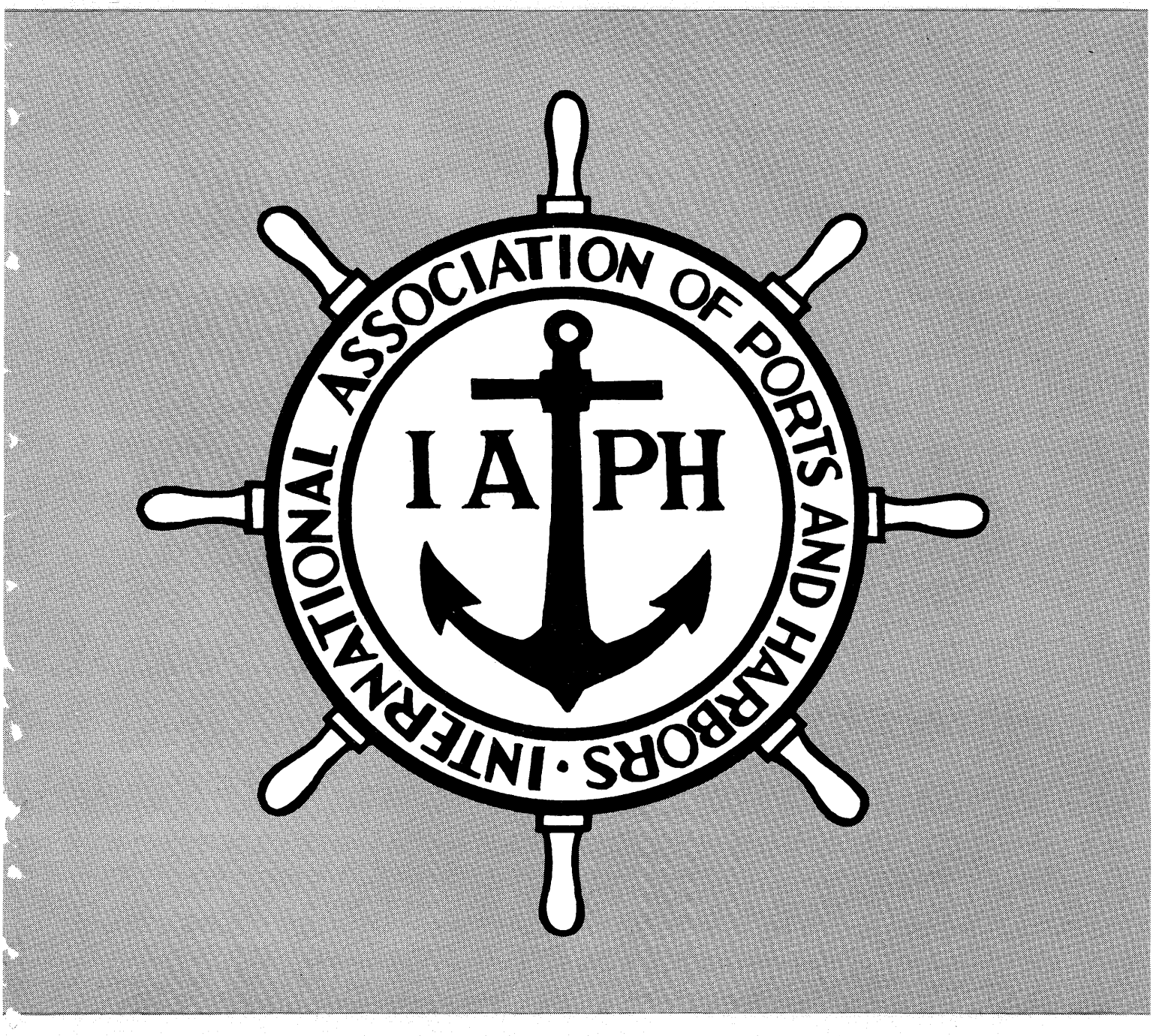
PORTS *and* HARBORS

Jul.–Sept., 1967 Vol. 12, No. 3



THE INTERNATIONAL ASSOCIATION OF PORTS AND HARBORS

THE PORT OF KOBE

—Modern, Efficient Port With Elegance—

The Port of Kobe, a fine, natural port in the heart of the vital Osaka-Kobe industrial area of Japan, served as a main gateway for shipping and trade between Japan and the Asian continent from ancient times. Described as the "Naples of the Orient," Kobe is renowned for its scenic beauty with the Rokko Mountain Range forming a colorful background to the port city. The headland of Wada to the south at the mouth of Kobe Bay protects the port from high seas.

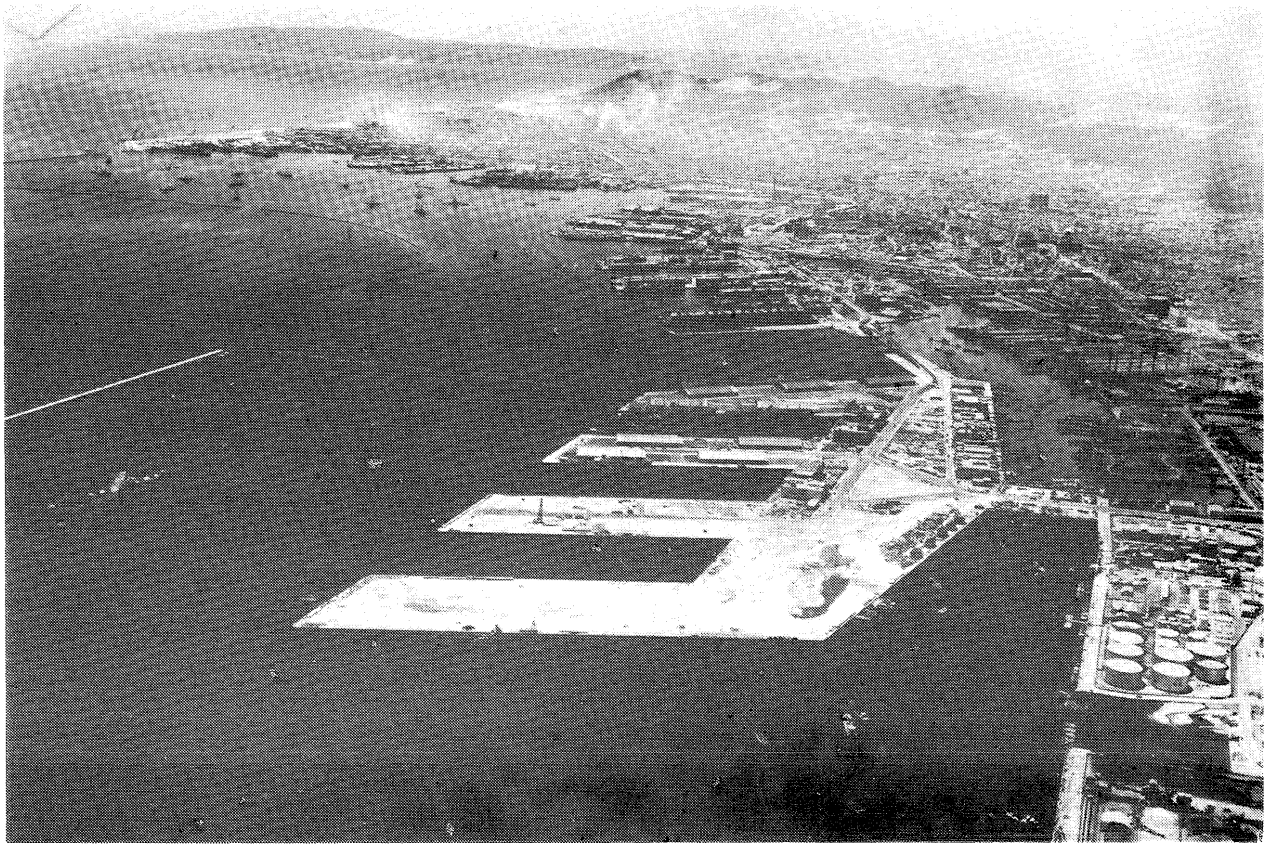
It is nearly 100 years since Kobe was opened as one of the first trade ports of Japan. Today it is one of the major export ports of Japan and handles cargoes representing 30 per cent of the value of Japan's total export trade.

In parallel with the recent growth of Japan's economy, ships and cargoes arriving at Kobe from abroad have been increasing in number and tonnage. This growth has made the expansion of water-front facilities here essential. In the light of this demand, the construction of the Maya pier terminal was undertaken in the eastern section of the Port in fiscal 1959 to increase foreign trade facilities. The Maya terminal, to be completed at a total cost of ¥22 billion by the end of fiscal 1966, is to be a massive and up-to-date unit of four piers capable of accommodating eighteen 20,000-tonners at one time. In order to deal successfully with containership services, preparations are in full swing to make the Maya Pier No. 4 a container terminal to welcome the first container carrier in the summer of 1967.

On the other hand, to connect the Maya terminal now under construction and the Shinko pier terminal already in operation, a semi-suspension bridge, the first of its kind in this part of the world, was completed in June, 1966. This bridge has contributed to a great improvement of the port facilities and functions.

Thus, the Port of Kobe handles more than 7,200 foreign service ships and 42 million tons of foreign and domestic cargoes yearly. It is under a rational management with the motto of "inexpensive, speedy and reliable cargo handling."

With the objective of preparing itself for the world's expanding economy, the Port of Kobe has taken a step forward this year in greeting the container-ship age by beginning its five-year project to construct a 1,000-acre island for increased facilities.



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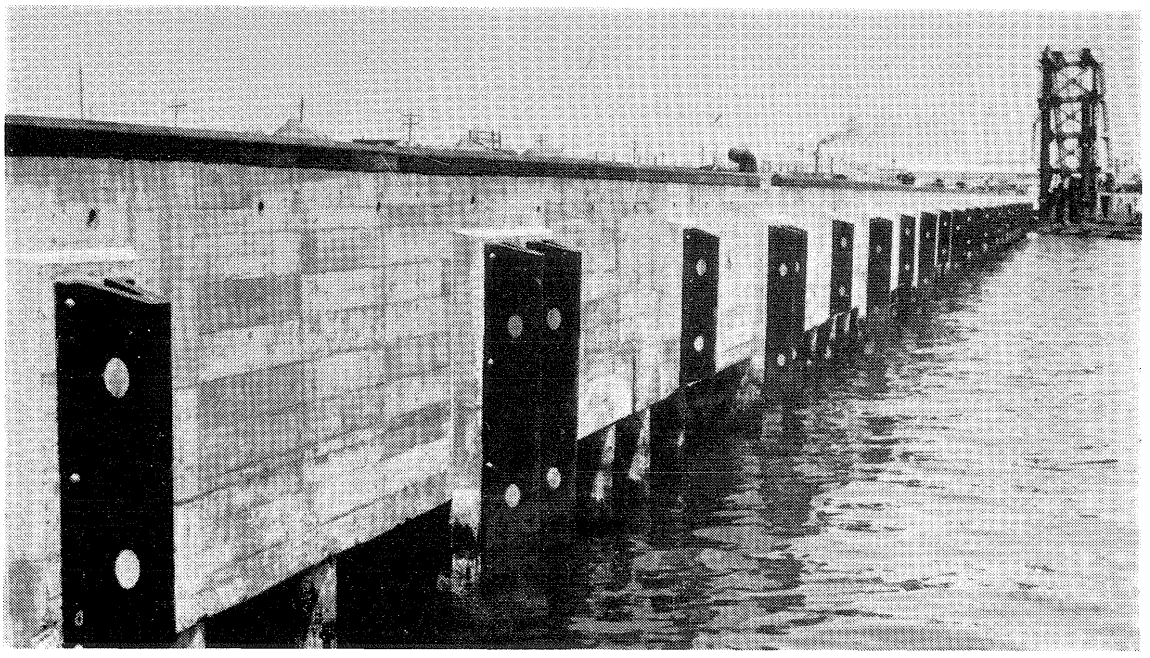

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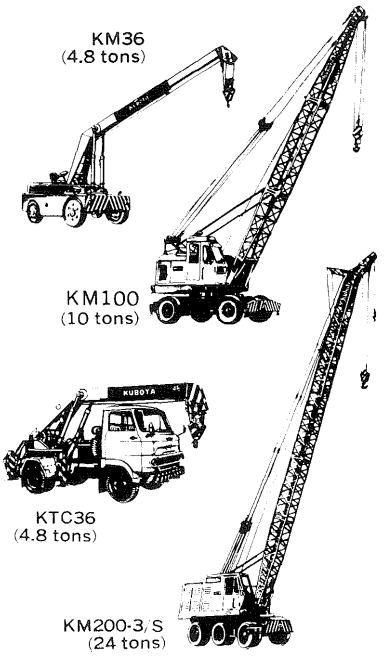

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PORTS and HARBORS

Published quarterly by
The International Association of Ports and Harbors
Consultative Status, N.G.O., United Nations

Head Office:
Mori 7th Bldg.
2, Tomoe-cho, Minato-ku
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Editor: Yoshio Hayashi

Jul.-Sept. 1967 Vol. 12, No. 3

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PORTS and HARBORS

FORUM ON PORT PROBLEMS

Marine Container Transport

The Ministry of Transport
Japan

July, 1967

Development of International Marine Container Transport of the World

When the container ship, the Fair Land of Sea-Land Corporation of the United States, sailed from New York for Rotterdam in April last year, she marked an epoch in the international marine container transport. Today, about a year after her historical voyage, the merchant fleet of Sea-Land Corporation, composed of four container ships, is steadily winning its way in the Atlantic run. The marine transport by semi-containerized ships launched immediately preceding the Fair Land's voyage by the Moore McCormack Lines and the U.S. Lines is also making a steady progress and the Container Marine Lines, the container transport division of A.E.I.L. Corporation, is scheduled to place two large-size container ships on the Atlantic run. In an effort to cope with such a rapid advance of the American shipping companies in this field, the marine transport companies in European maritime countries formed the Atlantic Container Lines (ACL) as a joint venture to go into container transport business in the Atlantic line. At the time of its initial formation, the ACL was composed of three Swedish shipping companies and one Dutch company, but afterwards, with the participation of the French Line of France and the Cunard of the United Kingdom, it took the form of an international organization, transcending the national boundaries. Four ships with special features are scheduled to be launched in September this year and, together with those now being planned, the Lines is expected to grow into a large group embracing a total of ten container ships that will play an active role in container shipping.

Of all member countries of the Commonwealth, the United Kingdom and Australia enjoy the closest ties with a large reciprocal trade volume between them. In this route between the two countries, P & O and three other liner companies jointly established the Overseas Containers, Ltd. (OCL), which is scheduled to go into container shipping business early in 1969. Under this program, the OCL has already placed orders to European ship yards for the construction of six large-size container ships capable of loading 1,150 containers.

As is well known, Matson of the United States is planning to place two container ships next September in the Pacific Route, and the American President Lines announced that it will remodel its two semi-container ships into full container ships to be placed in the same route.

In this manner, the marine container transport of the world is making a rapid progress, and in parallel with this, projects for the improvement of port and harbor facilities are being actively pursued on large scales in the United States and Europe. At the same time, against the background of such a vigorous growth of container transport, serious studies are also being made in such related fields as the coordination with customs brokers and inland transport businesses, the standardization of containers, and the responsibilities of forwarding agents at various stages.

Of the ports which are currently carrying out projects for the construction of large-scale container, terminals, the major ones are Tilbury near London, England, Rotterdam and Amsterdam in Holland, Antwerp in Belgium, Bremen in Germany, Genoa in Italy (where Rivalta-Scrivia, located inland, will be utilized.) In the United States, New York, Boston, Baltimore, Los Angeles, Long Beach, Oakland, Portland, Seattle and innumerable other ports are carrying out similar construction projects, and Sacramento and Tacoma, too, have a number of utilizers of their container facilities.

Alignment of Marine Container Transport System in Japan

In our country, a plan for marine container transport is being carried out with a view to containerizing the transport in Japan-North American Pacific route by the latter half of the next year. As is widely known, the number of 5-ton containers owned by Japan National Railways already passed the 10,000 mark and the shipping companies also are in possession of more than 4000 units of 8-ton containers for use in the North American run. But seen from the view point of a fully containerized shipping, these achievements are far from being significant. In September last year, the Council on the Rationalization of Marine Transport and Ship Building submitted a recommendation concerning "the Alignment of Marine Container Transport System," and the container transport program of our country is being carried out in compliance with this recommendation.

With regard to the grouping of shipping companies which will con-

Table 1: **Construction Projects of Container Terminals.**
(Those now in use are not included)

	Location	No. of Berth	Year of completion of the last berth
U.S.A.	New York	25**	1975
	Long Beach	42*	—
	Los Angeles	4	1968
	San Francisco	more than 1	1967
	Oakland	10	—
	Portland	more than 2	1968
	Seattle	3	1971
U.K.	Tillbury	3	1968
	Liverpool	18*	1971
	Southampton	2	1969
	New Port	1	1968
	Grangemouth	1	1967
	Felixstowe	1	1967
Belgium	Antwerp	12*	1968
Holland	Rotterdam	5-8	1970
	Amsterdam	1	—
Germany	Bremen	under planning	—
	Hamburg	7	—

* Conventional berth

** Includes those used by Sea-Land Corp.

stitute the bases of container transport, groups were formed in September last year of Nippon Yusen and Showa Marine Transport Group, of Mitsui-OSK Lines and Yamashita Shin - Nihon group, Kawasaki and Japan Lines group respectively. In order for the container transport to achieve the desired effect of a large-scale transport, the formation of groups by shipping companies becomes a prerequisite. The first group mentioned above will organize a merchant fleet of four container ships in concert with Matson Navigation Company of the United States, and aims at running one service a week, and beginning in September this year, Matson is planning to place two container ships on this run as mentioned earlier. The four companies of the other two groups also are initially trying to organize jointly a merchant fleet of four ships with a view to running one service a week. The six container ships that will be built by these Japanese shipping companies will have a gross tonnage of about 17,000 tons each, capable of loading 700 to 750 containers and of a service speed of 22 knots. These ships will be built under the fiscal 1967 Ship Building Plan and their constructions are expected to be completed between the summer and fall of the next year.

These groupings aim at the container transport between the North American ports on the Pacific coast and our country. Accordingly, as the container transports are extended to the New York, Australian, and European lines, different groups are expected to be formed.

The construction of container terminals in Japan will be undertaken by the Foreign Trade Wharf Public Corporation, and these terminals will be rented to certain domestic as well as foreign shipping companies for their exclusive use. Under the existing system of financing the construction of ports and harbors, the costs are defrayed out of the funds of National Treasury, the funds transferred from the general sources of revenue of port cities, the government bonds and the revenue of port charges and dues, etc. By the very nature of these sources of funds, the public interest takes precedence over private ones, with the result that an exclusive use of the port facilities by private shipping companies is not allowed. However, the mode of use of a container terminal, which plays a pivotal role, must of necessity be an exclusive one by the very nature of the work involved. Obviously the existing system of financing could not meet such requirements. Accordingly, a public corporation was conceived to undertake the construction of ports and harbors with a view to facilitate a smooth operation of container terminals.

According to the plan of the Foreign Trade Wharf Public Corporation, a total of 22 berths for container ships are scheduled to be constructed and offered for use, that is, 8 berths at Oi Wharf of Tokyo, 3 berths at the Honmoku Wharf of Yokohama, 5 berths at the South Port of Osaka, and 6 berths at the New Wharf of Kobe. The total costs for the construction of these berths will amount to 52,000 million yen, for which investments are expected to be made by the national government and local public bodies, bonds, and commercial loans.

Features of Marine Container Transport.

The objective of transport business is to forward cargoes as quickly and correctly as possible to their destinations at a cheapest possible cost. For this purpose, techniques are being developed to realize more effectively an integrated transport, volume transport and unit-load system, which in themselves represent the modernization of transport. Compared with the conventional transport methods, the container transport is far superior in these respects. While the conventional rail cargo transport in our country is suffering from stagnation, the container freight alone continues to make a remarkable progress each year. The growth of marine container transport achieved in recent

Table 2: **Construction Plan of Container Terminals of Foreign Trade Wharf Corporation.**

Year in which operation to commence	'69	'70	'71	'72	'73	'74	'75	Total
Oi Wharf, Tokyo	1	1	1	2	1	1	1	8
Honmoku Wharf, Yokohama	1	1	1	–	–	–	–	3
South Port, Osaka	1	1	1	1	1	–	–	5
New Wharf, Kobe	1	1	1	1	–	1	1	6
Total	4	4	4	4	2	2	2	22

years itself testifies, we dare say, to the advantage inherent in the container transport.

In respect of the speed of transport, the tremendous improvement of efficiency in loading and unloading cargoes at both terminals enabled by container system, combined with the increased speed of container ships, will drastically enhance the efficiency of marine transport. The cargoes that took a conventional cargo liner 3 to 4 days to load or unload at a port can be easily discharged by a container ship within 20 hours. The service speed of the container ships that are being planned at present by the Japanese shipping companies will be 22 knots—a drastic improvement over the average speed of conventional ships at 16 knots. As a result, the container ship can complete a round trip service in the Pacific run in only 28 days as against 60 days required by the conventional liner for the same run, thus increased the efficiency 2.5-folds. In the field of overland transport, also, the advent of container trailers, the implementation of TERRE Plan (Trans-Europe Road and Rail Express) in Europe and the emergence of container freight trains that are being planned by major railway companies in the United States are expected to shorten the transport time by a large measure.

In respect of the safety of cargoes, the containerized transport will drastically reduce the damages of cargo. In the case of 5-ton containers handled by Japan National Railways, the percentage of accidents involving cargo damages was a minimal of 1.5% as against 22.8% in conventional freight trains. Also, the rate of pilferage of cargoes during the loading and unloading had been substantial, but practically no incidents of pilferage were reported in containerized cargoes, and this will vastly deepen the faith of shippers in the container transport.

In respect of the reduction of transport cost, owing to the large initial investments involved and the interruptions in containerization during the initial stage, there are posibilities, contrary to the general expectations, that the transport cost may increase. However, as the containerization makes progress, the speed of transport and safety of cargoes will improve, as mentioned above, which, in turn, is expected to bring about a reduction in transport and insurance costs. Further, the savings in packing and crating expenses ensuing from containerization and the rationalization of clerical works will reduce the overall expenses of management. Packing and crating expenses vary depending on the type of merchandise, but normally 30 to 80% savings are deemed feasible. In the following, we will cite an example contained in the report of the National Academy of Science of the United States.

According to Table 3, it is indicated that 40% of the overall transport cost incurred by ordinary transport can be saved by container transport. In our country, also, the experiences of Japan National Railways suggest that, in general, a substantial amount of packing expenses and transport charges can be saved by container shipment.

Trade Promotion and Container Transport

It goes without saying that the promotion of export trade is indispensable to the economic growth of our country. It is also a truism that in order to promote the development of export trade, it is necessary to reduce the production and transportation costs, in addition to the development of high-quality merchandise. In the case of export to the United States, transportation cost occupies 10 to 40% of the F.O.B. price of merchandise, and particularly in the case of low-priced goods, the weight of transportation cost is great. Accordingly, the reduction of transport cost by utilizing container transport goes a long way toward the promotion of export trade of our country.

In our ports where foreign trade cargoes are handled, due to the backwardness of port facilities and the shortage of labor, their inadequacy becomes especially acute when increased quantity of cargoes

Table 3: **Instances of Transport Cost Saving by Container Transport in the United States** (in dollars per ton)

	Packing cost	Domestic transport cost	Cargo handling cost	Marine freight etc.	Overseas inland transport cost	claim cost	Total
Ordinary transport	32.00	3.73	5.15	5.83	2.63	0.32	49.66
Container (20 ft)	20.00	3.41	0.94	3.94	2.63	0.08	31.00
Container (40 ft)	20.00	3.30	0.94	3.80	2.53	0.08	30.65

converge on them. Under the current Economic and Social Development Plan, the trade volume of our country is estimated to increase by 10% each year, and in 1971, these ports will have to handle 1.6 times as much cargoes as now. However, a progressive decrease in the labor force for ports and harbors is foreseen. Accordingly, in order for the ports of our country to function efficiently, a modernization program including container transport and mechanization of cargo handling facilities must be carried out.

A speedy transport, together with the absence of damages and pilferage of cargo and dependability of shipping schedule, will enhance the faith of shippers in marine transport, and at the same time, the required minimum quantity of inventory of merchandise can be reduced, thereby facilitating the adjustment of sales to the changing market conditions. The following remarks made by an officer of a leading British chemical manufacturer, ICI, give an apt explanation of the situation:

Utilization of container assures the good condition in which the cargoes are received and, at the same time, the delivery schedule, enabling us to give our customers a better service at a cheaper transportation cost. Container helps us expand our sales."

Container service has already commenced in the New York-Europe route and it is being started in Europe-Australia route in the near future, too. Both of these markets are important export objectives for our country. Unless something is done about these markets, the trade conditions of our country in these areas will have to suffer considerably. The strengthening of marine container transport of our country will exert a profound influence not only on the shipping business of our country but also its trade development.

Conclusion:

At present, there are about fifty container ships in operation, and according to the plans made public so far, another 150 of them are under construction. Thus, more than 200 of them will be placed in various routes in the near future. The marine container transport of the world is making a progress at a much faster pace than expected, and it tends to gain momentum in scale and intensity. In addition to the several American firms pioneering in this field, those aggressive companies of Europe including ACL, OCL and ACT, armed with this new transport technology, are actively striving to expand regular line operations. Having far greater transport capabilities than the conventional transport methods, the container transport could very well become the dominant form of transport in the future in all major shipping routes of the world.

The across-the-board tariff cutting negotiations — the so-called Kennedy Round—has been brought to a successful conclusion after five years. Under this agreement, the world trade will achieved a still greater development. Particularly, the trade among advanced countries, whose volumes of mutual trade constitute more than one half of the world trade as they are and whose economies have enjoyed high rates of growth, will become even more accelerated. The marine container transport is a form of transport most suitable to the trade among advanced countries, and such a trend of world economy will brighten the prospects of international marine container transport.

Under the circumstances in which the industries of our country in all fields are making persistent efforts at rationalization to cope with the liberalization of foreign trade and capital transaction, an unswerving effort must be made for modernization through adoption of new technologies in the transport field which serves as the pipe system of our economy.

The Port of Rouen

Port of Rouen Authority

France

In the development of a modern economic society, the great river valleys have become centers of navigation, roadsteads for transportation and areas for population growth, available for both industrial pursuits and for an infinite variety of commercial activities. In the Benelux countries, grand plain rivers of regular flow, such as the Rhine, the Meuse and the Escaut, have brought about the riches of Rotterdam and Antwerp. For France, the River Seine offers the example of one of the ways of penetration which is an indispensable pre-requisite for any industrial and economic development.

Rouen is located 120 kilometers from the open sea and 20 kilometers from Paris via the River Seine, or 130 kilometers by road. This location at once defines Rouen's characteristics and vocation. Rouen is an estuarial port directly connected to the ocean and, moreover, rests on a magnificient navigable water-way: the Lower Seine. It is the Port for the region of the French capital, Paris, whence much of its trade derives. This unique locality cannot but bring about a very prosperous local industry, another source of traffic for the port.

1. Administration of the Coastal Seine and Estuary

Experience over the decades has clearly shown that the Port of Rouen's prosperity depended above all on the condition of accessibility. Also, the improvements of the estuary and river channel should constitute the first chapter of all administrative program of the port.

In the execution of the works in progress, which tends to resolve the traffic problem between the river sector and the maritime part of the estuary, the Port of Rouen expects not only the channel clearing in the lower estuary, which has just been completed, but also the dredging of nearly 3 meters at the river mouth bar. Ships drawing 9 meters of water could practically go up to Rouen at all tides.

The works which were commenced in 1932 were interrupted during the hostilities of 1939-1945, but were resumed in 1949 and since then have been vigorously pursued. A new channel was opened for navigation in 1960. It worked out in a manner entirely conforming to conditions set forth by reduced model tests pursued with the collaboration of the Sogréah Laboratory. Thus it was that 106 vessels each drawing more than 8 meters of water, of which 20 drawing more than 9 meters and one drawing 9.63 meters, negotiated the river up to Rouen in 1965, compared with 77 in 1964, 27 in 1963, 4 and 1962 and none at all in all the preceding years.

The Port is accessible by day at all tides for ships of 8.30 meters draught, with 9.20 meters passable half of the time, and even 10.00 meters and over during the stronger spring tides.

The pursuit of the works of channel improvement should permit authorizing, at the end of the Fifth Plan, the draughts of 9.20 meters at all tides and 10.20 meters during half of the time, rendering it possible for ore carriers of 30,000 tons load to go up to the port.

Because of the need to overcome low tide conditions in the stream and to negotiate the estuary at the end of the high tide, outbound vessels have a more severe draught limitation than those inbound to Rouen. Major dredging operations undertaken between Vieux-Port and the upper reaches of the maritime Seine, the clearance of sunken hulks which accumulated either during the last century or during the War, have effected considerable improvements for outbound vessels on the Seine. Since 1965 vessels have been able to depart from Rouen with very heavy loads, the draught permitted being 7.60 meters (25 ft.), or nearly 5 ft. more than allowed four years ago. New dredging operations will allow an additional margin beyond the 25 ft. maximum for outbound vessels and will approach the mark for inbound traffic.

Channel improvements for night navigation essentially involve an effective placement of river buoys and the suitable location of dolphins (buoys) to pin-point the most favourable depths in the river.

