through the gates. On a rough estimate about 700 vehicles pass in and out of the harbour daily.

There are three entries for rail movement. The broad gauge wagons enter from Royapuram through Gate I-A and from Madras Beach station at marshalling yard. The metre gauge wagons enter through Gate IV.

Port Signal Station: The port signal station is manned throughout the 24 hours. The station attends to messages from ship to shore and vice versa, records weather observations, and communicates them to the Meteorological Department, intimates outbreak of fire, etc.

Pilotage: Pilotage is compulsory. Pilotage service is provided round the clock, except for the Jawahar Dock where it is provided up to 22 hours.

Lighthouse and Navigational Aids: The Madras lighthouse, situated on the main tower of the High Court building, near the port, has an electric light with a power of 300,000 candles which is visible up to 18 miles (29 kms.). The Department of Lighthouses propose to build a new light-

house at a site south of the port area.

There is a flashing Aga navigational light, situated at the extreme of the outer arm protecting entrance for the harbour. This is visible up to six miles (9.6 kms.).

A fixed violet anchorage light has been provided on the shores north of the port at a height of 64·5 ft. (20 metres) above sea level. It has a range of 7 kms.

Bunkering Facilities: (*a*) *Coal* : Bunker coal is supplied at all quays and at moorings for which sufficient lighterage is available. Bunkering firms hold large stocks of coal at plots rented to them.

(*b*) *Oil* : Facilities exist for bunkering fuel oil to vessels at all the 18 berths and the mooring berths.

Water Supply: Ships receive fresh water alongside quay berths or from water boats. In 1965, the Madras Port Trust, at its own cost, completed the laying of a 21-inch water main from the Kilpauk water works of the Madras City Corporation to the harbour. This main has a maximum capacity of 4.5 million litres of water a day, against the current demand of 23 to 27 lakh litres per day.

Ship Repairs: There are no dry dock facilities but a slipway exists in the boat basin which is capable of handling all the crafts of the Port Trust. The maximum tonnage it can take is 980. The Port Trust maintains a workshop and a running shed for the repairs and maintenance of its locomotives, cranes, floating craft, etc. It undertakes the work of testing chains, wire ropes, etc., upto 51 tonnes pull. The Binny's Engineering Works adjacent to the port trust workshop undertake ship repairs.

Harbour Lighting: The entrance, quays, transit sheds, roads and the environs have all been illuminated to a high standard. This is an invaluable aid for efficiency of port working round the clock and also for the prevention of pilferage.

Special Facilities: Two storage tanks each of 203 tonnes capacity and one storage tank of 254 tonnes capacity have been installed for receiving groundnut and castor oil in bulk. These can be used for import of vegetable oils, such as, soyabean oil. They are fitted with electric pumps for pumping these oils to tanks in vessels berthed at West Quay II, Centre Berth, and W.Q. Nos. III and IV Berths. The tanks are available for storing molasses when not required for the vegetable oil traffic.

For shipment of molasses, plots of land have been leased to private firms near S.Q. II for erection of storage tanks. Three such tanks of a total capacity of 23,000 tonnes have been installed. They are provided with railway sidings.

Fumigation of Cotton: A fumigation shed has been provided for the fumigation of 2,000 bales of cotton at a time. During periods of heavy imports of American cotton, fumigation is also done in wagons, barges and on ground.

Cold Storage: Cold storage facilities owned by private firms are available at a short distance from the harbour.

Diving Service: The port provides the services of a diver for examining vessels under water.

Telephone Facilities: Available at all the berths.

Constitution, Administration and Finances

The port is administered by a board of twenty-one trustees constituted under the Madras Port Trust Act, 1905, as subsequently amended. The Chairman is appointed by the Central Government. Of the other trustees, seven are ex-officio, namely, the General Manager, Southern Railway; the Collector of Customs; the representative of the State Government (the State Port Officer); the Commissioner of the Corporation of Madras; the Principal Officer, Mercantile Marine Department, Government of India; and the General Officer Commanding, Madras, Mysore and Kerala area representing the Defence Services. There are two representatives of labour chosen by the Central Government in consultation with the registered trade unions, if any, composed of persons employed in the port.

The remaining eleven are elected one by the Municipal Corporation of the city of Madras and the rest by the chambers of commerce representing commercial interests.

The board is a non-profit making body. Its budget, the scale of rates and charges framed by it and its borrowing powers are subject to the sanction of the Central Government. Its account is audited by the Comptroller and Auditor-General of India.

The Port Trust board is also the conservator of the port under the Indian Ports Act, 1908.

The Port's Finances: The balance sheet as on 31st March, 1965 shows that the port's assets on capital account stood at Rs. 23.90 crores. Of this amount Rs. 11.22 crores represented the cost of works, land, etc., and Rs. 12.68 crores, the cost of works in progress. Among the other assets, stock on hand amounted to Rs. 14.4 crores while investments stood at Rs. 53.8 crores.

The liabilities on capital account amounted to Rs. 8.24 crores, made up of Rs. 4.67 crores representing loans from the Central Government and Rs. 3.57 crores from the World Bank. Reserves and other funds stood

at Rs. 4.33 crores.

The major part of the assets consists of the value of the works executed in the First, Second and Third Plans. Rs. 21·50 crores were spent on such works. Out of this amount the Trust contributed Rs. 10.26 crores from its own revenue surpluses.

The revenue account for the year 1964-65 shows a gross revenue of Rs. 4.62 crores. Out of this, after all the working expenses, repayment of instalment of loan to Government and to the World Bank, providing for sinking fund charges, etc., the Port Trust was able to make a contribution of Rs. 1.30 crores to the capital account.

The revenue of Rs. 4.62 crores is made up of (*a*) Rs. 3.42 crores by wharfage and demurrage on imports and exports, ground and shed rent, water supply to shipping, night and holiday work charges, hire charges on cranes and other port trust plant, etc., (*b*) Rs. 21 lakhs by rent on land and buildings, (*c*) Rs. 56 lakhs from the Port Trust railway (including Rs. 47 lakhs collected from the Southern Railway as terminal charges), (*d*) Rs. 14 lakhs as port dues on vessels, (*e*) Rs. 4 lakhs as interest on investment, (*f*) Rs. 10 lakhs from the pilotage account, and (*g*) Rs. 13 lakhs miscellaneous.

The year's gross revenue (Rs. 4.62 crores) works out to Rs. 10.5 per tonne of cargo handled (4.4 million tonnes).

In the Bombay and Calcutta ports the revenue per tonne in 1964-65[1] was Rs. 10.03 and Rs. 17.13 respectively.

The net expenditure during 1964-65 amounted to Rs. 3.77 crores compared to Rs. 3.07 crores in the previous year. The increase in expenditure has been higher than the rate of growth of traffic handled by the port. In 1964-65 the total imports and exports passing through the port amounted to 4.4 million tonnes which was only 5.6 per cent higher than that in the previous year. The actual working expenses as a proportion of receipts have increased from 70.40 per cent in 1963-64 to 84.73 per cent in 1964-65.

The above description serves to show that the port has over the years evolved into a premier major port in the southern region occupying an extremely pivotal position in respect of shipping and trade on the international routes as well as on the coastal routes, serving a very large hinterland of the country. Facilities such as the port have, are necessarily the result of a long period of growth. The trade interests that have developed over its long commercial history are very much a part of the life of the city of Madras.

The port is financially sound and has contributed substantially to the

[1] *Annual Report of the Ministry of Transport for the Year 1964-65.*

funds needed for its own development. These facts should weigh in planning for additions to port capacity whether such additional capacity should be provided in this first class major port, if circumstances would permit it, or whether other sites should be explored for the purpose.

Chapter 4

Trends of Traffic

THE STEADY GROWTH in the number and tonnage of ships that have visited port of Madras since 1950-51 is shown in Table 8.

The number of ships that entered, increased from 1,048 in 1950-51 to 1,406 in 1965-66, an increase of 34.16 per cent.

Over the same period the NRT of the ships increased from 3.74 million to 5.78 million, that is, by 54.55 per cent, the higher percentage indicating that the average size of the ships visiting the port has increased.

The sailing vessels traffic has practically disappeared from this port. Cargo tonnage handled, which is dealt with under 'cargo traffic', shows that it has grown much faster than the shipping tonnage—114 per cent over 1951-52 as against 46.33 per cent in 1964-65. This shows that more cargo is shipped or unloaded per vessel presently than in the past. In other words, the average volume of business handled by the shipping companies at this port per each visit has increased. This is partly explained by the fact that the proportion of full loaders (e.g., ore ships) and full-unloaders (e.g.. grain and coal ships) to liner vessels which land or ship parcels of cargo has increased. Another way of saying the same is that Madras is becoming more and more a "terminal" port as contrasted with its past predominant character as an "intermediate" port.

Table 9 gives the number of vessels of the Indian flag and the total number of vessels of all other flags put together which visited the port from 1952-53 to 1965-66. The table shows that the percentage of Indian flag vessels has grown from 19.51 in 1952-53 to 46.86 in 1965-66.

The number of tankers increased from 94 in 1952-53 to 142 in 1965-66 and their tonnage from 0.8 million to 1.6 million. The total number of ships (excluding sailing vessels) increased from 1,026 to 1,406. Their tonnage increased from 6.50 million to 10.04 million. The proportion

of the number of tankers to the total number of vessels (excluding sailing vessels) which in 1952-53 was 9.16 per cent increased to 10.10 per cent in 1965-66. Correspondingly the proportion to tonnage increased from 12.25 per cent in 1952-53 to 15.75 per cent in 1965-66. The number of ships engaged in the coastal trade and their proportion to the total decreased from 206 and 19.56 per cent respectively in 1950-51 to 171 and 12·16 per cent respectively in 1965-66.

Passenger Traffic

The Madras port handles a fair amount of passenger traffic. Table 7 gives the passenger traffic at the port from 1950-51 to 1965-66.

The traffic is mainly to and from Malaysia. Except for 1964-65 and 1965-66, when there was an abnormal increase in the incoming passengers due to repatriation from Burma, the traffic has been fairly steady. This passenger traffic is catered to by the modern facilities at the passenger-cum-cargo berths at the North Quay which was brought into commission in 1958-59.

Cargo Traffic

The cargo traffic handled by the port has shown a steady and substantive growth from 2.1 million tonnes of imports and exports in 1950-51 to 4.9 million tonnes in 1965-66. The traffic has more than doubled in 15 years. Unlike the ports of Bombay or Visakhapatnam where the total traffic got a special boost with the establishment of oil refineries during the First Plan period, the traffic in the Madras port did not benefit from any similar impetus and has been of a steady growth.

Imports Versus Exports

The import and export traffic constituted 89.3 per cent and 10.7 per cent respectively in 1950-51. During the period under study the proportion of import has gradually fallen and that of exports gradually risen. The following figures are of interest.

Year	*Imports*		*Exports*	
	(Million tonnes)	(Per cent)	(Million tonnes)	(Per cent)
1950-51	1.9	89.3	0.2	10.7
1955-56	1.7	74.2	0.6	25.8
1960-61	2.1	70.0	0.9	30.0
1965-66	3.3	67.8	1.6	32.2

Overseas Trade and Coastal Trade

Table 4 shows that foreign trade constituted 72.97 per cent and coastal

labour engaged by private parties is entitled to the terms agreed to with the employers which in many cases are not as liberal as the terms admissible to Port Trust employees.

Labour working in the holds of ships, known as stevedore labour, have regularity of employment and their terms of service are regulated by a statutory body (different from the Port Trust) known as the Dock Labour Board, although they are employed by different stevedoring firms.

Goods entering international trade (other than the coastal trade) are subject to customs check both for tariff purposes and in relation to import/export control regulations. This adds another link to the chain of operations which affects the speed of clearance of goods from transit sheds.

These factors tend to influence port capacity because the operations in many cases form a chain; different rates of output in the different links of the chain (not to speak of breakdowns) make the resultant output equal to that of the link with the lowest output.

Port capacity thus is a product of several complex factors and it would be difficult to come by any single yardstick for measuring it as a whole. For the same length of a berth, the output may differ from one port to another; apart from the permanent fixtures and equipment, constituting port facilities, the depth of water at the berth, factors like weather, the length of the monsoon seasons, tide variations, etc., also affect it. However, a rough yardstick, generally applied by harbour traffic experts, is the annual dry cargo export and/or import output of 0.20 million tonnes per first class berth working in three shifts round the clock.

With only nine alongside berths in commission until 1958-59, Madras has maintained an average annual output exceeding 0.20 million tonnes per berth annually since 1955-56. The output per berth of import and export (dry cargo) is given on the next page. The figures show intensive berth occupancy and good output.

The intensity of congestion before the completion in 1965-66 of the expansion works, can also be judged from Table 12—tonnage lightered—which shows that operations from mooring berths was a regular feature until recently. The tonnage lightered which stood at 39,000 in 1950-51 (total traffic 2.11 million tonnes) rose to over 100,000 in 1955-56 (total traffic 2.34 million tonnes) reaching a peak of 193,000 in 1960-61 (total traffic 3.0 million tonnes). Bearing in mind that discharge by lighters is expensive to importers and exporters, it is clear that the expansion programme has rendered a positive service to the shipping and commercial community of Madras.

Year	*No. of berths*	*Total dry cargo* (Million tonnes)	*Average output per berth* (Million tonnes)	*Remarks*
1954-55	9	1.63	0.18	—
1955-56	9	1.82	0.20	—
1956-57	9	1.93	0.21	—
1957-58	9	2.03	0.22	—
1958-59	9	1.95	0.22	—
1959-60	8	2.20	0.27	(a)
1960-61	11	2.44	0.22	(b)
1961-62	11	2.78	0.25	(c)
1962-63	11	3.00	0.27	(d)
1963-64	13	3.35	0.26	(e)
1964-65	17	3.52	0.21	(f)
1965-66	18	3.97	0.22	—

NOTES :—(*a*) South Quay II out of commission.
(*b*) South Quays III and IV added.
(*c*) South Quay I out of commission; South Quay V brought into commission.
(*d*) South Quay I still out of commission.
(*e*) South Quay I out of commission; Berths I and II of Jawahar Dock commissioned.
(*f*) Remaining four berths of Jawahar Dock commissioned. South Quay I still out of commission.

The last main feature of the expansion scheme was the commissioning in July 1965, of the remodelled South Quay I, the longest berth in the harbour, with a heavy lift yard close to it. The operational statistics of 1965-66 (which are not available) will not, therefore, fully reflect the benefit of the port expansion project as yet. A study of the ship detention statistics for 1965-66, however, shows that detention of all dry cargo vessels has gone down appreciably in 1965-66. The following table compares the 1965-66 results with the results for the previous four years showing the average number of ship-days lost per delayed ship.

(Delay due to non-availability of berth)

Type of vessel	*1961-62*	*1962-63*	*1963-64*	*1964-65*	*1965-66*
Colliers	2.1	2.1	2.9	2.8	1.8
Tankers	1.0	2.4	1.4	1.3	1.6
Foodgrain vessels	4.3	7.7	2.8	4.2	3.1
Fertilizer vessels	4.4	4.95	4.3	6.9	3.1
Ore-loaders[a]	3.6	4.5	1.7	4.5	4.2
Other vessels	2.3	3.2	2.2	2.9	1.6

[a] Waiting for the mechanical berth.

The figures would have made a better showing were it not for the fact that in 1965-66 foodgrain-carriers made peak demands on berthing capacity. Foodgrain imports in that year amounted to 0.95 million tonnes as against 0.75 million tonnes in the previous year. When the demand of a major commodity reaches high levels, performance figures of other cargo ships are bound to be affected, due to abnormal detention of those ships.

The Madras Steamer Agents' Association has estimated that the port can, with its existing facilities, handle comfortably 50 per cent more traffic than what it handles now; in other words, its capacity is between six million and seven million tonnes including ore, foodgrains, fertilizers and coal. An estimate prepared in consultation with the Port Trust authorities given in the following table, shows that the Association's view is not wide off the mark. The present traffic consists of five major items, namely, (*i*) foodgrains, (*ii*) coal, (*iii*) fertilizers, (*iv*) petroleum, and (*v*) ore; the rest constituting other general cargo.

Foodgrain ships now enjoy priority of berthing to the extent of three berths. Coal is handled at the two special berths, South Quay IV and South Quay V. Ore exports are handled at the mechanised berth at South Quay III and also manually at two berths on the east side of Jawahar Dock. Fertilizers use one berth. Thus general cargo is left with nine berths. Petroleum is handled at the three mooring berths. Adopting the actual berth output per day achieved in the year 1964-65, the following table gives the estimate of the port's present minimum capacity.

Commodity	*Number of berths used*		*Number of effective working days in a year*	*Average output per berth day achieved in 1964-65*	*Output per year (Product of columns 2, 3, and 4)* (Million tonnes)
(1)	(2)		(3)	(4)	(5)
Foodgrains	3		300	1,168	1.05
Coal	2		300	755	0.45
Ore	1	(S.Q. III)	300	2,022	0.60
	2	(J.D.)	300	833	0.50
Fertilizer	1		300	833	0.25
Other general cargo	9			626	1.69
Petroleum				2,476	1.00
TOTAL					*5.54*

Of foodgrains, the output per day in recent months has considerably exceeded the average (1,168 tonnes) in 1964-65. Peak levels of 6,000 tonnes a day were in fact achieved. In the case of coal, the traffic has fallen and the capacity of the two berths, at South Quays IV and V, alone have been taken

into account, although, East Quay also is used for coal when necessary. In the case of ore, three berths at the Jawahar Dock for manual loading can be made available, if required, in addition to the mechanised berth at South Quay III. Further, the average rate of loading ore has recently improved to 2,500 tonnes a day in South Quay III and to 1,500 tonnes a day in the manual berths at the Jawahar Dock. The additional ore loading potential contributed by these factors is one million tonnes. Against this must be set off the reduction of 190,000 tonnes in other general cargo that will take place by allotting an extra berth to ore. Thus the net addition to capacity, as estimated in the table in the preceding page, will be 810,000 tonnes bringing the total to 6.36 million tonnes. This does not take into account the current rate of foodgrain handling which is much higher than the rate assumed here.

As regards petroleum, there are three mooring berths which, theoretically, should give a total output of two million tonnes at the 1964-65 discharge rates but only one million tonnes have been taken credit for because there are certain limitations to such full use at present.

The present capacity of the port of Madras, on the above analysis, is between 5.5 and 6.3 million tonnes, depending on the demand of the sections of the trade using the port.

The Madras Port Trust is constantly aware of the vital need of maximising capacity, with the existing facilities, by using special cargo-handling aids and also by stimulating increase in labour productivity. Taking cargo-handling equipment, for instance, the Port Trust is employing a fleet of 56 fork lift trucks, 8 more are on order. The usefulness of fork lift trucks lies not only in their capacity to move cargo to transit sheds faster and with less effort but also in increasing the height up to which cargo can be stacked by 50 per cent, thereby increasing shed capacity to 50 per cent.