Thus it is that between Rouen and the Carosse Roads the banks of the Seine have been marked with 70 beacons, electrically activated. They provide a light facility which is suplemented by battery power source or alternatively by propane reserves to cover any contingency that the principal power source fail. The definition of the channel is circumscribed by a dozen or so illuminated buoys which are moored between Rouen and the confluence of the Risle; the estuary channel itself is prescribed by twelve pairs of buoys marked at a distance of between 1,000 meters and 1,500 meters each and forming a lane 200 meters wide.

About thirty marigraphs and water gauges illuminated by powerful spotlights, in addition, enable pilots to determine the level of the Seine while negotiating the water-way, and these therefore facilitate navigation which varies with the nature of the tide, at various points in the river.

Navigation of the river in foggy weather has always been of some concern to ships' masters who call at the Port of Rouen. But in fact, the statistics available over several years now indicate quite a low frequency of the incidence of fog during which navigation has actually been interrupted. This fog is formed in pockets of a few kilometers in width above the small valleys where tributaries flow and

sometimes, too, over prairies where the fog gathers at an altitude of several meters.

The development of ships' radar has now almost eliminated navigation difficulties during foggy periods, but in any event, the Port of Rouen is fully conscious of the importance of appropriate equipment and has therefore undertaken major steps to enhance the security of navigation during periods of adverse visibility:

—A series of automatic detectors disclose the formation of fog and notifies both its existence and intensity to the port authorities which, in turn, distributes the newly acquired intelligence via the VHF radio-telephone network of the port operations.

—The vigilance of the Seine Estuary channel, assured by the radar station installed at the entry of the Port of Honfleur, will in the near future be extended to the lower reaches of the river, to the curve of Vieux-Port, by another radar facility which will be established atop the loop at Tancarville-Radicatel.

2. Description of the Port

The maritime Port of Rouen extends over a length of 18 km. On the 35 km of banks thus offered by the Seine, those on the left shore have received priority attention, the spacious level sectors offering the most favorable opportunities for the construction of railroads as well as for the establishment and growth of industrial projects.

On this side, four basins, the lumber basin the Rouen-Quevilly basin, the dock harbor and the petroleum basin of Petit-Couronne, have promoted the economic interest of extensive areas available for the construction of wharves and quays.

In the commercial port sector are to be seen successively, on the left bank, wharves for general merchandise, the coal centre of the Rollet Island, docks specially geared for handling timber and logs, and for chemical products too; the cereal complex of the Elie Island, and the quays of the Rouen-Quevilly basin, at one time reserved for the traffic of refined petroleum, but currently undergoing modification for the handling of general cargo.

In the industrial sector, there follow wharves which function mainly to supply the needs of a factory situated immediately behind. Thus it is that one sees a succession of wharves and launching docks of the Navy Shipyard Dubigeon-Normandie, the quays of the Societes Saint-Gobain (fertilisers), Electricite de France, Lecomte Bony (ferrous metals), Charvet (coal), Mory (coal), and the quays of the Compagnie Rouennaise de Dechargement which operates principally for the transportation of coals for the major coke-ovens of the Gaz de France. Then we can see the wharves of Hauts-fourneaux de Rouen, those of Simarex (cereals), the four floating docks capable of hoists varying between 4,200 tons and 14,000 tons, the petroleum dock, and the quays of the Compagnie de Raffinage Shell Berre, the wharves of the S.A.M.S., now undergoing extension (logs and paper mill products), the Société Commercial des Potasses d'Alsace (chemicals), the Grande Carue (coal, cereals, general cargo) and finally the receiving yards for transports and rolling stock direct from Moulineaux.

In a similar manner, on the right bank we see first the wharves of the commercial port sector, those for general cargo, and wharves specially equipped for the wine industry, with their storage sheds, and finally the central facilities for the reception of fruit and vegetables, equipped with refrigerated storage sheds and a "bourse commerciale" (stock exchange).

Immediately at the mouth, the Saint-Gervais dock comprising administration facilities for wine, timber, and especially the quais des Antilles, the quay d'Afrique, the most recently constructed in the Port, which with their liberal length of 800 meters and their five sheds, permit the simultaneous berthing of two banana vessels and two or three general cargo boats, and favored with a draught at the foot of the quay of 9.50 meters even under the most unfavorable tidal conditions.

Then afterwards we can see the quays of the Semoulerie de Normandie, those of the Papeteries Aubry, the reception centres for the hazardous products from Biessard, and the reception and storage center for automobiles.

Finally, from Rouen to the ocean, spaced out all along the Seine, a variety of maritime establishments which function under the authority of the Direction of the Port of de Rouen: Duclair, Yainville, La Mailleraye, Caudebec, and Port-Jérôme.

3. Opportunities Offered by the Port of Rouen

The Port of Rouen, it is acknowledged, had to exert major efforts to effect improvements to her access, but she did not forget, just the same, the characteristics of the infrastructure and the compelling need for appropriate equipment to facilitate the reception of ocean-going vessels. In addition to the role of transportation which constitute the main activities of a port establishment, adaptation to the needs of trade by suitable specialization of equipment is also a prime requisite, and modern ports must henceforth fulfil two supplementary functions:—

—On the one hand, assure the efficient warehousing of cargoes for appropriate conservation and subsequent withdrawal.

—On the other hand, offer attractive opportunities for the establishment of industries alongside the waters, industries which are closely connected with maritime trade.

Rouen is fully aware of the convenience which should be made available through good connecting ways, rail and water, with the entire hinterland.

The Port of Rouen boasts at present more than 7 km of wharves for general cargo, equipped with 106 hook cranes.

In addition, three sectors are specialized for the handling of fruit and primary products; the banana complex has available two berths served by five bucket conveyors of 30 ton per hour capacity. Cereals may be stored at this Port in a vertical silo of 20,000 tons capacity, and soon capable of 40,000 tons, as well as handling equipment pneu-

matically operated, and chain flour conveyors.

For the automobile trade, in addition to ideal berths for general cargo, there are two special facilities of the roll-on/roll-off principle, and all these locations will soon be linked with the Paris-Normandy arterial highway.

The equipment of 33 berths allocated for heavy traffic comprises 15 large gantry bucket cranes and 37 powerful cranes, permitting the handling under normal conditions an annual traffic of 3 to 4 million tons.

And lastly the petroleum refineries of the Lower Seine have suitable facilities for the reception of tankers which call there, and in 1964 two new berths were constructed while a supplementary berth should be ready by the beginning of 1967.

The Port of Rouen offers good storage facilities for general cargo; the shed area allocated to this traffic is more than 130,000 m^2 and this was supplemented in 1964 by the construction of three new sheds. But special installations too are no less well equipped, since the Port has:—

—A shed of 15,000 m^2 earmarked for fruits and primary products.

—A shed of 23,000 m^2 entirely air-conditioned for the storage of bananas.

—A capacity of 180,000 hectolitres of wine storage sheds, connected directly with the quays by a network of pipelines.

—A park of 16 hectares for the storage of automobiles.

—A storage capacity of 50,000 tons for cereals, either in silos or in specially equipped warehouses. New extensions will increase this capacity to 70,000 tons and over.

The sectors for the storage of coal and other heavy materials cover more than 250,000 m^2, and additional stocks can easily be handled on the extensive areas which lie at locations alongside the berths receiving the vessels.

Rouen has been pre-occupied for many years with the fostering of port industries and have taken the appropriate steps for the efficient administration of extensive land reserves essential for industrial opportunities. The industrial harbour belt of Rouen today covers 500 hectares but there is also in reserve another 300 hectares of terrain linked by road (and soon by arterial highway), railway, and waterways. All these are immediately available for potential manufacturers.

The Seine Valley equally offers interesting opportunities and already an important center for petrochemicals is developing near the two major refineries of Port-Jérôme, the latter themselves acknowledging continuing expansion. Below these refineries more than 800 hectares of land located alongside

the river can accommodate industries of all type.

Finally, the demands of industrial Seine have led to the filling in of the vast marshland which existed between Honfleur and the old South dyke and has permitted the creation of more than 1,000 hectares of land now available for industrial exploitation. The waterway between the two zones nearest the estuary is readily navigable in spite of a heavier clay deposit than at Rouen; besides, the proximity of the Bay permits vessels to leave the berth at about the hour of the high tide at the estuary and consequently to navigate in descent with the same draught limits as those authorized for entry.

The Port of Rouen has always followed with great interest the measures completed for the river improvement which are open to large pusher convoys and European-style self-propelling barges; the harbor authorities are likewise studying the establishment of a channel of sufficient depth to connect the Seine with the industrial centers of Eastern France and with the Rhein region.

The railway facilities of the port, always convenient, has undergone a marked improvement since 1965 following the electrification of the Paris-Le Havre line under the S.N.C.F. network.

Likewise the completion in 1967 of the auto-route from Normandy will permit trucks to link the port to the Paris regions in less than two hours and this is an additional 'trump-card' in the development of Rouen.

4. Trade

What has been written so far makes clear the dual vocational character, maritime and river-way, of the Port of Rouen, and we would in passing mention that in an average year the river trade approximately amounts to three quarters of the traffic specifically marine in character.

A breakdown of merchandise utilising the sea lanes would disclose the following pattern:—

—Raw Material Imports: coals, crude oil, minerals and ores of all kinds, timber and wood pulp.

—Bulk exports: refined petroleum, gypsum, cereals and fertilizers.

—Consumable produce: sugar, molasses, rape-seed oils and farm products for exports; wines from North Africa, cooking oils and fats, tropical fruits, perishables, vegetables, oil cakes and animal feed, for import.

—Finally, the products of every variety which enter into international trade.

Between the two wars, Rouen was always at the first or second place on any list of tonnages handled at French ports. These varied between 6 and 8 million tons per annum. But in 1929, 1930 and 1937, 9 million tons were exceeded. But this situation has undergone a change in recent years. Rouen is now in the 4th or 5th position, but with a tonnage in excess of 10 million since 1963, and 1966 will undoubtedly show 12 million tons.

This changed position should not be treated as a decline, and some explanations may be necessary here. Rouen in effect has undergone certain trade losses but these have been offset by increases in other segments of trading.

There has been a sharp decline in the purchase of coal abroad and also a transition from casks to bulk stowage of Algerian wines. These two importations counted for 60% of the total traffic in 1938, but they represent less than 20% in 1965.

The extraordinary importation growth of raw petroleum which has contributed essentially to the overthrow of the traditional hierarchy of French ports has not benefited the Port of Rouen. Tankers of 50,000 tons and over cannot navigate the Seine and the refineries are fed principally via pipe line from Le Havre.

Finally the collapse of trading with North Africa in which Rouen secured the highest tonnages in France, has also been keenly felt.

Nevertheless, counteracting this negative balance sheet:—

—Rouen has benefited from the increase in French agriculture. Almost non-existent prior to the War, the exports of domestic cereals and grains have reached an annual figure of 1½ million tons. This figure represents today between 15 and 18% of the total traffic and we may underscore the fact that about one-third of the wheat and barley exported goes via Rouen.

—The expansion of the chemical industries has introduced a second element of compensation. The 435,-000 tons of imports of sulphurs, phosphates, pyrites and ores of 1938 swelled to 1,225,000 tons in 1965.

—The export of refined petroleum by medium sized tankers has followed a comparable pattern.

—The importation of perishable foodstuffs by refrigerated vessels has multiplied five times.

But the most remarkable evolution is that the Port of Rouen has become more and more a port for regular lines. Those lines which called before the war covered essentially North Africa, the United Kingdom and Scandinavia. They still continue and the lines have greatly increased, except for Algeria. For example, the importation of Scandinavian paper increased from 13,000 tons in 1938 to over 235,000 tons in 1965.

Due to the augmentation of the lines, the number of regular liner today exceeds 60, a very thick network now links Rouen with Southern Europe, West Africa, Madagascar, the Antilles and the two Americas.

This rapid impetus has naturally changed the nature of the merchandise which one used to see handled on the quays of Rouen. Bananas from Martinique, oranges and tomatoes from Morocco, autos, machinery of all types, household equipment. Merchandise from Paris, are being currently handled by our dockworks. According to concurring testimony of users, they are fully capable, and their labor has earned the high reputation enjoyed by Rouen.

The Port of Rouen was at one time called the "coal port" or, more amiably, the "port for heavy cargoes". In that sense the so-called general merchandise in 1938 amounted to less than 20% of the total traffic.

This proportion is practically doubled in 1965. It is again necessary to mention that imports in

1938 were six times greater than exports, while at the present time there is more or less an equilibrium and the movement has even been reversed a few times in 1966. No other French port can equal this trade pattern.

If it is necessary to close this study with a forecast on the future of Rouen, it has to be acknowledged that her incapacity to receive huge tankers will not permit her any longer to recapture her pre-eminence of the years 1920/1930 on a quantitative basis.

But it is no less certain that advances in refined petroleum, the rising prosperity of the chemical industries and the constant advances made in agriculture, are the guarantees of a harmonious, balanced and continuing development.

Thanks to the improvements made to her access, the finest "trump-card" for the Port of Rouen rests in the years to come, in the multiplication of the regular lines for the transportation of manufactured goods and in the increasing frequency of specialized vessels bringing high quality foods: colonial fruits, tropical products, vegetables, consumed by the 25 million consumers of high purchasing power who people the hinterland.

All this is the natural consequence of her privileged situation and accords with the latest official plans to develop the Seine Basin.

5. Prospects for the Future

After having been almost completely destroyed, the Port of Rouen has recovered a potential greater than that of 1939.

The character of her activities has been considerably modified.

If one of its basic traffic has been considerably reduced (import of crude petroleum) and if elsewhere there has been a major shift in European economy (importation of coals) there have been happy compensations by the increase in imports of raw materials necessary for regional industries (coals, ores, natural phosphates, logs for paper manufacture, wood pulp), and the upsurge too in the entry of certain finished products (paper, machinery, animal foods), also influenced by modifications in wine transports, now bulk, and the advances in the

imports of primary products and perishables like bananas. Markets extending their activities to all the Paris regions have been created for these perishables, either at the port itself, or via negotiations as soon as the cargoes arrive.

But the most remarkable transformation is the development of the export function of the Port of Rouen. The tonnage reached today is nearly four times that of 1938 and comprises an infinite variety of products. If the cereals, the petroleums of the refineries of the Lower Seine, the ores, sugar, fertilizers and chemical products constitute the bulk of the traffic, the complete listing of all the products exported would yet be very long: fruits, vegetables, glassware, machinery, automobiles, textiles, and so on.

There has been a parallel development in maritime liaison. From modest beginnings, Rouen has now become a major port for regular lines, perhaps more than 60 principal lines, linking the countries of Northern Europe, North Africa, the West Coast of Africa: daily departures for Algeris, Morocco, Scandinavia, Great Britain, Belgium and the Netherlands; 15 saillings a month to the West African coast; a weekly liaison with North America, two voyages monthly for Madagascar, two others to Portugal, regular sailings for South America and the Antilles. Such are the facts which command the respect of ship owners who look for signs of regular traffic. They also account for Rouen's dedication to the lines now accumulated.

The administration of areas State-controlled in the lower reaches of the maritime port, as well as the administration of the river sector with its vast areas along the banks for industrial expansion, linked directly to the sea lanes and to the railroads, offer enormous possibilities for port extension and industrial growth generally.

The effects of the evolution of ocean transportation towards containerization or in specially built carriers are for the future but they have already been foreseen, while the reception quays of the roll-on/roll-off type are ideally situated at Moulineaux which will benefit from a direct link with the Normandy arterial highway.

In conclusion, if it is true that the future of the Port of Rouen is governed by any general expansion of the French economy, her geographical position in the centre of a very prosperous and industrial region, her proximity to Paris, her excellent river connections, rail and road too and the major advance due to the arterial highway from Normandy, all these contribute to her eminence and should assure continuing economic development. And the select location given to the Lower Seine in the directorial plans of the Paris region is the best assurance of it.

A Study of How New Zealand's Overseas Freight Bill Can Be Held or Reduced

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Foreword

The Northland Harbour Board has made a study of the use of containers and the likely effect of using them upon our overseas freight bill.

The conclusion we have reached is that the change from present methods to the general use of containers, both on shore and by sea, will require great capital expenditure during the change-over period. In the long run however, the general use of containers must tend to stabilise transport costs.

The Board is convinced that under the conditions mentioned below, internal and overseas freight costs will be held, and as the years go by, will be much better controlled.

This stabilisation of transport costs will, in our opinion, only come about—

(1) if a standard size container is adopted throughout New Zealand and the countries with which it trades; and

(2) if the road, rail and ship modes of transport are integrated, thereby permitting the same container to move from the factory or warehouse of origin where it is packed, to the warehouse of destination where it is unpacked, so that the individual packages of goods are manhandled only twice; it is expected that in due course world-wide air transport will become integrated with these modes of transport, just as it has become integrated in New Zealand during the last 16 years; and

(3) if there is one container terminal port for New Zealand, thereby enabling ships to arrive from overseas, unload, then reload and depart from New Zealand within 48 hours; and

(4) if, in order to obtain this quick turn-round—

(a) new methods of moving the containers between ship's side and shore destinations and vice versa are introduced, and

(b) there is a re-organisation of waterfront work.

The Northland Harbour Board believes that there will be a period of years during which the existing ships must be phased out, but its study shows that—

(1) even now, if they were available, five container ships of 1,130 container capacity could operate profitably (full both ways) between the United Kingdom and New Zealand carrying one-third (1,000,000 tons) of our cargo that is now capable of being carried in containers; and

(2) with experience in packing methods this tonnage will increase substantially; and

(3) in due course, as most of the existing ships disappear, 17 container ships calling at one New Zealand port will be able to carry the whole of the imports and exports of New Zealand.

The choice of the site for the National Container Terminal Port is one that can affect the economy of New Zealand for generations. The site must be one that will be effective in the changing times of the next 20 to 50 years or more. The only site in New Zealand that is certain to be able to accommodate the mammoth ships of the future and where it is certain that vast numbers of containers will be able to be efficiently marshalled immediately alongside the shipping berths is Marsden Point on Whangarei Harbour.

It has a natural great depth of water, large areas of vacant flat land and a fleet of four modern powerful tugs. The fact it is 68 miles by water, 93 miles by road, and would be 130 miles by rail from Auckland, is far outweighed by the many advantages indicated towards the end of the study.

Chairman
R. K. Trimmer

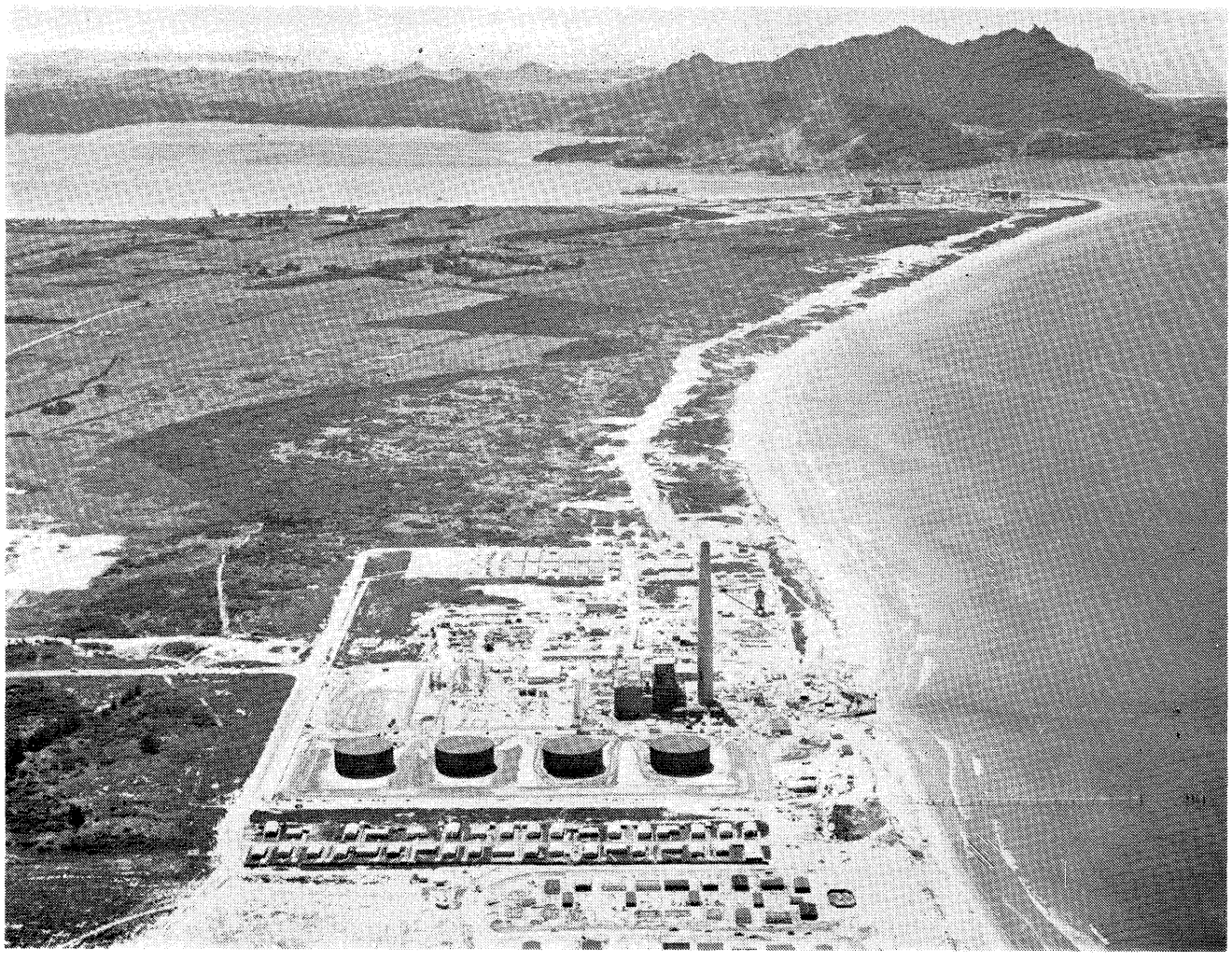
Introduction

Three years ago the Northland Harbour Board installed the rolling method of moving cargo when it built its cold store adjacent to the overseas export wharf at Port Whangarei. This system provided for the loading of butter on pallets placed on Cargon rolling floors in the cool chamber of the dairy factory of manufacture and the unloading of these pallets alongside the working face in the hold of the ship being loaded. In other words, each 56-lb carton of butter is man-handled only twice, once in the factory of manufacture and secondly, when stowed in the hold of the ship. Four manhandlings of each carton are eliminated. So far as the on-shore movement of the cargo is concerned, the turnround time of the motor trucks bringing the butter to the cold store has been reduced to three minutes or less, as is also the loading time of the trailers taking the butter from the cold store to the ship.

This unit loading equipment has resulted in the rate of loading butter into an export ship at Whangarei being a New Zealand record, indeed even a world record.

From this it can be seen that the Northland Harbour Board is alert to the modern trends of cargo handling. The Board is determined to keep its ports equipped so as to speed the turn-round time of ships and thereby reduce New Zealand's overseas freight bill.

Early in 1967, the Northland Harbour Board sent a delegation of three executive officers under the leadership of one of its mem-



The above photograph shows Marsden Point with the electric power station in the foreground and the oil refinery in the distance. Ships can be seen in the sheltered waters of Whangarei Harbour berthed at the Refinery and the Northland Harbour Board jetties. The photograph clearly shows the large area of vacant flat land owned by the Northland Harbour Board, available immediately alongside deep water.

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bers, Mr. D. C. Waterhouse, to Pacific and Far Eastern ports to study the recent development of unit loading methods and in particular, the use of modern containers.

They visited Honolulu, San Francisco, Oakland, Seattle, Tokyo, Kobe, Hong Kong, Singapore, Perth, Melbourne and Sydney. From the many people and authorities interviewed much information was gathered about the use of containers and unit loading in general, in Britain, Europe, United States, Japan and other countries.

It was found that the following organisations are either using containers or are preparing to do so:

(1) Sealand is already operating a substantial container shipping service on the east and west coasts of United States and from the United States to the United Kingdom.

(2) Matson Navigation Company has been operating a highly successful container shipping service between the west coast of United States and Hawaii for six years.

(3) American Export—Isbrandtsen is establishing a container shipping service from United States to Amsterdam and other European ports.

(4) Overseas Containers Limited, a consortium of British shipping companies which includes P. & O., Furness Withy, Alfred Holt and British and Commonwealth Shipping Company Limited, is proceeding with a major container operation between the United Kingdom, Europe and Australia. Overseas Containers Limited will operate in conjunction with Associated Steamships Pty. Limited through a jointly held subsidiary, Seatainer Terminals Pty Limited.

Overseas Containers Limited has ordered six specialised container ships for the above trade. They will be delivered in 1969. They will have a speed of 21½ knots, will be 745 feet long and will have a gross tonnage of 27,000 tons. They will have cellular hold construction and call at only two or three ports. Each ship will carry

Serenia, 70,000 tons, berthing at Refinery Jetty, Marsden Point.

1,130 containers, a quarter of which could be refrigerated. Feeder services to the smaller ports at both ends of the route will be provided by coastal container ships.

The world is in a period where cargo handling methods are being changed. The cause of this change is the ever increasing cost of the old methods. Some of the shipping companies have already proved that the new methods prevent rising costs. The other companies would not be interested in the new methods but for the fact that they are convinced of the soundness of the economics of using them.

This study has six tables as an appendix. These are necessary for an understanding of the general statements made herein. No attempt has been made to include in the study the voluminous statistics and information which the study itself has produced. This would have made it too voluminous for busy people to read. All such statistics and information, however, have been preserved in stencilled form and are being transmitted separately to all whom the Board thinks might have reason to use them. They are available upon request for any person who would care to have them.

Containers

At the present time, there are many different types of containers owned by shipping and trucking companies throughout the world. These fall into two main groups, dry and refrigerated, and they vary in size from small box-like containers to—

(a) Standard
20' × 8' × 8' (I.S.O.)

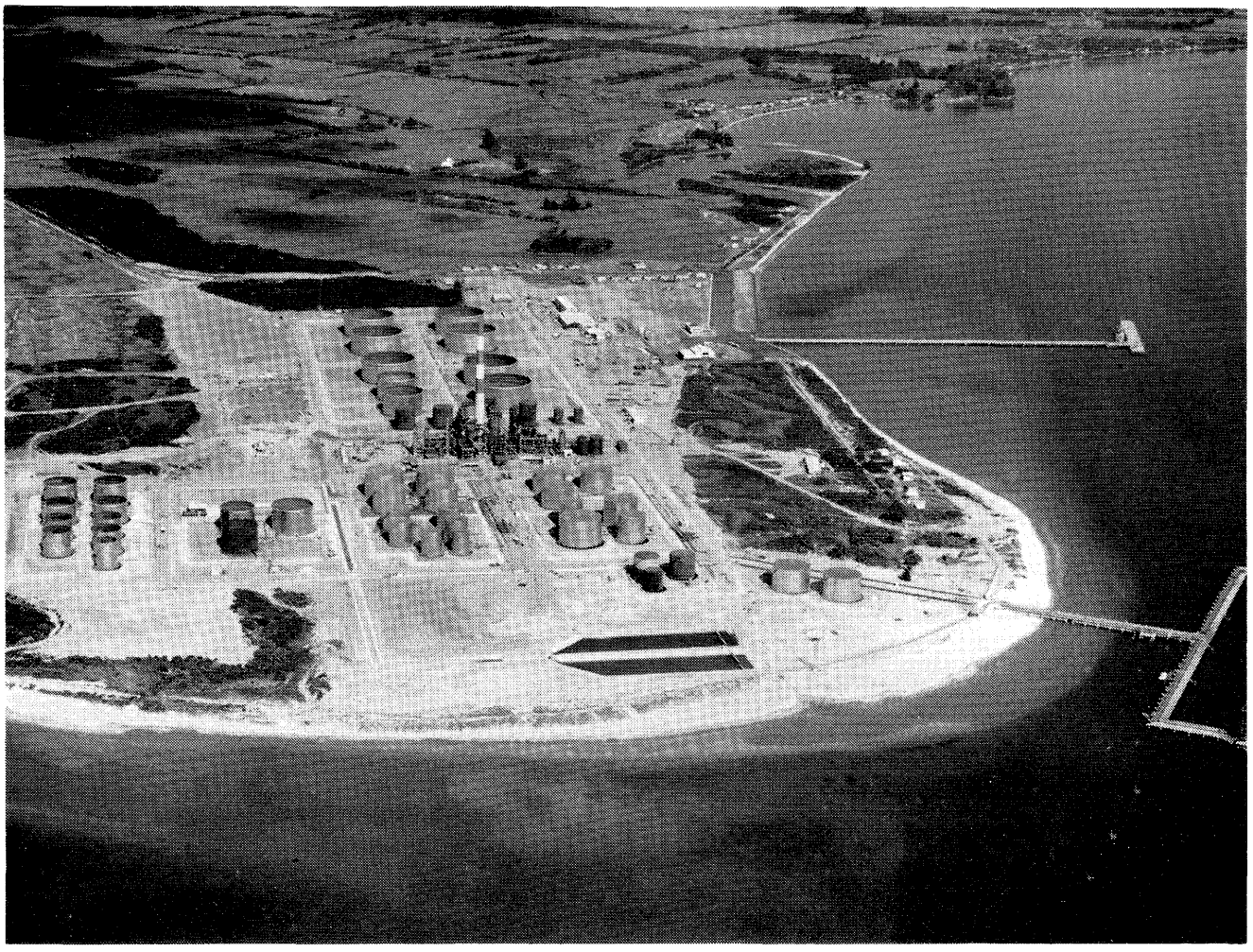
(b) Matson
24' × 8' 6" × 8'

(c) Sealand
35' × 8' 6" × 8'

(d) Standard
40' × 8' × 8' (I.S.O.)