The average output per head of shore labour in 1964-65 was 1.40 tonnes per day for import and 1.20 tonnes per day for export. The corresponding figures for the two previous years were :

	(Tonnes per day)	
Year	*Import*	*Export*
1962-63	1.20	1.30
1963-64	1.30	1.20

An interesting incentive scheme which has been very effective and popular in increasing productivity was the introduction, with effect from the 1st October, 1964, of cash awards in selected operations for good attendance. The categories of workers covered are fork lift drivers, loco drivers and firemen, shunting masters and coupling porters and operatives in the

(In '000 tonnes)

Year	*Coal imports (including railway coal)*	*Railway coal*
1961-62	424	324
1962-63	521	389
1963-64	458	336
1964-65	488	389
1965-66	385	266

Coal now forms 9.70 per cent of the dry cargo trade of the port and 16.02 per cent of the coastal dry cargo imports. The traffic attained its peak in 1962-63 when it reached 520,000 tonnes. Coal is a commodity in the movement of which the railways have a vital interest, because they constitute the largest single consumer of coal and their requirements of this commodity are at locations widely spread over the country.

In the past there were difficulties in moving large quantities of coal by rail from the Bengal-Bihar coal fields to the southern region. The difficulties arose from shortage of wagons, junction limitations, etc. Because of this the Railways had to make use of coastal shipping for the movement of coal to the southern region as well as to western India, year after year, notwithstanding the fact that shipping freight was higher than railway freight. In 1961, there occurred an acute shortage of rail capacity and the Government decided that an additional one million tonnes of coal should be diverted to the coastal sea routes. The spurt in the coal import figures for 1962-63 is explained by this fact. The Madras Port Trust had geared itself to the additional load of coal imports by constructing two new coal berths (South Quays IV and V) with mechanical unloading equipment. The railways have quite recently declared their ability to move all railway coal to the southern region by rail. They have also embarked on a policy of replacing steam locos by diesel locos. The prospects of the continuance of coastal coal imports through Madras at previous levels are, therefore, uncertain. The matter is further dealt with in Chapters 6 and 9.

Foodgrains

Foodgrain imports consist of (*i*) wheat, (*ii*) rice and paddy, and (*iii*) other items including flour. The trend of foodgrain imports through the port of Madras since 1950-51 is given in the table on next page.

Excepting for one year, 1955-56, when the total fell below 100,000 tonnes, the import of foodgrains has shown a rising trend, particularly since 1962-63. In 1965-66 foodgrains constituted 39.54 per cent of the port's import trade in dry cargo. The greater proportion of the foodgrain imports consists of wheat. Wheat is not the staple cereal of the southern region;

('000 tonnes)

Year	*Wheat and milo*	*Percentage of wheat to total grains*	*Rice and paddy*	*Percentage of rice and paddy to total grains*	*Flour, etc.*	*Total*
1950-51	228	—	76	—	175	479
1951-52	249	50.10	54	10.87	194	497
1952-53	117	33.82	18	5.20	211	346
1953-54	94	51.37	1	0.55	88	183
1954-55	24	21.43	82	73.21	7	112
1955-56	16	37.31	13	30.23	14	43
1956-57	45	36.18	93	61.18	4	152
1957-58	230	68.05	109	32.25	0.2	338
1958-59	304	83.52	60	16.48	0.08	364
1959-60	256	78.29	68	20.80	3	327
1960-61	383	86.46	35	7.90	25	443
1961-62	253	80.57	50	15.92	11	314
1962-63	336	81.36	64	15.50	13	413
1963-64	405	87.10	43	9.25	17	465
1964-65	696	92.80	28	3.73	26	750
1965-66	886	93.26	24	2.53	39	950

yet, it forms a sizeable portion of the import traffic in the port. The explanation is that the distribution of imported wheat is over a wide radius and for destinations far away from the ports of import. The allocation of the imports portwise is based not merely on the foodgrain requirements of the hinterland of the ports but on the capacity and limitations of the ports themselves. The Calcutta port cannot be reached by ships exceeding the notified draft and so such ships bringing grains are made to discharge part of their cargo at Madras or Visakhapatnam in order to lighten them for entry into the Hooghly river. The wheat discharged at Madras in a month consists on the average of 6 to 7 of such ships which finally discharge at Calcutta and of two grain-carriers a month allotted to Madras to prevent congestion at the Bombay port. Of the 0.75 million tonnes of foodgrains imported through the port in 1964-65, 0·48 million tonnes were moved by rail to various districts in Madras, Andhra Pradesh, Mysore and Kerala and some quantities to distant States, such as U.P., Bihar, Maharashtra, etc. Empty wagons available for their movement from the south towards the north makes this flow less objectionable than would otherwise be the case.

Fertilizers

Imports of fertilizers have risen from 85,000 tonnes in 1951-52 to nearly 0.46 million tonnes in 1965-66. The growth has been steady. Fertilizers

form fifth by volume among imports and exports taken together and fourth among imports. If dry cargo alone is taken into account, fertilizers constitute 19.15 per cent. About 0.11 million tonnes of fertilizers were moved by rail, from the port in 1964-65 to various districts in Madras, Andhra Pradesh, Mysore and small quantities to other States, further distant.

Other Cargoes

The traffic in other general cargo has increased from 0.76 million tonnes in 1954-55 to 0.94 million tonnes in 1965-66, i.e., an overall increase of 23 per cent during the period. Other cargoes do not readily lend themselves to bulk handling; their rate of loading and unloading will necessarily be lower than the bulk handling rate.

Chapter 5

A Critical Appraisal of the Present Port Capacity

THE BASIC FUNCTION of a port is to provide facilities smoothly and efficiently for the two-way exchange of passenger and goods traffic between inland transport and sea transport. A variety of services are required to be rendered to the shipping and commercial community using a port. The agencies rendering those services are several. The nature and dimension of the services have been changing with changes in the ship-building trends as well as the changes in the composition and character of the trade. The description of the Madras port given in Chapters 2 and 3 shows that these facilities have been provided at that port in adequate measure and expanded over the years according to the requirements of the traffic.

The capacity of a port, however, is a function not only of the berths, transit sheds, inland transport facilities and other such assets but also, very largely of the productivity contributed by the human element involved in operations and management. Taking the cargo-handling labour in the first instance, the Port Trust's responsibility is limited to the maintenance of an adequate supply of shore labour, i.e., labour for the reception of the cargo at the quay including the manpower for operating the shore cranes and the removal of the landed cargo to the transit sheds. The labour for the removal of the cargo from the transit sheds after completion of the delivery formalities is that of the consignee or the clearing agents. Until recently, in the Madras port, even shore labour for import or export was not provided by the Port Trust in all cases. For example, coal was handled by the consignee's labour. With regard to export cargo also, the procedure is similar but certain categories of export cargo are handled by labour engaged by shippers. Labour engaged by the port authorities is entitled to certain benefits and protection against irregularity of employment while

trade 27.03 per cent of the total trade in 1950-51. These percentages have remained fairly steady during the period under study and in 1965-66 it was 75.86 per cent and 24.14 per cent respectively.

The following table gives comparative figures of the total traffic of the Madras port with those of the other major ports at different dates over the period covered by the study:

(Million tonnes)

Major ports	*1950-51*	*1955-56*	*1960-61*	*1964-65*
Madras	2.1	2.4	3.0	4.4
Bombay	7.0	10.3	14.7	17.3
Calcutta	7.6	7.0	9.5	11.1
Marmugao	1.1	1.7	5.8	6.6
	(1952)	(1955)	(1960)	

SOURCE:—*Final Report of the Committee on Transport Policy and Coordination.*

Calcutta, like Madras, did not get any special stimulus like refineries, and the growth of its traffic over the 15-year period has been only 46 per cent as against 100 per cent for Madras.

(Million tonnes)

	1950-51	*1955-56*	*1960-61*	*1964-65*
Traffic of Visakhapatnam	1.0	1.3	2.9	3.9

The growth over the 15-year period in this case is nearly 300 per cent. This high growth is largely due to the establishment of the Caltex refinery.

(Million tonnes)

	1950-51	*1955-56*	*1960-61*	*1964-65*
Cochin	1.4	1.6	2.1	2.8

The growth of traffic in Cochin port is the same as in Madras. Cochin did not receive any special traffic boost through the establishment of a refinery or any other large industry demanding special port facilities.

(Million tonnes)

	1950-51	*1955-56*	*1960-61*	*1964-65*
Kandla	0.1	0.3	1.6	2.3

The case of Kandla is rather sui-generis. It is a new major port, completed by 1957-58. The main traffic consist of petroleum products and food imports. Its traffic pattern has yet to establish itself because the industrial and commercial development in its hinterland has not so far succeeded in making matching demand on the port's capacity.

The growth of traffic in the port of Marmugao has been nearly sixfold over the period under study mainly due to the development of the export of iron ore from the Goa territory.

Distribution of Traffic According to Commodities or Groups

The composition of the traffic in the port of Madras in 1965-66 and the percentage of each component to the total were as follows:

	Million tonnes	*Percentage*
Petroleum products	0.90	18.48
Iron ore and other ores	1.24	25.46
Coal	0.38	7.80
Fertilizers	0.46	9.45
Foodgrains	0.95	19.51
General cargo	0.94	19.30
TOTAL	*4.87*	*100.00*

For studying the trends of traffic as well as for making estimates for the future, it will be convenient to proceed according to the above composition for the following reasons:

(*a*) The first five commodities are amenable to bulk handling, demanding the provision of special and separate facilities.

(*b*) Petroleum products come under the category of dangerous cargo; berths are, therefore, positioned at a safe distance from other berths. (In Madras it is located outside the harbour basin). The method of discharging petroleum products is by a pipeline system for delivery into storage installations located at a distance from the harbour.

(*c*) Coal, iron ore and other mineral ores are usually shipped as full cargoes intended to be loaded or unloaded by mechanical arrangements on conveyor belt system. Usually berths with such mechanisation are specially set apart for ships carrying these cargoes.

(*d*) Fertilizers also lend themselves to bulk handling. In this category, are included raw materials for the fertilizer manufacturing industry such as rock phosphate and sulphur.

(*e*) Foodgrains used to be treated as ordinary cargo and dealt with as such, often being bagged. The recent trend, however, has been to ship foodgrains in giant tankers or grain-carriers. The operations are on a scale that has resulted in the evolution of a special bulk handling technology capable of an unloading rate of several hundred tonnes an hour, bagging and weighing the grain, etc.

(*f*) Decisions as to how much of these commodities will require to be moved through a particular port and as to how their movements are to be spared, are made by the Central Government.

The trend of traffic of the various groups of commodities is dealt with in the succeeding paragraphs.

Table 5 gives the quantities of petroleum products handled by the port from year to year since 1954-55.

The volume of petroleum traffic has steadily increased over the years, the index (190) being slightly less than the growth index of the total trade—231 for the same period.

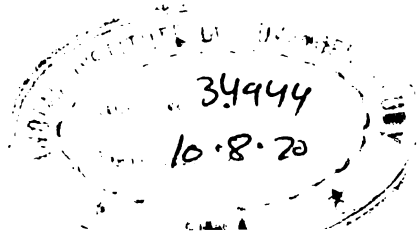
Petroleum products consist of petrol which is classified as dangerous petroleum and some other items not so classified, viz., kerosene, fuel oil, diesel oil and lubricants. Figures showing the breakup of annual traffic in petroleum products into these constituents are not available. It is understood that dangerous petroleum which is discharged at the mooring berth, north of the existing harbour basin, constitutes approximately 10 per cent of the total volume of the petroleum traffic handled at the port.

Pipe connections are given from the tanker moored at the mooring berth to the pipelines on the northern breakwater through a floating pipeline set up for each operation with a rubber hose floated on catamarans. For non-dangerous petroleum discharged in bulk a similar arrangement is made south of the pier inside the harbour basin. These arrangements were statisfactory so long as the volume of the traffic was not large. The oil trade has lately been pressing for expansion and improvement of the facilities. Now that a refinery is being established in the vicinity of the port, facilities are required for receiving bulk petroleum on a much larger scale and on an urgent basis. This is dealt with in Chapter 6.

Iron Ore and Other Ores

Ores handled in this port are mainly three : (*i*) iron ore, (*ii*) manganese, and (*iii*) magnesite and others. The traffic in these three kinds of ores since 1950-51 is shown in the Table given on the following page.

Iron ore: Iron ore which was not exported through Madras in 1950-51 has grown to over a million tonnes by 1965-66. It now constitutes the largest single item of traffic whether of export or import. Its percentage to the total traffic is 23.75, to the total dry cargo traffic 29.11 and to exports 73.57 per cent. The rate of growth of traffic in iron ore is 30 per cent over the 15-year period. The ore originates in the mines of the Bellary-Hospet area of Mysore State. In view of the rapid growth of this traffic, the port of Madras, which was under-equipped, had quickly to devise means of meeting the demand as soon as possible. In the Part I stage of the wet dock expansion scheme, a special ore berth (Quay III in the harbour basin) designed to load on into ship by mechanical aids was, therefore, included and work completed and the berth put into commission in 1960. In the Jawahar Dock also, the berths on the east side were kept open for



(In '000 tonnes)
(Corrected to 3 decimal places)

Year	*Iron ore*	*Manganese*	*Magnesite and others*	*Total*
1950-51	—	—	—	20
1951-52	24	—	77[a]	101
1952-53	42	—	89[a]	131
1953-54	158	—	147[a]	305
1954-55	159	—	90[a]	249
1955-56	223	80	29	333
1956-57	319	124	28	471
1957-58	324	145	31	500
1958-59	387	101	21	509
1959-60	496	152	36	684
1960-61	483	181	30	694
1961-62	738	184	34	956
1962-63	750	61	33	844
1963-64	1,061	110	43	1,214
1964-65	999	55	48	1,102
1965-66	1,157	21	61	1,239

[a] These figures include manganese, magnesite and other ores put together.

adaptation and use as ore export berths when necessary. The effectiveness of these arrangements is demonstrated by the growth of iron ore traffic which in 1965-66 was more than twice than what it was in 1960-61. The traffic programmed through this port by the iron ore exporting interests for the future is of still greater proportions. The quantum of the traffic and the further facilities required to serve it are discussed in Chapters 6 and 7.

Manganese Ore : The export traffic in manganese ore rose to over 100,000 tonnes a year and reached a peak of 184,000 tonnes in 1961-62 whereafter it has shown a decline. It is learnt that this is due to Indian manganese ore being out priced in the world markets and also to the emergence of cheaper supplies from other countries.

Other Ores: Though these constitute a small proportion of the ore trade the figures show a steady growth.

Coal

The traffic of coal through the port is by imports from Calcutta of high grade coal moved from the Bengal and Bihar coal fields. There has been a steady and sizeable traffic of coal for many years as shown in Table 6. Coal intended for the Railways for the years it is available is given in the table on the next page.

mechanical coal and ore berths. Since the introduction of the scheme the attendence has improved considerably; the number of employees present for 21 days in a month improved from 70.4 per cent to 88.5 per cent.

The following are other such schemes at present in operation :

(*a*) Incentive scheme for improving loco output.

(*b*) Extension of the piece rate scheme to the shed staff in the Traffic Department—scheme for the award of cash prizes for the best maintained unit. (This has resulted in keeping clean and tidy the entire port premises, particularly in the space around the berth where vessels are tied and where cargoes are stacked or stored, including, the shed. No visitor can fail to be impressed by the prevalent atmosphere of tidiness in the port.)

(*c*) Cash your suggestion scheme.

(*d*) "Casual leave, cash it if you like".

(*e*) The Madras Port Trust Block Holiday Scheme, 1965.

Port capacity, to be fully effective, has to be matched by the capacity of the connecting inland transport, road and rail. Table 13 gives the breakdown as between road and rail of the port traffic tonnage from 1951-52 to 1965-66. It will be seen that the percentage of rail borne traffic to the total traffic has varied from 55.70 to 58.12. The average for the five years from 1961-62 was 58.30. There are reports of irregular and/or inadequate wagon supply, particularly for clearance of foodgrain imports and for movement of iron ore from the rail head to the port. But the close coordination that exists between the Port Trust departments and the railways and the users of the port has apparently been effective in solving the occasional bottlenecks as the volume of traffic dealt with grows year after year.

In reply to enquiries addressed to the users of the port certain comments have been received. These are critically examined in the Appendix.

In concluding this chapter, it may be stated that the port of Madras has now all the facilities needed to deal with the current traffic demands efficiently and to the satisfaction of shipping and trade interests. In fact it has at this stage sufficient reserve capacity to enable it to continue to meet the annual increase in traffic that may be expected between now and the completion, some three years hence, of the expanded facilities planned at the new oil dock. Further, it has the capacity to take peak loads in any of the bulk commodities that it is currently handling such as foodgrains and ores.

Chapter 6

Estimates of Traffic Trends— 1970-71 and 1975-76

IN THIS CHAPTER an attempt is made to estimate the trends of traffic which the port of Madras may be expected to handle in 1970-71 and 1975-76 in terms of imports and exports. Re-exports are not estimated separately because the statistics maintained by the Port Trust do not include such a classification. Only the trade statistics published by the Department of Commercial Intelligence and Statistics classify "re-export" as a separate category. This is based on data furnished by the Customs Department, because re-exports qualify for certain tariff concessions.

In making the estimate, note has been taken of the data available in the reports of (*i*) the Working Group of Port Planning (April 1964), (*ii*) the Haldia Study Team (August 1965), and (*iii*) Commodity Transport Study on Iron Ore by the Planning Commission's Joint Technical Group for Transport Planning (December 1965).

In Chapter 4 where the trends of past traffic have been studied, the procedure adopted was to deal with the problem separately for each of the bulk commodities, together forming about 80 per cent of the port's current traffic, viz., mineral oils, ore, coal, foodgrains, fertilizers/rock phosphate/sulphur. The remaining commodities were grouped together, and was "termed other general cargo"; this group which constituted about 20 per cent of the total trade of the port, was then considered separately. A similar method will be followed in this chapter with the modification that the important constituents of the group "other general cargo" will be individually studied. Passenger traffic has been remarkably steady since 1950-51, around 60,000 passengers a year, except for 1964-65 and 1965-66 when it increased due to repatriation from Burma. Barring such unforeseen developments, there is no reason to assume that passenger traffic will increase to an extent so as to

call for facilities in excess of what are available at the existing passenger-cum-cargo berths at the north quay.

Imports

Mineral Oils

The present level (1965-66) of the traffic in this commodity is about 0.90 million tonnes of which about 10 per cent constitutes "dangerous petroleum" and the rest non-dangerous petroleum. The dangerous petroleum berth comprises of a mooring stern on to the north pier, just on the shoreward side of the entrance to the harbour. This is a fair weather berth and is not used at all during the north-east monsoon period. Tankers, normally unload about two or three thousand tonnes at this berth on their way to Calcutta. The two mooring berths for non-dangerous petroleum are located south of the north pier within the harbour basin. Floating pipelines are set for each discharge operation with a rubber hose floated on catamarans. The draft available at the dangerous petroleum berth is only 9.4 metres and, therefore, larger ships of 20,000 DWT and above cannot be berthed at this mooring. The capacity of these berths is now somewhat restricted particularly because only small quantities are discharged each time and, therefore, a large number of tankers have to be berthed in a given period than would otherwise be the case. The oil companies engaged in the distribution of petroleum products to the zone served from their Madras supply centre have been pressing for the provision of better facilities. It would have been necessary to adopt some steps in this direction at an early date if the present pattern of imports of finished petroleum products were to continue. However, the situation has now changed with the decision of the Government to establish an oil refinery at Madras with an initial capacity of 2.5 million tonnes and with provision for its expansion to 4 million tonnes. Land has been acquired at Manali, 11.3 kms. north of Madras. Work on the project is progressing and it is expected that the refinery will be ready to go on stream by the year 1969. The construction of a new oil dock has thus acquired urgency and the Madras Port Trust has already received the approval of the Government to their development project prepared to meet the refinery's demand.