The International Standards Organisation has also recommended 10' × 8' × 8' and 30' × 8' × 8' containers.

For the purpose of this study, the standard container size with the outside dimensions of 20' × 8' × 8' has been used. These containers are manufactured in various materials. There are two main types, one of an aluminium construction and the other constructed with a steel frame, plywood panels, and strengthened and protected with a fibre glass exterior. This container could be constructed in New Zealand using a high percentage of New Zealand materials and all New Zealand labour. The cost of this container in the United States of America is approximately $2,350.



A view of the oil refinery and Harbour Board areas. Also showing is the deep water and the large area of vacant flat land owned by the Northland Harbour Board.

It is essential that when containers are used between New Zealand and overseas terminals they must be of standard dimensions.

The container vessels for the Australian trade have been designed to carry standard containers. It follows that the containers to service the New Zealand trade must also be of the standard sizes.

Dry containers are used to carry all commodities as listed in part (a) of Table IV. Refrigerated containers are used for the carriage of produce required to be shipped and maintained at a controlled temperature. This type of container would be used for the carriage of commodities shown in Part (b) of Table IV as set out in this study. Special containers are also being used for the carriage of the following other goods

(a) Edible oils in bulk
(b) Bulk flour
(c) Printers' ink
(d) Tetraethyl lead
(e) Liquid fertiliser
(f) Livestock
(g) Automobiles

Almost all commodities that can be contained within the physical dimensions of a container, are in fact now being carried in this manner in the United States of America and in Europe.

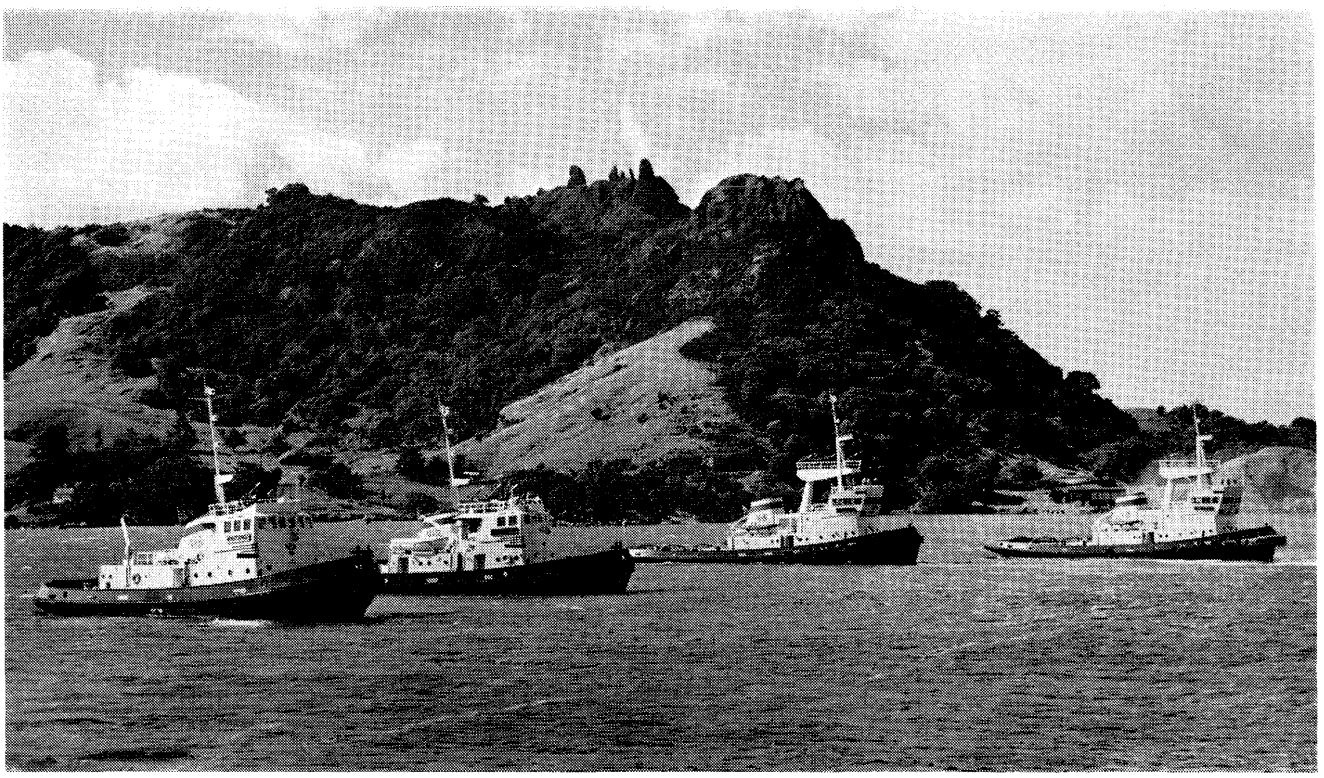
Refrigerated containers with self-contained refrigerating plants are in general use in the United States of America. These plants derive power from electric motors, or internal combustion engines run on butane gas. The cost of such a container in the United States of America is approximately £8,350.

Experiments are now being conducted in the United States of America and in the United Kingdom with the object of improving methods for the carriage of cargoes in containers at a controlled temperature. Experiments include—

(a) controlled atmospheric conditions coupled with refrigeration;
(b) insulated containers, the contents of which can be exposed to a ship's cold air circulating system; and
(c) direct expansion of liquid nitrogen.

In the nitrogen system a bottle of liquid nitrogen is attached to the outside of the container. The nitrogen is released into the container and in changing from a liquid to a gas, supplies the necessary cooling effect.

Results of this experiment will



From left to right: Waitangi, a Voith Schneider tug with 20 tons bollard pull; Herekino, straight diesel, Kort nozzle, 32½ tons bollard pull; Parahaki, diesel electric, Kort nozzle, 29½ tons bollard pull; Raumanga, diesel electric, Kort nozzle, 29½ tons bollard pull.

be awaited with keen interest in New Zealand.

If the nitrogen system proves to be a success New Zealand produce could be conveyed from the freezing works to the container ship in an insulated container suitably equipped. The nitrogen is only used to prevent the temperature rising above the allowable limits. The nitrogen bottle would be removed before the container was placed in the ship's hold. The ship would provide the normal cold air system to maintain the temperature of the produce to its port of destination even as far away as the United Kingdom. Nitrogen could again be used to maintain the temperature of the produce from ship to consumer.

This system would allow the containers to be stowed below the weather deck. This is not practicable with the present type of refrigerated containers which require the usual maintenance and cooling air for their condensers. The nitrogen system, too, has the advantage that the only space lost in transit is what is taken up by the insulation. Therefore, the nitrogen type container has a greater capacity than present refrigerated containers for cargo on the return voyage and a better dual use, dry or refrigerated.

If New Zealand's temperature controlled produce is conveyed by containers, it is probable that individual refrigerating units on each container will not be necessary. Successful experiments have been carried out with the nitrogen system between Seattle and Alaska. Lettuce in bulk has also been transported from the United States of America to the Philippines and has had a seven-day shop life using this method of refrigeration.

Savings in container operation

The success of Matson Navigation Company in improving its own financial position from one of near disaster to one of success, without increasing freight rates should be reviewed to illustrate the possible effect upon the freighting of New Zealand trade. Since 1961 Matson has not increased freight rates at all.

Indeed, in some cases, reductions have been made. Matson's annual financial reports from 1961 to 1966 have been studied. Basically, little change has occurred in its passenger service during these years. Any significant gains are substantially reflected in improved freight operation. The statement shows a steady change from a loss of $1,067,137 in 1961 to a profit of $9,460,427 in 1966. Another significant fact is that long-term debts have been reduced from $24,270,330 to $11,864,119 in the same period.

Pointing out the savings inherent in the use of containers the following statement (Handling and Shipping, September 1964) was made by Mr. Norman Scott, Matson Vice President in charge of freight:

"Shippers are cutting as much as 32 per cent from costs they used to pay for conventional steamship freighting. The average cost reduction is around 15 per cent. The savings over what conventional rates would be are of course

TABLE 1

TOTAL TONNAGES OF VARIOUS COMMODITIES HANDLED AT ALL PORTS [3] [4]

Commodity	INWARD[1]		TRANSHIPMENTS				OUTWARD[1]		Total Manifest Tonnage[2]
	Coastal	Overseas	Coastal to Coastal	Coastal to Overseas	Overseas to Coastal	Overseas to Overseas	Coastal	Overseas	
Beans and peas	1,850	967	14	241	514	—	1,407	14,775	20,537
Bitumen	68,934	19,507	—	—	55	—	73,266	2,183	164,000
Butter	7,196	—	—	8	—	—	4,177	191,403	202,792
Cement	444,973	2,687	—	—	133	—	456,607	1,327	905,860
Cereal and bakery products	32,512	1,663	14	33	21	639	38,063	7,895	81,547
Cheese	113	185	—	—	1	—	286	101,496	102,082
Coal and coke (except bunkers)	309,955	2,931	—	—	—	—	313,317	55	626,258
Flour	60,629	69	2	—	—	—	62,707	1,756	125,165
Fruit, fresh	13,332	95,788	86	745	92	—	12,283	90,768	214,017
Fruit, preserved	5,566	22,115	13	37	1,624	1	7,887	1,817	40,735
Glass, glassware, crockery	5,881	37,424	—	224	370	149	6,526	4,247	55,564
Grain	45,896	158,279	120	—	34	56	52,947	103	257,645
Gypsum, plaster of paris	1,928	104,053	—	—	521	1	822	233	108,080
Hides, skins, and pelts	987	241	6	332	1	—	1,410	63,966	67,282
Iron and steel, pipes, etc.	46,701	514,773	68	3	10,046	497	47,024	4,954	634,680
Machinery	11,770	141,925	52	12	5,968	366	12,049	6,240	184,780
Manures, lime, rock phosphate, etc.	75,021	1,260,796	23	23	1,565	851	63,473	5,680	1,409,894
Meat, frozen and preserved	2,734	71	—	186	—	—	2,262	516,597	522,036
Milk products, other than butter and cheese	4,528	13	—	2,395	—	22	4,148	184,688	198,211
Motor spirit, kerosene	1,091,411	410,239	—	—	3	—	1,126,922	4,397	2,632,975
Motor vehicles, parts and tyres	585,740	335,607	45	13	2,146	483	547,784	4,123	1,478,358
Oil, diesel (except bunkers)	374,434	133,183	—	—	—	—	402,692	—	910,309
Oil, fuel (except bunkers)	406,863	40,791	841	—	645	486	413,543	237,709	1,102,850
Oil, other mineral	14,537	2,639,517	—	—	13	—	3,850	553	2,658,483
Paper, newsprint, etc.	36,569	40,802	—	58	955	22	42,632	114,594	236,667
Rubber, crude, and manufactures thereof, excluding tyres	1,087	22,241	—	—	117	6	1,465	338	25,377
Salt	520	39,500	—	—	697	—	247	45	41,706
Seeds	4,983	2,748	10	123	111	1	3,617	10,776	22,614
Sugar	59,375	144,034	8	—	13	—	59,466	947	263,864
Tallow	1,231	4	—	620	113	—	1,784	56,743	61,228
Tea, cocoa, and coffee beans	2,759	29,171	—	—	766	16	2,465	143	36,102
Textiles	7,208	124,441	2	—	2,233	547	8,965	2,943	149,121
Timber, hardwood	2,567	73,474	—	—	4,945	7	1,243	20	87,208
Timber, softwood					2,068	10	32,013	471,081	583,343
Tobacco, raw and manufactured, and cigarettes	33,607	42,312	87	—					
Vegetables, including potatoes and onions	3,801	9,915	132	4	10	—	4,467	405	18,880
Wines, spirits, ale, beer	40,289	3,174	129	584	46	—	42,510	28,030	115,521
Wood pulp	31,092	16,873	13	243	613	62	32,747	2,019	84,593
Wool	3,316	18,790	—	—	—	—	3,018	57,270	82,394
Goods in reusable containers if contents not known	10,604	656	83	3,578	15	—	8,926	268,990	296,528
Goods, n.e.s.	51,153	793	64	160	133	48	46,012	1,257	100,025
Totals	732,416	689,670	1,290	643	28,917	1,876	732,909	110,987	2,331,434
	4,635,798	7,181,422	3,102	10,265	65,504	6,146	4,679,938	2,573,553	19,240,745

[1] Excluding transhipments. [2] Transhipments included twice. [3] Excluding loadings of bunker fuels.
[4] Excluding landings of sand, shingle and shell, not loaded at ports.

even greater.

"Savings develop in a number of ways, some inherently applicable to containerised freight regardless of destination.

"Multiple handling of freight is eliminated in a through containerisation system. From point of origin to destination, a through container's load is untouched. Only the container itself is handled.

"Warehousing costs are eliminated in most instances. Shipping damage is virtually eliminated. There is no need for costly special packaging for overseas shipment.

"Pilferage is practically nonexistent in containerised shipping; the container is sealed at its loading point.

"Protection against handling damage and pilferage brings a sharp reduction in insurance costs.

"Depending upon the type of commodity, a shipper may save as much as $200 on a single containerised load shipped to Hawaii."

It can justifiably be said that the Hawaiian-West Coast of United States of America transport problem was not quite the same as the New Zealand-United Kingdom one is today. The length of the haul is different, the balance of freight in the two directions is different, and, inter alia, the percentage of refrigerated freight is totally different.

In spite of these differences, we

simply cannot ignore the Matson experience nor can we ignore the extensive use of containers elsewhere throughout the world. It well could be that whatever savings there may be in the capital outlay in ships, could be counterbalanced by the capital outlay in the containers. Nevertheless, experience overseas is that the freight rates have at least been held, if not reduced, and the operator's profits have risen.

Common sense rebels at the thought that the rest of the world is wrong in proceeding to change over to the use of containers as a form of unit loading and that New Zealand, almost alone, would be right in standing out.

It is not possible to calculate in £ s. d. exactly what savings would follow the use of containers between New Zealand and its overseas markets. Any such calculation would of necessity be based on a number of assumptions and guesswork not only as to the present but as to the future to which no one could attach scientific authenticity. In this Board's opinion it is not necessary to attempt to make such assumptions or to engage in such guesswork.

What is irrefutable is that there would be a quicker turn-round of ships, there would be a greater degree of utilisation of each ship, that is, each ship would be moving to and fro between New Zealand and its overseas terminal for a greater number of days each year and there would be a much less labour content in the movement of the cargo.

Only a few years ago, on New Zealand wharves, coal used to be unloaded from ships by men shovelling it into cane baskets which, when filled, were hoisted by ship's gear and emptied into horse-drawn vehicles. When the use of mechanically operated grabs was first suggested no one could authoritatively foretell the future savings. Common sense forced the grabs upon us. Thus, when the construction of the Main Trunk Railway was first mooted, no one could possibly calculate with any degree of accuracy the future costs and revenues. In due course, in spite of these uncertainties the railway was built. Common sense triumphed over fear.

The use of containers is common sense.

It is just as much common sense as when a manufacturer of, say, 2-lb tins of jam, for distribution purposes first packed them 24 at a time in a wooden box—a container. The use of containers today is merely an extension of this idea.

This study does not presume to solve all the problems that will arise when containers are in general use. For instance, it does not attempt to decide whether meat should continue to be exported in carcass form from the freezing works of origin in New Zealand to the warehouse of distribution in the United Kingdom. If it is accepted that the use of containers will hold, if not reduce, our overseas freight bill, then the appropriate authority must concentrate on solving such a problem, and if necessary, must embark on a pro-

TABLE II

SCHEDULE OF MEASUREMENTS FOR A CONVERSION TO A UNIFORM TONNAGE BASIS

For uniformity purposes the Department of Statistics has compiled and supplied to all Port Authorities the following schedule of standard conversions.

40 cubic feet=1 ton shipping

Bran, sacks	12 to ton
Bricks	320 to ton
Butter	Actual weight, or 35 boxes to ton
Candles	44 boxes to ton
Casks (quarter)	4 to ton
Cement, bags	18 to ton
Cement, casks	6 to ton
Chaff, sacks	25 to ton
Cheese (standard sizes)	Actual weight or 12 crates to ton
Cheese (loaf)	Actual weight
Coke, bags	20 to ton
Copra, sacks	Actual weight
Drums, 5 gallon	32 to ton
Flour, 200 lb sacks	10 to ton
Fruit, fresh	Actual measurements
Fuel oils	Actual measurements
Grain, 4-bushel sacks	10 to ton
Hides	Actual weight, or 10 sacks to ton
Hogsheads	2½ to ton
Honey	Actual weight
Kerosene	Actual measurements
Livestock	Horses, cattle, 2 to ton Calves, sheep, or pigs, 20 to ton
Meat, frozen	Actual weight
Meats, preserved	Actual measurements
Oatmeal, 200 lb sacks	10 to ton
Pelts	Actual weight
Pollard, 200 lb sacks	10 to ton
Potatoes	Actual weight
Pumice, sacks	Rough, 20 to ton Ground, 10 to ton
Salt	Actual weight
Seed, 4-bushel sacks	10 to ton
Skins	Actual weights, or 6 bales or 3 dumps to ton
Sugar, 70 lb bags	32 to ton
Tallow	Actual weight
Timber	Hardwoods, 320 super feet to ton Softwoods, 480 super feet to ton
Vehicles—Push cycles	¼ ton
Motor cycles	½ ton
Side-cars	½ ton
Motor cars	6½ tons
Motor lorries and buses	8 tons
Wheatmeal, 200 lb sacks	10 to ton
Wool	5½ to ton (bales)
Other items	Actual weight where available, otherwise measurements

gramme of educating the people in our markets to purchase increasing tonnages of boned or packaged meat, just as has been done by the meat producers in the United States of America. Boned and packaged meat will increase the carrying capacity of a container from about 9 tons for carcassed meat to nearly 20 tons. This is, in itself, a freight reduction that New Zealand cannot ignore.

There cannot help but be other problems peculiar to New Zealand arising out of the use of containers. The problem of rising freight costs is so serious that it will become necessary for other aspects of export trade to be studied by relevant authorities with a view to ensuring that the advantages to be secured from the use of containers, are not lost. Once we are satisfied that, if the problems were solved, the use of containers would be in the national interest, then we must boldly move on to use containers, confident that by a process of trial and error, the problems will be solved.

There is no other way in which such a fundamental change in cargo handling methods can be accomplished. Fear of change and fear of making mistakes will leave the country perpetually confronted with a rising overseas freight bill, without the satisfaction of knowing that any real attempt has been made to counter it.

New Zealand's overseas container trade

As the cargo from United Kingdom to New Zealand is 36.6 per cent of the value of New Zealand imports and the cargo from New Zealand to United Kingdom is 51.4 per cent of the value of New Zealand's exports, it is assumed that this section of our overseas trade would be among the first to use containers. While planning to implement the container trade between New Zealand and the United Kingdom gradually, thereby bringing it about in an orderly manner, a fuller utilisation of existing ships should be maintained in the meantime. Conventional vessels will for a long time be required to carry certain cargoes.

In analysing New Zealand's trade suitable for overseas containerisation, it is assumed that the meat loaders already in operation at the ports of Timaru and Bluff will continue for many years to load conventional ships. However, no adjustment has been made in Table IV in this respect.

TABLE III

DISTANCES WHANGAREI TO OTHER NEW ZEALAND PORTS

	Sea Miles
Bay of Islands	68
Auckland	68
Tauranga	147
Gisborne	306
Napier	381
New Plymouth	441
Wellington	560
Nelson	571
Picton	582
Lyttelton	679
Timaru	765
Otago	843
Bluff	958

The major commodities which could be transported in containers between New Zealand and all overseas countries and the estimated number of container loads are listed in detail in Table IV. The percentage of New Zealand container trade for each port is shown in Table V. It is considered that it will be a number of years before full containerisation can be realised in New Zealand. It is a process that will take some years to complete and should be done in stages.

It is conservatively estimated that a 20'× 8' × 8' *container would carry an average of* 15 *tons.*

At the first stage, only one container berth would be required. The 1965 cargo figures (the latest available) have been accepted. This berth would handle 500,000 tons of cargo in and 500,000 tons out, a total of 1,000,000 tons. This represents 33,250 container loads outwards and 33,250 container loads inwards, being a total of 66,500 container loads per year.

Of this number 16,488 of the outward containers would have to be refrigerated and these same containers on the return voyage from the United Kingdom would carry dry cargo to New Zealand.

These 66,500 *containers could be carried now by* 5 *container ships of similar capacity to those ordered for the Australian-United Kingdom trade — viz.,* 1,130 *containers each.*

This would be an economic service, for the ships would have their containers full both ways.

At the second stage, when all New Zealand cargo (including Bluff and Timaru) to and from all parts of the world is carried in containers, the following containers will be required:

	Imports	**Exports**
Dry	81,726	69,304
Refrigerated	4,789	76,582
Total	86,515	145,886

These import container figures are substantially less than the export ones, hence the latter alone have been analysed and are as follows:

U.K. & Europe	99,932	68.5%
Australia	7,294	5.0
Japan	7,294	5.0
Canada, U.S.A.	20,424	14.0
Miscellaneous	10,942	7.5
	145,886	100.0

Only 17 *container ships* (1,130 *(containers each) would be needed.*

This could be done now but obviously the existing ships must be phased out gradually. Judging from overseas experience it is thought that the increase in container ships operating between New Zealand and all overseas ports from 5 to 17 could reasonably be expected to take place over a period of from 10 to 15 years.

Our study indicates that on present trade figures, if 17 container ships were now operating between New Zealand and all overseas ports, some of the ships would be reaching New Zealand with a substantial number of empty containers. In 10 years from now, however, the improved

TABLE IV

MAJOR COMMODITIES FOR CONTAINERIZATION AND ESTIMATED NUMBER OF CONTAINERS PER YEAR

In estimating the capacity in freight tons of these commodities per container, a weight ton is taken as 2,000 lb and a measurement ton as 40 cubic feet.

Commodity	T/c	TONS Inwards	TONS Outwards	CONTAINERS Inwards	CONTAINERS Outwards
Beans and peas	17	967	14,775	57	869
Cereals	20	1,663	7,895	83	395
Fruit, preserved	17	22,115	—	1,301	—
Glass and crockery	20	37,424	4,247	1,871	212
Hides and skins	20	—	63,966	—	3,198
Iron and steel pipes (20%)	20	102,955	—	5,148	—
Machinery (35%)	18	49,674	—	2,760	—
Milk products	16	—	184,688	—	11,543
Motor vehicles, parts and tyres (80%)	15	268,486	—	17,899	—
Paper	20	40,802	114,594	2,040	5,730
Rubber	18	22,241	—	1,236	—
Salt	20	39,500	—	1,975	—
Seeds	12	2,748	10,776	229	898
Tallow (50%)	20	—	28,372	—	1,419
Tea, cocoa and coffee	10	29,171	—	2,917	—
Textiles	10	124,441	2,943	12,444	294
Tobacco	20	9,915	—	496	—
Wines, spirits, etc.	20	16,873	—	844	—
Wool	6¾	—	268,990	—	39,850
Goods (n.e.s.) (75%)	17	517,253	83,240	30,426	4,896
Total Dry		1,286,228	784,486	81,726	69,304
Butter	20	—	191,403	—	9,570
Cheese	20	—	101,496	—	5,075
Fruit	20	95,788	90,768	4,789	4,538
Meat	9	—	516,597	—	57,399
Total refrigerated		95,788	900,264	4,789	76,582
Total dry and refrigerated		1,382,016	1,684,750	86,515	145,886

(T/c—Estimated Freight tons per container)

Source: Calculated from New Zealand Transport Statistics 1965

methods of packaging meat and the greater compression of bales of wool may well reduce the imbalance in the movement of containers to an unimportant figure.

Savings in cargo handling by the use of containers would be dissipated if the ships continued to call at the same number of New Zealand ports as they do today. Indeed, if the overseas freight bill is to be reduced to a minimum, it is basic that the overseas container ships must call at only one New Zealand port and that must be a port so equipped that even the largest container ships of the present or of the future can be unloaded and reloaded within 48 hours of arrival.

Neither the population nor the trade of New Zealand would support more than one national container port during the next 50 years.

The present population of 2,700,000 and the projected population of 50 years hence do not justify more than one national container port.

Even the densely populated and highly industrialised countries, such as the United Kingdom and Japan, do not contemplate more than two or three container ports of national status. Thus the ratio of population to container ports of national status in the United Kingdom would be 17 million to one, in Japan over 30 million to one.

In Australia, with a population of 12½ million and much greater distances than exist in New Zealand, the ratio of population to container ports is four million to one. At Fremantle is 3,000 miles from Sydney, it must have a container port of its own.

What facilities are needed to enable a port to operate as a nationl container terminal?

The companies which have been operating full containerised services must be the organisations which have the greatest knowledge of the facilities required for a container terminal.

Without exception, they are convinced of the necessity of having 40 acres or more of flat land immediately alongside each deep water berth.

The Matson Navigation Company, which pioneered the use of containers, is finding its area of 30 acres at Honolulu already too small. The Hawaiian Line is at present planning a container terminal nearby with an area of 60 acres, having room to expand to 100 acres.

Moreover, Oakland, on San Francisco Bay is reclaiming 180 acres as a container terminal while Seattle, Tokyo, Kobe, Singapore and Melbourne are reclaiming well in excess of 40 acres. In fact Tokyo and Kobe are reclaiming over 1,000 acres each for container terminals and additional berthage.

The Clyde Port Authority in the United Kingdom has planned a container terminal port, but not of national status, costing more than £2,000,000 at Greenock. At present, the project is for a single berth which would provide a depth of water of at least 42 feet L.W.O.S.T.

This is an example of the amount of money required even for a secondary container port that has a substantial, even though limited depth of water.

World-wide experience has shown that the basic requirements of a national container terminal port are similar to those of an oil refinery.

In the study conducted by the oil companies to determine where the New Zealand Oil Refinery should be located, the paramount considerations were—

(1) sufficient depth of water to accommodate not only the tankers of that time, but tankers of over 100,000 tons; and

(2) the availability of a large area of flat land immediately adjacent to the deep water and

having good load-bearing characteristics.

Any site that did not comply with both of these requirements was rejected regardless of all other considerations. These two aspects are natural features which cannot be created artificially without astronomical expense.

Far a National Container Terminal Port the following features are absolutely essential:

(1) Natural safe deep water approaches, capable of taking the largest ships envisaged, at any state of the tide, at any time of the day or night, leading to a sheltered site.
(2) A large area of flat land immediately adjacent to the berth or berths, being not less than 40 acres for each berth envisaged. If the long view is taken, then it is wise to have even 200 acres or more available.
(3) The terminal port must be served by all forms of transport thereby enabling prompt and unimpeded transportation to and from the port.
(4) Tug power, so as to enable any ship to be berthed under all weather and tidal conditions.
(5) Navigational aids operating for the safe conduct of ships of all sizes 24 hours a day.

The following features are highly desirable:

(6) Short pilotage.
(7) Full bunkering facilities.
(8) All marine facilities of whatever kind that will tend to shorten the turn-round time of shipping.

Where in New Zealand should such a national container terminal port be sited?

Table V shows that the whole of the South Island would handle only 25.73 per cent of New Zealand's total container trade. If the mechanical meat loaders at Timaru and Bluff are to continue to be used, then the cargo percentage that should be considered now would be 25.73 per cent less Timaru 2.98 per cent and Southland Bluff) 5.23 per cent. This would leave the whole of the South Island handling only 17.52 per cent of New Zealand's container trade.

TABLE V

PERCENTAGE OF CONTAINER CARGO AT EACH PORT

North Island	Imports %	Exports %	Total %
Bay of Islands	—	2	1.01
Auckland (Inc. Onehunga)	43	31	36.67
Tauranga	1	7	4.54
Gisborne	—	1	.52
Napier	2	9	5.71
Taranaki (New Plymouth)	2	9	5.33
Wellington	32	11	20.49
	80	70	74.27
South Island			
Nelson	1	3	2.05
Picton	—	1	.58
Lyttelton	12	8	10.17
Timaru	1	5	2.98
Otago	5	5	4.72
Southland (Bluff)	1	8	5.23
	20	30	25.73
	100	100	100.00

Source: Calculated from New Zealand Transport Statistics 1965

Obviously, a National Container Terminal Port must be in the North Island.

At first sight it may seem logical that either Wellington with 20.49 per cent of the national container cargo, or Auckland with 36.67 per cent should be considered as possible national container terminals for overseas container ships. However, export cargo originates at freezing works and dairy factories scattered throughout the length and breadth of the country. The internal transport system is already used to carry export produce to ports of shipment. Since practically all export produce must be transported in any event to a port, the additional haulage involved in running to a National Container port is not a significant factor in the overall internal transport cost.

It would be futile and costly to choose a site for a national container terminal now that will not, without the expenditure of many millions of pounds, be able to accommodate the ships that will be built in 10 to 50 years' time.

The selection of a port that is already fully developed in a metropolitan area is impracticable because of a number of factors, such as the shortage of land for adequate marshalling areas, not merely for the requirements of today but of the years ahead; the road and rail systems servicing such old-established ports never anticipated the whole of the inward and outward container cargo of New Zealand being channelled through harbour and transport facilities planned generations ago. Moreover, even if the above problem could be solved the container ships of the future would not be able to enter many such harbours without the expenditure of many millions of pounds on dredging.

These consideration apply with force to the existing major ports of New Zealand. Not one of them has 50 feet depth of continuous navigable water. It would cost millions of pounds to provide it at any one of these ports. Each one of these major ports has existing transport problems.

The National Container Port would, even on the cargo figures of 1965, handle 290,000 containers a year. This is 800 every day for seven days each week, each year; it is over 1,100 every warehouse working day in the year. These would need to be marshalled for distribution by rail, coastal container ship, barge or motor truck. The roads and the railway leading from any one of these metropolitan ports would become virtually impassable.

The movement of such a number

of containers must be a highly efficient operation. Any hold-up at all would cause a complete breakdown of the transport system. A very large reserve of marshalling and storage area is essential.

Six years ago there were comparatively few oil tankers in the world larger than 50,000 tons. Today there are scores larger, even in the 100,000, 200,000 and 300,000-ton class. The economics of the mammoth ship made this trend towards larger and larger tankers inevitable. The same trend must be inevitable for all bulk carrying ships. Container ships are in effect bulk carriers.

In view of the problems of converting metropolitan ports into national container ports, the search must be for a suitable site as close as possible to the greatest concentration of population and of trade.

This is precisely what the oil companies did when they selected Whangarei as the national oil refinery port.

Feeder system from and to a national container terminal port

Basic land transportation in New Zealand is at present largely by rail with truck transportation within cities and other hauls. All movements of export and import cargo are geared to services from existing ports. Therefore, at the outset, container traffic would tend to follow existing transportation systems. As future container traffic increases three types of feeder system to and from the national container port would develop:

(a) by rail;

(b) by sea to existing ports by tug and barge or coastal container ship; and

(c) by motor truck.

The Matson Navigation Company distributes its containers from their Terminal in Honolulu to the other islands of Hawaii by a weekly service operating to three ports. It is done by a 310-foot barge that carries 155 containers, 19 of which are refrigerated. It is equipped with a crane for handling containers and is towed by a tug.

Containers are commonly distributed throughout Europe by barge, road and rail. Within the United States they are distributed substantially by rail and road partly by water. Large barges carrying up to 200 containers and towed at a speed of ten knots present one way of distributing containers in New Zealand between a national container port and some feeder ports. In this mode of transport it has been found that wherever possible shore-side cranes should be used. This allows a higher deck load of containers to be carried, which is most important when the balance of cargo movement necessitates a large number of empty containers being accommodated. Although this mode of distributing containers in New Zealand would be best by a barge without a crane, it would be necessary to have at least some barges equipped with cranes to service the smaller ports.

As the capital involved in the barge with or without a crane and the shore based crane is comparatively low, the speed of unloading or loading at feeder ports is not as important as at the national container port where overseas ships of high cost are involved. Moreover, there would be some ports close enough to the national container port at which, while the unloading is proceeding on one or more barges, the tug can be towing export barges to the national container port.

Highly expensive shore-side cranes such as are at Honolulu and elsewhere would not be necessary at any port apart from the national container port. Whirley cranes would be satisfactory to load and unload barges onto railway wagons, motor trucks or to the cargo shed where break-bulk operations may need to be carried out. In some cases, straddle trucks or large fork-lift trucks may be required to transport the containers to a local container yard. New Zealand experience in rolling unitised loads could be applied at all ports whether national or provincial with tremendous savings in money, time and effort.

The United States of America railroads are at present studying the use of high speed trains of 60 or more wagons carrying containers only. At the present time, Matson Navigation Company and the Burlingham Railroad have a very successful operation of container flow eastward of canned pineapples to the United States mid-west and a balance return load of commodities destined for Hawaii.

These specialised container trains indicate that substantial savings are realised.

A high percentage of New Zealand's export cargo originates at places that are considerable distances from ports. Therefore this cargo must be taken to the national container port by rail if double handling is to be avoided. It follows from this that trains carrying only containers might well be the logical solution.

Existing rail wagon loading areas are usually from platforms with loading through side doors. For container loading, two types of wagons might be developed, namely:

(a) single container cars with additional car length to allow turning room on the car for fork lift truck or other entry into the container; and

(b) double container car with doors facing each other and with sufficient separation for fork lift truck or other entry into the container.

Where container transfers are required, they can be performed by cranes, straddle trucks or by the rolling method already used by the Northland Harbour Board.

It is perhaps relevant while mentioning feeder services, to venture the opinion that the internal costs of transporting containers within New Zealand could be held, if not substantially reduced, by the three modes of transport, rail, road and water, being integrated by the general acceptance of the rolling method of moving cargo that has already been in highly successful operation in New Zealand for a period now of 16 years.

If this were done, the various costly forms of equipment needed

for lifting containers at every point of transfer during their journey to and from the ship and to and from the warehouse or factory of origin or destination, would be rendered quite unnecessary. Millions of pounds could be saved in capital outlay alone.

This study is directed to the question of how we can reduce our overseas freight bill. The transport of the containers within New Zealand would affect our internal more than our external finances. It is probable that all forms of transport would become involved: rail, road and water. The extent to which one might dominate the business of transporting containers to or from the national container terminal port would, in the long run, depend substantially on the service rendered to the customers. The amount of overseas content in any expansion of railway facilities or in the establishment of a coastal container shipping or barge service would not be greatly different wherever a national container terminal port were situated.

Whangarei is the logical place for a national container terminal port

Marsden Point on Whangarei Harbour already has every one of the essential requirements for a national container terminal port, not only under present conditions, but also under the conditions that may conceivably prevail during the next 50 years.

It has the following requirements:

(1) Natural safe deep water leading to a sheltered site. It is a port in world class and of world renown. It has already accommodated oil tankers of 91,500 tons and arrangements have now been made for it to receive tankers of 100,000 tons and above.

(2) (a) It has, immediately adjacent to future container ship berths, more than 200 acres of vacant flat land admirably suited for a national container terminal and for a railway marshalling yard.

(b) It has further areas of land available, if necessary, for break-bulk assembly areas, administrative buildings and workers' and other amenities.

(c) All the above land has perfect foundations. There is not one pile under any part of the adjacent refinery, not even under the the 329-foot high ferro concrete chimney. Such country is capable of carrying the heavy loads resulting from the use of railways, transporter cranes, heavy fork lift trucks, straddle trucks, trailer units and other equipment used in the movement of cargo.

(d) Working areas and all access roads are wide and clear of all obstructions. Because of the large area of land available there could be no transport bottle-necks either in the marshalling yards or in roads approaching them.

(3) MODES OF TRANSPORT

(a) *Water Transport*

A harbour with an area of 40,000 acres of land-locked water existing wharves and facilities suitable for the handling of barge traffic and coastal container ships.

(b) *Road Access to Terminal*

Served by State Highway No. 1: Awanuir-Bluff, Class I Loading with unimpeded access to terminal.

(c) *Rail*

With the addition of a spur link of approximately eight level miles, the site would be connected to the National Rail network.

(d) *Airport*

The land immediately adjacent to the container port at Marsden Point is ideal for an airfield.

(4) It has four of the most modern and powerful tugs in the Southern Hemisphere capable of handling ships of any future size no matter how large they become. These tugs are fully equipped for firefighting and salvage purposes.

(5) It has excellent approaches to the harbour lighted superbly from Cape Brett, Mokohinau, Poor Knights, the Chickens, Tutukaka, the Hen, Bream Head and with a 10-mile radius fairway buoy light. It has the very latest navigational aids, such as buoys, beacons, leading lights, radar reflectors, radio-telephone and V.H.F. operating 24 hours a day.

(6) It has a short pilotage, the service being operated by a team of pilots who have had overseas experience in the handling of mammoth ships. They have now been handling ships at Whangarei for over three years.

(7) It has full bunkering facilities.

(8) It has already in existence onshore marine servicing facilities.

(9) An oil-fired power station within two miles of the suggested container site came into operation in April 1967. It uses the surplus fuel oil produced by the New Zealand Refinery Company's refinery at Marsden Point. Although this power station will produce 240 mw. initially, it has been designed to enable it to double and treble output as desired.

An atomic power station is also being considered and investigations into foundations and cooling systems are being made on sites not far from Whangarei.

(10) Adequate supplies of water for domestic and other purposes are reticulated and available now.

(11) In the immediate vicinity of the oil refinery, the electric power station and of the proposed national container terminal site, there are further large areas of land already zoned "industrial" on which industry could be established.

(12) With the fast industrial growth of New Zealand, each year new plant facilities are required. Industries seeking site location require favourable operational, transportation, business and living conditions. Modern planning in other countries has provided "Industrial Parks" to meet all these requirements.

(Continued on Next Page Bottom)

The Relation of Harbor Activity To the Local Economy in Portland

Report Prepared for Portland Public Docks, Oregon, U.S.A. by the Bureau of Business and Economic Research of the University of Oregon

Harbor activity in Portland is an elemental and important part of the local economy. Its impact extends beyond the direct employment which it provides and beyond the local economy. In 1965, more than 7,600 local residents depended upon the port for their livelihood. An equal number of other jobs were created by the "new money" which the direct employment of port-related jobs provided. In sum, in 1965 there were 15,262 jobs paying $103.8 million which ultimately depended upon the activities of the port. Furthermore, over 17,000 jobs were linked to the port because of the export of manufactured goods or the import of materials for a manufacturing process.

Relating any segment of the economy to the whole and measuring its relative importance are rarely clear and concise tasks. The difficulties are increased when that part of the economy to be isolated pervades the entire economic structure. Such is the case with regard to port activity.

There is no standard industrial classification which includes all of the people[1] whose jobs depend upon a port's activities. A first approach to the problem, then, is to determine the number of people directly employed in activities which exist because the port is active. In accomplishing this, over 200 firms and government agencies were questioned by phone, letter, or interview with regard to the number of employes and their payrolls which would be lost if there were no port activity. Responses varied with respect to the nature of the employment. For example, all employes who load and unload ships naturally

[1]The terms "people", "jobs", and "employes" are used interchangeably to mean full-time equivalent positions. That is, 7,600 jobs means that 7,600 individuals could have worked full time all year to fill these jobs. Actually, because of job transfers, part-time employment, etc., more than 7,600 individuals would be involved in 7,600 jobs.

The establishment of a Whangarei Industrial Park in conjunction with the National Container Terminal would be a national asset and would provide industrial opportunities unequalled elsewhere in New Zealand.

(Photos by Derek Messenger,

(13) The City of Whangarei, with a present population of 30,000, offers all the advantages of a modern city without the disadvantages of a metropolitan one. It has highly efficient engineering, building, transport, earthmoving and other industries and excellent educational, health, cultural and sporting facilities. The district has a temperature climate and is renowned for its beautiful bays and beaches and for its yachting, swimming, deep sea fishing and other outdoor recreations.

Terminal facilities

If the Whangarei Harbour were selected as the site of New Zealand's national container terminal, the Northland Harbour Board would provide the most modern and efficient equipment and facilities.

The high daily cost of container ships makes it imperative for the turn-round time to be as short as possible.

A national container terminal could be established at Marsden Point, Whangarei, at a fraction of the cost that would be incurred at any other port in New Zealand. In fact, the greater part of the cost of establishing a national container terminal and the installation of the necessary moving equipment could be met without resorting to loan money.

The Board is convinced that it is in the national interest for a container terminal to be established in the not too distant future. It is also convinced that it is in the national interest for the terminal to be at Marsden Point, Whangarei, because of the low capital cost and the existence now of complete harbour facilities. This position would be reflected in minimum harbour dues.

A consideration of all relevant factors makes the selection of Marsden Point, Whangarei, as the national container terminal logical and, indeed, inevitable.

Sources of information

Trade and cargo statistics used in this study have been extracted from the New Zealand Government Department of Statistics Publication. Transport Statistics 1965, and the New Zealand Year Book 1966.

Table I

Total overseas tonnage of various commodities handled at all New Zealand ports.

Table II

The schedule of measurements for a conversion to a uniform tonnage basis, as detailed on page 11 of the above publication.

From these tables, an estimate of the major commodities capable at present of being packed in containers and the estimated number of container loads has been prepared.

(Photos by Derek Messenger, Industrial Photographer, Whangarei)

depend upon the port entirely; but not all truck and rail employes in the Portland area depend upon the port. Similarly, not all bank employes depend upon the port, and those jobs which are port-related are included under foreign departments of banks. The results of the survey are detailed in Table 1, which shows that each category depends to a varying degree upon the port. However, the data listed include all employes whose jobs depend directly upon harbor activity.

This first table as well as the rest of this report are similar in nature to a report published in 1960[2]. Although there will be a natural inclination to compare the data for the two years in order to determine possible trends and to examine particular changes, such comparisons must be made with caution. No attempt was made in either year to note particular events which may have distorted (that is, made exceptionally high or low) any of the data presented. Moreover, changes were made in the collection and classification of the data as well as in some points of the analysis in order to present a more valid picture. As in all such projects, things learned in the first experience facilitated work on the second.

The importance of the port does not end with the incomes which harbor activity directly generates. In addition to the direct impact detailed in Table 1, there are 7,631 additional jobs generated by the direct impact and distributed approximately as in the listing in Table 2.

A determination of the complete collateral effects of port activity was beyond the scope of this report. Yet it seems reasonable to assume that these effects are similar in nature to those detailed in studies of other ports.[3] In fact, this estimate may be conservative, and each dollar earned by the employes in Table 1 may mean more than one additional dollar to the local community. The distribution in Table 2 assumes that these port-dependent employes are distributed in the same manner as those in any other area of activity in Multnomah County.

As noted earlier, direct employment in habor activity can not be classified in a single industrial category. So, it is not entirely valid to compare harbor activity with another segment of the local economy such as transportation, for some transportation employes are included in the figure for total employment related to harbor activity as well as in transportation. Furthermore, it is not possible to relate harbor activity to City of Portland employment since such data are not available. Nonetheless, some comparisons can be drawn in reference to employment in Multnomah County; these are detailed in Table 3. The total employment in harbor activity, both direct and port-dependent, represents about 7

Table 1

Direct Employment in Port of Portland Activities, 1965

	Employees	Payroll
Loading and unloading (including PMA)	2446	$15,299,000
Shipbuilding, repair equipment	1277	5,862,000
Steamship and agents	206	1,585,000
Tug and barge lines	660	5,290,000
Freight forwarding and brokerage	114	799,000
Grain and industrial docks	620	4,720,000
Bonded warehouses	40	254,000
Bunkerage and supply	132	1,024,000
Charts and mapping, inspection, insurance	68	433,000
Foreign departments of banks	54	341,000
Truck and rail transport	1227	9,509,000
Government service (customs, immigration, maritime, etc.)	391	3,144,000
Port of Portland	212	1,515,000
Commission of Public Docks	126	1,112,000
Pilots associations	58	1,027,000
Total	7631	$51,914,000

Table 2

Port-dependent employment in Portland, 1965

Industry	Employes
Contract construction	432
Manufacturing	1801
Food processing	273
Lumber and wood products	185
All other manufacturing	1343
Transportation, communication and utilities	751
Wholesale and retail trade	2447
Finance, insurance, and real estate	602
Services	1025
Government	573
Total	7631

[2]Bureau of Business and Economic Research, University of Oregon, *The Impact of Harbor Activity on Portland's Economy*. Prepared for Portland Public Docks, 1960.

[3]Bureau of Population and Economic Research, University of Virginia, *Measuring the Impact of the Waterborne Commerce of the Ports of Virginia on Employment, Wages, and other Key Indices of the Virginia Economy, 1953-1964*. Charlottesville, Jan. 1966.

Seattle Port Commission, *The Seattle Harbor's Waterborne Commerce and its Meaning to You*. Seattle, 1959.

Table 3

Employment in Multnomah County, 1965

Industry	Employes
Agriculture, forestry, fisheries	435
Mining	73
Contract construction	11,276
Manufacturing	46,967
Food and kindred products	7,119
Lumber and wood products	4,817
All other manufacturing	35,031
Transportation, communication, and utilities	19,583
Wholesale and retail trade	63,842
Finance, insurance, and real estate	15,737
Services	26,726
Government	14,953
Total	199,603

Source: Oregon State Department of Employment, *Oregon Covered Employment and Payrolls by Industry and County,* 1965.

percent of the total employment in Multnomah County. The percent would be higher if computed for the City of Portland alone.

Just as it is difficult to indicate what share of local economic activity is the result of Portland's harbor activity, so it is at least equally as difficult to compare dependency on the port in Portland with that of another city. Seattle, for example, published a study of this nature in 1959.[4] Although the method used is basically the same as the one for this report, there are important and fundamental differences which make the reports noncomparable. These differences center in the relation between direct and indirect effects.

There is, however, a study by Roy Sampson of the University of Oregon which indicates that Portland has recently been doing much to develop its potential for harbor activity.[5] Professor Sampson cites some comparisons between Portland and Seattle port facilities: 1) Portland has twice as much grain storage space as Seattle; 2) Portland has seven times as much shipside rail trackage; 3) the Port of Portland is served by 16 shallow draft water lines as compared to 3 for Seattle, and by 34 trucking and 54 local pickup and delivery firms as compared to 17 trucking and 60 pickup and delivery carriers for Seattle. Furthermore, he cites evidence to support the increasing role of warehousing in Portland; commercial warehouse space available there for public storage of general goods rose from 1,133 to 1,283 thousand square feet from 1958 to 1963; during the same period it declined in Seattle from 1,190 to 996 thousand square feet. Consequently, revenues from warehousing increased in Portland during this period from $2.9 to $5.1 million and declined in Seattle from $3.2 to $2.7 million. Finally, the author notes: "Although it can not be documented, one gets the impression that Puget Sound marine interests were content to bask in past glories following World War II, and were somewhat shocked to find that their aggressive counterparts in Portland had succeeded in diverting a considerable amount of ocean borne tonnage away from Puget Sound."[6]

The amount of habor activity in Portland is also indicated by the tonnage figures of exports and imports passing through the port. A brief listing of the more important commodities is given in Table 4. The figures from the Merchants Exchange indicate that 3,727,606 short tons were exported from Portland during 1965. In the same period, 1,368,259 short tons were imported. Over 1740 ships entered and left the port. The origin of imports and the destination of exports include countries of every continent. In addition to the exports listed are flour, dried peas, paper,

[4]See footnote 3.

[5]O.L. Carey, *et al., Trends in Distribution, Services and Transportation with Particular Reference to the State of Washington.* Economic and Business Studies Bulletin No. 41, Washington State University, Pullman, Wash., 1966. See particularly Chapter 6, "Transportation," by Roy J. Sampson.

[6]*Ibid.,* p. 216.

Table 4

Leading Imports and Exports of the Port of Portland, by Tonnage, 1965 (thousands of short tons)

Exports	Short tons	Imports	Short tons
Wheat	2,454,863	Limestone rock	495,522
Barley	307,676	Metal–misc. iron and steel products	257,365
Lumber	148,907	Ore–alumina	159,561
Metal scrap	123,337	Salt, crude	131,212
Logs	120,943		
All commodities	3,727,606	All commodities	1,368,259

[1]Note: These figures do not include information on petroleum products, which were in excess of 6,000,000 short tons in 1965; these were almost entirely imports.
Source: Merchants Exchange, *Merchants Exchange Bulletin: Shipments from Portland,* Oregon, 1965.

corn, poultry and stock feed, aluminum, and fresh apples. Other imports include autos, chemicals, coffee, lead concentrate, petroleum products, drugs and medicine, glass products, window and plate glass, marble, starch, rope and twine. The complete lists for both imports and exports are far more detailed.

The variety and number of imports and exports leads to another very important effect of harbor activity. There are a number of firms who depend upon imported materials for their production process; further, there are a number of firms who export a significant part of their produced goods. These firms are designated import-and export-oriented firms, respectively. In 1957, at the request of the Oregon Congressional Delegation, a study of foreign trade interests in Oregon included information about such firms.[7] Since such a study is lengthy and costly, it was not repeated at this time. Yet, its results are probably still reasonably accurate for extrapolation. Therefore, Table 5 has been constructed on the assumption that port interests grew in the same proportion as total employment in the respective manufacturing areas.

[7] *Foreign Trade Interests in the State of Oregon,* prepared at the request of the Oregon Congressional Delegation by the Legislative Reference Service of the Library of Congress, the Oregon State System of Higher Education, and the Oregon State Department of Planning and Development. Washington, D.C., U.S. Government Printing Office, Oct. 1959.

Table 5

Employment in Import-and export-oriented Firms

	Employees
Machinery	3392
Transportation equipment	4253
Food products	2743
Textiles and apparel	2882
Metal products	3022
Chemicals	789
Instruments	148
Paper products	395
Total	17,624

Source: Derived from information in *Foreign Trade Interests in the State of Oregon, op. cit.*

It is very important to note that these 17,624 jobs are in addition to the 15,262 direct and port-dependent ones. They are not con-

Table 6

Distribution of $103.8 million in Direct and Indirect Port Payroll

Expenditures		Amount (millions)
Food and tobacco	$21.3	
Food for home consumption		15.2
Purchased meals and beverages		4.0
Tobacco		1.6
Clothing, accessories, and jewelry	8.7	
Clothing and shoes		7.2
Clothing services (cleaning, storage, etc.)		.7
Jewelry and watches		.5
Personal care	1.5	
Toilet articles and preparations		.9
Barbershops and beauty parlors		.6
Housing	12.6	
Owner-occupied (nonfarm)		8.3
Rentals		3.4
Household operation	12.3	
Furniture and appliances		5.1
Household supplies		.9
Household utilities		3.5
Telephone and telegraph		1.3
Medical care expenses	5.6	
Drugs and medicines		.9
Physicians and dentists		2.2
Private hospitals and sanitariums		1.6
Health insurance		.4
Personal business	4.4	
Financial services		2.2
Life insurance handling		1.0
Legal services		.5
Transportation	11.5	
New cars and net purchases of used cars		5.3
Gasoline, oil, tires, tubes, accessories, parts		3.6
Miscellaneous (repair, storage, washing, insurance, etc.)		1.7
Purchased local transportation		.4
Purchased intercity transportation		.3
Recreation	5.2	
Recreation equipment		3.9
Recreation services		1.2
Private education and research	1.1	
Religious and welfare activities	1.1	
Foreign travel	.6	
Subtotal, personal consumption expenditures	86.0	
Personal taxes	12.8	
Personal savings	5.0	
Total	$103.8	

Source: U.S. Department of Commerce, Office of Business Economics, Survey of Current Business, July 1966.

sidered to be either direct or port-pedendent jobs because it is virtually impossible to quantify the importance of the harbor to such firms. That is, such firms by importing and exporting goods through other ports might continue to locate in Portland if there were no harbor. It seems reasonable to assume that their activity would be curtailed by the increased transportation costs, but such consequences are not at all clear and concise.

Another interesting aspect of harbor activity, as with any segment of the economy, is to follow its impact into all segments of the economy. This group of 15,262 employees spends over $103 million. Table 6 has been constructed on the assumption that the expenditures of these harbor employees are distributed in the same fashion as expenditures in the nation as a whole. It is readily apparent from this table that the port has significance for virtually everyone in the city.

The importance of the port to the local economy has been discussed is terms of the employment and incomes which it generates. It has further been indicated by the export and import traffic through the port as well as by the development of port facilities. There is, however, one very significant additional effect not yet considered. Each of the firms involved in port activity presumably earns a profit and certainly pays taxes. An attempt was made to measure this effect, but the responses were insufficient to do so. Nonetheless, these firms do support the local community, at least through tax payments. They further support it to whatever extent their profit dollars remain within the community.

Although the survey was not sufficiently conclusive to permit a complete analysis of the effects of nonwage payments, it did permit a rough approximation of the value of a ton of cargo in terms of revenue generated by all cargo which passes through the port. The terminology is most important here because various studies have placed a value on each ton of cargo, but in different terms or for different cargo classifications.

For example, it is possible to think of the value of a ton of cargo solely in terms of the wage and salary payments it generates. Alternatively, total receipts of port-dependent firms might be considered as the relevant base. It is also possible, although quite expensive, to analyze and report payments for specific cargo classifications such as grain, coal, crude oil, lumber, and so forth. This would require detailed reports from ships and port firms on the character of cargo and costs of handling each type.

Such detailed work was beyond the scope of this study. However, it was possible to develop a total revenue figure of $135 million and from this to develop an estimate of the value of various kinds of cargo. This $135 million is the sum of payments to those firms that carry on the activities listed in Table 1. It is the direct revenue generated by harbor activity and does not include the indirect effects noted either in Table 2 or in Table 5. The multiplier approximations used for these computations would not be appropriate for computing the value of a ton of cargo.

With reasonable certainty that $135 million of revenue was generated and 11,476,341 short tons of cargo were handled, then each ton of cargo on the average generated $11.77 in revenue. If wage payments only were considered, this figure would be considerably lower; if direct and indirect effects were considered, this figure would be considerably higher.

A revenue figure for more specific cargo classifications can, however, be estimated from the preceding analysis. First, it is known that revenue from all types of cargo must approximate $135 million, *i.e.*, the revenue per ton times the tonnage of the various types of cargo must sum to $135 million. Second, it is known that certain types of cargo have characteristics which make them more or less expensive to handle, store, transport, etc. Finally, other port studies[8] and discussions with people knowledgeable about port operations give some indication of these characteristics and their relative costs. By use of this information we have computed that the revenue is generated in the ratios reported in Table 7.

[8]Research and Promotion Bureau, Division of Port Development, Delaware *River Port Authority, The Value of a Ton of General Cargo to the Area's Economy*. Camden, N.J., Sept. 1963.

Bureau of Population and Economic Research, University of Virginia, *op.cit.*

Table 7

Estimated Direct Revenue Generated per Ton of Cargo for Specific Cargo Classes, 1965

Cargo class	Revenue generated per ton
General cargo	$25
Petroleum	8
Logs	16
Ores	11
Grain	13

It seems clear, that harbor activity is both basic and important in the Portland economy. Over $50 million in wage payments and $135 million in general revenue are directly attributable to harbor activity. If anything, this figure may be an underestimate due to lack of coverage. But it is not likely that such undercoverage is great. Furthermore, an additional $50 million is generated for port-dependent wages and salaries. Even more significant may be the more that 17,000 jobs which are port-related through import- and export-oriented industries in manufacturing. Finally, on the basis of the 1960 report and of some recent data on property values in Portland and Multnomah County, it has been estimated that the value of real estate and capital equipment utilized in port activity approximates $225 million.

(Copies of this report are available without cost by writing to the attention of: Mr. Fritz Timmen, Director of Public Relations, Portland Public Docks, 3070 N.W. Front Avenue, Portland, Oregon 97210, U.S.A.)

Mr. Raimondo Rivieccio

The Port of Naples Links All Continents

By Arch. Mr. Raimondo Rivieccio

President
The Port of Naples Authority

A rapid economic growth is the particular character of Southern Italy, an area which the State—after World War II—is continuously favouring in its development. The port of Naples, one of the most important in Italy and the largest in the South, is one of the economic poles of the regional development. It is the link between all continents —and particularly North America and Africa—and this large territory, inhabited by more than 20 out of the 52 million people of the Country and in a stage of fast industrial growth.

This is the way by which the port of Naples contributes to the process of economic promotion of the South and favours the overcoming of obstacles of geographical, economical and even social kind which made possible to look at the regions of Southern Italy as sort of suburbs of Europe. Making the development of South easy, the port of Naples derives at the same time a benefit from the process of growth of this hinterland, this process increasing the traffics through the harbour.

Since 1940 the history of the port of Naples has been rich of events. The efficiency of its equipments and its geographical position made possible its use during the war both as a commercial port and an operations basis for the military campaign in Africa. It was one of the most important naval harbours in the Mediterranean and this made it a target for aerial attacks by English and American forces; so the port as well as the rest of the town recorded one hundred heavy air raids, some of which carpeted the area with bombs, causing impressive destructions. After the armistice and the landing of allied armies in Salerno, the Germans, before retiring on the line of Cassino, destroyed what the aircraft had missed.

In the Autumn 1943 the landing place was only an array of ruins: buildings razed to the ground, wharves in pieces, useless rails, erased streets; and there were no longer hydric, electric and telephonic equipments. Scores of sunk vessels were on the bottoms. The port was requisitioned by the Allied forces and these took care of a part of the more urgent works. Some ruins were removed, some streets and railtracks restored, a part of hydric and electric sets was repaired. Some ships which had sunk were lifted up, pushed to a deeper water and let sunk again, in the area of St. Vincent wharf, the southwest boundary of the port.

People were aware of the urgent need of reconstruction even when the port was still under requisition. In March 1945 a ministerial committee was appointed, with the task of preparing a plan of reconstruction and determine the expenditures needed and the length of time involved, with special considerations to possible development in the growth of Italian and world traffics, and to the consequent role of the local port in the general frame of those expanding traffics. The committee submitted its proposals with a plan which had been prepared on the ground of the data collected by the special bureau of Public Works, shore department. In March 1946 a special bill was approved and it appropriated the funds to be used in order to repair the damages of the war in the port and start the programme of reconstruction. A few months later the Government appointed a Commissary to the Port of Naples Authority (E.A.P., for the Ente Autonomo Porto di Napoli). With the plan of restoration also the making of some works already planned before war was approved. These were limited to the building of the third dry dock, in brickwork and with a capacity considerably superior to that of the operating two dry docks; the widening and settlement of the area reserved to the traffic of petroleum; the continuation of the "Duca d'Aosta" main dike of protection; also works to dredge the bottoms in some areas were in the program.