The scheme in its essentials is the construction of a new dock immediately to the north of the present harbour basin which will have a depth of water sufficient to berth tankers of 40,000 to 45,000 tonnes capacity with a draft of 11.9 metres initially. The oil dock will be so designed as to cater eventually to 13.7 metres draft tankers or other bulk carriers by further

dredging. Initially the turning basin will be dredged to 13.1 metres and the entrance channel to 14.3 metres.

The operation of the refinery with an initial capacity of a 2.5 million tonnes of imported crude will generate certain products for export, viz., one million tonnes of fuel oil and other products.

With the establishment of the oil refinery, the current import of about 0.90 million tonnes of petroleum products will be replaced by 2.5 million tonnes of import of crude oil and export of 1.0 million tonnes of petroleum products by 1970-71.

By 1975-76 crude oil imports may increase to four or five million tonnes while exports of refinery products may go down to 400,000 tonnes. The reduction of exports is assumed due to increased internal consumption of fuel oil for industrial requirements.

Foodgrains

The Madras port has been handling imports of foodgrains (mainly wheat) in increasing quantities during the past several years. With its facilities for berthing ships up to 9.4 metres draft, Madras holds a pivotal position in the port system of the country. The import of wheat at the port (which serves a hinterland where the major foodgrain consumed is rice) is a significant pointer to the help it renders to the other major ports, principally Bombay and Calcutta, in receiving grain-carriers which cannot be accommodated in the latter ports—in Bombay, because of congestion of grain-carriers and, in Calcutta, because of inadequate depths of water in the river Hooghly. The Madras port is thus taking a good share of the imports; in recent weeks the handling rate per day has been as much as 6,000 tonnes.

The aim of self-sufficiency in foodgrains for the country has been stated many times before, during the first three Five Year Plans; but for reasons which it is not necessary to go into here, it has unfortunately not been possible of achievement. However there appears to be more hope now than before of reducing the gap between production and demand.

The Working Group on Port Planning had assumed (April 1964) that food imports would continue throughout the Fourth Plan period at an average rate of four million tonnes per year. Since no one can say when imports of foodgrains will be unnecessary, the Group concluded that it would be prudent to provide facilities at the ports sufficient for a total of five million tonnes a year even beyond the Fourth Plan period.

The Haldia Study Team proceeding on the basis that imports will be of the order of five million tonnes (4.55 million tonnes wheat and 0.45 million tonnes rice) has broken down the imports portwise by assuming that the

percentage of imported food to be supplied to the various States would correspond to the past pattern of releases of foodgrains from the Central stock.

The pattern of imports port by port that may be expected to occur in (1970-71) is estimated by the Haldia Team as in table below.

Port Traffic in Foodgrains in 1970-71

(Million tonnes)

Port	*Wheat*	*Rice*	*Total*
Calcutta/Haldia	2.16	0.16	2.32
Visakhapatnam	0.12	0.02	0.14
Madras	*0.39*	*0.03*	*0.42*
Cochin	0.03	0.14	0.17
Bombay	1.00	0.15	1.15
Kandla	0.75	0.05	0.80
TOTAL	*4.75*	*0.55*	*5.00*

In view of the vital importance of the foodgrains problem the matter has received the careful attention of other groups also. It is understood that one such group has assumed the need to import between 3 and 4 million tonnes of *wheat* annually but not of any rice. The line of thought here is that the demand for wheat may exceed supply, even with the achievement of the production targets set for the Fourth Plan and subsequent years. On the other hand, there are prospects that the production of rice may grow ahead of demand creating a possible surplus.

Of the imports of 3 to 4 million tonnes of wheat, the share which the Madras port may be expected to have should be limited, from transport and other economic considerations, to the demand of wheat of the region served by the port. This demand may be placed at about 200,000 tonnes in the year 1970-71, and at 250,000 tonnes in 1975-76.

Coal

The trend of traffic in coastal coal import from Calcutta has been a steady one, the variation being from 410,000 tonnes in 1950-51 to 385,000 tonnes in 1965-66. The traffic is now going down to a collier or two a month discharging not more than 12,000 tonnes a month, that is about 150,000 tonnes a year. This is due to the increased capacity for movement of coal by rail from the Bengal and Bihar coalfields to the southern region, formerly supplied by sea-borne coal via Madras port. The railways which used to employ sea transport for moving their coal requirements in the south have stopped doing so and do not expect to have to resume it at any time in the future. An added reason for the decline of this traffic is the gradual conversion of steam traction to diesel traction by the railways and the increasing

use of fuel oil in place of coal by certain industries. Coal movement in the future by sea via Madras is likely to be confined to the requirements of industrial units in Madras and its vicinity. According to the estimate given in the Final Report of the Committee on Transport Planning and Coordination, the total movement of coal by sea in 1970-71 will not exceed 1.5 million tonnes a year. The share of Madras may be about 300,000 tonnes a year. The fate of the coastal coal traffic at the port is very much linked with the future of coastal shipping in the country. Coastal shipping is now passing through difficult times. Many of the ships engaged in that trade are over-aged and replacement is rendered difficult due to the shortage of foreign exchange. It is expected that when Haldia port is developed, the handicaps imposed on coastal shipping by the draft limitations at Calcutta port would be removed. It should then be possible to plan coastal shipment of coal in suitably designed coal-carriers, resulting in economies and restoring coal transport by coastal shipping to its rightful competitive place at least for certain destinations, namely, Madras, Tuticorin, Goa and Kandla. But at present there is no data justifying a higher rate of coal imports through Madras in 1970-71 and 1975-76 than 200,000 tonnes per year and this figure is taken as the projection.

At the Madras port there are two mechanised coal berths with a current capacity of 450,000 tonnes a year. The berth at east quay which has a capacity of 200,000 tonnes a year is also used as a coal berth when required. Most of this capacity will be rendered idle and the Port Trust will have to find means of utilising the capacity. The Madras Steamer Agents' Association, at its annual meeting in 1966 has referred to this distressing development in terms of regret. It has expressed the view that to avoid giving rise to such situations in the future, the Port Trust should, before providing additional special facilities for trade sponsored by a particular party (like mechanical loading plant for ore exported by the MMTC), take an undertaking from the sponsor to maintain the traffic at a stated level and fix a suitable measure of compensation to the port, if actual traffic fell below the stated level. Further reference to this aspect of the matter is made in Chapter 9.

Rock Phosphate and Sulphur for Fertilizer Production

The present all out national effort to achieve the foodgrain production target of 125 million tonnes by the end of the Fourth Plan is supported by a massive effort to produce fertilizers. The overall target is two million tonnes of nitrogen and one million tonnes of phosphate by 1970-71. As new fertilizer units get into production, imports of finished fertilizers are likely to taper off. The factories for production of ammonium sulphate/phosphate

and superphosphate require imports of rock phosphate and sulphur. In the region served by the Madras port, there are a number of fertilizer units, either in production or planned to be established or having expansion programmes on hand. They have all been considered and their requirements of rock phosphate and/or sulphur have been estimated at 375,000 tonnes of rock phosphate and 184,000 tonnes of sulphur or say 560,000 tonnes both the commodities taken together, as per details given in the following table. To this has to be added the requirements of sulphur for other industries, which may be put at 40,000 tonnes.

Estimate of Import Requirements of Rock Phosphate and Sulphur for the Fertilizer Units in the Hinterland of the Port of Madras

(In '000 tonnes)

Product	*Anticipated production*	*Anticipated requirement*	
		Rock phosphate	*Sulphur*
Urea	210	—	—
Super phosphate	172	100	27
Ammonium chloride	60	—	—
Ammonium sulphate	282	—	46
Complex fertilizers	413	275	111
TOTAL	—	*375*	*184*

NOTES:—(*a*) The factories now located or expected to come up at Madras, Ennore, Avadi and Ranipet have been treated as situated in the hinterland of the port of Madras.

(*b*) The estimates given exclude the production and requirements of the units located at Cuddalore, Neyveli and Coimbatore on the assumption that their requirements will be imported via the ports of Cuddalore and Cochin.

The total thus comes to 600,000 tonnes of rock phosphate/sulphur for 1970-71. The projections for imports through Madras for 1970-71 made by other study groups are given below :

('000 tonnes)

	Rock phosphate	*Sulphur*
Port Planning Group	500	200
Haldia Study	500	200
Madras	500	200

For purposes of port planning for 1970-71, the estimate of 600,000 tonnes of rock phosphate/sulphur has been taken in this Report. For 1975-76, the Madras Port Trust has suggested one million tonnes and this target is acceptable in view of the prominent position of the State of Madras in fertilizer consumption.

The above projections for both 1970-71 and 1975-76 may err on the conservative side since ideas regarding targets of fertilizers are currently undergoing rapid change in the massive drive towards maximising production. However, the capacity of the proposed rock phosphate/sulphur discharge facilities (*see* Chapter 7) is up to 5,000 tonnes a day or 1.5 million tonnes a year and this will take care of possible imports in excess of the projections made for these commodities.

Exports

Iron Ore

Several studies have been made in the last few years by Government committees, study groups and other agencies on the subject of export of iron ore from India. The following is a summary taken from the report (December 1965) on Commodity Transport Studies (Iron Ore) by the Joint Technical Group for Transport Planning appointed by the Planning Commission.

Iron Ore Exports in 1970-71 and 1975-76 as Anticipated by Different Agencies

(In million tonnes)

Agency	*1970-71*	*1975-76*
1. Joshi Committee (October 1963)	25.0	N.A.
2. Perspective Planning Division	25.0	35.0
3. World Bank (June 1964)	18.0 to 22.0	N.A.
4. NCAER (January 1965)	25.0	N.A.[c]
5. Stone and Webster (April 1965)	N.A.[b]	21.0 to 23.0[a]
6. Haldia Study Team (August 1965)	20.0 to 25.0	35.0

[a] On the basis of 15 to 17 million tonnes to Japan and six million tonnes to Europe during the period 1973-78.

[b] Exports to Japan have been indicated at 11 to 12 million tonnes.

[c] NCAER have estimated 40 million tonnes in 1981.

The forecast for 1970-71 varies from 18.0 million tonnes to 25.0 million tonnes and for 1975-76 from 21.0 million tonnes to 35.0 million tonnes for all ports put together. The Joint Technical Group has adopted a target of 21.3 million tonnes for 1970-71 which according to the Group is based on the knowledge that exists at present about the prospects of the saleability of iron ore from India in the international market on the one hand and the prospects of completion of the projects concerned with iron ore exports on the other.

While knowledge about a more future date is limited, 27 million tonnes have been projected for 1975-76. The break-up of the figures is as shown below:

(Million tonnes)

Port	*1970-71*	*1975-76*	*Source*
Madras	*3.0*	*3.0*	*Bellary-Hospet*
Visakhapatnam	6.0	8.0	Bailadilla
Marmugao	7.0	8.0	Goa-Bellary-Hospet
Paradeep	2.0	5.0	Toinca-Baitari-Nagagarh
Haldia	2.0	2.0	Barajamda
Mangalore	0.5	1.0	Southern Mysore
Cuddalore	0.5	Nil	Bellary-Hospet
Karwar	0.3	Nil	-do-
TOTAL	*21.3*	*27.0*	

The report of the Joint Technical Group states that the estimate for 1970-71 is based on a tentative railway programme, formulated following a review of export possibilities of iron ore by the Planning Commission in consultation with the Ministries concerned. The Group's estimate of three million tonnes of export of iron ore through Madras is the target set by the Madras Port Trust since the last two or three years for purposes of port development. Early in 1963 the World Bank had deputed a harbour expert and a railway expert to report on the soundness of the Madras Port Trust's proposal to increase the ore export capacity of the port to three million tonnes by providing a mechanical loading plant with a loading rate of about 3,000 tonnes an hour. The relative priority of this project *vis-a-vis* a project for stepping up the capacity of the Marmugao port for exporting Bellary-Hospet ore was also studied by this team. It is understood that this team had recommended that the Madras project for exporting three million tonnes of Bellary-Hospet ore to Japan should be proceeded with. The matter was held up due to the delay in obtaining foreign exchange credit from the World Bank.

The economics of export of three million tonnes of Bellary-Hospet iron ore through Madras in preference to Marmugao has undergone a significant change in favour of export through Madras consequent on the decision to construct an oil dock to serve the Madras refinery which will take in ships of 11.9 metres draft initially and of 13.1 metres draft later, when required. This will enable the docking of 60,000 tonnes DWT ore-carriers, a possibility which did not exist under the earlier scheme of providing the berthing facility for the ore-carriers in the Jawahar Dock. In the NCAER study "Cost Price Structure of Iron Ore" it was recommended that the ore export plan should be rationalised by routing the ore through the four ports of Paradeep (nine million tonnes), Visakhapatnam (six million tonnes),

Marmugao (12 million tonnes) and Mangalore (three million tonnes). Madras was left out for the reason that there was no proposal then to develop that port to receive 60,000 tonnes ore-carriers, and, therefore, ore exported through that port would be relatively unattractive from the point of view of the large scale foreign buyer.

Now, with the establishment of the Madras refinery, it is possible, concommitantly, to provide deep water berthing facilities for super ore-carriers at Madras at much less expense than would otherwise be the case and the justification for routing three million tonnes of iron ore through the Madras port therefore gets stronger. In any case this will not be irrational at least in the short run when much of Bellary-Hospet ore cannot get exported for some years, since the creation of deep water facilities at Marmugao and the expansion of the Hospet-Goa railway facilities to the broad gauge standards would take time to take concrete shape and will need an investment of about Rs. 50 crores on the railway project alone in addition to about Rs. 20 crores on the port project. Port development projects are well known to take many years for preparation and execution. If we were to wait for say 8 to 10 years for Marmugao to be developed fully while Madras will have been developed in three years—from now, the time lost will lead to loss of sales and possibly also loss of the customer since he will have looked elsewhere for the iron ore that he needs.

For 1975-76 the Joint Technical Group has retained three million tonnes as the target for Madras. The total for all ports is placed at 27 million tonnes as against 21.3 million for 1970-71. For the purpose of designing the port facilities, however, it is considered that a target of five million tonnes should be aimed at. This would mean that the railway yard, ore stacking area and the design of the mechanical loading plant should be such as not to debar exports beyond three million tonnes; rather they should be adaptable to the higher target at relatively short notice, if required.

Manganese Ore

Exports of manganese ore have declined from about 152,000 tonnes in 1959-60 to 21,000 tonnes in 1965-66. This is mainly due to the cost of Indian manganese ore being higher than world market prices. There is also increasing competition from other producing countries. The Minerals and Metals Trading Corporation, through whom manganese exports are canalised, are taking several steps not only to arrest the decline in export but also to step it up as far as possible. It is, therefore, estimated that the traffic in manganese ore exports will rise to about 25,000 tonnes in 1970-71 and continue at that level upto 1975-76.

Magnesite and Other Ores

The exports of magnesite and other ores amounted to about 61,000 tonnes in 1965-66. There is little data to make a useful projection regarding the growth of this traffic. The present trend may be expected to continue. The total for iron ore and other ores thus comes to about 3.1 million tonnes in 1970-71 and 5.1 million tonnes in 1975-76.

General Cargo : Imports and Exports

"General Cargo" consists of items other than ores, coal, foodgrains, rock phosphate/sulphur and P.O.L. In some respects the task of estimating the future trend in general cargo is more complex and attendant with possibilities of greater deviations than in bulk cargoes because of the conflicting forces operating on the future trends in its imports and exports. With the ever-increasing pressure for restricting imports and promoting import substitution, on the one hand, and the diminishing trend in the exports of certain traditional agro-based commodities on the other (which form the principal exports under the present pattern) it would appear on a preliminary view, that the general cargo traffic in many items may fall or remain static hereafter.

In attempting to make projections relating to the Madras port, however, it is necessary to take note of certain important considerations. The first is the stride made in the Madras State in industrialisation in the three Five Year Plans. The second important consideration is that the draft Fourth Plan drawn up by the State Government is for a continuation of the growth of industry with accelerated tempo and for a wide diversification to fill the needs of certain basic industries producing raw materials and intermediates. The aim is to get the industrial sector make a substantial increase (Rs. 200 crores) in its contribution to the State income. This order of increase is expected to call for an investment of Rs. 600 crores by the State, Central and private sectors taken together.

The planning for power and transport during the Fourth Plan is also to make these two sectors serve industry and agriculture better. The past trend in the growth of consumption of power in the State points to a doubling of the demand over a five-year period. In preparing the development plan for power the State Government has taken note of this factor.

Increasing industrialisation necessarily results in a greater reliance on indigenous machinery, spare parts and raw materials. The imported element gradually shrinks, from the point of view of tonnage affecting port capacity.

True, the products of industry will in time generate some exports. But a developing country wishing to export manufactured products has to face many odds in keeping down production cost and attaining competitive capacity in international markets.

Coming to agriculture, the stated national objectives during the Fourth Plan period are (*i*) to assure a per capita consumption of foodgrains of 18 ozs. per day; (*ii*) to create an exportable surplus without impairing local consumption; (*iii*) to meet the demand for industrial raw materials and thus provide a strong agricultural base for industrial expansion; and (*iv*) to match the additional incomes generated by the enlarged Plan outlays with additional production so as to check the inflationary forces.

Accordingly the production of foodgrains in the Madras State is expected to be stepped up from 6.5 million tonnes in 1965-66 to 8.2 million tonnes by the end of 1970-71.

Commercial crops will receive due attention. Production of cotton, which was 5.2 lakh bales in 1965-66 is to be increased by 1.25 lakh bales by 1970-71.

For sugarcane the target of increase by 1970-71 is 1.8 lakh tonnes of gur or 18 lakh tonnes of cane.

Oilseeds (production of which is of special interest in the study because of its former important position as an export commodity through the port of Madras) will be stepped up from 13.94 lakh tonnes in 1965-66 to 17.24 lakh tonnes by 1970-71 through popularisation of improved seeds, intensive manuring and adoption of plant protection measures. It is proposed to concentrate on groundnut crop.

The foregoing general resume of the economic outlook of Madras, present and future, has been given as a background for the estimation of the future trends of harbour traffic—imports and exports—under general cargo through the Madras port. The resume shows that a transition is taking place which will alter the past pattern of port traffic. As regards the future, the trend should and, perhaps, will be for more and more manufactured goods to be exported while primary commodities may remain stationary. It is an extremely difficult task to state the trends in exact quantities : however in what follows, the case of each important commodity falling under "General Cargo" is considered.

Imports

Chemical Manures : The import of chemical manures which stood at 160,000 tonnes in 1955-56 had gradually risen to 317,000 tonnes in 1964-65, the imports being all foreign. The figure which includes phosphate also is

expected to be gradually replaced by rock phosphate and sulphur by 1970-71 for the fertilizer factories. The estimate for chemical manures is, therefore, taken as nil.