The works started only in 1948, when the harbour was passed back to Italian authorities. These delays caused a great damage to the port of Naples, which started the process of reconstruction from a condition of inferiority. The rest of Italian harbours had already been connected easily and safely in the network of traffics as they had had no military restructions and occupation. Despite the depreciation of the funds assigned in 1946—and which were now absolutely inadequate to match the needs—the port of Naples realized some relevant works. The relics which obstructed the bottoms were removed (21 ships by the Navy, 79 by the dredging

Port of Naples—General view of eastern part of port and bay by night. In the background is seen the Volcano of Vesuvius.

service of the port, 75 by private shipowners and recovering enterprises); large areas of quays were gradually restored; the passengers station was rebuilt, with the quays and complementary fittings; the body of Public works consigned—on the 19th of January 1956—the new dry dock, which sheltered the liner "Conte Grande" and afterwards the tank-ship "Italmotor" (the administration of the dry dock was committed to the S.E.B.N.—Società Esercizio Bacini Napoletani, a company for the management of docks). Some years before had been built a number of stores to be used as grain and other warehouses, refrigeration stores, oil storages; the elevators for coal unloading had been brought in to operations again at the Bausan wharf, while the whole hydric, rails, electric and telephone nets had been completely reinstated. In 1953 the thermo-electric central of Naples-East had been opened, a fact which had brought its effects on the traffic of coal through the harbour, for the supplies needed to operate the central. In 1961 the "Mobil Oil" refinery was completed and a new floating dry dock was finished —namely the fourth dry dock available in the harbour. The President of the Republic—SEGNI—attended the ceremony of inauguration and the first ship raised in the new dry dock was the tank-ship "Nina D'Amico".

With the new dry-dock the repair station has reached the level which had been programmed in the past, but which is however inadequate to the needs of today. In 1946, 91 ships for a total of 220,000 gross tons had been sheltered in the dry docks, for careenage or other works. Three years later the number of ships rose up to 122 and that of the gross tons to 364,000; in 1956, after the start of operations with the new brickwork dry dock, 213 ships for 1,249,000 gross tons were assisted in 1963-1964, when the fourth dry dock was being operated, the number of ships was 260 (more than two million gross tons.).

The improvement of the structure of the port of Naples, even if it has taken place less rapidly than required by the expanding traffics throughout the world, has nonetheless been the premise of a considerable development of the harbour both for the number of passengers and the amount of goods embarked and disembarked. Since 1948 (the year when Allied forces returned the port to civil Italian authorities) to 1966, the number of landing ships has duplicated (15,000 in 1948) and the total tonnage has

Port of Naples—Passengers station

quintuplicated; the traffic of goods has increased six times in respect of after war and three times the traffic of passengers. During 1953 the national flag (not including the local traffic between Naples and the islands of Capri, Ischia and Procida) has had the 50.1 per cent of the total movement of arrivals and departures in the port.

The share has reached the amount of 52.33 per cent in 1957 and lowered to 44.84 per cent in 1963, while mounted again to 47.36 per cent the following year.

In recent years many Italian experts regretted that national ports had not proved ready to respond to the fast development of economy and traffics in the country.

It was a good remark and the Government has then granted the implied request. The Government has prepared a "national plan for ports" which envisages the expenditure of 120 million dollars in five years to modernize and enlarge most important Italian ports, in order to make them competitors to other European harbours. About 20 out of these 120 million dollars have been granted to the port of Naples; at the same time the CASSA PER IL MEZZOGIORNO (a public authority charged with the promotion of southern region growth) has appropriated a fund of 32 million dollars for the port of Naples.

The port of Naples Authority has prepared a plan to use these funds, in agreement with the Ministries of Public Works and Mercantile Marine. Two series of expenditures are to be allotted:

1) expenditure for the extension of docks, wharves and quays and construction of Port's buildings.
2) expenditures to modernize and increase in number the mechanical equipments at service in the port's area.

The works envisaged under 1) have already commenced; they include—in the term of five years—the construction of a new ship station, the extension of dikes and the enlargement of the petrol dock.

As to the programme of proportionment of mechanical equipment, it includes the purchase of at least thirty new cranes—their power from 1,5 to 15 tons—and of a floating crane of 200 tons, the construction of a "floating isle," where high tonnage tanks may moor so to overcome the obstacle given by low bottoms—the acquirement of an area of about 100,000 sq. mts. to be destined to containers, the realization of connections between the harbour and the highways which reach Naples, the purchase of me-

Port of Paples—Ship repair industry

chanical fittings for the handling of goods on squares, conveyor belts and tippers.

Also this programme will be completed in five years. It aims to reduce the cost of port operations and to improve efficiency and speed in work, in order to reach conditions of competition with other ports in and out of Italy.

We close these outlines with some data on traffics through the port and here we meet with a steady increase. In 1966, 19,421 ships arrived (v.18,533 in 1965) with a total tonnage of 25,361,930 (v. 23,891,446 in 1965). The increase in tonnage is 6.15 per cent.

The total traffic of freight is 16,020,462 tons versus 15,449,389 in 1965 with an increase of 3.69 per cent. This increase is meaningful if we bear in mind that by the end of 1965 we thought of having reached a record which could have been overcome only with difficulties; compared with the previous year the 1965 increase was in fact of 16 per cent.

Goods disembarked during 1966 are 12,624,570 tons (+3.24 per cent v. 1965); embarked goods are 3,995,895 tons (+5.07 per cent).

During 1966 the figure of passengers arriving and departing was 2,456,918 (in 1965 it was 2,229,-783) with an increase of 10.18 per cent. A closer exam proves some flexures (disembarkations of goods from national ports have diminished by 13.8 per cent and goods shipped to foreign harbours by 1.53 per cent) to be largely compensed by some increases (disembarkations from foreign ports have increased by 6 per cent and embarkations to national ports by 14.11 per cent).

Amongst the goods disembarked in the port of Naples petroleum (5,308,000 tons) metallic minerals (2,126,000 tons) and coal (1,464,-000 tons) get the highest peaks, refineries and ironworks being near the port area. It is important, however, to note the traffic of other goods and particularly cereals, fruit and dried fruit, cellulose and paper, chemical products, machinery—as regards disembarkments — and alimentary preserves, machinery and agricultural products—as regards embarkments.

A considerable reduction has been recorded in the importation of coffee, as a consequence of its centralization into other ports during recent years; the importation of bananas has opposingly increased, after the end of the monopoly of the Italian State. As for the principal directions of the traffics, these are to be seen in the lines between

(Continued on Next Page Bottom)

Specialised Handling Facilities in the Port of London

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Presented at the 8th International Technical Conference of the International Cargo Handling Co-Ordination Association Antwerp—22nd/26th May 1967

Introduction.

This paper describes three specialised handling facilities which are to be found in the Port of London. All have a common aim which is to improve the turn-round time of ships in Port by expediting the rate at which cargo is discharged ex ship but each achieves this objective by a different method. The Bulk Wine Terminal provides facilities for handling wine in bulk as opposed to importation in cask or in bottles in cases; the Packaged Timber Terminal illustrates the advantages accruing to the packaging of softwood timber in unit loads, as a result of which mechanical equipment can be utilised to the maximum extent; the mechanised meat berth applies modern mechanical handling methods to cargo packed in conventional form.

Naples and North and South America, and in those connecting the town with Mediterranean Asia, Africa and Oceania.

The steady increase of world sea traffics, the expansion of international touring, the attention given by Italian Government to the problem of ports, the equipment modernizing and enlarging programmes already started in the port of Naples, the development of southern economy in Italy, the growth of economical relations between Europe and Africa (and Naples is a natural way between the two) are all facts to be seen as a favouring the development of the major port of Southern Italy.

1. Bulk Wine Berths, London Dock.

Prior to 1939, all wine was imported into the Port of London in casks, or in bottles in cases. In the early post-war years, a number of merchants experimented with the importation of wine in containers in order to expedite the loading and discharging operation to and from ship and minimise the cost of packing. The success of these early experiments led to the construction by the Port of London Authority of a bulk wine terminal at London Dock, this being opened in 1959 and having steadily extended since that date.

The quay facilities are provided by means of concrete vats lined with glass tiles affixed with special wine resistant cement, the vats ranging in capacity from 2,500 gallons to 5,400 gallons each. Wine is received in bulk, either in tanks built into vessels as part of their carrying capacity, or in maritime containers, each of 500 gallons capacity. The wine carried on ship board tanks is pumped direct from the ship to the shore facilities, that carried in maritime containers being dealt with in a somewhat different way; the maritime containers are discharged ex ship into barge, the barge containing the containers is then moved to the bulk wine facility where the wine is pumped ex the containers to the storage vats whilst the containers remain in the craft. Pumping having been completed, the empty containers are then returned in the same barge to the vessel (which meantime is discharging other dry cargo at a conventional discharging berth) for loading back to the vessel for the return journey.

The storage vats are housed in single storey transit sheds of conventional design, although the buildings are lined internally with fire resistant insulation board to provide temperature control. Natural lighting is provided by translucent sheets fitted in the roofs and there are controllable vents to assist in ventilation. Set in the quay face alongside the sheds are a number of intake points to which can be connected plastic piping, this giving the means of transference between either the maritime containers or the ship tanks and the storage vats. The intake points are served by static pumps (on the archimedean screw principle, in order not to damage the wine) which can pump wine from maritime containers or ship to the appropriate storage vat at rate of 3,000 gallons per hour, per pump. The pumps can be controlled from the pump room itself or by remote controls sited on the top of each block of vats. When delivery is required, the appropriate quantity is passed from the storage vat to a measured delivery tank, there to await collection by the road tank vehicle. Pumping from the storage vats to the delivery tanks, and from the delivery tanks to road tanker vehicle is effected by a number of mobile pumps, each having a potential of 3,000 gallons per hour. Deliveries could be effected direct from vat to road vehicle but the use of the measured delivery tanks ensures greater accuracy.

The success of the bulk wine terminal can be gauged from the fact that, initially, five blocks of vats were provided. These quickly proved inadequate and the number of blocks was increased to eleven, consisting of 148 storage vats, providing a total storage capacity of 516,000 gallons with an effective operating capacity of some 450,000 gallons. The demand for storage accommodation for bulk wine still increased, however, and in 1965, the Authority provided a second

facility at an adjoining berth. This was similarly housed in a single storey transit shed and provided 72 concrete glass brick lined vats, 36 of 3,000 gallons capacity and 36 of 5,000 gallons capacity so that the total storage accommodation now available for bulk wine at London Dock is of the order of 750,000 gallons.

Both sets of premises are bonded for H.M. Customs purposes. At No. 22 Berth, the first section of the facility to be completed, the merchant pays duty on the quantity delivered ex each vat. At the second part of the facility, No. 23 Berth, the arrangements have been slightly modified by H. M. Customs and, whilst the complete stock is held in bond, the merchant pays duty on the contents of a complete vat before taking his first delivery.

When the first set of vats was constructed, provision was made for control by H. M. Customs by providing counter-balanced dip-sticks —one to each vat—and it was necessary, therefore, to provide head room equivalent to the depth of the vat to accommodate these dip-sticks. On the second half of the terminal being constructed, the agreement of H. M. Customs was obtained to the use of calibrated sight glasses for ascertaining the amount of wine in each vat. This dispenses with the need for dip-sticks and removes the requirement for head room above the vat equivalent to its depth. In consequence, it was possible to build the vats in two tiers, each vat in the top tier being of 3,000 gallons capacity, those in the bottom tier being of 5,000 gallons capacity.

Throughout the terminal, care had to be taken that only those materials were used which would not contaminate or be themselves contaminated by the wine. In consequence, all metal parts are either of gun metal or of stainless steel and all piping is of plastic materials or of stainless steel. After complete delivery has been effected from a vat, the vat itself is sterilised before the next batch of wine is received for storage. This is undertaken by filling the vat with water containing 15% solution of sodium hypochlorite. The vat remains in soak for a minimum of two hours, after which it is emptied and the glass brick walls are washed down with mop and brush with a solution of metabisulphite—this dispels any chlorine smell. Finally, the vat is hosed down with fresh water. Each of the vats has a manhole through which access can be gained by a man for cleaning down purposes.

Considerable savings can be effected by the handling of wine in bulk as against the conventional methods in cask or in bottles in cases. The operations of loading to and discharging from ship are considerably expedited and, therefore, made much more economical, the cost of packing in cask or in bottles in cases is avoided as is the liability to theft, damage, or pilferage. This apart, considerable economies can be effected in relation to ancillary operations, such as that of gauging casks of wine by Officers of H. M. Customs. As has been mentioned, the contents of a 5,000 gallon vat can be ascertained by H. M. Customs either by means of a dip-stick or by the use of a calibrated sight glass, by either method the operation only taking a few seconds. The alternative would be to roll the casks out of stowage, chock them in an upright position with bung up, remove the bung, measure and gauge the cask, replace the bung, remove the chocks and roll the casks back into stowage. As a rough comparison, a 5,000 gallon vat can be gauged in a matter of seconds by H. M. Customs as against one and a half days work for gauging the equivalent quantity in 50 gallon casks. At the bulk wine terminal itself, no dock labour at all is utilised, the facility being serviced by a small number of staff cellarmen.

The throughput at the terminal is now approaching three million gallons per year and the following types of wine are received:—

a) Italian Martini Vermouth—carried in maritime containers of 500 gallons each.

b) Spanish Light Table Wines—carried in ship's tanks on vessels of MacAndrews Line. Tank capacity on board these vessels is some 65,000 gallons each.

c) Cyprus Sherry — carried in Safrap containers.

d) French Dubonnet—carried in a specially chartered tank vessel, the first bulk shipment of 180,000 gallons having been received in January, 1967.

e) Grape Must—delivered direct by pumps from ship's tanks to road tanker, a consignment of 160,000 gallons having been handled in this way.

2. Packaged Timber Terminal—Tilbury Docks

The Port of London receives some 25% of the total import of softwood timber into the United Kingdom, a major proportion of the London import having, for many years, been discharged ex ship in Surrey Commercial Docks. Again, for many years, this commodity has been carried in conventional piece form, a ship's cargo being loaded and stowed piece by piece, subsequently being discharged in similar fashion. 80% of timber discharged ex ship at these Docks is unloaded direct into barges for conveyance to wharves on the river and the various canals serving the river. However, the size of vessel engaged in the carriage of timber from Western Canada has increased over the last few years to the point where the vessels have become too large to be accommodated at Surrey Commercial Docks and berthing accommodation for their discharge has, therefore, been made available at Tilbury Docks. Such vessels have discharged completely overside to craft at Tilbury Docks, the softwood timber then being conveyed by barge to the river or canal wharves, or to Surrey Commercial Docks if required for storage by the Authority.

At the same time, increasing quantities of Canadian Softwood Timber have been received in packaged form and the need to discharge complete cargoes ex ship to barge has, hitherto, prevented the shipowner from exploiting to the full the advantages of timber packaging. It became obvious to the Authority that the quantity of Canadian Softwood Timber being received in packaged form justified and, indeed, required the provision

of a special terminal at which these cargoes could be handled. In consequence, negotiations between the Authority and the shipowners concerned resulted in the adaptation of No. 34 Berth, Tilbury Docks for use as a packaged timber terminal at which the complete ship's cargo of packaged timber could be landed to the quay for subsequent delivery to land or water conveyance, thereby enabling the shipowner to achieve the maximum advantage of increased outputs and improved turn-round which are possible when timber is shipped in packaged form.

No. 34 Berth was chosen as it was the only berth existing in the Docks at that time which had a large area of ground behind the quay which could be utilised for the storage of packaged timber. It was, however, designed and in use as a conventional general cargo berth, having a quay 800 ft. long with a transit shed 600 ft. by 120 ft. sited parallel to the quay apron. Such a layout is not ideal for the handling of packaged timber but the project could not wait on the completion of the new berths under construction in the new dock extension and the main attraction of the berth was the 11 acres to the rear of the transit sheds. It was decided, therefore, to divide the quay transit shed into two by providing a central opening 72 ft. wide to give access to the piling ground at the rear of the shed in addition to the access which was possible at each end of the transit shed. The two separate sheds thus provided, each 264 ft. by 120 ft. have, in fact, proved useful for storage of plywood, pulp, linerboard, paper, etc., (wood and paper products which often accompany a shipment of packaged timber) but, obviously, in any purpose built berth for these commodities such storage accommodation would be provided at the side or the rear of the berth to give the maximum ease of communication between the ship and the piling ground.

The berth as adapted, therefore, comprises a quay at which vessels up to 600 ft. in length and up to 34 ft. draft can be accepted—additional dredging can be undertaken to give increased depth of water if required—a paved open storage area of 11½ acres behind the quay, and two transit sheds, each having a capacity of some 477,000 cu. ft. (allowing for gangways, this providing some 300,000 cu. ft. of storage space in each shed).

The berth is served by six five ton capacity quay cranes for use during ship discharge if required, although these can be moved along to the end of the quay if modern ships with ship mounted deck cranes are received. Conveyance of packaged timber from ship's side to the storage area is undertaken by side loading fork lift trucks; these are diesel powered with a capacity of 14,500 lbs. at 24 inch centres. They have a maximum height of lift of 10 ft. and are of left hand drive with a 16 ft. turning radius. Piling and unpiling of packaged timber at the storage area is undertaken by conventional heavy duty fork lift trucks, supplemented as required by the side loading fork lift trucks when these are not in use for conveyance purposes. The standard fork lift trucks are also diesel powered and have a capacity of 12,500 lbs. at 24 inch centres. They have a maximum height of lift of 12 ft. using 44 inch forks, the fork lift width being adjustable. Consideration was, in fact, given to the use of straddle carriers for the movement of packaged timber from ship's side to the storage area but it was decided that these would represent equipment with only a limited use in that they would be under-utilised during the period between vessels, whereas the side loading fork lift trucks, which offered comparable duties, could be utilised for the piling and unpiling operation when not required for conveying timber from the ship to the piling and storage area.

The large majority of cargo handling operations in the Port of London have, for many years, been undertaken on a piecework basis, such piecework payments being calculated per gang unit. The normal and accepted practice in London for general cargo is that labour is employed in gang units, separate gangs being employed on the quay to receive from each gang discharging from ship, and other gangs being employed for the subsequent operations of delivery to land or water conveyance. Having in mind that the complete cargo of packaged timber would be landed ex ship to quay, that the whole quantity would be in the form of unit loads and that, therefore, full use could be made of mechanical equipment, it appeared to the Authority that conventional manning and piecework payment arrangements were unsuited to this port operation. At the same time, it was felt that the Authority's Permanent Labourers who would undertake the quay operations, would prefer the advantages of a regular forecastable weekly wage as opposed to the fluctuations of weekly earnings which unavoidably result from the piecework system as normally applied in London, and the usual pattern of discharge ex ship being effected partly to the quay and partly overside to barge.

This led to the negotiation of an agreement whereby, as an alternative to the employment of separate gangs to match each ship discharging gang, plus gangs for delivery, one "shed crew" of twenty men would undertake all operations of receiving ex ship, sorting, piling and subsequent delivery—all men to be interchangeable, and all men to be qualified to operate the various items of mechanical equipment used in connection with the quay operations. Each member of the shed crew is paid a weekly wage covering normal working hours—8 a.m. to 5 p.m., Monday to Friday, overtime to be payable in addition. This weekly wage, of course, incorporates an element of what would, under normal conditions, be classified as piecework earnings and was set having regard to the average earnings of dock labourers at Tilbury Docks and the possible earning power under a conventional piecework system. An annual bonus is payable related to total throughput at the berth, this providing the output incentive normally obtainable from a piecework system.

The most important advantage accruing to this arrangement is, of course, the flexibility of manning which has been achieved and the most significant saving is in man-

power. It is difficult to make a precise comparison with the manning which would be required under existing conventional arrangements as, even under such arrangements, account would have to be taken of the provision of mechanical equipment, but I would say that the minimum total manning under conventional arrangements to cover the operations undertaken by the shed crew of twenty men would be of the order of 50 to 60 men.

The success of these arrangements can be gauged from the experience gained from the first ten vessels to use the berth, a period which could be represented as the time necessary to "work up" the new berth. From these vessels, 63,561 tons have been landed and 24,328 tons discharged overside ex ship to craft, a total of 87,889 tons. Included in the tonnage landed figure are some 17,408 standards, or 52,224 tons of packaged timber, the remaining 11,337 tons comprising loose lumber, plywood, kraft linerboard and woodpulp. The commodities discharged overside ex ship to craft were wood and paper products, such as paper, plywood, kraft linerboard and woodpulp. Throughout the period, the shed crew of twenty men has matched all the efforts of the ship's discharging gangs without the incentive of a piecework payment. The vessels regularly are manned by six ship's gangs and a situation with seven gangs, all landing concurrently, has occurred on two occasions. This has resulted in some impressive daily tonnages when these are compared with conventional handling at manual berths.

The highest total achieved so far was obtained when 828 standards (2,484 tons) packaged timber were received from the ship concurrently with 46 standards (138 tons) being delivered to road transport. A further 628 tons of other commodities were also delivered by the same men, resulting in 3,250 tons being handled in one day by the shed crew of twenty men. Subsequently, 3,232 tons have been handled in a day and daily totals in excess of 2,000 tons regularly have been attained.

Work at this rate has produced some creditable ship turn-round times:—

a) "Dorothy Ann" with 8,943 tons, of which all but 36 tons were landed, was discharged in 44 working hours. Five ship gangs were employed for four days and three for the last part-day. The cargo comprised 2,745 standards (8,235 tons) packaged timber and 708 tons plywood.

b) "Belcargo" with 13,182 tons, of which 11,140 tons were landed, discharged in 63 hours. The cargo included 3,317 standards (9,951 tons) packaged timber, approximately 2,000 tons plywood and 1,000 tons woodpulp. The ship commenced with six gangs but this was increased to eight by double banking two hatches, although one hatch handled overside cargo only.

Every opportunity has been taken to ascertain and record gross and net tonnages handled for the various commodities. The best achievements in this direction so far, on cargo which has been landed, are:—

a) Packaged Timber

"Dorothy Ann"

No. 2 Hatch 20 stds. per hour gross over 10 hours (60 tons)
27.6 stds. per hour net (83 tons)

Over the entire ship on this day the five gangs achieved:
17.6 stds. per hour gross over 10 hours (53 tons)
24.3 stds. per hour net (73 tons)

b) Kraft Linerboard

"Grey Master"

Average over six gangs, 45 tons per hour gross
54.5 tons per hour net

c) Plywood

"Belcargo"

40.5 tons per hour gross
52.9 tons per hour net

When this plywood outturn was recorded, the comparable results for delivery overside to craft were 21 tons per hour gross and 23.3 tons per hour net. These outturns are strictly comparable, being recorded over the same three hatches which landed a total of 344 tons in the day and delivered 492 tons direct overside to craft.

It will be noted that the increased output and improved turn-round obtained by the shipowner has enabled him to effect substantial economies in the operation of his vessels. At far as the importer of softwood timber is concerned, the Authority have been able to pass on many of the benefits to the importers by quoting a charge for receiving timber ex ship at No. 34 Berth, Tilbury Docks, sorting and delivery to land or water conveyance which is very nearly half the lowest rate previously available for the handling of packaged timber and one quarter of the charge for handling an equivalent quantity of timber in piece form.

3. Mechanised Meat Berth, Royal Victoria Dock

Some 70% of the total United Kingdom import of mutton and lamb is imported through the Port of London. This amounts to 200,000 tons per annum and is mainly handled in the Port of London Authority's Royal Group of Docks. The meat is transported in the refrigerated holds of vessels and, by current practice, is discharged by means of quay cranes with the use of nets or landing boards to the quay where it is received on to large sorting tables for sortation to the various marks and grades, etc. before being trucked direct through the quay transit shed for delivery to insulated road or rail vehicles, or to barges alongside the ship.

In common with other commodities, consideration has been given to ways and means of expediting discharge ex ship, thereby improving the turn-round time of the vessel. To improve the rate of discharge ex ship is comparatively simple by utilising a form of mechanical pocket elevator as has been used for the discharge of bananas in the Port of London since the 1920s and as is now being applied to the loading operation at ports such as Bluff in New Zealand. The complications start, however, once the meat has reached the quay in that it is then necessary to undertake the extensive sortation required by importers. This will involve several hundred Bills of Lading, a head mark identifying the original freezing works, a grade mark and

many sub-marks; there may be 30 to 40 separate descriptions of meat and 60 to 80 different receivers, each with special delivery instructions. The equipment now being installed at "B" Shed, Royal Victoria Dock for the Port of London Authority should overcome all these problems.

Starting in the ship's hold, the meat will be discharged by three mechanical pocket elevators, delivery within the hold to the boot of the elevator being assisted by a system of small portable belt conveyors which can be moved in the hold as required. The meat in carcass or carton form will be removed from the ship's hold by these elevators and will then be transferred to conveyors running along the second floor of the quay transit shed. These transfer conveyors which, incidentally, will permit the elevators to be moved along the quay to operate at any hold of the ship, will carry the meat to three main conveyors which run across the shed and the road at the back of the shed to a specially constructed delivery facility sited at the rear of the dock road serving the transit shed.

These main conveyors in turn pass the meat to automatic tallying and sorting conveyors which consist of a series of trays on which the cargo is carried, one unit, whether it be a carcass or a carton, being contained in each tray.

At the point of transfer, a number of operators are seated at consoles fitted with keys. As each carcass or carton passes, an operator registers the distinguishing marks and grades by operating the appropriate keys. The trays are colour coded to enable one operator to pick out his own colour and therefore deal only with every fourth tray, ignoring all colours but his own—this is necessary in order that the speed of the operation may be matched by the speed of the operator. In fact, each operator will have about five seconds to recognise the distinguishing marks of the carton or carcass and register it on the console in front of him. Operating the keys on the console passes a signal to a computer, identifying the tray and its contents. The computer has been prefed with information on punched cards as to the delivery requirements at each of the 47 road and 14 rail outlets at the delivery facility, together with the delivery requirements to barge. The computer sorts out the right carcass or carton of the right mark for the right outlet and automatically diverts the carcass or carton to that outlet. What is more, when the delivery requirement for a particular vehicle has been satisfied, the outlet shuts off automatically, thus preventing any over-delivery. At this time, the punched card is automatically stamped and an indicator lamp will light up as evidence that delivery has been completed. The card, signed by the lorry driver, will form his receipt.

All relevant information (the number of items delivered at each outlet, the number of vehicles dealt with, etc.), will be remotely displayed and recorded in a central control office mounted over the delivery platform. Should a tray be missed by one of the console operators, it and its contents go to the end of the A.T.S. conveyor where it is discharged onto a reject conveyor and subsequently is returned into the main system.

A lorry park, with space for 140 vehicles, together with marshalling and calling-up arrangements, ensure an adequate supply of transport and communications between the central control office, and the various control points should ensure a smooth pattern of vehicle movement.

All parts of the discharging and delivery system are enclosed, thus making this an all-weather working berth, whilst special provision has been made for cleaning the handling sections of the system to satisfy Port Health requirements. A special training scheme is being introduced to prepare all the various console operators and other personnel at the berth for the part they have to play in the operation of this system. The co-operation of the shipping companies and shippers has been obtained in improving the marking of carcasses and cartons in view of the important part which this plays in the successful operation of the mechanical discharging method.

The advantages to be gained from this mechanical discharge arrangements are as follows:—

a) The equipment has a rated capacity of 9,000 carcasses or 300 tons of cartons per hour, this comparing with outputs obtained under current methods of some 35,000 carcasses or 500 tons per day. Thus, the discharge of the vessels concerned will be considerably expedited and the throughput at the berth increased.

b) The berth will be all-weather working and the 5% of working time at present lost through weather delays will be saved.

c) Manual handling will be minimised, thus reducing the risk of damage to the cargo.

d) Whilst dock labour will still be required to stow meat in road vehicles, rail trucks or in barge, and in feeding meat from the stowage in the ship's hold to the boot of the elevator, considerable savings can be made in the staff required for sorting and tallying.

e) Over or under deliveries as the result of errors in manual tallying will be avoided.

f) In view of the fact that the conveyors are taken through an upper floor of the shed to a new delivery facility entirely separate from the existing shed, the handling of meat will be completely segregated from the handling of general cargo. Thus, the discharge of meat can proceed at three holds by means of the elevators and the conveyor system, whilst general cargo is discharged into the transit shed from the remaining hatches.

g) The equipment is designed to handle other commodities in box or carton pack. Whilst the berth is intended primarily for the handling by mechanical means of meat cargoes, it can also be utilised for the fast discharge and delivery (incorporating automatic sorting and tallying) of such commodities as butter or fruit.

The Ports of Ghana— Tema and Takoradi

By Hamilton K. Biney

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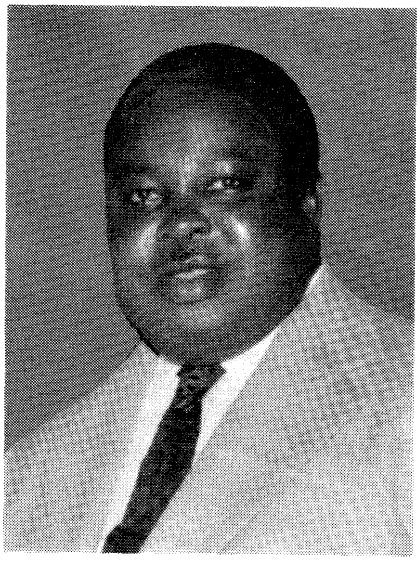


Mr. Hamilton K. Biney

Ghana, with just over 300 miles of coastline is unfortunate in that it possesses no natural harbours. For centuries the country's imports and exports were handled by the traditional surf boats at such ports as Sekondi, Cape Coast, Winneba and Accra. In 1923 it was decided that a deep water port should be built at Tokaradi and this port was eventually opened in 1928. From this date onwards the port of Sekondi was allowed to decline and Takoradi, assisted by the surf ports, handled an ever increasing volume of trade. Takoradi was then the main "gateway" to Ghana. Cargoes routed for the eastern part of the country placed a heavy burden on the inland transport system.