Hardware : Hardware import which stood at 77,000 tonnes in 1955-56 has fallen rather steeply over the years and stood at the very low figure of only 4,000 tonnes in 1964-65. It is apparent that indigenous production is replacing imports rapidly. The item may vanish altogether by 1970-71. However, the present small figure may be retained for 1970-71 and 1975-76, as special sophisticated items, not produced locally, may still be required to be imported.

Iron and Steel : The sizeable imports of iron and steel in the State are an index to its recent industrial expansion. This will be more apparent from the figures for machinery, mentioned next. Although the indigenous production of iron and steel is growing, imports are still necessary of special steels. The trend of iron and steel imports during the ten-year period has not been steady. The import in 1955-56 was 50,000 tonnes and after moving to as high as 159,000 tonnes in 1956-57, it dropped to 80,000 tonnes in 1959-60 and stood at 85,000 tonnes in 1964-65. Imports may be estimated to continue at the 1964-65 level upto 1970-71 and to go down to say 50,000 tonnes by 1975-76.

Machinery : With the prospects of further industrialisation in Madras, more machinery will be needed both as initial equipment and as maintenance spares. But India's machinery-building capacity is growing both in the heavy and light machinery sectors. A figure of 60,000 tonnes for 1970-71 and of 50,000 tonnes for 1975-76 seem reasonable, considering that by 1970-71 all the major industrial units planned for the Fourth Plan should have gone into production. The initial equipment required after 1970-71 should be of lesser magnitude than during the years of the Fourth Plan.

Chemicals (Excluding Soda) : The import of chemical (excluding soda) has grown steadily from 11,000 tonnes in 1955-56 to 22,000 tonnes in 1964-65, registering a cent per cent growth over the ten-year period. A further growth should be allowed for until the end of the Fourth Plan period so that indigenous production may gather volume. The figure for 1970-71 may be put at 30,000 tonnes and a lower figure, say 25,000 tonnes, adopted for 1975-76.

This estimate does not include muriate of potash (K_2O) required for the fertilizer plants which is estimated at 100,000 tonnes for 1970-71 and 125,000 tonnes for 1975-76.

The total for chemicals thus comes to 130,000 tonnes for 1970-71 and 150,000 tonnes for 1975-76.

Soda : The figure for soda has shown a declining trend over the ten-year period, the figure for 1955-56 being 16,000 tonnes and for 1964-65 3,000 tonnes, all imports being foreign. Obviously indigenous production is growing to keep pace with the demand. No import may be allowed for this in 1970-71 and subsequent years.

Paper and Stationery : Paper and stationery, which consist mostly of newsprint, are being steadily imported from foreign countries to meet the internal demand, the indigenous production being small. The import figure for the ten-year period has shown very slight variation, the figure in 1955-56 being 34,000 tonnes and in 1964-65, 37,000 tonnes. Indigenous production of newsprint being small, imports will continue; 45,000 tonnes may be assumed for 1970-71 and 55,000 tonnes for 1975-76.

Metals Other than Iron and Steel : Metals other than iron and steel are being imported mainly as industrial raw materials; their import in the Madras port has grown from 24,000 tonnes in 1955-56 to 32,000 tonnes in 1964-65, or by 33 per cent. The imports may be expected to increase to 35,000 tonnes by 1970-71 and to 40,000 tonnes by 1975-76.

Textiles : The textiles import in the port has shown a rising trend from 25,000 tonnes in 1955-56 to 65,000 tonnes in 1964-65, an overall increase of 160 per cent over the ten-year period. The import consists of cotton, twist and yarn; the growth of this reflects the growth of the textile industry in the hinterland of the port. Increases up to 70,000 tonnes by 1970-71 and 75,000 tonnes by 1975-76 are considered reasonable.

Dyeing and Tanning Substances : These imports are mainly required for the hides and skins industry. It is a steady industry with some growth prospects. Indigenous substitute chemicals are hoped to be introduced. A unit for wattle bark extraction from indigenous bark is proposed at Mettupalayam. The imports, all foreign, were 19,000 tonnes in 1964-65. A modest increase to, say, 20,000 tonnes in 1970-71 can be expected; the same figure may be repeated for 1975-76.

Timber : Timber is being imported into Madras mostly from Andamans and hence is a coastal import. The import figures have varied over the ten-year period from 6,000 tonnes to 19,000 tonnes, indicating that the demand for this item is elastic. The import in 1964-65 stood at 10,000 tonnes. An increase to 12,000 tonnes by 1970-71 and to 14,000 tonnes by 1975-76 is considered reasonable.

Building Materials, Cement, etc. : This is coastal traffic and consists of bricks, sand, tiles, asphalt, bitumen, etc. It may be assumed that the present level of this traffic, which is 60,000 tonnes, will continue.

All Other Imports : This will consist of predominantly items in coastal

trade such as gunnies, tinplates, tea, lubricating oil, etc. These items have shown a steady decline over the period of last nine years, i.e., from 202,000 tonnes in 1955-56 to 122,000 tonnes in 1964-65, a decline by nearly 60 per cent. Because of the all round development that is expected to take place in the hinterland of the port in the coming years, a very moderate increase to 125,000 tonnes in 1970-71 and to 130,000 tonnes in 1975-76 can be expected in this category.

The projections for general cargo imports are summarised below :

(In thousand tonnes)

Imports	*1970-71*	*1975-76*
Chemical manures	Nil	Nil
Hardware	4	4
Iron and steel	85	50
Machinery	60	50
Chemicals other than soda	130	150
Soda	—	—
Paper and stationery	45	55
Metals	35	40
Textiles	70	75
Dyeing and tanning substances	20	20
Timber	12	14
Building materials	60	60
All other imports	125	130
TOTAL	*646*	*648*

Exports

Hides and Skins : Hides and skins are traditionally the most important export through the Madras port. The South Indian red-haired sheep skins are claimed to be one of the best, most suited for gloves, garments and other sophisticated items. These skins are now exported in the raw state as well as semifinished leathers. Research for converting them into finished leather has been undertaken in the Central Leather Research Institute, Madras. Research is also going on for discovering Indian substitutes for imported foreign chemicals required for the leather industry. Although leather substitutes have been artificially produced and marketed in foreign countries, knowledgeable people in the leather trade and industry are hopeful that South India can maintain and even advance the export of leather and leather products. By and large sophisticated manufactures may be expected to replace part of the raw leather exports. In terms of tonnage of leather cargo export, however, considering the declining trend in the ten-year period ending 1964-65 (22,000 tonnes), no substantial or spectacular increase can be estimated; 25,000 tonnes in 1970-71 and 30,000 tonnes for 1975-76 may be adoped as the likely quanta of exports.

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Vegetables and Provisions : This is a minor fluctuating item consisting mainly of onions. The destination is "other Asian countries" such as Malaysia. The trend during the last seven years is a rise from 15,000 tonnes in 1957-58 to 23,000 tonnes in 1964-65. Increases to 25,000 tonnes by 1970-71 and 28,000 tonnes by 1975-76 may be expected.

Textiles : This includes, besides piece goods, carpets including matting, cotton and cotton waste, twist and yarn and wool. The growth over the ten years ending 1964-65 is nearly 10 per cent, i.e., from 21,000 tonnes to 23,000 tonnes. An export of 24,000 tonnes for 1970-71 and 27,000 tonnes for 1975-76 may be assumed.

Tobacco : There has been a sudden and nearly 100 per cent jump in the export for 1964-65 over the previous year, i.e., from 19,000 tonnes in 1963-64 to 37,000 tonnes in 1964-65, all the exports being to foreign countries. There are reasonable hopes that the increase will continue, though at not so high a rate, particularly because of the conditions in the international market consequent on the political developments in Rhodesia which is a substantial exporter of tobacco. A figure of 40,000 tonnes for 1970-71 and 45,000 tonnes for 1975-76 appear to be reasonable.

Groundnut Oil : For the ten-year period the trend is for this export to disappear. The export which stood at 77,000 tonnes in 1955-56 had declined to 16,000 tonnes in 1964-65, all being coastal exports. However, the State Government has plans for increasing the production of groundnuts and the Central Government is encouraging it from the export promotion angle. It is reported that an export target of 250,000 tonnes of vegetable oils, 60,000 tonnes of groundnuts and 1.2 million tonnes of de-oiled cakes has been proposed for the Fourth Plan. Although indigenous consumption will increase, it is to be hoped that some results will attend the export promotion efforts. On such a consideration a figure of 20,000 tonnes of groundnut oil for 1970-71 and the same figure for 1975-76 appear to be acceptable.

Oil Cakes : Exports in the past have been :

Year	*Tonnes* ('000)
1955-56	4
1956-57	—
1957-58	—
1958-59	1
1959-60	57
1960-61	30
1961-62	37
1962-63	81
1963-64	86
1964-65	84[a]

[a] All foreign.

It will be seen that the rise in exports of oil cakes is parallel to the fall in export of oil. For reasons similar to what were mentioned in the case of groundnuts, an increase in exports may be expected. The export may be put at 100,000 tonnes for 1970-71 and the same figure for 1975-76.

Mica : The trend is for a sizeable increase. The countries importing mica from Madras are Japan, U.K., U.S.A. and some European countries. The export which stood at 8,000 tonnes in 1955-56, has steadily grown over the years. In 1964-65, it stood at 13,000 tonnes all exports being foreign. Assuming that the rising trend will continue, the export may be put at 15,000 tonnes in 1970-71 and 18,000 tonnes in 1975-76.

Bone and Bonemeal : The export of bone and bonemeal appears to have steadied itself between 5,000 and 6,000 tonnes during the last seven years. The figure for 1970-71 may be put at 7,000 tonnes and that for 1975-76 at 8,000 tonnes.

Fodder Including Rice, Makka and Wheat Bran : With the expected increase in rice production, it is felt that the export of rice bran will increase. Twenty thousand tonnes may be assumed for 1970-71 and the same figure for 1975-76.

Sugar : In view of the fact that Indian sugar is not competitive in the world markets and was being subsidised for export, the future trend is difficult to predict and the past trend is not a guide. Since production of sugar is increasing, however, export surpluses will be available and so a figure of 20,000 tonnes is acceptable for 1970-71 and 1975-76.

Molasses : The past trend has been :

Year	*Tonnes* ('000)
1955-56	8
1956-57	2
1957-58	6
1958-59	24
1959-60	—
1960-61	1
1961-62	1
1962-63	36
1963-64	45
1964-65	7[a]

[a] Coastal.

Molasses will be available for export only to the extent there is no use for it in the country. Molasses is the raw material for the production of industrial alcohol, which in turn is the raw material for certain chemical industries. The variable trend is indicative of greater internal consumption. However, since molasses is the by-product of the sugar industry where production is expected to increase, it may be assumed that there

will be some exportable surplus—say, of the order of 10,000 tonnes both for 1970-71 and 1975-76.

Scrap : Scrap has been exported in the past as under :

Year	*Tonnes* ('000)
1955-56	1
1956-57	2
1957-58	—
1958-59	9
1959-60	13
1960-61	25
1961-62	17
1962-63	12
1963-64	23
1964-65	23[a]

[a]All foreign.

Japan is the main buyer of scrap. With greater industrialisation of the hinterland of the port of Madras, it may be expected that scrap output as waste will increase sizeably. That part of it, which is uneconomic to transport by road or rail to Indian steel mills, will go as export, particularly what emanates from the city of Madras and nearby places. A figure of 25,000 tonnes for 1970-71 and the same for 1975-76 may be regarded as feasible.

Turmeric : This is a steady export. The past trend, which has been more or less steady around 6,000 tonnes may be assumed to continue. On that basis 6,000 tonnes may be estimated both for 1970-71 and 1975-76.

All Other Exports : The bulk of this consists of sundry cargoes in the coastal trade. The trend here has shown a steady decline from 64,000 tonnes in 1955-56 to 35,000 tonnes in 1964-65. Since internal movements of consumer articles should increase with increasing per capita income and industrialisation, a modest rise of this cargo to, say, 40,000 tonnes in 1970-71 and to 50,000 tonnes by 1975-76 may be assumed.

New Cargoes : The items of exports considered in the preceding paragraphs are the important ones as per the present classification of goods by the Port Trust. They are all what may be called "traditional" items. Non-traditional items such as plastics, light engineering and electrical goods, etc., are gradually emerging into the export field. Export Promotion Councils have been set up to stimulate exports in this field systematically. A review committee which is reported to have studied the performances of 17[1] Export Promotion Councils has revealed that by 1970-71 the exports of the goods

[1] "Market Research in Engineering Industries" by R. Rajaramsi, *Economic Times*, 11-4-1966.

covered by these Councils will go up by 76 per cent over 1963-64. The percentage increase in engineering goods is expected to be 240 per cent. For port traffic purposes quantitative estimates in terms of weight are necessary. Discussions with the trade representatives of Madras indicate that much hope is laid on more exports of cycles, electric fans and the like. One can only make a rough guess and put an optimistic estimate, perhaps, of 100,000 tonnes of such new items for 1970-71 and 125,000 tonnes for 1975-76.

Petroleum Products : In the paragraph on import of petroleum it was stated that products from the Madras refinery would be available for export for the extent of one million tonnes in 1970-71 which may trail off to about 400,000 tonnes in 1975-76. These figures have, therefore, to be added under export in this paragraph.

The summary below gives the position regarding exports of general cargo :

('000)

Exports	*1970-71*	*1975-76*
Hides and skins	25	30
Vegetables and provisions	25	28
Textiles	24	27
Groundnut oil	20	20
Tobacco	40	45
Oil cakes	100	100
Mica	15	18
Bone and bonemeal	7	8
Fodder, including makka and wheat bran	20	20
Sugar	20	20
Molasses	10	10
Scrap	25	25
Turmeric	6	6
All other exports	40	50
New cargo	100	125
Petroleum products	1,000	400
TOTAL	*1,477*	*932*

Diversion of Cargo to Other Ports in Region

The magnitude of the cargo that is expected to be handled at the Madras port in 1970-71 being of the order of 10 million tonnes, small diversions of traffic which properly belongs to the natural hinterland of other ports, existing or prospective, can make no appreciable dent on Madras.

In the NCAER's Regional Transport Survey of Madras State and Pondicherry (nine districts) it was assumed that there would be a diversion of 20,000 tonnes from Madras to Tuticorin.

In the Draft Outline of the Fourth Plan of the Madras State, certain port

development projects are planned for Ennore on the assumption that a cargo traffic of four million tonnes will arise there by 1975-76. Seven lakh tonnes of fertilizers, 22 lakh tonnes of coal, one lakh tonnes of salt and 5.25 lakh tonnes of ore are mentioned in the Traffic Survey of the Intermediate and Minor Ports of the Madras State, prepared by the Madras Government, Port Department in 1964. In the light of the remarks made elsewhere about coal, the coal traffic is uncertain. As regards fertilizers, it would be a waste of the excellently developed port facilities at Madras to attempt to divert this cargo to Ennore. Economies to importers that may be anticipated to occur are highly problemetical.

Cuddalore is to get 500,000 tonnes of ore export traffic in 1970-71 as stated in the NCAER's Regional Transport Survey of Madras. No credit has been taken for this traffic at Madras : nor for the receipts of raw materials for the fertilizer factories located nearer to the other ports.

To summarise, the items of traffic expected to be handled by the port of Madras in 1970-71 and 1975-76 are as follows :

(Million tonnes)

	1964-65	*1970-71*	*1975-76*
Imports			
Petroleum products	0.88	2.50	5.00
Foodgrains	0.71	0.20	0.25
Rock phosphate/sulphur	0.20	0.60	1.00
Coal	0.49	0.20	0.20
Other cargo	0.71	0.65	0.65
Exports			
Petroleum products	—	1.00	0.40
Iron ore and other ores	1.10	3.10	5.10
Other cargo	0.30	0.48	0.53
TOTAL	*4.39*	*8.73*	*13.13*

Fishing Industry

A new industry, namely, the fishing industry, requiring port facilities is to be established at Madras during the Fourth Plan period. The Central Ministry of Food and Agriculture is sponsoring this scheme. On their request the Madras Port Trust have included in their master plan for the outer harbour dock development a plan for developing a fisheries harbour. The location is to the north of the proposed outer harbour as indicated in the sketch map of the port given in the frontispiece. The tonnage of fish is estimated at 35,000 to 50,000; but the facilities to be provided for this industry are dependent upon the number of fishing trawlers that will be engaged in the industry and it is dealt with in Chapter 7.

Chapter 7

Additional Traffic Facilities Required and Their Cost Estimate

IT WAS STATED in Chapter 6 that the Madras port may be expected to have by 1970-71 a traffic of about 8.7 million tonnes broken up as under :

	Million tonnes
Petroleum	3.5
Iron and other ores	3.1
Coal	0.2
Fertilizer/rock phosphate/sulphur	0.6
Foodgrains	0.2
General cargo	1.1
TOTAL	*8.7*

The present traffic of about 4.8 million tonnes is handled at 18 quay berths and 4 mooring berths.

Prima facie it might seem that the berthing facilities would need doubling. The matter has, however, to be examined more closely paying attention to the needs of the various constituent elements of the traffic.

The two largest items are petroleum and iron and other ores each of which will bring in a traffic of over three million tonnes. Both are handled according to the latest trends in international shipping, by giant supertankers or carriers, drawing between 11.9 and 13.7 metres of water. The port of Madras cannot at present receive such vessels due to the inadequacy of the existing depths in the harbour basin and in the Jawahar Dock. On technical considerations it is not possible to improve depths in these two water areas to the levels required by supertankers or ore-carriers. There is thus no alternative but to provide a new dock where such depths can be provided.

The Port Trust having been advised of the proposal to build an oil refinery at Madras has been giving thought to the many facets of the problem and have been in consultation with the refinery authorities and the Standing Consulting Engineers of the Port Trust. The consensus of opinion is that the solution to the problem lay in developing an oil-cum-ore cargo dock in the Royapuram bay area to the immediate north of the present harbour basin as roughly indicated in the sketch plan given in the frontispiece. The salient features of the proposal are the construction of an outer harbour north of the existing breakwater, approximately along the alignment indicated in the plan. The entrance channel will be deepened initially to 14.3 metres and later to 15.2 to 15.8 metres when 13.1/13.7 metres draft tankers have to be admitted. The depths at the berths will be sufficient for 11.9 metres tankers initially and upto 13.7 metres tankers later as required. There will be one berth for crude oil import which will also be adequate for exports of certain refinery products. Tankers will pump the crude direct to the refinery through shore-based pipelines which will be provided by the refinery company. A second berth may become necessary later if the quantities to be handled increase.

The decision to establish an oil refinery of 2.5 million capacity at Madras and the consequential need to establish an oil dock have come in handy for iron ore export development to the tune of three million tonnes per annum for which the Port Trust had at one time certain plans at the Jawahar Dock. These plans were inadequate because of the limited depths that could be dredged there. An oil dock to the north of the existing basin with its deep waters sufficient for 11.9 metres to 13.7 metres draft ore-carriers makes it a suitable site for locating a high speed mechanical ore-loading plant; sufficient land can be reclaimed to accommodate such a plant and the ancillary railway yard. In fact some effort at reclamation of land was put in even some years ago. A further advantage is that the railway yard serving the new ore-loading plant would branch off from Royapuram, releasing railway capacity in the existing south marshalling yard and also avoiding the existing bottleneck between the Beach station and the marshalling yard via Springhaven Road.