In 1952 the then Gold Coast Government decided to build a new deep water port at Tema, following the presentation of a Preliminary Report on the Volta River Project by the consulting engineers, Sir William Halcrow and Partners. An essential requirement of this project was a port at some convenient point on the coast of Ghana where the large quantities of plant and materials for the construction of the proposed dam and smelter could be imported and when finished aluminium from the smelter could be exported. Takoradi was too far removed from the site of the dam and smelter sites, and the growing trade of the country was rapidly overtaking the capacity of Takoradi and the various surf ports. The new port was therefore constructed at Tema, some 17 miles east of Accra, to deal with the growing general trade of the eastern part of the country, to ease the burden on the inland transport system and to meet the requirements of the Volta River Project.

Preliminary works were commenced in 1952 and the construction of the main harbour began in 1954. Ships began using the port in 1958, such cargoes being mainly for constructional purposes. The Port actually opened for full commercial purposes on January 1st, 1962. From this time onwards the remaining surf ports either completely ceased to be used, like Accra, or have only been used to a very limited extent. Ghana's trade is adequately catered for by Takoradi and Tema.

TAKORADI — Latitude 4°53′N, Longitude 1°45′W.

Takoradi is, like Tema, a completely artificial port. There are two breakwaters, the main cargo wharves being constructed on the lee breakwater. There is room alongside the main wharf for six vessels, in addition to a small coasting type vessel at the coal wharf. One of these berths is designed as the Manganese berth and has a conveyor loading installation. On the seaward side of the lee-breakwater, there is a Bauxite pier, with a conveyor loading installation, and a Tanker berth. Shell and B.P. have storage tanks nearby for 30,000 tons of petroleum products. Moorings are provided within the main harbour for nine ocean-going vessels at which almost all the export traffic, mainly timber and cocoa, is loaded.

The depth of low water at the entrance to the harbour is 35 feet. Safe draughts at the main wharves are 26 feet and 28 feet, at the mooring berths 22 feet to 30 feet, at the coal wharf 14 feet 6 inches and the manganese berth 27 feet 9 inches.

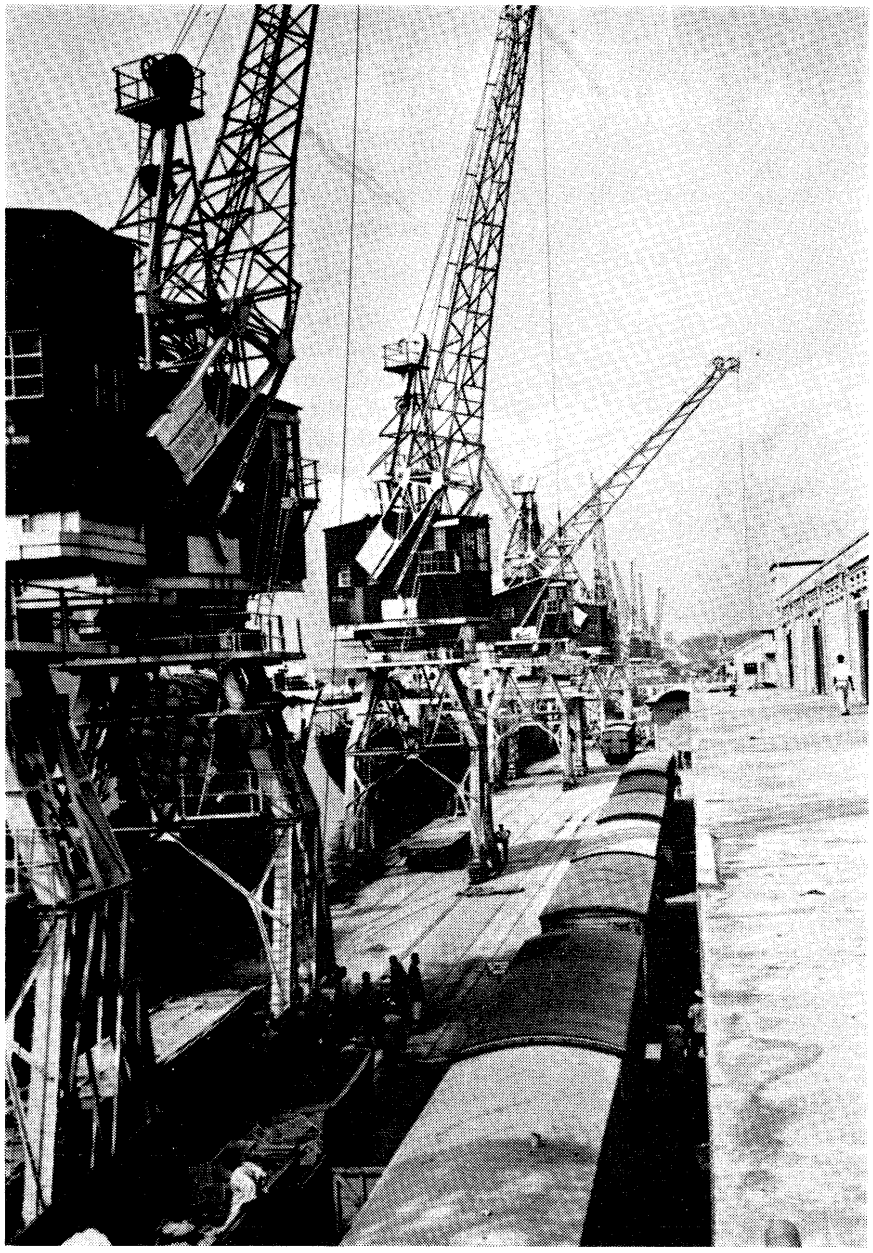
The main wharf is equipped with four transit sheds and a small cement shed, rail and road connections, parking areas, bollards, water and electricity services. Two of the transit sheds are double storey, one of which (No. 4 Shed) is the passenger terminal — the upper storey being for passenger accommodation, baggage inspection rooms and offices etc.

To the west of the main quay a large cargo platform is provided for open storage cargoes, this area being linked with the berths by full rail and road services.

Shore installations include 16 x 3 ton and 1 x 15 ton electric portal cranes on the main wharf, 2 x 5 ton and 1 x 7 ton electric portal cranes on the cargo platform (in addition to mobile cranes), 6 x 10 ton electric cranes on the timber wharf, 20 x 3 ton overhead electric gantry cranes in the sawn-timber sheds and 1 x 15 ton derrick crane at the log wharf.

A slipway is available for vessels up to 500 tons deadweight, also a dry dock for vessels up to 100 feet length (b.p.), and 24 feet 6 inches beam.

TEMA—Latitude 5°38′N, Longitude 0°1′E, 18 miles east of



Main wharf.—Takoradi

the Capital—Accra, built on the open coast on the site of a former fishing village.

The Main and Lee Breakwaters, 7,200 feet and 4,800 feet long respectively, originally enclosed a water area of approximately 500 acres. Subsequently reclamation in the shallower inshore area for construction of the marginal quay, roads, dry-docks and shipyard will eventually reduce this to somewhere in the region of 300 acres. The entrance to the main harbour is 800 feet wide with a depth of 36 feet M.L.W.S. Depth in the anchorage is 42 feet and the rise of tide is approximately 4 feet at mean springs.

The first stage of development was of course the construction of the break-waters. These are constructed wholly of tipped rock consisting of quarry-run material protected on both sides by a layer of selected armour stone, the armour stone on the seaward side is an eight foot thick layer of blocks from 5 to 10 tons in weight. The maximum width of the breakwaters on the sea bed is 200 and feet they rise to a height of approximately 13 feet above high water level, the top width of which is thirty feet. All this material was available in the Tema area (an important factor when considering the site of the new Port) and was hauled from the quarries at Tetedwa and Mampong in the Shai hills.

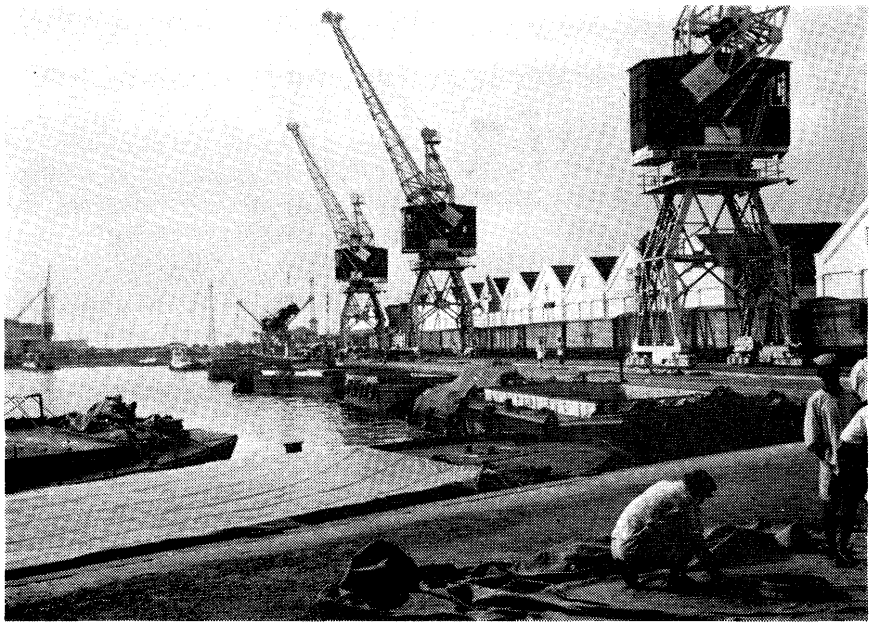
The main breakwater containing some 1,620,000 cubic yards of rock was completed in November 1959, with the completion of the lee breakwater following a few months later.

Meanwhile, work proceeded on the finger quay which projects into the main harbour from the main breakwater and provides five berths (two on each side and one at the end) including a passenger terminal. Also from the lee breakwater two more breakwaters extended seawards to enclose a further 30 acres of sheltered water and provide a fishing harbour, to replace the traditional fishing beach swallowed up in the area of the main harbour. This fishing harbour is supplied with 1319 feet of quay and a boat building yard.

The finger quay (Quay No. 2) is 1,200 feet long and 490 feet wide. This quay is equipped with three single storey transit sheds each 460 feet length and with a clear span of 85 feet width. The fourth transit shed, at the mail boat berth, is a double storey building 500 feet long, the upper floor being for passenger accommodation, customs and other offices, baggage inspection rooms etc., and provided with four lifts to the lower floor, which is utilised as a normal cargo transit shed. The 3 acre space between the transit sheds is a stacking area for such cargoes as will not suffer as a result of outside storage. All four transit sheds are equipped with rail/road delivery platforms sheltered by a canopy cantilevered from the shed; lorry loading bays are provided at each end.

The sheds are set well back from the quay face, giving a 70 foot apron to facilitate the movement of mobile cranes, fork lift trucks, lorries and railway wagons etc.; there are two sets of railway lines on the quay apron.

There are two 5 ton and two 3 ton electric portal cranes at berths 1 and 2 (that is the south side of Quay 2) one 5 ton and two 3 ton electric portal cranes at berths 4



Loading cocoa ex sheds to lighters prior to shipment at buoy berths. —Takoradi.

and 5; a further 3 ton portal crane is shortly to be brought into service at the latter berth.

QUAY NO. 1

Towards the end of the first stage of construction the Government of Ghana decided to proceed with the second stage of development of the harbour. This took the form of a "marginal" wharf—Quay No. 1, shorewards of the finger quay and approximately parallel to the original coastline. This called for a further five berths, four of which would be equipped with transit sheds, the remaining berth (No. 10) to provide an open storage area only. This marginal quay was however, extended to give in all seven berths, six of which are equipped with transit sheds. Behind each shed there is a large open storage area amounting to 31 acres in all.

The transit sheds on the marginal quay are 400 feet in length with a clear span of 120 feet. They are set well back from the quay face and are equipped with full road and rail services together with all other conveniences provided on the finger quay.

Berths 6 and 7 are linked with the cocoa storage sheds by a conveyor system for handling bagged cocoa. This installation delivers the cocoa directly into the ships hatches by means of telescopic chutes fitted to gantry type outloaders, and has the capacity to supply four points, each at 25 tons per hour, or by using two outloaders only—at 50 tons each per hour. A further two side chutes have recently been fitted whereby the cocoa may be delivered to the quay if necessary. This latter innovation proves extremely useful when it is necessary to load deep tanks and other such restricted spaces where it is impossible to place the outloaders; in this case the cocoa is loaded from the quay in the conventional manner, using cranes or ship's derricks.

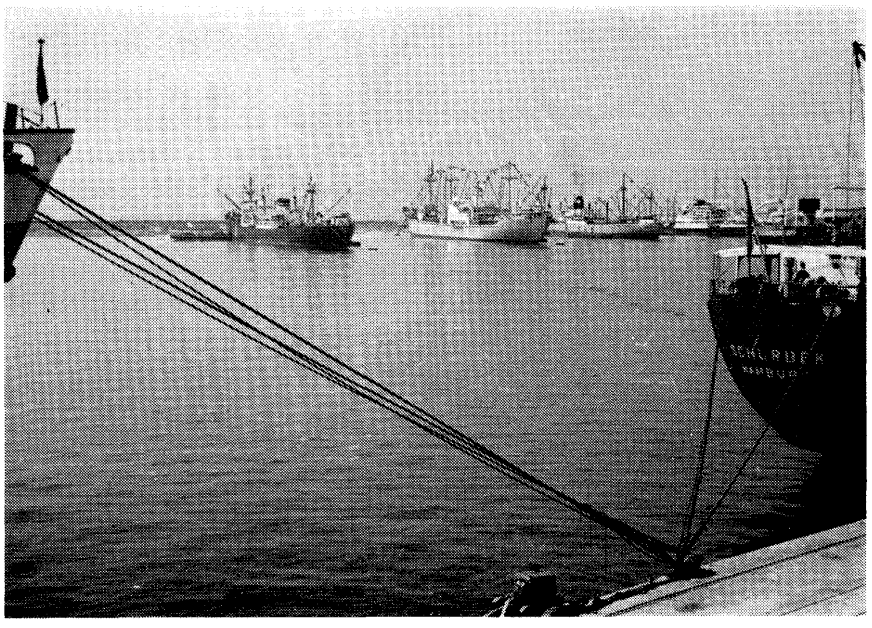
There are two 5 ton and two 3 ton electric portal cranes at berths 6 to 12. A further seven portal cranes are at present being erected on this quay, three of which will have a capacity of 7½ tons, the remainder being 3 tons capacity.

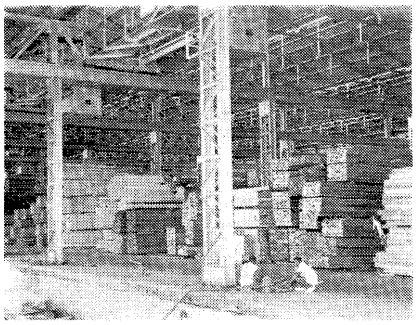
COCOA STORAGE

Cocoa is the chief export from Ghana and Tema handles the major quantity of this commodity. Four large cocoa sheds each 440 feet in length and with a clear span of 170 feet have been erected to the west of the marginal quay and each has a capacity of approximately 11,000 tons. The overhead conveyors extend down the centres of the sheds and onwards to Quay No. 1 via junction towers where suitable direction changes are made; the final sections of the conveyor system being carried on the roofs of Transit Sheds No. 6 and 7. Portable elevating equipment is provided in the cocoa sheds to load the bags onto the overhead conveyor.

The cocoa arrives at Tema from up-country mainly by rail although a large quantity is delivered by road. On receipt in the port, the bags of cocoa are subject to 100% check-weighing and sampling prior to being stacked for short term storage in the Cocoa Sheds. Dur-

View of buoy berths from main wharf.—Takoradi





Packaged timber in timber sheds.—Takoradi

ing storage the cocoa is subjected to 100% fumigation and immediately prior to shipment each bag is again sampled and check-weighed.

A large area of each shed is naturally required for laying out the bags of cocoa for inspection. It is interesting to note that such "laying out" for inspection is still done in "boat-loads" of 25—a procedure left over from the surf port days.

THE PORT AUTHORITY

The Ghana Railways and Ports Administration is the Port Authority for the Ports of Ghana.

This Administration has been responsible for the management of Takoradi harbour ever since that deep water port was first opened in 1928. It was also responsible for the management of the surf ports at Accra, Cape Coast, and Winneba and controls eight lighthouses along the coast as well as managing and operating the country's entire rail network.

CARGO HANDLING

In 1960, the Ghana Government decided that all cargo handling operations at Tema should be carried out by an independent indigenous private company. Accordingly, the Government invited a well-known Ghanaian entrepreneur, who has built up over a considerable number of years an efficient organisation (W. Biney and Company Limited) for handling cargoes on the west coast of Africa, to co-operate in setting up the Ghana Cargo Handling Company Limited.

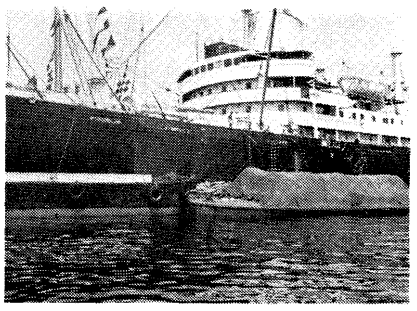
Although this is a private company, the Government is the majority shareholder. W. Biney and Company are the minority shareholders and also the Managing Agents, thus ensuring that harbour users benefit from their wide experience.

PROGRESS IN CARGO HANDLING IN GHANA PORTS

Ghana Cargo Handling Company went into operation in early 1961 in the Port of Tema and it was the wish of Government that cargo handling operations in Ghana's new port should be run on the most modern commercial lines. The company started with shorehandling work at Tema only but has, since May, 1964, on Government's instruction extended its activities to include all stevedoring and shorehandling at Takoradi Port. Ghana Cargo Handling Company is now, in effect, the sole Master Porter and Master Stevedore in the two major ports of the country.

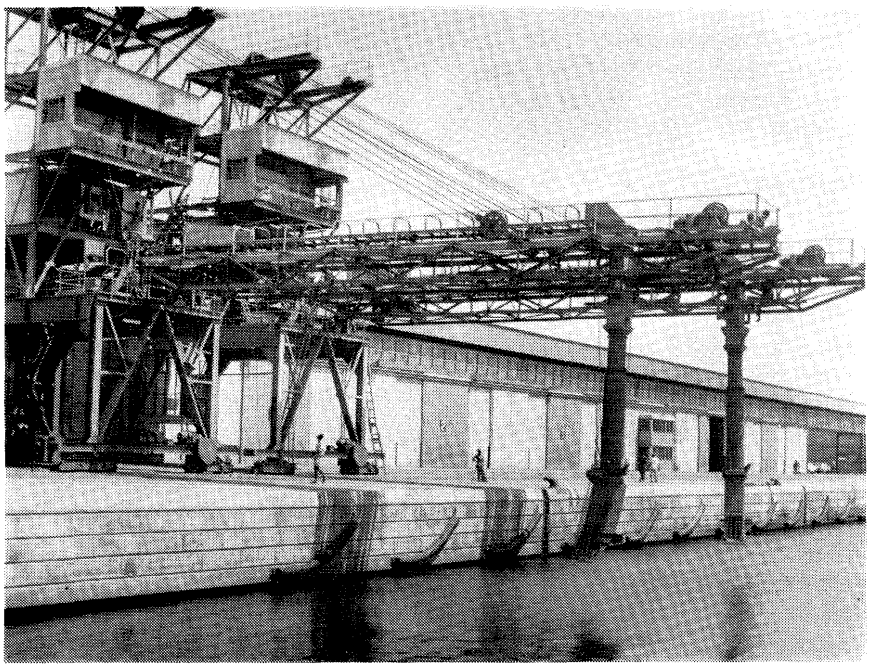
The primary concern of the Company has been to provide the best possible service to the many port users and to the nation as a whole. Though this essential service to the nation may not be apparent to, or directly felt by, the ordinary citizen, it derives from the fact that the prime function of a port in any part of the world is to ensure that the country's exports and imports pass through the port with all possible speed and the greatest care and security. In the course of carrying out its responsibilities, Ghana Cargo Handling Company has had to be forward-looking in the search and use of the most modern methods and equipment suitable for our ports and in the training of staff to make full use of these facilities which are now of general application in most of the modern ports of the world. The Company believes that to obtain reasonable output, investment in machinery and equipment must also be matched with investment in the man. Considerable emphasis therefore has been given to training staff locally and in overseas ports and institutions which include seminars and conferences on a new developments in port operations.

The initiation and implementation of the policies of the Company were the responsibility of Messrs. W. Biney and Company



Loading cocoa at buoy berths.—Takoradi

Logs—Takoradi



Cocoa conveyor outloaders.—Tema (Note telescopic chutes.)

Limited, the Managing Agents, who have had more than forty years experience in cargo handling in West Africa and were thus in a position to guide the new Ghana Cargo Handling Company. The Port of Tema has achieved a high reputation for efficient and rapid cargo handling among all the ports in West Africa. There has been significant progress also in Takoradi since the middle of May, 1964, when Cargo Handling Company extended cargo working activities to that port. Mechanical handling equipment such as mobile cranes, heavy and general duty fork lift trucks, heavy tractors, and specially designed trailers are employed in a day to day work on cargoes in Tema and Takoradi as conditions in each place permit. Palletisation and the use of other devices for the quick discharge and loading of ships, and also for the delivery of cargo to consignees are adopted to the maximum as found practicable. At present the company operate such equipment as are shown in the table at the bottom of this page. Improved types of these machines are on order as replacements or additions to existing ones.

When the Port of Tema had become accustomed to working with mechanical handling equipment it was possible to reorganise labour by the reduction of gangs from the strength of fifteen men to ten men without any reduction in efficiency.

On the 18th of May, 1964, when the Company began operations in Takoradi, fork lift trucks were introduced for the first time in the history of the port for the handling of general cargo and completely altered the pattern of cargo working in the transit sheds. Heavier and greater quantities of cargoes were moved into shed and out onto lorries with greater despatch and safety. Work, which took the men hours to perform is now being done in a far less time, leaving them to tackle more and other jobs.

The Cargo Handling Company is always looking for improved methods and has been conducting experiments on new devices and methods, some of which are initiated by its own officers and staff. These experiments are undertaken to improve the handling rate of certain commodities which have hitherto been accepted as not lending themselves to any further improvement under the existing local conditions.

Although there is much written and spoken about containerisation and the resulting benefits, of considerable saving in time to ships, shippers and importers, the company feels that in Tema and Takoradi more immediate benefit to all concerned will come from encouraging the unit load whether it be pre-slung or pre-palletised. The company adapted some fork lift trucks for use in the holds of ships for the discharge of general cargo and also in the loading of bundled and loose sawn-timber. Following reasonable successes achieved in these experiments, three special fork lifts were purchased and employed on a more extensive scale and more will be needed.

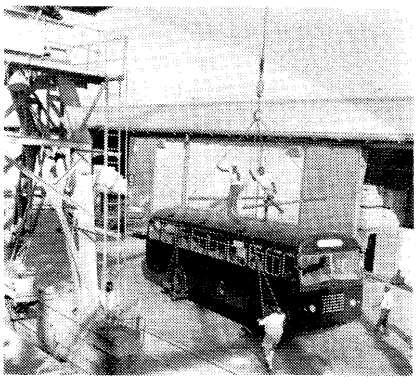
Another experiment has also taken place in the loading of loose sawn-timber in Takoradi where a rather low rate of loading, piece by piece, has always been accepted as customary with a similar low rate at the port of discharge. Gravity rollers and special skids are employed in this case and have brought to light many interesting results which should have been obvious many years ago. For instance the initial ship on which

CARGO HANDLING PLANT

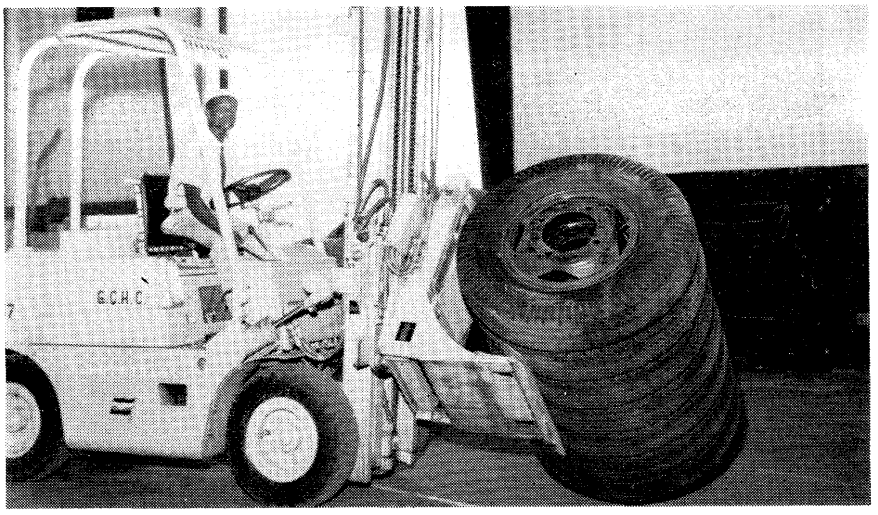
Plant	Tema	Takoradi
Cranes, Mobile Diesel Electric	18	4
Mechanical Horse	—	6
Heavy Duty Tractors (Shunting)	2	—
Heavy Duty Tractors (Towing)	16	—
Trailers—mechanical horse—6 ton	—	18
Trailers—16 ton	79	—
Fork Lift Diesel—5,000 lbs.	57	8
Fork Lift Electric—5,000 lbs.	2	1
Fork Lift Heavy Duty—8 tons	4	—
Lorries 6/8 tons	6	1

this method was tried was able to complete loading sawn-timber and to leave the port of Takoradi three clear days earlier than was expected. The tonnage rate achieved was about three times the traditionally accepted figures. This vessel subsequently discharged 1,257 tons of sawn-timber at Norfolk—U.S.A. at the rate of 40 tons per hook hour. The method of stowing in the ships hatches was by unit stow, enabling the discarging Stevedores to discharge "set by set" rather than "piece by piece". The unit stow method has now been accepted by a major shipowner and extended to other ports in West Africa.

Other innovations which have been introduced in especially stevedoring include new methods and equipment designed within the company to speed discharge and minimise damage. Some of these are the use of special boards with rope lifting legs for lifting cement; special wooden trays with removable sides for safer handling of asbestos pipes which have reduced damage to almost nil; the use of "chandeliers" to spread the top of case-boards slings has also eliminated the crushing of top tiers of packages of mixed general cargo. The latest and most successful method employed in palletisation has been the joint use of case-boards as "slave pallets" and the "chandelier", the former providing a firmer support for the pallet. Palletisation has led to less sorting, quicker tallying and most important, less congestion on the quay as the fork lifts constantly move away the cargo. The most important results however, achieved so far in palletisation has been the reduction of handling from five times to twice between the initial discharge and delivery of goods to their owners. Consignee's when collecting their cargoes from the port may, for a small hire charge, take delivery on pallets thus reducing by as much as 400% the time taken for loading their transport.



Discharging buses. Tema (Note palletised cargo in the sheds.)



Clark D.C.Y. 50 forklift fitted with rotating reel clamp—for handling newsprint and bundles of tyres.—Tema

Ghana Cargo Handling Company has on its roll 1,168 permanent Junior Staff. In addition it offers work to an average of about 4,250 labourers per day of whom 3,000 are permanent or regular. There are also 66 Ghanaians holding various senior posts. The Company's training scheme for men of the right potential is continuing steadily and so far seventeen officers have been sent abroad for further training at West African Terminals Limited, Tilbury Docks, where cargoes peculiar to West Africa are handled. In addition, W. Biney and Company (Ghana) Limited, the Managing Agents have under the Chief Biney Scholarships Scheme trained six men in England and Germany in port work and they are now employed by Ghana Cargo Handling Company Limited. The Company runs a regular training school, with a full time Training Officer, for the Junior Staff and special trainees with the minimum qualification of West African School Certificate or the equivalent General Certificate of Education. Five such men are now in training on this accelerated scheme with prospects for early appointment to senior positions. In all over 500 men of all grades have passed through the school since 1961.

Day to day training in the use of new gear, safety instructions, Factory Act Regulations and care in the handling of cargo and gear is done "on the job" and is supplemented by the issue of written instructions to all staff.

The relationship between the company and the staff have always been good due greatly to the excellent co-operation received from the Maritime and Dockworkers Union of T.U.C.

Although the rate of handling cargo has continued to be high (and this is confirmed in recent foreign reports) the company is determined to maintain this progress and to introduce further improvements which become desirable. A Work Study Group therefore comprising officers within the Company was set up to conduct a review of the Company's activities, including the methods used and the procedure operating within it. It is believed that this would show ways to greater economies and efficiency, and also open up new spheres along which the Company could direct its activities more profitably in the economic use of equipment and men in the service of Ghana, which include the reimbursement to Government in various forms of taxes and dividends, as a return

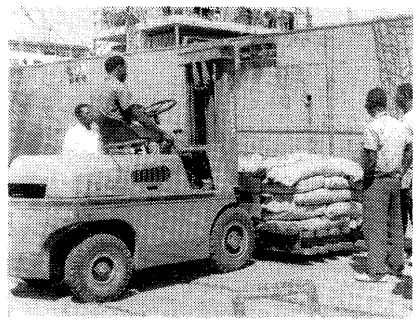
on its capital, of over 90 per cent of the entire annual earnings of the Company.

Some indication of the work performed by the Ghana Cargo Handling Company, and the steady rise in the volume of trade of the country, can be observed from the following figures of import and export cargoes handled since it began operations.

DOCKYARD AREA

The dockyard area, built on reclaimed land inside the lee breakwater, comprises a small drydock 174 feet in length by 46 feet with depth over sill of 16.9 feet at L.W.S., two slipways—one for vessels up to 150 tons and the other for up to 12 tons, 600 feet of fitting out quay and a workshop equipped with modern machinery.

Work on the new dry-dock is now well advanced and scheduled for completion about the end of 1966. The drydock will be 910 feet in length by 155 feet (149 feet at the entrance) with depth over sill of 30 feet at L.W.S. An intermediate gate is to be incorporated to give two sections of drydock space (allowing ship building to proceed along with drydocking). Two travelling cranes, one at 60 ton the other 20 ton capacity are shortly to be erected, one at each side of the dock.



Cargo palletised on board vessel for speedy clearance on quay.—Tema

Shorewards of the drydock are the large assembly, plate and production shops, these are equipped with some of the most modern machinery available in ship building. The former has 1 x 30 ton and 1 x 20 ton overhead gantry cranes, the latter having 2 x 10 ton.

The aforementioned fitting out quay will be extended to the entrance of the new drydock giving a total length of 946 feet.

COMMERCIAL WAREHOUSE AREA

Situated outside the Customs area, and immediately adjacent to it, is the Commercial Warehouse area. This extends over some 60 acres and is divided into plots for leasing to private commercial firms and each plot has full rail and road access. Thus there are direct connections to the nearby marshalling and sorting sidings and thence to the berths and the main railway line to Accra.

INDUSTRIAL AREA

The industrial and oil area to the east of the new town of Tema is closely linked with the harbour and offers considerable scope for private industrial enterprise. The harbour, the industrial area and the aluminium smelter together support the belief that Tema will be "the cradle for Ghana's industrial future".

Industries already established include the vehicle assembly plant, fish cold storage plant, soap factory, oil refinery, cement factory. The chocolate factory has already started production and the gigantic cocoa silos together with the interlocking complex (a combination of ten factories including Wheat Silos, Flour Mill, Animal Food Mill, Fish Factory and Oil Cake Mill) are nearing completion.

RECENT DEVELOPMENTS IN THE PORT OF TEMA

A further berth is nearing completion alongside the Lee Breakwater immediately shorewards of the Oil Berth, for the import of raw materials for the Aluminium Smelter and the export of aluminium ingots. The imported materials will be unloaded from the vessels by pneumatic unloaders and transported by belt conveyor along the Lee Breakwater and above the dockyard to a temporary storage area on shore for subsequent transport to the smelter side about two miles away.

The deep water fishing harbour, seawards of the original harbour is also near completion and this will cater for a fleet of large refrigerated, trawler type, tuna fishing vessels.

	Deadweight tons			Freight tons
Tema	**Imports**	**Exports**	**Total**	**Total**
1961/62	252,227	166,181	418,408	950,632
1962/63	695,833	197,274	893,107	1,081,291
1963/64	744,897	221,718	966,615	1,200,544
1964/65	912,088	248,413	1,160,501	1,396,233
1965/66	982,018	309,317	1,291,335	1,649,085
Takoradi				
1964/65	315,154	684,185	999,339	1,027,722
1965/66	396,908	825,768	1,222,676	1,298,843

Mr. Harold B. Ehrlich

Buffalo A World Port

By Harold B. Ehrlich

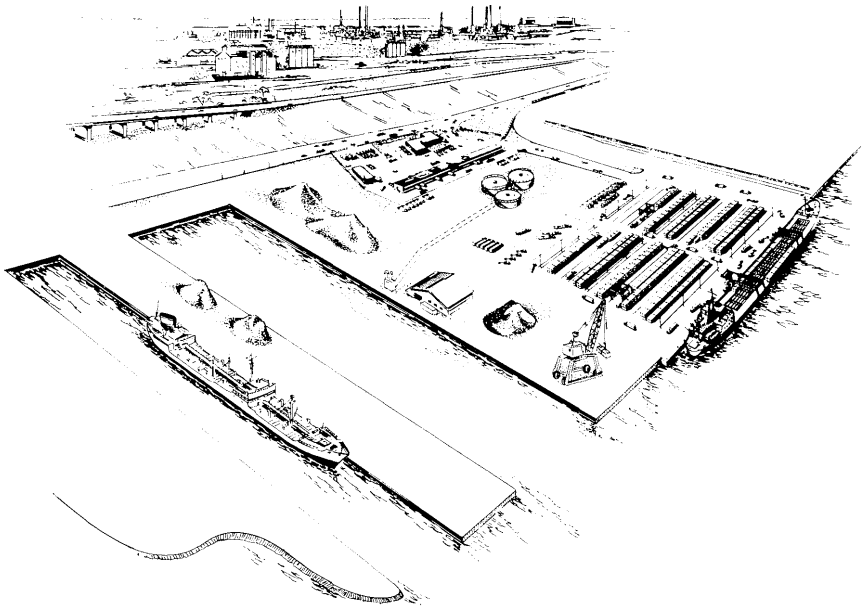
Executive Director
Niagara Frontier Port Authority

The Port of Buffalo, at the Eastern tip of Lake Erie, is in the most advantageous position to serve as the hub of commerce for an area blessed with great natural wealth. The Buffalo-Niagara Frontier offers business and industry tremendous opportunity for growth.

Well over a million and a half persons live in the 1,587 square-mile Frontier area and the population continues to increase by more than 4500 each year. Within 500 miles are located many of the country's largest cities and over 110,000,000 people...plus approximately 75% of the population of Canada.

Buffalo's steady, continuing growth as a world port is due to many important factors. The harbor has a controlled 27 foot depth. It has the largest general cargo handling facility on the Great Lakes and this facility is now being supplemented by a newly built ware-

Buffalo, New York, Port Terminal (center) and new 82,000 sq. ft. Warehouse (left)



Port of Buffalo's planned accommodations for containerized cargo.

house of 84,000 square foot capacity. Buffalo also possesses the finest bulk cargo piers with a 100 x 100 foot shed recently erected to protect bulk materials that can not be left in the open.

The Port of Buffalo now is acquiring a mobile gantry crane that lifts 25 tons at 85 foot radius; 40 tons at the square of the hatch. Also of major importance, Buffalo's waterfront land is ready for adaptation to the most effective and economical use in caring for containerized cargo.

Buffalo's freight and passenger transportation facilities—by rail, water, air and land are among the best in the nation. The St. Lawrence Seaway has linked Buffalo with the world as the first inbound, last outbound major U.S. port of call on the Great Lakes and Buffalo is the second largest railway center in the world. Abundant low cost electric power continues to be an important asset.

Along the 3½ mile waterfront, and the inland river and canals, choice sites are still available for industrial use and development. The Buffalo area has a tremendous labor supply, both skilled and unskilled, and is rapidly developing a force of technicians and research people adaptable to electronic and space industry callings. Buffalo also is developing as a national center for metallurgical industries with high electrical energy requirements.

Through a continuing, concentrated development program, the Port of Buffalo will continue to move progressively forward as a World Port.

Where import/export tonnage via the St. Lawrence Seaway is concerned, vessel agents and operators, as well as private business interests, see a continuation of rising foreign trade.

Flags from all corners of the globe are a common sight at Buffalo's Port Terminal and Seaway Piers as ships arrive from transoceanic voyages and from Canadian ports.

As many as five foreign ships have been in port in Buffalo at one time.

Buffalo Port Terminal saw import-export cargo moving between Buffalo and such foreign ports as Manchester and London, England; LeHavre, France; Hamburg, Germany; Naples, Italy; Alexandria, Egypt; Rijeka, Yugoslavia, Pakistan, Japan, Israel, Thailand and Formosa. Local steamship agencies representing two dozen steamship lines that connect Buffalo with over 100 foreign ports, look for an even greater number of ocean ships coming here this year.

Import commodities handled in Buffalo consist of such varied items as newsprint, wire rods in coils, steel channels and bars, sulphur, Chilean iron ore, baler twine, molasses, hardboard ceiling tile, saw sharpeners, window glass, tie rods, quarache, furniture, grass seed, tractors, whiskey and champagne, preserves, olives, marble chips, limestone, aluminum sheets, iron ore, beer, tapioca, perfume, cheese, sardines, burlap and rubber. Categories of cargo exports were of wide variety including chemicals, oils, bulk liquids and lumber products.

The Niagara Frontier Port Authority, under whose jurisdiction the port is operated, has completed a bold and farsighted program to further develop the port and stimulate increased traffic.

Francis D. Flori, Trade Solicitations Manager is considered to be among the foremost authorities on Great Lakes port economics. He is constantly ready to contribute a wealth of valuable information to every importer or exporter as to the feasibility, and economy, of shipping or receiving via the Port of Buffalo. Adrew J. Corbett is New York City Representative for the Port of Buffalo.

There are greatly increased trends toward the growth of Buffalo as the commanding port on the Eastern Great Lakes and there is every reason to believe that its importance among American ports will continue.

International Transport at Rotterdam in 1966

1966-1965 Sea Transport Increased From 122 to 130 Million Tons

(Reprinted from Rotterdam Europoort Delta 1967 No. 2)

Sea-Going Shipping

The number of sea-going ships that entered the port of Rotterdam in 1966 amounted to 28,352. Compared with 1965, this was an increase of barely 1%. The capacity of the sea-going ships that arrived here in 1966 was 79,7 million N.R.T. This was 8% higher than the previous year. The difference in the increase-percentages points to the increase in the average size of the ships which was 2,811 N.R.T. in 1966 against 2,623 N.R.T. in 1965.

Of the above-mentioned number of seagoing ships to call at Rotterdam in 1966, 10,835 ships were smaller than 500 B.R.T. This number was about the same as that in 1965. In 1966, the total tonnage of the ships under 500 B.R.T. amounted to 2,3 million N.R.T. The average net register tonnage of the coasters showed an increase of 9% compared with 1958. The increase in the average size of ships over 500 B.R.T. in the corresponding period amounted to 35%. A clear picture of the development in the number of large ships in Rotterdam can be seen from the accompanying table of ship's draughts. Only those ships with a draught greater than 34'6" have been included in this table. In 1958, the total was only 240 ships, and the largest of these came in the 37'6"-38' draught class. In 1966, the number of ships with great draught amounted to 1215. Of these, 724 ships had a draught of more than 37'6". The largest ships that entered the port of Rotterdam in 1966 was in the class of 51'-51'6" draught. A number of factors such as larger ships, the reparcelling out of harbour sites, and modernization of transhipment methods, among other things, causes a considerable change in the spreading of seagoing arrivals over the various harbours. The number of ships that used the harbours situated on the right-hand bank of the Maas was 17% lower in 1966 than in 1965. In the Waalhaven and the other harbours lying to the East of it on the left bank of the Maas, the drop in seagoing arrivals there amounted to 14%. The number of ships to enter the harbours lying to the West of the Waalhaven in 1966 was 41% higher than in the previous year. The number of sailings in line-shipping in the year under review was 2% fewer than in 1965.

Goods Transport by Sea

International seaborne goods transport at Rotterdam in 1966 amounted to 130,4 million tons against 122,7 million tons in 1965. The average yearly increase of 8 million tons achieved since 1960 has, therefore, been maintained.

A better idea of the significance of this growth can be obtained by comparing the result achieved at Rotterdam with the results of other large seaports in the E.E.C. area. The ports compared with Rotterdam are separated in one group lying to the North of the Straits of Dover, and one group lying to the South of it.

It appears from the table that the growth in the southerly ports is stronger than that in the northerly ports. The increase-percentage of the ports in the south in the period 1966/1965 is even a little stronger than in the period 1965/1964. Of the southerly ports, only Nantes, St. Nazaire and Dunkirk made a

SEABORNE GOODS TRANSPORT IN A NUMBER OF MAJOR PORTS IN THE E.E.C. AREA FROM GENOA TO HAMBURG.

	1964	1965	1966	1966 against 1965
	in millions of tons			
a) Genoa	32.3	34.0	39.0	+15%
Marseilles	47.2	56.2	63.5	+13%
Bordeaux	7.1	7.3	7.8	+ 7%
Nantes/St. Nazaire	9.7	10.6	11.0	+ 4%
Rouen	11.1	10.6	12.0	+12%
Le Havre	27.1	28.0	30.8	+10%
Dunkirk	13.9	16.3	16.5	+ 1%
	148.4	163.0	180.6	+11%
b) Antwerp	53.3	59.4	±61.1	+ 3%
Amsterdam	14.7	13.9	14.5	+ 5%
Emden	13.1	11.5	9.9	−14%
Wilhelmshaven	16.4	18.5	20.3	+10%
Bremen	15.8	17.5	17.4	− 1%
Hamburg	35.4	35.3	37.6	+ 7%
	148.7	156.1	±160.8	+ 3%
c) Rotterdam	113.6	122.7	130.4	+ 6%
d) Total group a+b+c	410.7	441.8	471.8	+ 7%

relatively lower increase than Rotterdam in the comparison years 1966/1965. Genoa and Marseilles, on the other hand, show a considerable increase both absolutely and relatively in these years. But the growth of Marseilles in the years 1966/1965 was, as expected, considerably lower than in the years 1965/1964.

Transport by sea in the Northerly ports, which increased by 5% from 1964 to 1965, only rose by 3% during 1966/1965. Of the Northerly group of ports, only Hamburg made a slightly higher increase-percentage (+7%) than Rotterdam (+6%). The most striking feature is the continued decline at Emden. In the years 1965/1964, Emden already recorded a loss of 13%, and in 1966/1965 the decline increased to even 14%.

In comparison with the ports in the Northerly group, which includes Rotterdam's keenest competitors, the result achieved at Rotterdam during 1966 can be regarded as being favourable.

Of the total of goods unloaded and loaded in the port of Rotterdam in 1966, 99,4 million tons were arrivals and 31,0 million tons were departures. The arrivals at Rotterdam, which as in most of the other European seaports, has shown the strongest development over the years, increased by 4% in comparison with 1965, whereas departures rose by 12%.

As the figures for imports and exports at Rotterdam also include the entrepot traffic of goods which, in turn, were again sent abroad, a calculation of the total transit, both direct and indirect, has been made. This calculation shows that the share of transit traffic at Rotterdam fell from 54,4% in 1965 to 53,5% in 1966.

Since 1958, there has been a striking amount of shifting regarding the countries of origin and destination in seaborne goods-transport in Rotterdam. As the distribution of arrivals over the various continents differs considerably from that of the departures, one should look at both directions separately. From 1958 to 1966, the total

INTERNATIONAL GOODS TRAFFIC 1966 | 1965

	1965	1966	1966/1965	
	× 1000 t	× 1000 t	× 1000 t	%
imports	60,550	65,987	+ 5,437	+ 9
transit	34,575	35,442	+ 1,133	+ 3
unloaded	95,125	99,429	+ 4,304	+ 4
exports	20,353	22,731	+ 2,378	+ 12
transit	7,227	8,220	+ 993	+ 14
loaded	27,580	30,951	+ 3,371	+ 12
total	122,705	130,380	+ 7,675	+ 6
imports	2,346	3,246	+ 900	+ 38
transit	4,012	4,950	+ 938	+ 23
unloaded	6,358	8,196	+ 1,838	+ 29
exports	6,555	7,138	+ 583	+ 9
transit	30,540	29,525	+ 1,015	+ 3
loaded	37,095	36,663	+ 432	+ 1
total	43,453	44,859	+ 1,406	+ 3
imports	313	349	+ 36	+ 11
transit	234	246	+ 12	+ 5
unloaded	547	595	+ 48	+ 9
exports	188	173	+ 15	+ 8
transit	528	427	+ 101	+ 19
loaded	1,016	900	+ 116	+ 12
total	1,563	1,495	+ 68	+ 4
imports	615	703	+ 88	+ 14
transit	460	568	+ 108	+ 23
unloaded	1,075	1,271	+ 196	+ 18
exports	746	835	+ 89	+ 12
transit	987	995	+ 8	+ 1
loaded	1,733	1,830	+ 97	+ 5
total	2,808	3,101	+ 293	+ 10
Rotterdam—Rhine	10,260	11,681	+ 1,421	+ 14

arrivals rose by 83%. The share of the European countries during the above-mentioned years fell from 20,1% to 17,1%. The share of the American continent fell from 39,6% in 1958 to 26,1% in 1966. The flow of goods from Asia only show a slight fall. The share of the African countries in arrivals at Rotterdam which was only 5,5% in 1958, rose to 23,4% in 1966. The total departures in 1966 was 59% higher than in 1958. This increase is, therefore, considerably lagging behind that of arrivals. Round two-thirds of the departures are destined for European consumers. Europe's share even rose from 64,4% in 1958 to 65,8% in 1966. The departures to American, African and Asian countries, relatively seen, fell during the above-mentioned years.

In 1966, the share of these countries in the total departures was respectively, 6,5%, 5,2% and 7,0%. The share of the bunker material and ship's provisions that come under departures, rose from 8,8% in 1958 to 14,6% in 1966.

Both Bulk-goods and General-cargo increased by 6% in 1966 compared with 1965. General-cargo departures (+7%) rose more sharply than arrivals (+5%). Of the total seaborne general-cargo traffic at Rotterdam during 1966, 47% related to imports and exports and 53% to transit. Compared with the previous year, this means a small shifting at the expense of the transit traffic. Under general-cargo, a sharp rise was made in the item cattle-feeds, whilst the group metals showed a slight drop both in the arrivals and departures.

The amount of bulk-goods transhipped in 1966 was 110,6 million tons. It included 86,4 million tons arrivals and 24,2 million tons departures.

The share of mineral oil in bulk-goods again showed an increase. 75,6 million tons mineral oil was discharged resp. loaded at Rotterdam in 1966. Oil arrivals amounted to 56,7 million tons. This included 43,7 million tons of crude oil, which was 14% more than in 1965. The rise in the total arrivals of oil was, therefore, almost entirely due to the growth of the amount of crude oil. In 1965, 25,6% of the crude oil arrivals at Rotterdam already came from Libya. This share rose to 30,3% during 1966. It should be pointed out that half of the arrivals of crude oil at Rotterdam in 1966 were discharged in Europoort.

Departures of mineral oil rose from 17 million tons in 1965 to 18,9 million tons in 1966. Prior to 1965, departures consisted almost entirely of oil derivates. In 1965 departures of crude oil were already 0,6 million tons and this rose to 1,5 million tons in 1966. This crude oil, which mainly originated from

ROTTERDAM - EUROPOORT

NUMBER OF SEA-GOING VESSELS ENTERED AND CLEARED DRAWING > 34'6" = 10.49 m

DRAUGHT	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	DRAUGHT
34'6"—35'	81	81	155	135	180	152	123	163	170	157	134	10.49—10.67 m
35' —35'6"	18	13	27	39	57	30	18	22	29	23	21	10.67—10.82 m
35'6"—36'	26	24	34	60	110	92	52	48	52	73	62	10.82—10.97 m
36' —36'6"	10	18	14	32	57	82	94	109	130	96	118	10.97—11.12 m
36'6"—37'	1	11	8	20	23	79	121	164	142	132	132	11.12—11.28 m
37' —37'6"	—	1	1	3	14	30	23	26	29	14	24	11.28—11.43 m
37'6"—38'	—	2	1	9	10	33	65	61	71	69	67	11.43—11.58 m
38' —38'6"	—	—	—	7	11	37	55	78	139	116	115	11.58—11.73 m
38'6"—39'	—	—	—	3	5	27	44	42	85	110	134	11.73—11.89 m
39' —39'6"	—	—	—	1	—	3	5	14	12	50	41	11.89—12.04 m
39'6"—40'	—	—	—	—	—	—	6	6	4	10	14	12.04—12.19 m
40' —40'6"	—	—	—	—	—	2	15	7	10	32	62	12.19—12.34 m
40'6"—41'	—	—	—	—	—	—	1	—	2	15	13	12.34—12.50 m
41' —41'6"	—	—	—	—	—	1	1	2	4	11	36	12.50—12.65 m
41'6"—42'	—	—	—	—	—	—	—	1	8	7	24	12.65—12.80 m
42' —42'6"	—	—	—	—	—	3	6	5	13	20	29	12.80—12.95 m
42'6"—43'	—	—	—	—	—	—	6	4	12	9	11	12.95—13.10 m
43' —43'6"	—	—	—	—	—	—	8	8	13	24	8	13.10—13.25 m
43'6"—44'	—	—	—	—	—	—	—	3	6	8	9	13.25—13.41 m
44' —44'6"	—	—	—	—	—	—	—	1	4	14	14	13.41—13.56 m
44'6"—45'	—	—	—	—	—	—	5	3	4	3	6	13.56—13.71 m
45' —45'6"	—	—	—	—	—	—	5	6	13	10	12	13.71—13.86 m
45'6"—46'	—	—	—	—	—	—	2	6	11	16	18	13.86—14.02 m
46' —46'6"	—	—	—	—	—	—	4	9	8	11	23	14.02—14.17 m
46'6"—47'	—	—	—	—	—	—	1	8	3	9	18	14.17—14.32 m
47' —47'6"	—	—	—	—	—	—	—	7	7	18	25	14.32—14.47 m
47'6"—48'	—	—	—	—	—	—	—	2	8	7	14	14.47—14.63 m
48' —48'6"	—	—	—	—	—	—	—	2	2	7	12	14.63—14.78 m
48'6"—49'	—	—	—	—	—	—	—	—	—	1	6	14.78—14.93 m
49' —49'6"	—	—	—	—	—	—	—	—	—	1	6	14.93—15.08 m
49'6"—50'	—	—	—	—	—	—	—	—	—	1	5	15.08—15.24 m
50' —50'6"	—	—	—	—	—	—	—	—	—	—	1	15.24—15.39 m
50'6"—51'	—	—	—	—	—	—	—	—	—	—	—	15.39—15.54 m
51' —51'6"	—	—	—	—	—	—	—	—	—	—	1	15.54—15.69 m
51'6"—52'	—	—	—	—	—	—	—	—	—	—	—	15.69—15.85 m
52' —52'6"	—	—	—	—	—	—	—	—	—	—	—	15.85—16.00 m
52'6"—53'	—	—	—	—	—	—	—	—	—	—	—	16.00—16.15 m
total	136	150	240	309	467	571	660	807	991	1074	1215	

ARRIVALS OF SEA-GOING VESSELS — ROTTERDAM - EUROPOORT

	1955	1964	1965	1966	1965 = 100
Number of ships	20,348	27,548	28,103	28,352	101
N.R.T. × 1000	39,663	70,022	73,727	79,711	108

SEA-BORNE GOODS TRAFFIC IN MILLIONS OF METRIC TONS

	1955			1964			1965			1966			
	to ROTTERDAM	from ROTTERDAM	Total	to ROTTERDAM	from ROTTERDAM	Total	to ROTTERDAM	from ROTTERDAM	Total	to ROTTERDAM	from ROTTERDAM	Total	1965 = 100
General cargo	6.5	3.9	10.4	12.1	6.2	18.3	12.3	6.3	18.6	13.0	6.8	19.8	106
Bulk goods	38.8	17.0	55.8	75.6	19.7	95.3	82.8	21.3	104.1	86.4	24.2	110.6	106
Mineral oils	17.4	7.8	25.2	46.1	15.9	62.0	51.6	17.0	68.6	56.7	18.9	75.6	110
Ore	7.5	0.0	7.5	14.5	0.2	14.7	15.7	0.2	15.9	15.7	0.2	15.9	100
Coal	7.8	7.4	15.2	5.2	1.2	6.4	4.5	0.9	5.4	3.1	1.9	5.0	93
Cereals	3.3	0.1	3.4	4.5	0.5	5.0	5.2	0.7	5.9	5.2	0.8	6.0	101
Fertilizers	0.8	1.2	2.0	2.1	1.4	3.5	2.3	1.7	4.0	2.5	1.6	4.1	103
Other bulk goods	2.0	0.5	2.5	3.2	0.5	3.7	3.5	0.8	4.3	3.2	0.8	4.0	94
Total	45.3	20.9	66.2	87.7	25.9	113.6	95.1	27.6	122.7	99.4	31.0	130.4	106

overseas, is stored in Rotterdam and then re-shipped to Great Britain, Finland and France.

Ore transport at Rotterdam, reached the same volume in 1966 as in the previous year, i.e. 15,9 million tons. Achieving the same result in 1966 is reason for much satisfaction, particularly when one looks at the considerable drop experienced by the other arrival-ports of overseas ore destined for the Ruhr area. Emden and Vlaardingen in particular, suffered a severe loss. Of the total amount of ore transhipped in 1966, 15,5 million tons was unloaded transit traffic. This transit consisted of 78% iron-ore. The earlier mentioned development which has taken place in the countries of origin regarding this iron-ore, continued strongly during 1966. The share of iron-ore transport from African countries rose from 35,4% in 1965, to 43,2% in 1966. The share of European iron-ore remained the same at 36,5% but for the first time, was exceeded by African ores.

The main suppliers of iron-ore in Africa who shipped to Rotterdam in 1966, were Liberia (3,7 million tons) and Mauretania (0,9 million tons). The use of ever-larger ore carriers enables greater possibilities to transport more profitably over long distances because of the lower transport costs per ton. Towards the end of 1966, a start was even made on the shipment of iron-ore from Australia to Rotterdam. The development of this transport is looked forward to with great interest in Rotterdam.

The transit of unroasted pyrites, mainly from Norway, Spain and Cyprus, fell from 1,3 million tons in 1965 to 1,1 million tons in 1966. Of the other ores, bauxite and manganese ore are worthy of mention. Transit of bauxite in 1966 amounted to 800,000 tons. Compared with 1965, this represented an increase of no less than 19%. More than 40% of the bauxite originated from Yugoslavia and Greece in 1966. The transit of manganese ore also continues to increase in importance. In 1966, the transit of manganese ore reached a volume of 620,000 tons against 443,000 tons in 1965. Under the countries who shipped manganese ore for transit to Germany via Rotterdam, South Africa showed the strongest development. South Africa's share rose to 48% in 1966.

Grain transport takes third place in bulk-goods at Rotterdam and increased by 1% from 5,9 million tons in 1965 to 6,0 million tons in 1966. Because of a 6% drop in imports of grain at Rotterdam, the total grain arrivals fell by 1%. It is interesting to note that in the corresponding years grain imports at Amsterdam increased by 10% to 1,0 million tons, which amounts to 43% of the grain imports at Rotterdam. The amount of grain unloaded at Rotterdam in 1966 for further transit was 2,8 million tons. The 4% increase in this instance achieved in comparison to 1965, was the result of the rise in sea-sea transhipment to Great Britain and Scandinavia. The sea-sea grain transit traffic via Rotterdam in 1966 reached an amount of 821,000 tons.

The drop in coal traffic in the Rotterdam harbours continued again during 1966. Coal transports fell from 5,4 million tons in 1965, to 5,0 million tons or 7% in the year under review. On the arrivals side, both the imports and transit traffic fell by a round 30%. A striking feature, however, was the sudden revival of outgoing coal transit. This coal transport, which had dropped to 882,000 tons in 1965, rose by 111% to 1,9 million tons. 1,1 million tons of this last amount went to Italy.

Transports of fertilizers last year reached a volume of 4,1 million tons. The increase which was only 3% compared to 1965, was considerably lower than that achieved in the two years immediately preceding 1965. Arrivals of fertilizers during 1966 rose by 9% compared with the previous year. It is notable that this increase was due to a sharp rise in the arrivals of artificial fertilizers. In previous years, arrivals of artificial fertilizers never amounted to more than a few ten thousands of tons, but in 1966, this transport jumped suddenly to more than 200,000 tons. Exports of artificial fertilizers which since 1963 were again steadily recovering, dropped from 748,000 tons in 1965 to 637,000 tons the following year.

Other bulk-goods, which had developed powerfully since 1962, and which reached a volume of 4,2 million tons in 1965, fell during last year to round 4 million tons. This decline is due to the sharp drop in sulphur transport in 1966, the largest item making up other bulk-goods. Sulphur transport, which in only a few years grew to a volume of 1,5 million tons in 1965, fell in the following year by 15% to round 1,2 million tons. The progress made in imports and exports of other bulk-goods, which was quite considerable, was not able to compensate the drop made in transit traffic.

Inland Shipping

International transport of goods by inland shipping at Rotterdam during 1966, reached a volume of 44,9 million tons. Compared with the result achieved in 1965, this represents an increase of 3%. Of the 44,9 million tons, 39,5 million tons was related to Rhine shipping. The increase made in 1966 can be entirely ascribed to Rhine shipping. Completely contrary to the development during the last few years, arrivals went up by 29% whilst departures dropped by 1%. Arrivals achieved a volume of 8,2 million tons in 1966 and departures 36,7 million tons.