One of the reasons why frequent bottlenecks arise in wagon movements within the port area (said to affect the speedy movement of ore wagons into the ore stacking yard and food wagons away from the port) is the insufficient line capacity between the south marshalling yard and rail entry into the harbour from the main line railway. This difficulty will be removed by what will virtually amount to a segregation of the ore traffic to the north of the existing harbour when the oil dock and the ore berth with the mechanical loading plant are put into commission.

The oil-cum-ore dock will call for the drawing up of a Master Plan for the future development of the harbour. If an oil dock as at present conceived is developed, there will be scarcely any scope for further expansion of the port at a more distant future. So the Master Plan has to be a carefully integrated one. The Madras Port Trust are fully alive to this need and have already appointed a specialist firm of consulting engineers to draw up an integrated Master Plan that will meet the needs of the refinery, the three to five million tonnes iron ore export plan and the requirements of other bulk cargo like rock phosphate and sulphur. The consulting engineers' task will include drawing up the specifications and detailed design of the ore-handling plant also. The water area of the oil dock, will be sufficient for building a berth for oil tankers of sufficient length (304.8 metres) and draft (13.7 metres) for the largest oil tankers that may be expected at the port (upto 70,000 tonnes DWT). Assuming that five million tonnes of petroleum per annum are to be handled, i.e., by 1975-76, 70 tankers of 70,000 tonnes DWT class per annum would do the job, i.e., one every five days. Such tankers have a turn round of 24 hours and if that turn round is achieved then the berth would be empty for four out of five days in a week. But all tankers may not be of this top size. Taking a typical range of tankers of sizes between say 20,000 and 70,000 tonnes (DWT), about 125 average size tankers (of the 40,642 tonnes to 45,722 tonnes class) would be needed to transport five million tonnes per annum, that is, one every three days on an average. Even with an allowance for bunching, one berth should be adequate to handle this tonnage.

The sizes and the draft of the ore-carriers are similar to those of oil tankers and so the drafts and dredged depths required will be similar to what will be provided for the oil tankers. A 35,000 DWT ore-carrier will get loaded in 1.6 days by a plant with two ship-loaders, each with a capacity of 1,000/2,000 tonnes per hour. The total berth occupancy time will be 2½ days per shift; 90 ships to carry three million tonnes will occupy the berth for 225 days. The plant which will be initially having a capacity of 2,000 tonnes per hour may be worked later to 4,000 tonnes per hour. The work is to be planned in such a way that further expansion will have a minimum of engineering work.

Besides a berth each for petroleum and ore, the Master Plan will provide room for three other berths for bulk cargoes of each 244 metres long. It is not suggested that these be built in the near future but they can be built at a fairly short notice, if the need is foreseen. When they are built another six million tonnes bulk cargo capacity will be added to the port, the exact volume depending on the nature of the cargo and the ouput of the handling

plant required. The Master Plan will also take into account the requirements of the fishing industry.

This is a very satisfactory development and why it is satisfactory will be explained presently.

An integrated oil and ore dock that will initially, that is, by 1969, fully take care of the needs of the oil traffic and the ore export traffic will leave the present 18 quay berths to cater to the needs of the remaining traffic for many years to come.

Of the 8.7 million tonnes of total traffic by 1970-71, 6.6 million tonnes consist of oil and ore to be accommodated at the oil dock.

Of the rest, foodgrains imports (200,000 tonnes) can easily be handled at one berth, which could be done at the Jawahar Dock as at present.

Coal, which will tail off to 200,000 tonnes by 1970-71 will scarcely be sufficient to make a full use of the existing mechanised coal berths at South Quays IV and V. One berth will in fact be adequate and the question will arise of investigating the possibilities of converting the other berth to other uses.

Rock phosphate is likely to arrive in medium bulk-carriers of about 30,000 tonnes. In that case the mechanical berth at South Quay III, which is suitable for conversion to mechanical unloading of rock phosphate, cannot be used for berthing such vessels owing to draft limitations; a berth on the east side of the Jawahar Dock will have to be used. The three grabbing cranes now used for iron ore export at South Quay III can be shifted to the Jawahar Dock, fitted with new grabs and an extra grab to get a total discharge capacity of about 254 tonnes per hour. By working three shifts a day, rates of 4,000 to 5,000 tonnes a day can be obtained. One berth at Jawahar Dock equipped as just described can cope with the phosphate. By 1975-76, when the trade is expected to rise to one million tonnes, a berth in the oil dock can be developed.

Sulphur can be discharged at South Quay III after fitting that berth with four new wharf cranes, one of five and three 3-tonne each capacity. This berth will then become sulphur-cum-general cargo berth. A transit shed may have to be provided at this berth for general cargo.

A stockyard of 1,858 sq. metres area will also have to be provided to accommodate phosphate rock which cannot be moved out soon after unloading.

There will then be left for general cargo traffic 12 or 13 quay berths out of the existing 18 or a berthing capacity sufficient for 2.5 million tonnes of general cargo against the forecast of one million.

The conclusion that emerges is that, if the oil and ore docks are built to

the capacity, 2.5 million tonnes of crude import for oil and three million tonnes initially with a possibility of expanding the loading plant's capacity to five million tonnes for ore, and to the draft 11.9 metres, the port of Madras will have by 1970-71, facilities in excess of its then needs by about a million or a million and a half tonnes.

The trade estimated to develop by 1975-76 is about 13 million tonnes. The increase over 1970-71 is mainly due to the increased requirements of petroleum (five million tonnes) and ore (five million tonnes). These will be taken care of by additional dredging and expansion of the capacity of the iron ore loading plant.

The assets to be provided during the Fourth Plan period and the investment necessary are given in the table below. The investment, in the case of these works, which are the responsibility of the Port Trust, are based on the estimates made by the Engineering Department of the Trust. They include not only the works directly required to cope with the additional traffic estimated in oil ores, phosphates, etc., but also renewals and replacements of harbour craft, plant and equipment, improvement of existing equipment to step up operational efficiency, provision of improved maintenance and repairs facilities, workshop capacity, dry docking facilities, improvements to the electric distribution, internal transport system in the harbour area, etc.

Development Projects and Outlay thereon during the Fourth Plan Period

Project	*Total cost* (Rs. lakhs)	*Foreign exchange* Rs. (lakhs)
I. *Oil Dock*		
(*a*) Construction of break-water, approach jetty, dredging, purchase of special plant and equipment, sub-station, etc.	455.00	100.00
(*b*) Two dock tugs of 1,200 B.H.P.	90.00	40.00
(*c*) Additional dredger	120.00	100.00
(*d*) Additional sand-pumping plant	30.00	5.00
II. *Ore Exports*		
(*a*) Installation of facilities for the mechanical handling of 3 million tonnes of iron ore a year	390.00	75.00
(*b*) Grabs for transporter cranes	3.50	3.00
III. Mechanical Equipment for Handling of Rock Phosphate and Sulphur	28.00	18.00
IV. Warehouses and Transit Sheds	64.00	—

(*Continued*)

(*Contd.*)

Project	*Total cost* (Rs. lakhs)	*Foreign exchange* (Rs. lakhs)
V. *Additional Equipment*		
(*a*) Two locomotives of 2,400 tonnes hauling capacity	16.00	12.00
(*b*) Six locomotives of 1,200 tonnes haulage capacity	35.00	24.00
(*c*) Buildings for new workshops and stores, with ancillary services	144.00[a]	5.00
(*d*) Plant and machinery for workshops	20.00	—
(*e*) Service station for mechanical section	9.00	—
(*f*) Spares for operational plant and gear	90.00	70.00
VI. *Renewals and Replacements of Craft, etc.*		
(*a*) Mobile tank units, fire trailer units and fire tenders	3.00	—
(*b*) Tug "Sir Francis Spring"	25.00	16.00
(*c*) M.L. pilot	4.00	1.50
(*d*) Two water barges (to be replaced by one self-propelled 150-ton capacity water barge)	8.00	4.00
(*e*) Grab dredger "WENLOCK III' (to be replaced by a more powerful unit-cum-heave-up barge)	50.00	40.00
(*f*) General cargo-handling equipment due for obsolescence	73.00	48.50
(*g*) Replacement of sand pump	4.00	2.00
VII. *Improvements to Electric Distribution and Internal Transport Systems*		
(*a*) Additions and improvements to electricity sub-stations and hydraulic power house	1.00	—
(*b*) Additional railway lines	18.00	—
VIII. New slip-way	100.00	30.00
IX. Housing, Office-buildings, Staff Hospital and Miscellaneous, including Special Establishment and Construction Plant	299.00	11.00
X. Improvements to South Quays IV and V and East Quay	150.00	—
TOTAL	*2,227.50*	*605.00*

[a] This sum includes Rs. 52 lakhs carried forward from Third Plan.

The justification for undertaking the several works is stated in the following paragraphs.

Two Dock Tugs

The existing fleet of tugs in the port is not sufficient either in capacity or in numbers to handle the tankers/ore-carriers of 35,000 DWT and above. Two high capacity tugs of 1,200 B.H.P. are, therefore, required for the handling of ships in the oil dock.

Additional Dredger and Additional Sand Pumping Plant

In Chapter 2 mention is made of the littoral drift on the east coast and the consequent sand accretion south of the Madras harbour. It was also stated that among the measures taken to prevent the channel and the basin from silting up due to the sand accretion, were the provision of a "Sand Screen", the installation of a sand pump and the provision of adequate dredger capacity. With the projected expansion of the harbour by enclosing an oil dock and the greater depths of water that will be required in the channel and the oil dock, the quantities of the sand drift to be dealt with and the amount of dredging to be done will be much greater than hitherto. Besides, in recent years, it was found that some sand escapes the existing sand pump and fouls the channel. Ana dditional dredger and an extension to the sand screen with an additional sand pump are, therefore, necessary.

Mechanical-Handling Facilities for Ores

The present ore export which is of the order of 1.2 million tonnes per annum is handled at South Quay III berth by semi-mechanised equipment consisting of two transporter cranes, three shore electric cranes of 13 tonnes capacity, wagons and tubs. Two transporter cranes bridge across the stock pile which is of 30.4 metres width and 487.7 metres length and cover the full length of the stock yard over rail tracks. The iron ore arriving in BOX wagons or other types of conventional wagons is unloaded manually into a trench 0.9 metre deep and 6.1 metres wide running all along on the ore side of the yard. The ore thus unloaded is transferred to the stock pile by the transporter crane. When a ship is at berth, the ore from the ore yard is transferred by the transporter crane into steel tubs of 10 tonnes capacity mounted on wagons. The wagons are then hauled to the berth where the shore cranes lift the tubs and empty them into the ship's hold.

Under this system, the output is low. The manual unloading is slow and the capacity of the two transporter cranes is only 200 tonnes per hour. The berth at South Quay III cannot serve ships longer than 152.4 metres or with draft exceeding 9.1 metres. Hence the proposal to shift the ore loading to the new oil dock where a new berth will be built, capable of taking ore-

carriers up to 11.8 metres draft initially and 13.7 metres draft at a later stage.

The mechanical-handling arrangement envisages complete mechanisation from the ore wagon to the ore-carrier by conveyor belts. The ore will arrive in BOX, BOI or improved type of wagons in the new yard direct from Royapuram. Each rake will be divided into halves and each half rake will be propelled by diesel locos to a wagon tippler which would tipple the ore into a trunk belt through a hopper at the rate of 1,000 tonnes per hour. The belt will run between two stockyards each 609.6 metres long and 305 metres wide. The reclaimers working in each stock yard will transfer an additional quantity of 1,000 tonnes per hour to the ore fed from the tippler making the loading rate 2,000 tonnes per hour. The ore will be conveyed by a belt to two ship-loaders each with a capacity of 1,000/2,000 tonnes per hour and loaded into the ships' holds. On this basis, three million tonnes can be loaded in 225 days. The plant will be so designed that it can be expanded to twice its capacity, if necessary.

Grabs for Transporter Cranes

The grabs of the existing transporter cranes are put to heavy use and have to be replaced. The grabs of the coal cranes also require to be replaced. Although coal traffic is expected to fall, the coal crane can be used for other bulk cargo.

Mechanical Equipment for Handling of Rock Phosphate/Sulphur

As stated earlier, this equipment consists of new grabs required to refit and enlarge the capacity of the grabbing cranes now used for iron ore exports at South Quay III. A belt conveyor system will also be introduced, the equipment to be so designed that the whole outfit can be shifted to a new berth in the oil dock at a later stage, should that become necessary. A discharge rate of 250 tonnes per hour has been provided for and on three-shift working, 4,000/5,000 tonnes per day can be discharged.

Warehouses and Transit Sheds

With the re-location of the ore loading berth in the new oil dock, the east side of the Jawahar Dock which has now no transit sheds will be rendered useful as general cargo berths. Transit shed accommodation will, therefore, be necessary. More warehousing accommodation will also become necessary with the general expansion of the port's capacity.

The estimate provides for two additional single-storied or one double-storied warehouse and two single-storied transit sheds.

Additional Equipment—Locomotives

Eight additional locomotives are required to improve the efficiency of the transport to and from the berths. Two of them are of 2,400 tonnes hauling capacity. They will help to speed up foodgrain clearance in BOX wagons.

Workshops

The Port Trust workshop is at present located in a 40-year old building in a congested area. With the recent expansion in the fleet of cargo-handling equipment and with more equipment planned for the future, there is an urgent need for shifting the workshop to more commodious premises and providing it with more and better equipment. The plan for the new workshop includes a building for workshop stores, additional office accommodation, overhead cranes, road and rail approaches, etc. The general stores depot is now located in one of the warehouses which is unsatisfactory, besides using up warehouse accommodation. A scheme for re-organising the stores depot by locating zonal depots and sub-stores at convenient centres has, therefore, been prepared. Buildings and ancillary services for these depots have been provided for under this estimate.

Service Station for Mechanical Section

With the commissioning of the wet dock berths, the cargo-handling equipment is operating in a widely dispersed area. For efficient maintenance and servicing the service stations have to be re-organised so that they are available with a convenient distance of the equipment to be attended to. Three service stations, each equipped with the appropriate tools and equipment, oil storage, etc., will be established.

Spares for Operational Plant

The strength of the mechanical equipment of the port is growing. The average annual consumption of spares is of the value of Rs. 18 lakhs. A sum of Rs. 90 lakhs is, therefore, required for spares during the Fourth Plan period.

Renewals and Replacements

All the items listed under this head will have completed their useful lives and call for renewal or replacement during the Fourth Plan period.

Additions and Improvements to Electricity Sub-Stations

An additional sub-station is required to meet the needs of the new workshop. The existing sub-stations need an extra transformer each to separate

the load for lighting from power. The sub-station required for the ore loading plant has also been provided for, but the estimated expenditure for that item is included in the estimate for ore-handling project under Item II (*a*) on page 55.

Additional Railway Lines

The line capacity serving the existing marshalling yard has been found to be inadequate for meeting the large number of ore and foodgrain trains that have to be moved. Additional lines are, therefore, required.

New Slipway

The port of Madras is gradually acquiring the character of a "terminal port" in respect of a bulk of its traffic. When the oil-cum-ore dock is commissioned the number of full ship loads that will be discharged or loaded will increase greatly. Such ships will find dry docking facilities at the port very useful. In fact the lack of a dry dock will be a handicap to such ships because they will have nowhere else to go to for such facilities on the east coast. A dry dock to serve large ships is, therefore, an ultimate necessity and will have to be provided during the Fifth Plan. The Master Plan for the future development of the port should keep this need in view. Meanwhile, the port's own fleet of harbour craft—tugs, dredgers, barges, etc.—is increasing and outstriping the existing slipway capacity both for parking and for repairs. At present the Port Trust's dredger "Cauvery" which is about 85.3 metres in length has to be sent to other ports for underwater repairs. The new dredger and dock tugs which are to be acquired during the Fourth Plan will also have features beyond the capacity of the existing slipway. A new slipway is, therefore, necessary so that adequate facilities are created to enable periodical repairs and overhaul of the port's craft. This slipway will be required even after a new dry dock is provided during the Fifth Plan period.

Housing, Office Buildings, etc.

More housing units have to be built to meet the essential requirements of the officer cadre and the subordinate staff.

Improvements to South Quays IV & V and East Quay

The scheme is designed to make better use of the mechanised coal berths which are now underutilised and for which better use should be found. The area between the pier comprising South Quays IV & V and the East Quay should be bridged if the berths are to be put to other use, either for

general cargo or perhaps for rock phosphate or sulphur. The matter requires more careful study in the light of the future traffic trends in coal before any final step is taken to make further investments.

Fishing Harbour

The site will be at the Cassimode bay north of the Madras harbour as it will stand, after the proposed construction of the ore dock. This has been decided upon after necessary technical examination and consultation as well as model tests. The trawlers that will be engaged in the fishing industry will have a minimum length of 22.9 metres and a maximum length of 39.6 metres. The maximum draft will be 5.5 metres. The strength of the fleet will be 50 trawlers, and 400 pable boats up to the stage covered by 1975. The 'factory ships' and 'mother ships' which are required for the industry will be accommodated in the main harbour. Water accommodation is to be provided for the trawlers and boats inside the fishing harbour. The gauges will be 6.1 metres long and of a length sufficient to accommodate 1/7th of the total number of trawlers. There will be two sheds 18.3 metres wide, a long platform and a 18.3 metres wide road, with provision for railway access. A site will be reserved for slipway and repair facilities. On the shore there will be a wholesale fish market with 1579.4 sq. metres and a packing hall of 2090.3 sq. metres and 1728 sq. metres of cold storage accommodation will be provided.

The fishing harbour will embrace an area of 350 hectares protected by two breakwaters, one of 1371.6 metres length and another of 1188.7 metres length, with an entrance 61 metres wide with ample turning circle. A quay of 304.8 metres will be provided.

The estimate for the above works prepared by the Madras Port Trust, amounts to Rs. 320.40 lakhs with a foreign exchange content of Rs. 25 lakhs. The funds are to be provided by the Central Ministry of Food and Agriculture. The harbour will be the property of the Port Trust and there will be mutually agreed arrangements regarding administration.

The fishing harbour is expected to land about 35,000 to 50,000 tonnes of fish a year.

Additional Investment

Should the traffic in petroleum and iron ore develop to five million tonnes each by 1975-76, as it well might, the additional investment necessary, will be on account of the additional dredging to provide depths at the appropriate areas for 13.7 metres draft and for increasing the capacity of the ore loading plant from three million tonnes to five million tonnes per annum. This is

roughly estimated at Rs. 5 crores for dredging, including the additional dredgers and tugs, and at Rs. 1.50 crores for the additional ore loading capacity. By 1975-76, however, the port will have operated to twice its present capacity for five years. Its maintenance and operational expenditure will have grown too. No attempt has been made to estimate what this will involve in terms of new investment not chargeable to current revenues. So far as creation of new assets are concerned, the main item, besides the additional investment of Rs. 6.50 crores for the oil and ore traffic, will be the construction of a new dry dock of 750 to 304.8 metres length, sufficient to take the large-sized tankers/ore-carriers expected to use the port. A project for a dry dock of this kind will need careful technical studies and investigations. One possible site for such a dry dock can be on the northern bank of the river Cooum. It is understood that in the interests of dealing with the sand problem more efficiently it would be desirable to link such a scheme with a new project for creating a sand trap with an island breakwater for complete interception of the northerly littoral drift. Possibly the second sand pump could be installed at the proposed island breakwater. This may afford good scope for having deeper depths in the entrance channel unaffected by sand drifts at all times of the year. Further this could help in keeping the mouth of the river Cooum open for flushing the river to some distance into the city. With a wharf provided at the northern bank of the mouth of the Cooum, it would be possible to link the Buckingham Canal traffic with the port. The project needs detailed technical study. It may cost about Rs. 8 crores.

Another item for consideration in the Fifth Plan would be the improvement of road access to the harbour by the construction of an overbridge at the anchor gate in order to avoid stoppages of road traffic by the rail traffic at level crossings. The construction of such a bridge would have assumed urgency if the three million tonnes iron ore export berth were to be located at the Jawahar Dock, as previously planned and the Port Trust had, on that basis, included the overbridge project in its earlier proposals for development works for the Fourth Plan period. Now that the new ore berth is to be located at the new oil dock bypassing, the existing congested rail approach to the southern side of the harbour, the rail traffic which will interfere with the road traffic at the level crossing will not be heavy. Even so, it is considered that the project should not be shelved and arrangements should be made to take it up, should the traffic conditions there demand it, during the Fifth Plan period. The estimated cost of the overbridge is Rs. 46 lakhs.

To sum up, the investments required are as follows.

During the Fourth Plan Period :

(*a*) Rs. 22.27 crores by the Port Trust, of which Rs. 150 lakhs proposed for the modification to South Quays IV, V and east quay need more consideration.

(*b*) Rs. 3.20 crores for the fishing harbour—this investment to be made by the Ministry of Food and Agriculture.

During the Fifth Plan Period :

(*a*) Rs. 6.50 crores for the oil-cum-ore dock, made up of Rs. 5.00 crores for dredging, additional dredgers and tugs and Rs. 1.50 crores for providing additional capacity for the mechanical ore handling plant.

(*b*) Rs. 8 crores for a dry dock.

(*c*) Rs. 0.46 crore for an overbridge.

The estimate for the Fifth Plan period does not include what is required for renewals, replacements, and miscellaneous works necessary to maintain the various assets at the required level of efficiency.

Chapter 8

Port Traffic Growth and its Impact on the Regional Inland Transport

A BROAD APPRAISAL is made in this chapter of the impact which the estimated growth of traffic in the port will make on inland transport facilities in the region. The traffic to and from the port is at present distributed between rail and road in ratio of 58 to 42. There will gradually be an upward trend in the proportion of rail traffic in view of the expected increase in iron ore export (from one million tonnes to three million tonnes by 1970-71 and possibly to five million tonnes by 1975-76), all the iron ore being transported from the Bellary-Hospet area by rail. The study of the land transport break-up may, as in the case of the port traffic studies, be made by major commodities.

Petroleum

The imports in 1965-66 amounted to 897,000 tonnes. The quantity of petroleum traffic moving out of the port area into the hinterland is very small, being limited to the distribution from one storage tank belonging to an oil-distributing company located in land belonging to the port authority. Practically, all the petroleum discharged at the port at present is pumped through pipelines to the oil-distributing companies' storage tanks at Tondiarpet which is outside the port. When the refinery is established and the traffic grows to 2.5 million tonnes of crude oil imports and to one million tonnes of refined products exports, the same pattern of pipeline transport will take care of the traffic between the harbour and the refinery. The investment required on the pipelines now or later has not been estimated for the purpose of this study because that would be part of the estimate for the establishment of the refinery itself. The distribution to inland consuming centres from the refinery's storage tanks will become a purely inland transport problem of the

oil industry. The refinery's sales distribution agent (Indian Oil Company) will, no doubt, have acquainted the railway authorities of the rail transport that will be required and made its own arrangements for the road transport that will be required. The flows of petroleum traffic from the main distributing centres (including Madras) have been studied by the Planning Commission's Joint Technical Group and their report (not released so far) should give data about the density and direction of the petroleum traffic from the refinery.

Iron Ore

Here the present traffic of 1.16 million tonnes will rise to three million tonnes by 1970-71 and perhaps to five million tonnes by 1975-76. The target of ore export from the Bellary-Hospet area through the Madras port for 1970-71 having been agreed with the railway authorities, the additional rail transport capacity is, no doubt, being arranged and should be ready by that year. As regards 1975-76, this will have to be taken note of and the requirements studied and necessary additional capacity provided by the railways, at the appropriate time.

Fertilizer/Rock Phosphate/Sulphur

This is the next largest group that may make a sizeable demand on inland transport. The current import of fertilizers is 460,000 tonnes; $33\frac{1}{3}$ per cent of this (150,000 tonnes) is now distributed to most of the districts in Madras, Andhra Pradesh, Mysore and other States. The 460,000 tonnes of current imports will be substituted by 600,000 tonnes of imports in 1970-71, increasing to one million tonnes in 1975-76. All this will be raw materials moving to fertilizer factories, and in view of its nature and volume this traffic is likely to move by railway and not by road.

Coal and Foodgrains

Imports through Madras will make less demand on inland transport in 1970-71 since the quantities projected for 1970-71 and 1975-76 are much less than the present levels.

The volume of traffic in the other commodities which is now approximately one million tonnes is expected to be practically the same (1.13 million tonnes) in 1970-71 and in 1975-76. There is thus likely to be no appreciable extra load thrown on inland transport by the commodities in this group.

The pattern of rail movement from districts to the port and from the port to the districts which prevailed in 1965-66 is shown in Tables 15 and 16. It appears from these that the large movements of imports consist of

chemical manures, coal, foodgrains and iron and steel, while in the case of exports, the movement of iron ore dwarfs everything else.

Chapter 9

Methods of Working of the Port in the Past and at Present and Proposals to Improve them in Future

FOR THE PAST two decades and more, the port of Madras had to deal with traffic much in excess of its capacity. Every department of port activity was required to work at high intensity and to devise ways and means of maximising output with the available resources. Productivity consciousness has, therefore, been the guideline of operations at this port. Madras was the first among major ports in India to substitute old fashioned hydraulic wharf cranes by modern high efficiency electric cranes. The use of railway wagons with chutes for increasing the speed of foodgrains discharge was first made in Madras. The port has a good reputation among shipping and trade circles for the efficiency of cargo stocking in transit sheds. Clearing agents say that at Madras it is very easy to identify and clear goods speedily from the transit sheds.

The main deficiency that the port has suffered in the past is from the inadequate number of alongside berths and ancillary facilities that constitute "port capacity". This deficiency has been effectively removed by the completion of the Wet Dock Scheme and the works connected with that scheme.

Due to limitations of space within the port area and the general state of congestion all-round, workshop and repair facilities have not so far been expanded to meet the growing requirements. These are now being taken care of in the proposals for a fully equipped new workshop included in the Fourth Plan (details are given in Chapter 7). These proposals also include many other items necessary for improvement in other sectors, such as the Port Trust's railway system, both track and power, reorganisation of the

stores depots, new service stations for near-the-spot servicing of mechanical handling gear, electric distribution system, etc. There is hardly any item of importance not covered by the proposals included in the Fourth Plan.

The improvements necessary from the operational angle are in the ore handling and foodgrain handling techniques.

High speed loading of iron ore equal to current international standards will be rendered necessary when the harbour is placed in a position to receive super ore-carriers of 11.9 to 13.7 metres draft. It will be done by 1969, the date by which the new oil-cum-ore dock will have been commissioned.

The present arrangements for the handling of foodgrains do not come upto international standards. The deficiencies will be apparent from the following account of the methods at present in operation in the port :

(*a*) The chute wagons which receive the grain discharged by slings or by vacuators are operated on the open wharf with no monsoon protection.

(*b*) The chute wagons capacity is limited and, therefore, the discharge from ships gets interrupted; clearance from the wagon does not always keep pace with the discharge by vacuator.

(*c*) The filling of bags from the chute wagons is entrusted to one set of labour (engaged by the Food Department) while the removal of the bags to the sheds is done by another set of labour (Port Trust shore labour). The loading of rail wagons from the sheds is again done by the Food Department's labour. Such a division of work hinders smooth flow.

(*d*) Unless there is a constant stream of rail wagons, with regular placement, quick clearance from the transit sheds cannot be ensured.

All these factors which hinder the smooth and quick flow of foodgrains handling can be rectified by the Port Trust authorities by suitable modifications in the procedures now adopted. These are all matters of administrative detail which the Port Trust can solve. Attention may also here be drawn firstly to the fact that the foodgrain imports that are envisaged in the years 1970-71 and 1975-76 are substantially less than at present. Secondly, the Port Trust's proposals mentioned in Chapter 7 cover adequately provision of additional handling equipment and shed space.

Points of criticism relating to certain operational matters are contained in memoranda received from certain port users. These are commented upon in the Appendix.

The Madras Steamer Agents' Association has raised a crucial point affecting port finance and policy regarding the undertaking of large

works on behalf of Government. It has stated that, before additional mechanisation is provided for the ore traffic, involving huge expenditure, it would be advisable for the Trust to obtain an undertaking from the Government or the Minerals and Metals Trading Corporation to the effect that a certain quantity of ore will always be exported from the Madras port; failing which the Trust would be entitled to a subsidy from the Government. According to the Association, such an undertaking is essential in view of the recent experience of the Port Trust with reference to railway coal which used to pass through the port to the tune of about 450,000 tonnes a year. Most of this traffic is now moved by the all-rail route from the Bengal-Bihar coal fields to the southern region. This has rendered idle the mechanised coal berths at South Quay IV and the Port Trust is now proposing to incur further expenditure on converting the berths to other uses (item X in the list of the Fourth Plan works listed in Chapter 7).

In the case of iron ore, the Port Trust has reduced the port charges from Rs. 10 per tonne successively to Rs. 8 per tonne and to Rs. 6.50 per tonne on the condition that the quantity lifted in a twelve-month period does not fall below 1.5 million tonnes. If it falls below that datum, an additional charge of Rs. 1.50 per tonne will be made. This is a good arrangement, but it does not protect the Port Trust from loss if, for some unforeseen reason, the export falls to very low levels.

In view of the further large investment the Port Trust has to make on the installation of the facilities for the export of ore to the tune of about three million tonnes per year, to save the Trust from loss due to underutilisation of such facilities, the question arises if the Minerals and Metals Trading Corporation may not be called upon to make a direct investment to meet the cost of the mechanical ore loading plant to be installed on a berth to be leased to them by the Port Trust, (somewhat like the mechanical handling arrangements for foodgrains provided by the Food Department at its own cost), on terms to be mutually agreed upon. Such an arrangement will have its good features. It will interlink the financial interests of the Minerals and Metals Trading Corporation directly with the day to day working of the loading plant. The ore export trade will be placed on a more solid foundation as it would be an incentive to all parties concerned to cooperate to the utmost. For example, should production wobble at the mines, the MMTC would under the suggested arrangement, have the incentive to act promptly to spot and remove bottlenecks. Under the existing system there are several links in the chain, with differing interests—from the mines, through the railways and the port authority to the ocean-carrier—and

deficiencies occurring in any one link in the chain are not observed and corrected with the required speed and efficiency.

The point raised in the foregoing paragraph is also relevant when dealing with the criticism made by certain port-users that the port charges at Madras are high. Since the port authority is required to balance its budget, it is of paramount importance to effect the maximum possible economy in the cost of providing new facilities for the trade. Upto the end of the financial year 1964-65, the Port Trust had financed its development programme to the extent of a little over Rs. 10 crores from its own revenue surpluses. This contribution works out to nearly 50 per cent of the total cost of the development works during the three Five Year Plans, namely, Rs. 21.50 crores. The debt charges amounted in 1965-66 to about Rs. 90 lakhs a year which is more than 20 per cent of the Port Trust's annual revenues. The Port Trust is no longer in a position to earmark further funds from the annual income towards capital expenditure. All new capital expenditure will have to be financed from loans and, therefore, the prospects are that the charges will hereafter have to be raised rather than lowered. The increases would have to be higher if funds from current revenues are to be diverted to development works.

Coming to the merits of the criticism that the port and wharfage charges at Madras are high, it can be said that the overall charge levied from the trade at Madras, expressed in terms of revenue per tonne of cargo landed or shipped, bears favourable comparison with the two other leading major ports of India, Calcutta and Bombay. Based on the 1964-65 figures, the Madras port realized Rs. 10.50 per tonne, as against Rs. 17.13 at Calcutta and Rs. 10.03 at Bombay. This is the position notwithstanding the fact that about 50 per cent of the berthing capacity at Madras has been provided through new investment in the three Five Year Plans. In the case of Bombay and Calcutta, the new berthing facilities provided during the same Plan periods form only a small proportion of the total assets.

The port of Madras is now rated as among the most efficient of Indian major ports. The works envisaged during the Fourth Plan are designed to maintain and improve upon the present high level of efficiency. The port has now a capacity well in excess of the current demand on it. What is planned for the port, will place it in a position to deal with traffic in excess of demand that may arise in 1970-71 or 1975-76. Entrepreneurs in industry seeking to establish new units or to expand existing units would do well to take note of the port's adequacy to cope with the new loads of inputs of raw materials or exports of finished products that such new industrial activity will generate in the region.

Chapter 10

Summary of Conclusions and Recommendations

Historical

THE PORT OF Madras has a long history. Although seaborne trade commenced in 1639 an enclosed harbour giving protection to ships was constructed as late as 1890.

During World War I four quay berths were built to receive ships alongside. Another four berths were added before World War II.

Traffic developed much in excess of facilities and it took three Five Year Plans to increase the number of berths to 18, doubling the capacity at the commencement of the First Plan.

Descriptive

The existing port facilities are described in detail in Chapter 3. They serve to show the care devoted to meeting the special needs of shipping and of every section of the trade in step with the growing needs.

The port is administered by a Board of Trustees, official and non-official, representing a wide spectrum of user interests. The ports' finances are sound. It has contributed Rs. 10.26 crores out of its own revenues towards Rs. 21.50 crores spent in the three Plan periods on development works.

Traffic Trends

The highlights of the traffic trends since 1950-51 are :—

(*a*) Increase in the number of ships from 1,048 to 1,406, an increase

deficiencies occurring in any one link in the chain are not observed and corrected with the required speed and efficiency.

The point raised in the foregoing paragraph is also relevant when dealing with the criticism made by certain port-users that the port charges at Madras are high. Since the port authority is required to balance its budget, it is of paramount importance to effect the maximum possible economy in the cost of providing new facilities for the trade. Upto the end of the financial year 1964-65, the Port Trust had financed its development programme to the extent of a little over Rs. 10 crores from its own revenue surpluses. This contribution works out to nearly 50 per cent of the total cost of the development works during the three Five Year Plans, namely, Rs. 21.50 crores. The debt charges amounted in 1965-66 to about Rs. 90 lakhs a year which is more than 20 per cent of the Port Trust's annual revenues. The Port Trust is no longer in a position to earmark further funds from the annual income towards capital expenditure. All new capital expenditure will have to be financed from loans and, therefore, the prospects are that the charges will hereafter have to be raised rather than lowered. The increases would have to be higher if funds from current revenues are to be diverted to development works.

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Traffic Trends

The highlights of the traffic trends since 1950-51 are :—

(*a*) Increase in the number of ships from 1,048 to 1,406, an increase

of 34.16 per cent.

(*b*) Disappearance of the sailing vessels traffic.

(*c*) Growth of Indian shipping tonnages using the port—from 19.51 per cent in 1952-53 to 46.86 per cent in 1965-66.

(*d*) Tankers constituted a steady percentage of about nine all through the period under study.

(*e*) Decrease in coastal shipping—number of ships from 206 to 171; proportion of coastal ships to total from 19.56 per cent to 12.16 per cent.

(*f*) A steady passenger traffic of about 100/110,000 a year.

(*g*) Cargo traffic has more than doubled in 15 years—from 2.1 million tonnes in 1950-51 to 4.9 million tonnes in 1965-66. All of it is normal growth, without any adventitious factors such as the location of a refinery.

(*h*) Five main bulk commodities together account for 80.70 per cent of the current (1965-66) traffic. They are petroleum (18.48%), ores (25.46 %), coal (7.80 %), foodgrains (19.51%) and fertilizers (9.45 %). Of these the largest item is ores (1.2 million tonnes in 1965-66). Coal traffic is dwindling. 'Other general cargoes' which constitute 19.30 per cent of the total and which mostly reflect the economy of the region has increased by about 23 per cent in 12 years.

Port Capacity

With only nine alongside berths the port of Madras had for several years maintained a high average berth output well exceeding 200,000 tonnes which is an accepted norm. This is in the face of severe congestion, relieved by intensive use of lighterage and other expedients.

The completion, by July 1965, of the wet dock expansion scheme has brought up the capacity of the port to over six million tonnes of cargo against an actual utilisation up to 4.87 million tonnes in 1965-66.

Mechanical handling equipment is put to good use in the port, increasing the capacity of existing facilities.

Productivity of shore labour is on the increase. Various incentive schemes designed to increase output have been put into force and are showing good results.

Comments from the Madras Chambers of Commerce, the Madras Steamer Agents' Association, etc., show that the users are well satisfied with the port facilities and method of working. They also approve and welcome the

scheme for development of the oil dock and for other improvements.

The port now possesses all the facilities needed to meet the current traffic demands efficiently. It has also adequate reserves of capacity to take additional traffic upto about 1.5 million tonnes.

Traffic Projections

The total traffic in imports and exports is expected to rise from the present level (1965-66) of 4.87 million tonnes to 8.7 million tonnes in 1970-71 and 13.1 million tonnes in 1975-76. The increase is expected mainly from the establishment of an oil refinery at Madras of 2.5 million tonnes capacity and the expansion in the iron ore export trade from the current level of 1.2 million tonnes to three million tonnes.

Coal will decline from the current level of 385,000 tonnes to 200,000 tonnes.

Foodgrains which now stand at 950,000 tonnes will be reduced to 200,000 tonnes of imports of wheat required in the Madras region.

Raw materials for fertilizer production will constitute a large item in future traffic; 600,000 tonnes in 1970-71 and one million tonnes in 1975-76. The general cargo traffic is expected to be practically stationary—1.1 million tonnes in 1970-71 and 1.2 million tonnes in 1975-76 as against 0.94 million tonnes in 1965-66.

A new industry, the fishing industry, will develop requiring port facilities. The expected landing is between 25,000 tonnes and 35,000 tonnes of catch, not included in the port cargo traffic estimates.

Diversion of Traffic

Diversion of traffic from the port of Madras to other ports in the region will be small. No allowance has been made in the traffic projection in respect of traffic likely to be diverted.

Additional Berths, etc., Which are Necessary and Their Cost

The traffic is expected to be doubled by 1970-71. Practically all the increase is expected from bulk commodities, petroleum, ore and rock phosphate/sulphur. For petroleum, a new oil dock is necessary and is being developed. This will give a deep water harbour capable of taking supertankers and super carriers of between 11.9 and 13.7 metres draft and up to 70,000 DWT capacity. An ore berth with a loading plant of up to three million tonnes annual capacity, capable of being increased to five million tonnes if necessary, can be located at the oil dock. The combined

oil/ore dock project, which has been approved, is estimated to cost about Rs. 11 crores.

For the Fourth Plan, the Madras Port Trust have included, besides the amount required for the oil/ore dock, sums totalling Rs. 11 crores for various works of improvement of the port facilities. A list of all the works required to be undertaken during the Fourth Plan period is given in Chapter 7 in the table on page 55.

The berthing potentialities of the new dock will include 4 new berths for giant carriers of the 70,000 DWT class, if required later for other bulk cargo.

A Master Plan for the future of the port is being drawn up. It will include the requirement of the fishing harbour also, estimated to cost Rs. 3.20 crores.

The additional investment required by 1975-76 if the traffic in petroleum and iron ore develops to the projected levels will be Rs. 6.50 crores. A dry dock will also be necessary by 1975-76. This is estimated to cost Rs. 8 crores. Improved road transport to and from the harbour and link over-bridge, above the railway, estimated to cost Rs. 46 lakhs, will also be necessary.

Impact of Port Traffic Growth on Inland Transport

The impact which the growth of port traffic makes on road and rail transport has been broadly assessed. The present distribution between road and rail of the traffic is as 42 to 58. There will be an upward trend in the proportion that the railways will have to take mainly due to increase in the ore trade, and a downward trend in the movement of coal and food-grains from the port to its hinterland.

Trends in the Method of Working of the Port

The Madras port has been and is operating to high standards of efficiency. Representative associations of port-users have complimented the port administration's method of work. The main improvement the port needs is to introduce higher rates of loading of bulk commodities. This will be taken care of under the development plan included in the Port Trust's proposals for the Fourth Plan.

The Port Trust will be investing nearly Rs. 4 crores on the mechanical iron ore berth. To protect the Port Trust from loss and to avoid any serious decline in the traffic in iron ore, certain suggestions have been made by the

Madras Steamer Agents' Association. These have been commented upon.

The wharfage and other port charges at Madras Port appear, *prima facie*, to be reasonable, having regard to the high proportion of new investment in its total assets.

Tables

Table 1

Volume and Percentage of Imports and Exports

(Tonnes)

Year	*Imports*	*Exports*	*Total*	*Index of growth of trade*
(1)	(2)	(3)	(4)	(5)
1950-51	1,880,846 (89.28)	225,746 (10.72)	2,106,592	100
1951-52	1,775,134 (86.41)	279,157 (18.59)	2.054,291	98
1952-53	1,836,233 (85.13)	320,855 (14.87)	2,157,088	102
1953-54	1,594,938 (76.90)	479,164 (23.10)	2,074,102	98
1954-55	1,635,673 (77.70)	469,476 (22.30)	2,105,149	100
1955-56	1,740,104 (74.23)	603,972 (25.77)	2,344,076	111
1956-57	1,895,703 (75.72)	607,851 (24.28)	2,503,554	110
1957-58	1,915,656 (75.30)	626,497 (24.70)	2,544,153	121
1958-59	1,765,197 (71.20)	718,952 (28.80)	2,479,149	118
1959-60	1,841,020 (66.63)	921,828 (33.37)	2,762,848	131
1960-61	2,127,852 (70.03)	910,575 (29.97)	3,038,427	144
1961-62	2,268,853 (65.44)	1,198,290 (34.56)	3,467,143	165
1962-63	2,587,818 (68.37)	1,197,113 (31.63)	3,784,931	180
1963-64	2,588,757 (62.14)	1,577,005 (87.86)	4,165,762	198
1964-65	2,992,865 (68.05)	1,405,284 (21.95)	4,398,140	209
1965-66	3,298,879 (67.72)	1,572,713 (32.26)	4,871,592	231

NOTE :—The figures within brackets are percentages of the total.

SOURCE :—Trade Statistics (P & R) Cell, (Madras Port Trust).

Table 2

Comparison of Traffic of Madras Port with that at other Major Ports in India

(In million tonnes)

Year	*Number of ships that visited Madras port*	*Total number of ships that visited major ports*	*Tonnes handled at Madras port*	*Tonnes handled at Major ports*	*Percentage of ships that visited Madras port to total*	*Percentage of tonnes handled at Madras port to total*
1960-61	1,204	8,482	3.04	33.69	14.19	9.02
1961-62	1,230	8,377	3.47	33.93	14.68	10.23
1962-63	1,214	9,247	3.79	42.71	13.13	8.87
1963-64	1,280	9,312	4.17	46.71	13.74	9.03
1964-65	1,345	9,425	4.40	48.31	14.27	9.11
1965-66	1,406[a]	N.A.	4.87	N.A.	N.A.	N.A.

[a] Includes three pleasure yachts.

SOURCE :—*Annual Reports of the Ministry of Transport and Communications.*

Table 3

Comparison of Traffic of Madras Port with the Total Traffic of all Ports in Madras State

Plan	*Tonnage handled at the minor ports in Madras State*	*Tonnage handled in Madras port*	*Percentage of tonnage handled at Madras port to total*	*Percentage of tonnage handled at minor ports to total*
First Plan	3,760,397	10,734,706	74.06	25.24
Second Plan	5,878,524	18,828,131	69.19	30.81
Third Plan (First 3 years)	4,404,519	19,474,793	81.56	18.44

SOURCES :—*1.* Trade Statistics (P & R Cell), Madras Port Trust.

2. Regional Transport Survey of Madras State and Pondicherry, NCAER (for minor ports in Madras State).

Table 4

Foreign and Coastwise Traffic

Year	Imports		Exports		Foreign trade and percentage	Coastal trade and percentage	Percentage of		Percentage of	
	Foreign	Coastal	Foreign	Coastal			Foreign imports	Foreign exports	Coastal imports	Coastal exports
1950-51	1,357,663	523,354	179,823	45,933	1,537,486 (72.97)	569,897 (27.03)	88.30	11.70	91.93	8.07
1951-52	12,424,013	351,203	239,937	39,227	1,663,950 (81.00)	390,430 (19.00)	85.58	14.42	89.95	10.05
1952-53	1,270,628	565,690	296,844	24,025	1,567,472 (72.66)	589,715 (27.34)	81.06	18.94	95.93	4.07
1953-54	1,113,026	554,638	433,339	69,208	1,546,365 (71.25)	623,846 (28.75)	71.98	28.02	88.91	11.09
1954-55	1,197,889	545,954	417,236	75,617	1,615,125 (72.21)	621,571 (27.79)	74.17	25.83	87.83	12.17
1955-56	1,102,585	760,717	580,723	57,088	1,683,308 (67.30)	817,805 (67.30)	65.50	34.50	93.02	6.98
1956-57	1,179,311	716,480	564,766	43,144	1,744,077 (69.66)	759,594 (30.34)	67.62	32.38	94.32	5.68
1957-58	1,246,944	668,802	590,541	37,985	1,837,485 (72.22)	706,787 (27.78)	67.86	32.14	94.63	5.37
1958-59	1,146,769	618,510	662,734	51,251	1,809,503 (72.96)	669,761 (27.04)	68.37	36.63	92.35	7.65
1959-60	1,072,172	768,848	874,044	47,784	1,946,216 (70.44)	816,638 (29.56)	55.09	44.91	94.15	5.85
1960-61	1,359,995	767,857	861,074	49,501	2,221,069 (73.10)	817,358 (26.90)	61.23	38.77	93.94	0.06
1961-62	1,390,745	878,108	1,135,741	62,549	2,526,486 (72.87)	940,657 (27.13)	55.05	44.95	93.35	6.65
1962-63	1,560,754	1,027,064	1,136,794	60,319	2,697,548 (71.27)	1,087,383 (28.73)	57.36	42.14	94.45	5.55
1963-64	1,471,855	1,116,902	1,521,498	55,507	2,993,353 (71.86)	1,172,409 (28.14)	49.17	50.88	95.27	4.73
1964-65	1,848,098	1,144,767	1,352,909	52,374	3,201,007 (72.78)	1,197,141 (27.22)	57.78	42.27	95.63	4.37
1965-66	2,173,190	1,125,689	1,522,569	50,144	3,695,759 (75.86)	1,175,833 (24.14)	58.80	41.20	95.74	4.26

SOURCE :—*Madras Port Trust Administration Reports.*

Table 5

Petroleum and Dry Cargo Traffic of Madras Port

(Tonnes)

Year	*Petroleum*	*Dry cargo*	*Total*	*Percentage of petroleum traffic*	*Percentage of dry cargo traffic*	*Growth index for petroleum*	*Growth index for dry cargo*
1954-55	471,636	1,633,513	2,105,140	22.40	77.60	100	100
1955-56	526,103	1,817,973	2,844,076	22.40	77.56	111	111
1956-57	576,970	1,926,584	2,503,554	23.05	76.95	122	118
1957-58	515,014	2,029,139	2,544,153	20.24	79.76	109	124
1958-59	524,323	1,954,826	2,479,149	21.15	79.85	111	130
1959-60	559,635	2,203,213	2,762,848	20.26	79.74	119	135
1960-61	601,014	2,437,413	3,038,427	19.78	80.22	127	149
1961-62	687,023	2,780,120	3,467,142	19.82	80.18	146	170
1962-63	780,413	3,004,518	3,784,981	20.62	79.48	165	184
1963-64	818,500	3,347,262	4,165,762	19.65	80.35	174	205
1964-65	876,988	3,521,211	4,398,149	19.42	80.08	186	216
1965-66	897,411	3,974,181	4,871,592	18.42	81.58	190	243

SOURCE :—Trade Statistics (P & R Cell), Madras Port Trust.

Table

Traffic in Coal, Ores, Foodgrains, Fertilizers

Year	*Coal*	*Ores*	*Foodgrains*	*Fertilizers*	*Other general cargo*
(1)	(2)	(3)	(4)	(5)	(6)
1951-52	278,432	101,398	496,851	84,979	—
1952-53	462,034	131,422	345,716	186,963	—
1953-54	469,510	305,134	183,184	73,038	—
1954-55	424,815	249,418	112,507	82,042	764,731
1955-56	443,538	332,510	42,916	160,075	838,934
1956-57	379,348	470,837	152,362	147,111	776,926
1957-58	363,688	499,583	338,583	168,685	658,651
1958-59	324,828	509,401	364,173	112,828	644,096
1959-60	344,494	683,783	326,913	188,626	659,397
1960-61	362,840	693,544	442,826	215,039	723,164
1961-62	424,110	955,552	312,730	277,807	808,921
1962-63	521,056	844,162	412,685	332,086	884,529
1963-64	457,871	1,313,763	465,002	299,584	911,042
1964-65	488,139	1,102,150	750,417	317,433	863,072
1965-66	385,406	1,238,534	949,621	460,011	940,609

SOURCES :—(*1*) Trade Statistics (P & R Cell), Madras Port Trust.

(*2*) *Madras Port Trust Administration Reports.*

6

and Other General Cargoes

(Tonnes)

Coal growth index	*Ores growth index*	*Foodgrains growth index*	*Fertilizers growth index*	*Coal percentage in dry cargo*	*Ores percentage in dry cargo*	*Foodgrains percentage in dry cargo*	*Fertilizer percentage in dry cargo*	*Other general cargo percentage in dry cargo*
(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
100	100	100	100	—	—	—	—	—
166	130	70	220	—	—	—	—	—
169	301	37	86	—	—	—	—	—
153	246	22	97	26.01	15.27	6.88	5.62	46.82
159	328	9	188	24.40	18.29	2.36	8.81	46.14
137	464	31	173	19.69	24.44	7.90	7.64	40.38
131	493	68	199	17.92	24.62	16.68	8.31	32.47
116	502	73	133	16.59	26.06	18.63	5.77	32.95
124	674	66	222	15.64	31.04	14.84	8.56	29.92
180	684	89	253	14.89	28.45	18.17	8.82	29.67
153	942	63	327	15.26	34.37	11.28	9.99	29.10
191	832	83	391	17.68	28.10	13.74	11.04	29.44
165	1,197	94	353	13.68	36.26	13.89	8.95	27.22
175	1,087	151	374	13.86	31.30	30.31	9.02	24.51
138	1,221	191	541	9.70	30.31	23.89	11.58	23.67

Table 7

Passenger Traffic at Madras Port

Year	*Number of passengers disembarked*	*Number of passengers embarked*	*Total*	*Index*
1950-51	27,117	30,804	57,921	100
1951-52	29,325	34,590	63,915	110
1952-53	27,722	39,522	67,244	116
1953-54	25,126	36,386	61,512	106
1954-55	33,924	26,290	60,214	104
1955-56	33,264	27,524	60,788	105
1956-57	33,125	29,119	62,244	108
1957-58	34,060	24,636	58,696	101
1958-59	35,812	26,421	62,288	107
1959-60	32,111	25,778	57,889	100
1960-61	35,373	29,957	65,330	113
1961-62	29,714	29,574	59,288	102
1962-63	32,859	30,610	63,469	110
1963-64	29,997	31,214	61,211	106
1964-65[a]	64,110	30,071	94,181	163
1965-66[a]	76,083	31,858	107,941	186

[a] Includes repatriates from Burma.

SOURCE :—*Madras Port Trust Administration Reports.*

Table 8

Number of Vessels and their Tonnage that Entered the Port

Year	*Number of vessels excluding sailing vessels*	*Number of sailing vessels*	*N.R.T. of vessels excluding sailing vessels*	*N.R.T. of sailing vessels*	*Total N.R.T. of vessels*
1950-51	996	52	3,734,341	3,383	3,737,724
1951-52	977	114	8,626,246	7,003	3,633,249
1952-53	1,026	71	3,842,518	5,401	3,847,919
1953-54	1,037	23	3,859,704	2,326	3,862,030
1954-55	1,003	22	3,708,268	2,029	8,710,297
1955-56	926	58	3,415,820	6,860	3,422,680
1956-57	878	31	3,168,590	8,919	3,172,509
1957-58	933	17	3,497,112	1,458	3,498,570
1958-59	1,085	7	4,040,702	434	4,041,136
1959-60	1,195	11	4,480,943	829	4,481,792
1960-61	1,289	6	4,951,231	365	4,951,596
1961-62	1,276	13	4,957,242	1,201	4,958,443
1962-63	1,258	4	4,930,042	372	4,930,414
1963-64	1,289	4	5,246,798	564	5,247,362
1964-65	1,343	2	5,463,647	285	5,463,932
1965-66	1,406[a]	—	5,776,616	—	5,776,616

[a] Including three pleasure yachts.

SOURCE :—*Madras Port Trust Administration Reports.*

NOTE :—N.R.T. denotes Net Registered Tonnage.

Table 9

Indian Flag and Foreign Flag Vessels that Entered the Port

Year	*Indian flag vessels*	*Foreign flag vessels*	*Percentage of Indian flag vessels*	*Percentage of foreign flag vessels*
1950-51	N.A.	N.A.	—	—
1951-52	N.A.	N.A.	—	—
1952-53	214	883	19.51	80.49
1953-54	270	789	25.50	74.50
1954-55	243	724	23.66	76.34
1955-56	244	740	24.80	75.20
1956-57	219	685	24.28	75.72
1957-58	215	735	22.63	77.37
1958-59	309	788	28.30	71.70
1959-60	354	852	29.35	70.65
1960-61	350	894	28.13	71.87
1961-62	400	889	31.03	68.97
1962-63	405	858	32.19	67.81
1963-64	417	863	32.58	67.42
1964-65	418	927	31.08	68.98
1965-66	448	956	46.86	53.14

SOURCE :—*Madras Port Trust Administration Reports.*

Table 10

Number and Tonnage of Tankers Compared to Total for all Vessels (Excluding Sailing Vessels) that Entered the Port

Year	*Number of tankers*	*Gross tonnage of tankers*	*Number of vessels (excluding sailing vessels)*	*Gross tonnage of vessels (excluding sailing vessels)*	*Percentage of tankers to total vessels (excluding sailing vessels)*	*Percentage of tonnage of tankers to total of vessels*
1952-53	94	795,977	1,026	6,497,600	9.16	12.25
1953-54	84	765,320	1,037	6,567,029	8.10	11.65
1954-55	93	820,103	1,003	6,359,881	9.27	12.89
1955-56	101	867,470	926	5,844,550	10.91	14.84
1956-57	109	1,000,263	873	5,443,267	12.60	18.38
1957-58	100	870,531	933	6,025,054	10.72	14.45
1958-59	95	838,671	1,085	6,989,741	8.76	12.00
1959-60	96	909,400	1,195	7,767,736	8.03	11.71
1960-61	108	1,013,699	1,239	8,547,562	8.31	11.86
1961-62	114	1,150,003	1,276	8,579,956	8.93	13.40
1962-63	130	1,341,251	1,258	8,522,981	10.33	15.74
1963-64	126	1,320,296	1,289	9,196,162	9.77	14.36
1964-65	125	1,338,163	1,343	9,579,859	9.31	13.97
1965-66	142	1,581,602	1,406[a]	10,043,409	10.10	15.75

[a] Including three pleasure yachts.

SOURCE :—*Madras Port Trust Administration Reports.*

Table 11

Vessels Engaged in Coastal Trade

Year	*Number of vessels engaged in coastal trade*	*Total number of vessels engaged in trade*	*Percentage of vessels engaged in coastal trade to total*
1950-51	206	1,048	19.56
1951-52	159	1,091	14·57
1952-53	149	1,097	13.58
1953-54	162	1,060	15.28
1954-55	161	1,025	15.71
1955-56	128	984	18.03
1956-57	115	904	12.72
1957-58	92	950	9.69
1958-59	148	1,092	12.55
1959-60	164	1,206	18.60
1960-61	145	1,245	11.65
1961-62	166	1,289	12.88
1962-63	194	1,262	15.37
1963-64	172	1,293	13.30
1964-65	155	1,345	11.62
1965-66	171	1,406[a]	12.16

[a] Including three pleasure yachts.

SOURCE :—*Madras Port Trust Administration Reports.*

Table 12

Tonnage Lightered

(Tonnes)

Year	*Coal*	*General cargo*	*Total*
1950-51	9,342	29,457	38,799
1951-52	8,260	41,302	49,562
1952-53	24,887	55,193	80,080
1953-54	39,211	19,084	58,295
1954-55	31,390	49,294	80,684
1955-56	18,934	98,496	117,430
1956-57	15,167	148,250	163,417
1957-58	10,571	126,790	137,361
1958-59	9,051	181,400	140,451
1959-60	2,837	145,963	148,800
1960-61	5,482	187,331	192,763
1961-62	3,210	86,060	89,270
1962-63	—	119,739	119,739
1963-64	—	55,913	55,913
1964-65	—	11,261	11,261
1965-66	—	978	978

SOURCE :—*Madras Port Trust Administration Reports.*

Table 13

Percentage of Rail Borne Traffic to the Total Traffic of Madras Port

(Tonnes)

Year	*Number of wagons*	*Tonnage handled by railways*	*Tonnage handled by the port*	*Percentage of rail borne traffic to the total traffic*
1951-52	79,609	1,144,194	2,054,291	55.70
1952-53	89,976	1,421,156	2,157,088	65.88
1953-54	79,066	1,377,210	2,074,102	66.40
1954-55	74,873	1,263,286	2,105,149	60.00
1955-56	67,516	1,333,271	2,344,076	56.88
1956-57	84,308	1,435,047	2,503,554	57.36
1957-58	89,430	1,597,872	2,544,153	62.81
1958-59	81,392	1,543,016	2,479,149	62.24
1959-60	88,801	1,551,963	2,762,848	56.21
1960-61	98,067	1,778,859	3,038,427	58.55
1961-62	112,231	1,982,296	3,467,143	57.17
1962-63	95,841	2,333,171	3,784,931	61.64
1963-64	91,133	2,388,623	4,165,762	57.34
1964-65	88,279	2,516,055	4,398,149	57.21
1965-66	81,142	2,831,530	4,871,592	58.12

Table 14

Steaming Distances from Madras to Important Ports

Name of port	*Kilometres*	*Name of port*	*Kilometres*	*Name of port*	*Kilometres*
Abaden	4,733	Galveston	17,189	Philadelphia	14,927
Aden	4,250	Halifax	13,855	Pondicherry	126
Akyab	1,336	Hongkong	4,878	Port Blair	1,213
Alleppy	1,300	Kakinada	475	Port Said	6,503
Baltimore	15,163	Kandla	1,900	Quilon	1,228
Bangkok	3,856	Karachi	3,079	Rangoon	1,605
Bassien	1,402	Mangalore	1,611	Saigon	3,574
Bombay	2,338	Manila	4,719	San Francisco	14,357
Boston	14,408	Masulipatam	311	Singapore	2,560
Calcutta	1,211	Mormugao	1,897	Suez	6,359
Calicut	1,487	Moulmein	1,638	Suralaya	3,784
Chittagong	1,374	Nagapattinam	283	Tuticorin	1,176
Cochin	1,350	New Orleans	16,877	Vancouver	15,644
Colombo	933	New York	14,716	Visakhapatnam	595
Cuddalore	166	Penang	2,057	Yokohama	7,231
D'Jibute	4,464				

SOURCE :—*Port of Madras Handbook (1955).*

Table 15

Principal Import Commodities, Transported by Rail from Madras Harbour to Various Districts, 1965-66.

Name of State and district	Chemical manures	Coal	Phosphate	Paper and machinery	Foodgrains	Iron and steel	Electrical goods	Machinery	Cotton	Sulphur
Madras										
Madras	—	202,287	—	—	—	326	—	—	—	—
Chingleput	8,683	31,806	—	12	53,556	2,147	238	366	—	—
Coimbatore	10,155	34,075	3,322	—	71,533	1,222	213	336	244	89
Madurai	34	—	—	—	1,407	39	71	51	—	—
The Nilgiris	103	—	—	—	160	—	—	19	—	—
North Arcot	3,320	22,690	2,570	—	1,231	292	100	11	10	490
South Arcot	1,881	—	6,938	—	1,066	175	43	1,128	—	—
Ramanathapuram	45	385	—	—	—	—	—	—	—	—
Salem	1,446	1,540	—	—	16,262	424	91	829	25	—
Thanjavur	68	—	—	—	972	243	—	9	—	—
Tiruchirapalli	774	19,316	—	—	2,467	338	123	506	—	86
Tirunelveli	—	1,090	—	—	2,085	—	—	—	9	—
Andhra Pradesh										
Adilabad	15	—	—	—	75	12	48	375	—	—
Ananthapur	3,386	6,301	—	—	4,370	231	65	73	—	2
Chittoor	4,056	441	—	—	435	64	—	—	21	—
Cuddappah	811	548	—	—	418	195	154	290	—	—
East Godavari	2,996	—	—	—	369	343	39	33	95	26
West Godavari	7,623	—	—	—	4,201	228	—	76	—	899
Guntur	11,130	—	9,062	—	30,858	1,345	33	9	23	973
Hyderabad	1,183	—	4,847	781	81,197	1,487	131	1,658	—	—
Khammam	173	—	—	—	301	—	—	—	—	—
Krishna	6,225	—	—	42	12,993	642	16	252	—	—
Kurnool	1,513	—	—	—	374	20	—	—	—	—

Table 15 (*Contd.*)

Name of State and district	Chemical manures	Coal	Phosphate	Paper and machinery	Foodgrains	Iron and steel	Electrical goods	Machinery	Cotton	Sulphur
Kurnool Rural Area	450	—	—	—	172	—	—	99	—	—
Mehboob Nagar	1,489	—	—	—	2,751	—	10	46	—	—
Nellore	4,631	356	—	—	113	—	—	19	—	—
Nizamabad	2,363	—	—	—	1,710	263	106	13	—	—
Nalgonda	37	—	—	—	13,928	—	—	—	—	—
Warrangal	1,864	—	—	—	7,472	5,956	3,269	5,675	—	—
Karim Nagar	242	—	—	—	—	35	159	666	—	—
Medak	949	—	—	—	—	5	20	—	—	—
North Vizak	—	—	—	—	—	—	—	—	—	—
South Vizak	—	—	—	—	—	—	—	—	—	—
Srikakulam	—	—	—	—	168	13	—	77	—	—
Visakhapatnam	46	—	—	—	100	—	195	—	—	—
Mohamadabad	462	—	—	—	—	—	—	—	—	—
Mysore										
Bangalore	8,754	28,588	3,122	—	69,312	12,539	381	1,395	16	1,895
Belgaum	2,820	—	473	—	4,156	666	—	—	—	—
Bellary	119	—	—	—	—	70	—	—	—	—
Bijapur	281	—	—	—	1,226	—	—	—	—	—
Bidar	629	—	—	—	2,906	—	—	—	—	—
Chikmagalur	589	—	—	—	—	—	—	—	—	—
Chitaldurg	—	—	—	—	—	—	—	—	—	—
Coorg	—	—	—	—	—	—	—	—	—	—
Dharwar	1,179	—	—	—	14,651	21	242	185	—	41
Gulbarga	455	—	—	—	7,433	—	—	—	—	—
Hassan	941	—	—	—	235	—	—	—	—	—
Kadur	603	—	—	—	1,495	1,005	—	—	—	—

Kanara	—	—	—	—	—	—	—	—	—	—
Kolar	1,149	411	—	—	—	92	—	—	—	—
Mandya	1,836	—	—	—	179	26	—	—	—	—
Mysore	1,636	—	89	289	4,073	—	15	125	—	—
Raichur	993	—	1,002	—	1,835	48	—	4	—	—
Shimoga	490	—	—	—	1,228	—	394	982	—	—
South Kanara	1,487	677	18	—	2,077	—	15	112	—	—
Tumkur	110	—	—	—	198	—	—	—	—	—
Bhandara	—	—	—	—	—	—	—	—	—	—
BIHAR	*42*	—	—	—	*39,446*	—	*12*	—	—	—
DELHI	—	—	—	*16*	22	—	—	—	—	—
GUJARAT	*387*	—	—	—	*13,600*	—	—	*10*	—	—
GOA	—	—	—	—	*1,149*	—	—	—	—	—
KERALA	*3,826*	*1,249*	—	—	*39,413*	*3,973*	*88*	*111*	*74*	—
MADHYA PRADESH	*39*	—	—	—	*1,954*	—	—	*146*	*10*	*80*
MAHARASHTRA	*3,540*	*9*	—	*58*	*106,694*	*477*	*36*	*67*	—	*113*
ORISSA	—	—	—	—	*905*	*12*	—	—	—	—
PONDICHERRY	—	—	—	—	*52*	*130*	—	—	—	—
PUNJAB	—	—	—	—	—	*43*	*14*	—	—	—
RAJASTHAN	*46*	—	—	—	*307*	—	—	—	—	—
UTTAR PRADESH	*133*	—	—	—	*20,709*	—	*30*	—	—	*44*
WEST BENGAL	—	—	—	—	*110*	*730*	—	—	—	—
GRAND TOTAL	**109,297**	**351,769**	**31,448**	**1,198**	**651,018**	**36,014**	**6,451**	**15,754**	**535**	**4,740**

Table 16

Principal Export Commodities Brought by Rail from Various Districts to Madras Harbour During 1965-66

Name of State and district	*Iron ore*	*Manganese ore*	*Other ores*	*Tobacco*	*Scrap (Iron)*	*Mica*	*Molasses*	*Oil cake*	*Cattle food*
Madras									
Coimbatore	—	—	—	—	—	—	—	903	—
Kanyakumari	—	—	—	—	—	—	2,934	—	—
Salem	384	—	7,195	—	—	—	—	—	—
South Arcot	—	—	—	—	—	—	3,945	—	—
Tiruchirapalli	—	—	2,031	—	—	—	12,097	—	—
Andhra Pradesh									
Ananthapur	125,937	—	880	25	—	—	—	1,874	—
Cuddappah	11,076	531	3,658	—	—	—	—	—	—
Chittoor	—	—	16	—	—	—	—	—	—
East Godavari	—	—	—	72	—	—	—	—	—
Guntur	329,295	—	—	308	—	—	—	4,347	147
Krishna	137,730	—	—	—	—	—	—	67	—
Kurnool	—	—	1,540	—	—	—	—	9,556	—
Kurnool Rural Area	—	—	—	—	—	—	—	12,178	—
Nellore	6,474	—	483	—	—	2,058	—	—	—
Mysore									
Bangalore	140,020	18,086	—	—	3,304	—	—	—	—
Belgaum	892	—	—	—	—	—	—	—	—
Bellary	232,132	10,288	—	—	—	—	—	—	—
Bijapur	—	—	372	—	—	—	—	—	—
Chitaldurg	33,479	—	—	—	—	—	—	—	—
Gulbarga	—	—	—	—	—	—	—	73	—
Kadur	—	—	—	—	—	—	—	—	—
Raichur	—	—	—	—	—	—	—	689	—
Hasan	*12,992*	—	—	—	—	—	—	—	—
KERALA	—	—	—	—	*74*	—	—	—	—
MAHARASHTRA	*42,136*	—	—	—	—	—	*613*	*1,311*	—
UTTAR PRADESH	—	—	*48*	—	—	—	—	—	—
TOTAL	**1,074,829**	**28,905**	**16,223**	**405**	**3,402**	**2,058**	**20,489**	**30.998**	**147**

Appendix

Appendix

Comments on Points of Criticism Made by Chambers of Commerce and Other Port-Users

Railway Facilities

THE COMMENTS MADE by various port-users regarding the port railway facilities are quoted below:

The Madras Chamber of Commerce and Industry

"The foodgrain-handling arrangements are satisfactory but at many times in the past have been nullified by a slow rate of clearance by the Ministry of Food".

"The Chamber wish to express that if heavy imports of foodgrains are to continue and if iron ore will still be exported in increasing quantities then the railway infrastructure will need to be overhauled".

In the course of discussion with officials of the Southern Railway, it was gathered that in their view also, there is scope for improvement in the port railway system. It is understood that much of the shortcomings of the port railway system arise from the heavy ore and foodgrain movements (which cross each other) for which there is inadequate line capacity between the south marshalling yard and the Jawahar Dock on the one side and the link to the Southern Railway through the Beach Station and Royapuram on the other. The long term solution for this is the shifting of the ore berth to the new oil dock which would result in a new marshalling yard being developed branching off from Royapuram and bye-passing the present harbour railway including the present marshalling yard. Short term solutions are also being provided for. The list of new works given in Chapter 7 includes the provision of additional railway lines. Additional locomotives will also be provided. The question whether the existing single B.G. line between Royapuram and Madras Beach should be doubled and whether additional broad gauge facilities should be provided at Madras Beach station for exchanging pilots between Madras Beach and the south marshalling yard is now under discussion between the Madras Port Trust and the Southern Railway authorities.

As regards slow clearance of foodgrains referred to by the Madras Chambers of Commerce and Industry, this, as the Chamber itself states, is a thing of the past.

Foodgrain Clearance

The Regional Director, Food, Madras Region after stating that the priority of berthing in the three berths that foodgrain vessels now enjoy should be continued, suggests that

clearance of cargo from the wharf to the shed would improve if the following arrangements are made :—

(*1*) "A single coordinated agency under a unified control operates right from the discharge of the cargo from the holds of the vessels into the wharf and till the stocks are cleared from the transit sheds. At present different sets of labour under different agencies of control are operating for discharge of cargo, removal of the cargo from the wharf into the shed and the subsequent clearance of the cargo from the shed. A single agency controlling all these operations is bound to improve the efficiency of the discharge and clearance of the cargo.

(2) Additional mechanical contrivances like fork lifts, conveyor belts, etc., would quicken the tempo of clearance in the port. Some fork lifts are now available, but the number is found to be inadequate".

Regarding (*1*), need for a "single" coordinating agency, it is hard to appreciate the implied suggestion that at present there is no "single" coordinating agency. The single coordinating authority in a major port like Madras is the Chairman of the Port Trust, who is the Chief Executive. For day-to-day working the Traffic Manager works as the coordinating authority and any suggestion that there should be any other coordinating authority would be unworkable and unacceptable to the Port Authority and correctly so. What is necessary is recognition by one and all of the several links in the chain of operations that the speedy movement of cargo from step to step in its chain of movements is of the highest importance. How this point should be driven home to the persons in charge of the actual operations is a matter of administrative detail.

There is provision in the Port Trust Administration organisation of a *Port Working Committee* consisting of the following representatives :

The Chairman, Port Trust
Collector of Customs
A representative of the Chamber of Commerce and Industry
A railway representative (the Chief Operating Superintendent)
A representative of the Food Department
A representative of Clearing and Forwarding Agents
A representative of Stewedores Association
A representative of the Steamer Agents' Association
A representative of the MMTC
A representative of the Madras Dock Labour Board

The Committee meets periodically and makes visits of inspection to discover bottlenecks and deficiencies and resolve them with a common approach. Here Port Administrators and port-users meet for thrashing out problems of the nature pointed out in the above critical observations by the Regional Director, Food, Madras Region.

The second point regarding the need for adding to the fleet of fork lift trucks is being acted upon by the Port Trust. Eight more trucks are now on order to strengthen the present fleet which stands at 48.

Hides and Skins Merchants' Association

The Southern India Skin and Hide Merchants' Association in a memorandum have complained of inadequacy of berthing facilities, shed facilities, of excessive detentions, short deliveries, etc.

Their complaints are ill-founded. The facts are otherwise as the Madras Chambers of Commerce and the Madras Steamer Agents' Associations' remarks testify. How much

behind the times the Skin and Hide Merchants' Association is, can be judged from the fact that the Association wants labour to be removed from the Port Trusts' control, that bullock-carts, which were prohibited from the port area in the interests of faster traffic flow, should be permitted in the harbour, etc.

General Facilities

The Madras Steamer Agents' Association have remarked in favourable terms on many facets of the port working and the facilities available.

The following are some extracts :—

"With the commissioning of the Jawahar Dock with six berths and the renovation of South Quay I, the berthing facilities are adequate for the shipping needs of the port. In fact, in recent months, due to a fall in the traffic, some of the berths were lying idle. Even assuming that the port has to handle six million tonnes (ore, coal, foodgrains/fertilizers included) per year in the near future, 18 berths would be adequate.

"As far as unloading/loading operations from and into ships are concerned, there are an adequate number of mobile electric cranes, besides the 3 heavy lift cranes—50.80 tonnes and 60.96 tonnes static cranes and the 120 tonnes floating crane.

"For the porterage of goods on the quays and the sheds there are adequate number of fork lifts, wheel barrows and mobile cranes. The N.Q., all the W.Qs, S.Q.I. and 3 berths in the Jawahar Dock have spacious transit sheds opposite them. There are also a number of warehouses and overflow sheds.

"There are not many bottlenecks in this port in the passing of documents or the clearance of goods from the port. Compared to other ports it is felt that the efficiency in the Madras Port is better. This is because the port is a compact unit and access to officials is easy and quick."

"*Future of Ore Trade* : To stabilise this export, there should be further mechanisation so that ore-loaders get the quickest possible despatch from the port. In this context, the proposed oil dock where there will be also facilities for a deep berth for large ore-loaders, is a welcome project which should specially be implemented. The loading at the proposed berth will be by conveyor belt system.

"Members of the Association are of the view that before the Port provides additional mechanisation for ore exports, it should take an undertaking from the MMTC or the Government that regular traffic from this port will be maintained. A minimum should be fixed and if exports fall below that, the MMTC should pay a subsidy to Port Trust.

"*Future of Coastal Trade*. Besides coal numerous other commodities used to be loaded/discharged in the Madras Port in the coastal trade. But for the last five years, there is a steady decline in the trade and it looks as though after five years this port will not be catering to the coastal trade. The reasons for this should be examined."

Ore Exports

In the course of discussion with officials of the Madras Regional Officer of the MMTC the following defects in the existing arrangements for ore loading were mentioned :

(*a*) The existing two transporter cranes, besides going frequently out of order, are insufficient; therefore, two more transporter cranes are necessary.

(*b*) Reception pit where box wagons arrive should be lengthened so that more wagons can be unloaded at a time.

(*c*) Loco-power is inadequate. Enquiries made of the Port Trust authorities revealed

that the Transporter cranes have developed defects; that replacement of the whole cranes is too expensive and not justified financially but that new grabs are being ordered.

It is understood that the Port Trust is taking steps to increase loco-power and to enlarge the reception pit.

The port authorities feel that a problem needing attention is irregular despatches of ore from the mining areas. A daily arrival of between 80 and 100 Box wagons of ore is necessary to maintain a good stock pile and to release 70/80 Box wagons to be re-loaded with foodgrains. The statement that follows gives the actual despatches and arrivals during April 1966, shows how erratic the despatches are. It appears the MMTC have reported inadequacy of wagon supplies at the rail heads. This item has been included in this Appendix to illustrate the importance of all concerned knowing each others difficulties, so that remedial action may be taken without delay.

Statement Showing the Quantity of Iron Ore Loaded at the Mineheads and Received at the Harbour Each Day during the Month of April, 1966

Date	*Despatches (in tonnes)*	*Arrival*
1-4-66	4,165	2,343
2-4-66	2,035	3,089
3-4-66	3,556	5,603
4-4-66	4,881	2,870
5-4-66	2,591	—
6-4-66	6,275	3,435
7-4-66	2,651	6,525
8-4-66	4,444	2,287
9-4-66	2,608	2,910
10-4-66	4,668	6,241
11-4-66	5,992	3,354
12-4-66	5,664	2,426
13-4-66	5,266	4,694
14-4-66	2,184	7,077
15-4-66	4,027	3,619
16-4-66	2,563	2,861
17-4-66	4,457	5,161
18-4-66	4,184	2,138
19-4-66	2,480	2,879
20-4-66	4,611	2,850
21-4-66	4,607	2,722
22-4-66	6,590	5,394
23-4-66	4,397	2,068
24-4-66	5,718	3,815
25-4-66	4,503	5,002
26-4-66	3,352	5,747
27-4-66	N.A.	1,806

About this book

The importance of the port of Madras in the Southern peninsula of the country has greatly increased in the recent past resulting in growth of traffic by two and a half times in 1965-66 as compared to 1950-51. As a consequence of the Government's decision to establish an oil refinery shortly in the Madras State with an ultimate capacity of four million tonnes, the future increase in oil traffic is likely to be very substantial. A similar increase is expected in metallic ores.

This study conducted by the National Council of Applied Economic Research critically examines the existing capacity of the Madras port and suggests additional facilities necessary for meeting the traffic requirements upto 1975-76.

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