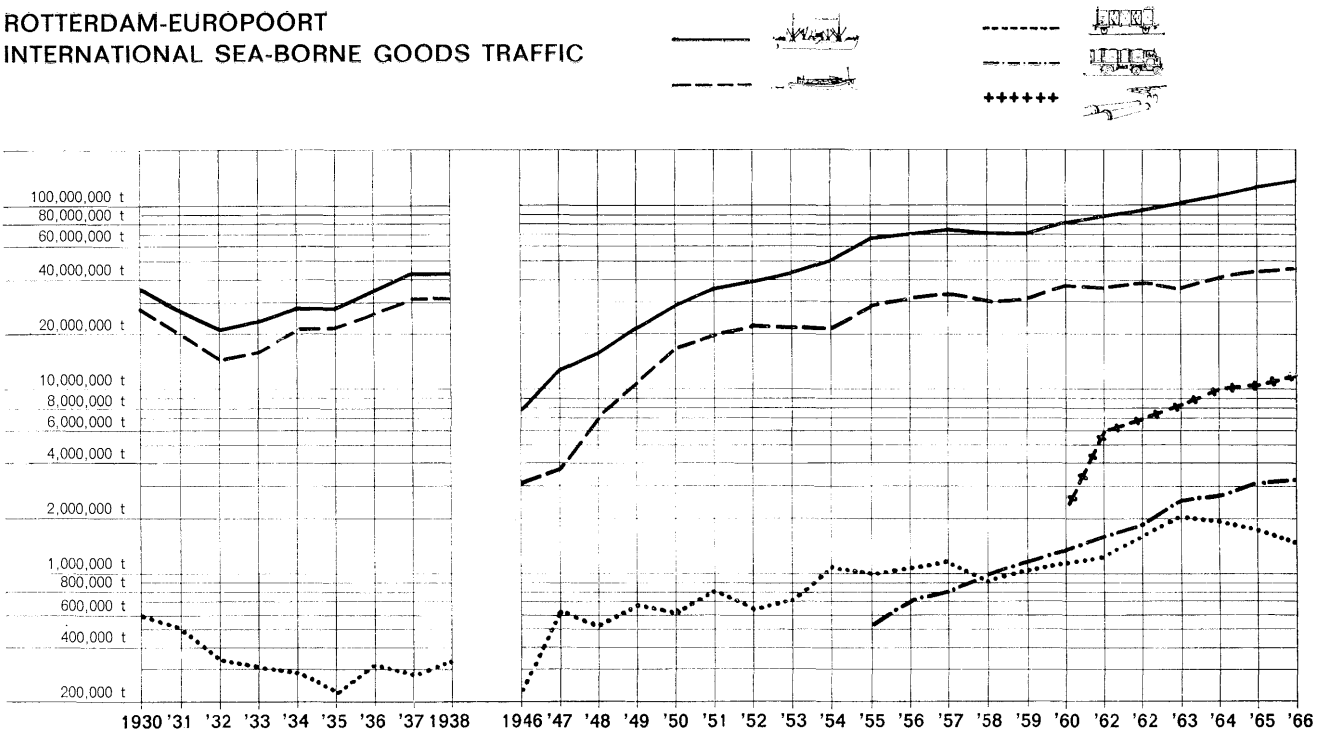
General-cargo transport rose in comparison to 1965 by 4% to round 8 million tons in the year under review. More than 8% of the general-cargo transports was transit by inland-shipping.

One-fifth of the total general-cargo transports by inland-shipping in the port of Rotterdam consists of metals and metal-ware. It was this very item which in contrast to the entire general-cargo group, dropped by 7%. Considerable progress was made in the transport of cattle-feeds to the hinterland.

Bulk-goods transport, inland-shipping's speciality, reached a volume of 36,9 million tons in 1966 which was 3% up on the previous year.

The share of ore transport to

ROTTERDAM-EUROPOORT
INTERNATIONAL SEA-BORNE GOODS TRAFFIC



the hinterland amounts to 40% of the total bulk-goods transport by inland-shipping at Rotterdam. The volume of ore transport in 1966, at 15,4 million tons, remained the same as that of 1965.

Transport of mineral oil by inland-shipping has, despite the rapid rise of transport via pipeline, been successful during the last few years in maintaining its second place and even strengthened its position. Compared to 1965, oil transport rose by more than 10% to 8,6 million tons in 1966. Of this 8,6 million tons, 7,6 million tons was departures and 1,0 million tons arrivals. Oil transport is almost entirely made up of oil products, under which the diesel-oil group and fuel-oil group dominate.

Coal transport by inland-shipping which in pre-war years headed transports by inland-shipping, and in recent years has continued to decline, rose in 1966 to 4 million tons. The loss that occurred because of the fall in up-going transport in 1966 (—0,8 million tons) was more than compensated by the extremely sharp rise in down-going coal transport. The traditional transport of German coal chiefly to Italy rose during 1966 by 1,2 million tons to 2,0 million tons. It is a striking fact that last year the arrivals and departures of coal balanced each other. The transport of raw fertilizers, mainly consisting of departures, which already showed a considerable increase during the last few years, was 6% higher in 1966 than in 1965. The transport of artificial fertilizers, on the other hand, fell by 10% from 1,1 million tons in 1965 to 973,000 tons in 1966. Transport of artificial fertilizers fluctuates considerably from year to year.

Other bulk-goods reached a volume of 3,7 million tons in 1966 which represents a 7% increase compared to 1965. It should be pointed out that in the years mentioned, imports increased by 569,-000 tons whilst against this, outgoing-transit traffic dropped by 406,000 tons. The increase of imports of sand from abroad (about 516,000 tons). The reason why outgoing transit dropped lies in the decrease of transports of sulphur (—182,000 tons), old iron (—136,000 tons) and clay —79,-000 tons).

Rail Transport

During last year, international goods-transport by rail at Rotterdam dropped from 1,6 million tons in 1965 to 1,5 million tons. The drop of only 4% is mainly due to the decrease of bulk-goods transport (—14%). As a result of the continued structural shift in the field of energy supplies, coal transport dropped from 130,000 tons in 1965 to 88,000 tons in 1966. A striking fact, however, was the transport of mineral oil which compared with 1965 fell by 13% to 176,000 tons in the year under review. The share of the total bulk-goods transport that is mainly made up of transport of coal and oil, only amounted to 25% of the total international transport by rail at Rotterdam in 1966. The remaining general-cargo was almost exactly the same in both 1965 and 1966. Fairly considerable shifting also took place in the transport of the various categories of goods. For instance, the transport of meat and fish during 1966 fell by 20% to 39,000 tons. This decrease was caused by the fall-off of meat and fish transports to the hinterland. The transport of fruit which had a volume of 139,-

000 tons in 1965 fell by only 4,000 tons the following year. Behind this seemingly small shifting, however, there is a counteracting development in transport policy. Transit of fruit to the hinterland which in 1965 had reached a height of 70,000 tons, amounted to only 48,000 tons in 1966. Banana transport by rail last year had to surrender a substantial share of traffic to road-transport. The transit traffic of oranges by train to the hinterland via Rotterdam, as well by road-transport, seriously felt the effects of the direct transport of oranges by train from Spain to Federal Germany. The loss that took place in the outgoing transport of fruit last year was, to a very large extent, made good by the growth in fruit imports from 58,000 tons in 1965 to 75,000 tons the following year.

Chemical products, with a volume of 264,000 tons in 1966, accounted for 24% of the total international general-cargo transport by rail at Rotterdam. The chemical products total mentioned above was 7% higher than in 1965.

Transport of metals, including both ferrous and non-ferrous, increased by 17% from 121,000 tons in 1965 to 142,000 tons in 1966. Transport of metals by train consists almost entirely of transit to and from the hinterland. Transport of machines and of transport material fell by 9% to 128,000 tons last year.

Road Transport

The development by international road transport at Rotterdam continued unabated during 1966. Arrivals and departures together reached a volume of 3,1 million tons in 1966 against 2,8 million tons the previous year.

Of the total frontier-crossing transport by truck at Rotterdam, only 7% was bulk-goods. Under the category bulk-goods, transport of mineral oil dropped from 95,000 tons in 1965 to 87,000 tons the following year. From the above, it will be seen that the majority of road-transport at Rotterdam consists of general-cargo.

Against the slight drop in transport of bulk-goods, general-cargo increased by 12%. In the year under review, general-cargo reached a volume of 2,9 million tons. Chemical products, with a volume of 797,000 tons, holds first place under the category of general-cargo transport. Compared with the results achieved in 1965, this represents an increase of no less than 27%. This increase-percentage is considerably higher than that of rail transport of chemical products (+7%). Metals now hold second place in volume in road-transport. Transport of metals rose from 369,000 tons in 1965 by 15% to 425,000 tons in 1966. This sharp rise can be ascribed to the big increase in imports of iron and steelware from the E.E.C. (+48%).

The group machines, apparatuses and transport material reached 237,000 tons in 1966. Compared with the results achieved the previous year, this represents an increase of 10%.

As a result of the sharp fall in the transit of oranges, the total transport of fruit by truck dropped from 208,000 tons in 1965 to 185,-000 tons in 1966. The direct transport of oranges by train from Spain to the German hinterland is to a large extent also the cause for the drop in the transport of oranges by seagoing ships and trucks via Rotterdam. The extremely important transport of meat, fish and vegetables dropped only slightly during 1966.

A striking fact is the sharp rise in the transport of raw materials for the textile industry and textile products (+19%). In 1966, this transport reached 119,000 tons. Moreover, substantial increase were booked in the transport of goods which remain under the 100,000 tons mark.

Transport Via Pipeline

11,7 million tons of oil was pumped through the Rotterdam-Rhine pipeline last year. Compared to the result achieved in 1965, this represents a transport increase of 14%. This increase-percentage is substantially higher than that of the other branches of transport.

Conclusion

It may be concluded that from the figures given in this review, 1966 has also been a satisfactory year for the port of Rotterdam. The same can be said for the different transport branches, with the exception of international rail transport. The important growth in general-cargo transport, in particular, is pleasing. Bulk-goods transport in total, has also made a considerable increase in spite of the fact that an economic decline began to manifest itself during the course of the year. With this in mind and also considering the structural problems which face certain branches of industry in Europe, the results of the port traffic in 1966 can, indeed, be described as being satisfactory. Seen in this light, reasonable chances of further development of port traffic and transport are also expected for 1967.

The Container Revolution— Five Years of Progress

at The Elizabeth-Port Authority Marine Terminal

The Port of New York Authority

Prologue

Seldom has a technological development stimulated the imagination of an entire industry as has containerization of cargo—the most important advance in ocean transport since steam replaced sails. American ocean carriers alone have committed themselves during the last year and a half to new container equipment estimated to cost more than five hundred million dollars.

Here in the Port of New York, the technology of the mid-twentieth century is making the transportation of goods and people more efficient, reliable and economical, so that the Port continues its record of growth and prosperity. Indeed, the Port is an excellent illustration of how technology can benefit mankind and add to employment opportunities. By permitting more people than ever before to travel, by making possible more rapid and economical transport of cargo, and by stimulating international trade, technology has helped the Port of New York maintain its pre-eminence and has added to the Port's work force. The economic significance of this is underscored by the fact that about 3,120,000 people, one out of every four persons living in this area, are dependent for their livelihood on the flow of commerce through this Port District.

The door-to-door container concept is expediting international trade at a rate inconceivable just a few years ago. It brings with it significant economies for export-import shippers and is of immense benefit to shipowners in securing fast ship turnaround time. Intermodular shipping in containers—on trucks, rails, ships and barges—is a technology that has arrived.

The design and structure of port facilities and the character and composition of merchant fleets are being revolutionized by these developments.

Inherent in this method of shipping is the need for large open areas for the marshaling and terminal flow of the containers. The planning and design of the Elizabeth-Port Authority Marine Terminal as the nation's first containership facility anticipated these demands generated by the relative shifts in economic activity and the changes in the modes and technology of transportation.

The Elizabeth-Port Authority Marine Terminal: Five Years of Progress

The Elizabeth-Port Authority Marine Terminal, the world's largest and most modern containership facility, is celebrating its fifth birthday. The terminal opened for business on August 15, 1962 when Sea-Land Service's S.S. Elizabethport was the first vessel to call at the seaport, thus heralding a new era in shipping transport. The marine terminal then had but four berths along its new Elizabeth Channel, 25 acres of paved upland area and one small structure. During its first full year of operation in 1963, it handled 1,504,021 tons of cargo on 242 vessels and employed 730 people who earned $4,015,000.

Today, ten deep-sea vessel berths and 158 acres of paved upland area

Site of Elizabeth marine terminal in 1956 (foreground), prior to Port Authority development. Note rivulet, Bound Creek, flowing through meadowland (center of photo) separating Elizabeth and Port Newark. The Bound Creek area was dredged to create Elizabeth Channel, 9,000 feet long, 35 feet deep and 800 feet wide.

Aerial view of Elizabeth - Port Authority Marine Terminal on August 15, 1962, the day it opened for business.

Sea-Land Service containership S.S. Elizabethport was first vessel to call at the new facility. The seaport then had only four berths along the new Elizabeth Channel, 25 acres of paved upland area and one small structure.

Port Newark is at left, with Newark Bay and city of Bayonne visible in background.

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have been completed, with another ten berths and 185 acres of paved upland under construction. There are twelve huge cargo distribution buildings with over a million square feet of space for the efficient handling of waterborne cargo, in addition to the nine major structures that dot the 111-acre Sea-Land Service terminal at the Elizabeth facility.

Over the last five years, tonnage at Elizabeth has increased by nearly 75 per cent and employment has doubled. In 1966, the terminal handled 2,587,918 tons of cargo on 400 vessels and provided jobs for 1,412 people who earned some $8,506,000. In addition, an average of 490 people earn $4,407,000 a year on construction jobs alone at the new facility.

Governor Richard J. Hughes' dedication day prediction that the Elizabeth marine development would mean "substantial economic benefits" to New Jersey communities and to the entire bi-state harbor, has been borne out.

The Elizabeth terminal is now being developed on 703 acres of reclaimed meadowland. It will be expanded during the next few years by 216 acres, including about 69 acres of unused marshy tideland just south of the facility and over 135 acres of land under water in Newark Bay. To date the Port Authority investment in this great seaport amounts to over $70,000,000.

When the 919-acre terminal is completed about 1975 there will be 25 vessel berths—three miles of berthing space—supported by some 690 acres of transit and open storage area and over 4,500,000 square feet of distribution building space. These facilities are expected to handle more than 9,000,000 tons of cargo a year, of which about 95 per cent will be containerized. Some 5,000 people will be employed at an estimated annual payroll of over $37,500,000. The completed seaport will then represent an investment by the Port Authority of $175,000,000.

The Elizabeth terminal is adjacent to 707-acre Port Newark, where six containership berths also are being built by the Port Authority. This important marine complex, with its unmatched facilities and services, has come to be known as America's Container Capital.

The Elizabeth Story

From marshland to modern marine terminal, the Elizabeth story is a dramatic example of how the provision of these incomparable facilities has given the New Jersey-New York Port a ten-year headstart on the "container revolution" and contributed to the economic growth of this region as one of the nation's greatest industrial and commercial areas.

The project had its start early in 1956, at the dawn of the container age, when the Commissioners of the Port Authority authorized the purchase of 700 acres of swamp land on Newark Bay and the planning and construction of the first container seaport anywhere in the world. Work on the transformation of this unproductive meadowland began in 1958; the new deep-sea port commenced service just four years later.

New Channel

The first step in the dramatic project was the dredging, beginning in 1958, of some 13,000,000 cubic yards of material at a cost of $4,500,000 to create the 35-foot-deep new Elizabeth Channel, which is 9,000 feet long and from 600 to 800 feet wide. Nearly two-thirds of the earth excavated in this massive dredging operation provided fill for the new terminal site. In addition, another 13,000,000 cubic yards of sand was obtained from off-shore locations.

To transform Elizabeth's primeval sea of cattails and salt grass into a modern seaport, sand is hydraulically pumped on the swampy meadowland to provide a working platform. Later, additional sand, or "surcharge fill," is heaped throughout the terminal site and left in place for varying periods to consolidate the underlying compressible soil layers. The fill is then removed so that actual construction can be-

More than 2,500 containers can be accommodated at Sea-Land Service's 50-acre marshaling yard at the Elizabeth-Port Authority Marine Terminal. Giant dockside gantry cranes along Elizabeth Channel are each capable of moving containers between wharf and vessel at rate of 60 per hour.

gin on firm ground. Surcharge fill is constantly being moved from one location to another since it can be used repeatedly as required.

The Elizabeth terminal is built with quays and spacious paved open areas, both vital to containership operations. The quay permits a continuous flow of trailers to shipside in an "assembly line" fashion, reducing loading time to a minimum. The paved areas enable the ocean-going trailers to be parked near the vessel berth, eliminating delays in transferring them from more distant points. The berths provided in Elizabeth vary from 625 feet to 815 feet in length. They can be supported by as much land as is required for containers, usually a minimum of 12 acres per berth.

Roadways and Rail Tracks

To provide the same freedom of movement on the streets of the seaport, roadways are as much as 100 feet wide and an additional 50 to 72 feet is allocated as a truck back-up area for those buildings with loading docks. Roadways of the terminal are supplemented by direct rail connections and sidings to the distribution buildings and other terminal structures.

Cargo Distribution Buildings

Modern cargo distribution buildings at the Elizabeth marine terminal complement its other cargo handling facilities. Efficiently located in relation to the deep-water berths and the seaport's rail and road system, these buildings provide distribution space in units of 13,000 square feet to 208,000 square feet. At present, twelve of the cargo distribution buildings have been completed, providing 1,175,000 square feet of building space. From these great structures, some eleven firms handle waterborne commodities such as chinaware, electrical appliances, coffee, cocoa, dates, rice, imported canned foods, household goods and books. There ultimately will be 4,500,000 square feet of distribution building space. Among the twelve completed structures, eight have been designed for temperature control. Insulated throughout, they are especially adaptable for use by exporters and importers of food items which might be damaged by extremes in temperature hot or cold.

Current Construction

Major work under way at the Elizabeth terminal includes con-

Recent aerial view of busy Elizabeth-Port Authority Marine Terminal showing Sea-Land Service containerships docked in Elizabeth Channel alongside company's 111-acre headquarters. Port Newark is directly across Elizabeth Channel.

struction of ten berths—three at the outshore end of the Elizabeth Channel, and the other seven "around the corner" on Newark Bay. The first of these ten will be ready by the end of 1967. The next four will be available by the end of 1968. Of the remaining five, two will be completed by the end of 1970 and the other three by the end of 1971. The berths are expected to be used for international containership operations as soon as they become available.

Surcharging of the upland areas under construction is progressing on a 24-hour, seven-day-a-week basis.

Last month, work began on the dredging of a 1¼-mile-long channel along a ten-berth wharf structure on Newark Bay. Five of these berths are the ones to be completed in 1970-71. The remaining five, still in the planning stage, will be the last to be constructed at Elizabeth; they are scheduled to be built by 1975.

The 300-foot-wide and 35-foot-deep channel will be created by the removal of about 3,430,000 cubic yards of material. The work, which is scheduled for completion by next spring at a cost of $3,206,700, also includes placement of about 2,100,000 cubic yards of dredged material as basic fill on land at the southern tip of the Elizabeth property, part of which is now under water. This will permit the development of upland area for the berths.

Containership Services

Six of the ten completed berths at this showcase of the world's maritime industry are occupied by **Sea-Land Service, Inc.,** pioneer container shipping company, which inaugurated service at the facility five years ago.

Sea-Land's 111-acre terminal includes about 50 acres of paved open area, making up a marshaling yard accommodating over 2,500 containers. On the other 50 acres the firm has erected nine major buildings, including a $5,500,000 Administration Building; a general cargo building which is equivalent to a huge truck terminal equipped with interior rail tracks; a refrigerated cargo terminal and separate structures for marine operations and truck and trailer maintenance.

The Sea-Land facility also features four giant dockside gantry cranes, each capable of moving con-

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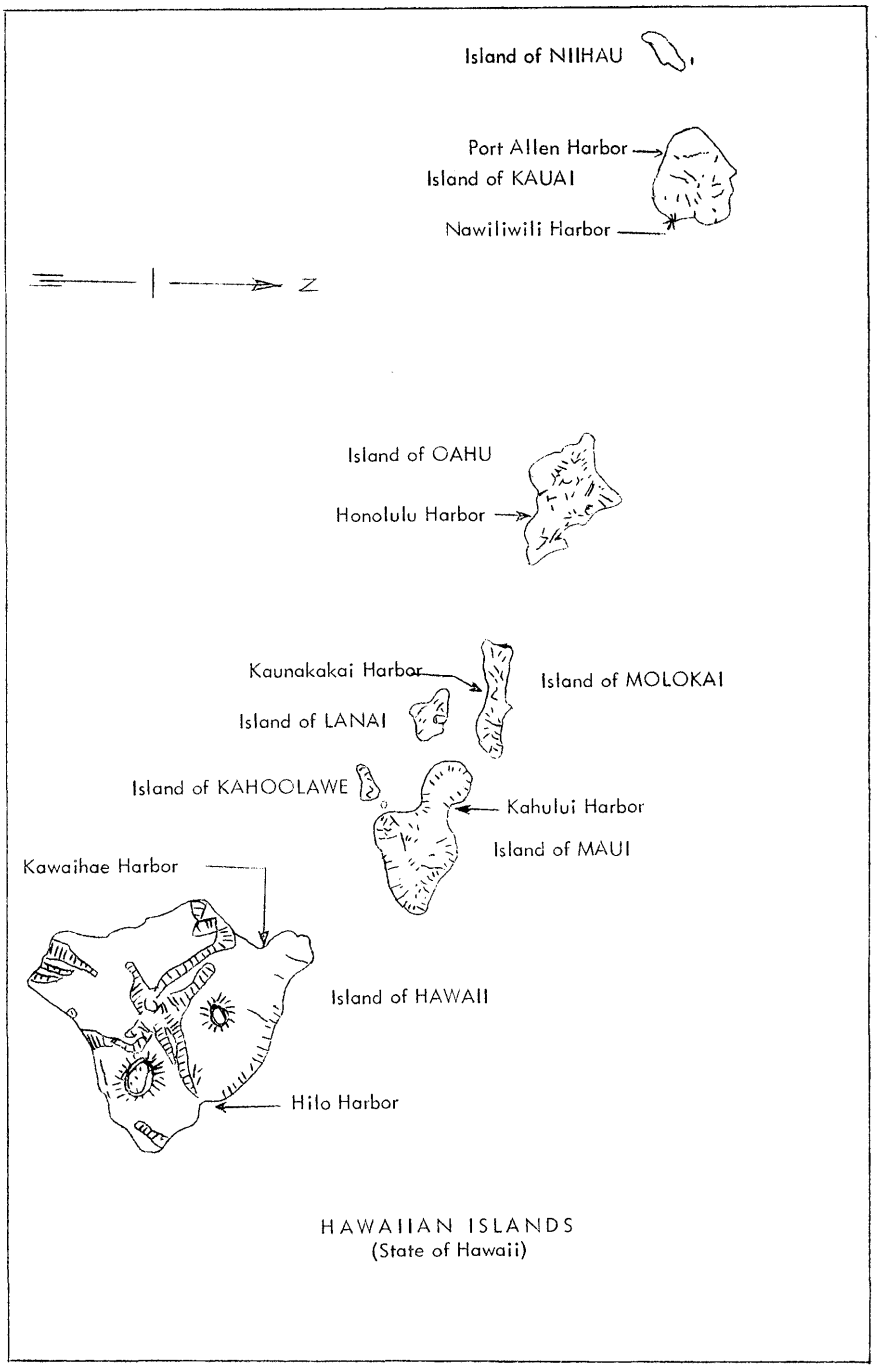
Ports of Hawaii

By Melvin E. Lepine

Chief
Harbors Division
Department of Transportation
State of Hawaii

Hawaii has seven deepwater harbors scattered throughout the State — six State-operated commercial deepwater harbors and the Navy's Pearl Harbor. In addition the State operates a light-draft commercial harbor, tour barge landings and fourteen small boat harbors which are used chiefly for recreational purposes.

Being located in the center of the Pacific Ocean, Hawaii depends upon shipping of imports and exports for its very existence. No other community in the entire nation is so dependent upon ships for its livelihood and welfare as Hawaii. Almost everything we eat and wear, the materials with which our homes are built, the automobiles we drive



tainers between wharf and vessel at the rate of 60 per hour. Sea-Land Service operates regular containership service between the New Jersey-New York Port, Puerto Rico, and northern European ports. It also has a Military Sea Transportation Service contract for containership service to the Far East.

This fall, **Atlantic Container Line, Ltd.** will begin transatlantic containership operations from the Elizabeth terminal. This line is a consortium composed of six of the world's leading steamship companies —Holland America, Swedish American, Swedish Transatlantic, Wallenius, French Line and Cunard Line. ACL's first two containerships will initially operate from two berths at Elizabeth, supported by 29 acres of paved upland area. These ships will be capable of carrying containers, automobiles, palletized cargo and other types of cargo on wheels. Dockside cranes will be used to load the containers while ramps and sideports will accommodate the roll-on, roll-off freight.

In the fall of 1968, Moore-McCormack Lines also will begin use of the consortium's Elizabeth terminal for European container operations. When both fleets with an estimated total of 18 ships are fully operational, by the summer of 1969, it is expected that they will occupy a total of five berths and 91 acres of upland area for their service between Elizabeth and North Atlantic ports.

Early next year, **International Terminal Operating Co., Inc.** will inaugurate service at a three-berth public containership terminal whose facilities will be available to any vessel on a "pay-as-you-come" basis. The ITO terminal also will include 36 acres of paved open area; track mounted dockside cranes will assure efficient lift-on, lift-off operations.

Honolulu, Hawaii, U.S.A. Entrance to Honolulu Harbor, container handling facilities (2 berths), Diamond Head Terminal (2 berths) in foreground. Aloha Tower (in center of photograph) marks the passenger-freight terminal (3 berths).

and the fuel which keeps them running, the toys children play with and the books from which they study at school, the movies we see at the neighborhood theaters and the TV sets we enjoy at home—all these are brought here by ship.

Hawaii's largest industries are sugar, pineapple and tourists. We ship out over 1,100,000 tons of sugar and 500,000 tons of pineapple each year and import several million tons of food, automobiles, construction materials and various other items. We also export tropical fresh fruit and flowers to markets along the Mainland's West Coast. Other thriving businesses are the exporting of scrap iron and coffee, the latter being no newcomer to Hawaii's industrial scene. Coffee comes from the sloping South Coast of the Big Island Hawaii. While the quantity of Hawaiian-grown coffee is small as compared with those of Central and South American plantations, the quality is very high. Kona coffee has for years been much in demand among the nation's leading manufacturers and foreign manufacturers.

The following are short descriptions of each island's major ports:

ISLAND OF OAHU: Honolulu Harbor, one of the most important seaports in the world, is located on the south coast of the island, 2,090 nautical miles southwest of San Francisco, and is a natural harbor. Its two entrance channels are well marked by buoys and beacons. The Kalihi Channel constructed by the U.S. Army Corps of Engineers went into service in 1962, after completion of the bascule bridge, which permitted the destruction of the causeway to Sand Island. The bascule bridge, with a horizontal opening of 250 feet, spans the new channel.

Aloha Tower, the chief landmark of the present-day Honolulu waterfront, was built in 1925. Its fame as a landmark is world-wide, but not so well known is the part it plays as "traffic cop" for vessels using the port. The 10th (top) floor is the lookout station for the harbor. It is from here that inbound and outbound harbor traffic is controlled. During the daytime an orange-colored ball and cone governs the shipping traffic, and during the night the movement of vessels is directed by two amber-colored lights located on the seaward side of the Tower. Radio contact with our pilots, pilot boats, harbor police, and the harbor master is maintained from the lookout station.

Aloha Tower is a great tourist attraction. It is not only the subject of many photographs itself, but also a favorite place from which to take photographs. The sweeping view includes the urban center of Honolulu, the ocean and shoreline from the dramatic profile of Diamond Head

Honolulu, Hawaii, U.S.A. One of six deep-draft harbors in the State of Hawaii, U.S.A. All harbors have a depth of 35 feet (10.67 m). Honolulu Harbor is the largest port in the Hawaiian Islands and serves a resident population of 622,500 persons. Principal exports are sugar and pineapple; principal imports are food, building materials, general merchandise and petroleum.

in the east toward Pearl Harbor and Barber's Point in the west.

Over on the Kapalama side of Honolulu Harbor is a spacious, modern terminal with berthing facilities for a total of eight overseas vessels. It is officially the U.S. Army Transportation Terminal, Honolulu, and is under the supervision of Headquarters, U.S. Army, Hawaii/25th Infantry Division. Pier 39 is leased to the State by the Army and is the location of Foreign Trade Zone No. 9. The Army operates Pier 40 and provides necessary berthing facilities to both Military Sea Transportation Service and chartered vessels. It also handles all personnel and cargo movements for the Army and Air Force.

Seven miles west of Honolulu, against a backdrop of green plantations and sheer mountains, lies one of the world's great naval bases, Pearl Harbor. Pearl Harbor got its name when in 1798 pearls were found in oysters growing in the bay. The reigning King Kamehameha I immediately banned all but his own personal divers from the waters, but the oyster beds were small and the pearls disappointing. Even so, the name "Wai Momi" (Pearl Waters) came to be associated with the Harbor.

December 7, 1941, will be a day never to be forgotten in the history of Pearl Harbor and America, for it was this day that the Japanese made their surprise attack on the United States. Today scores of tourists visit the monument that has been erected over the vessel USS ARIZONA that lies in Pearl Harbor.

ISLAND OF HAWAII: One hundred and ninety-four nautical miles southeast of Honolulu, the Harbor of **Hilo** lies in the shape of a half-moon against the northeast coast of the "Big Island" Hawaii.

Sugar and molasses are the principal produce which pass outbound over Hilo wharves. Other products shipped from Hilo include coffee, scrap iron and fresh produce.

Kawaihae, the second major port of the Island, was once just a little steamer landing. The Federal Government has since built a breakwater, and dredged a basin and channel to accommodate shoreside installations for raw sugar and molasses. This port provides shipping facilities for the south and west sides of the Big Island, so that the farmers do not have to transport their produce by truck to Hilo 80 miles away.

Military services also use this port for routing personnel and supplies to and from their training area on the Big Island.

ISLAND OF MAUI: Eighty-miles southeast of Honolulu and approximately 120 miles northwest of Hilo lies the harbor of **Kahului** on the north coast of the Island of Maui. Kahului Harbor is the Island's sole port of entry, and its chief exports, sugar, molasses and pineapple, are shipped directly from Maui in overseas vessels.

ISLAND OF MOLOKAI:

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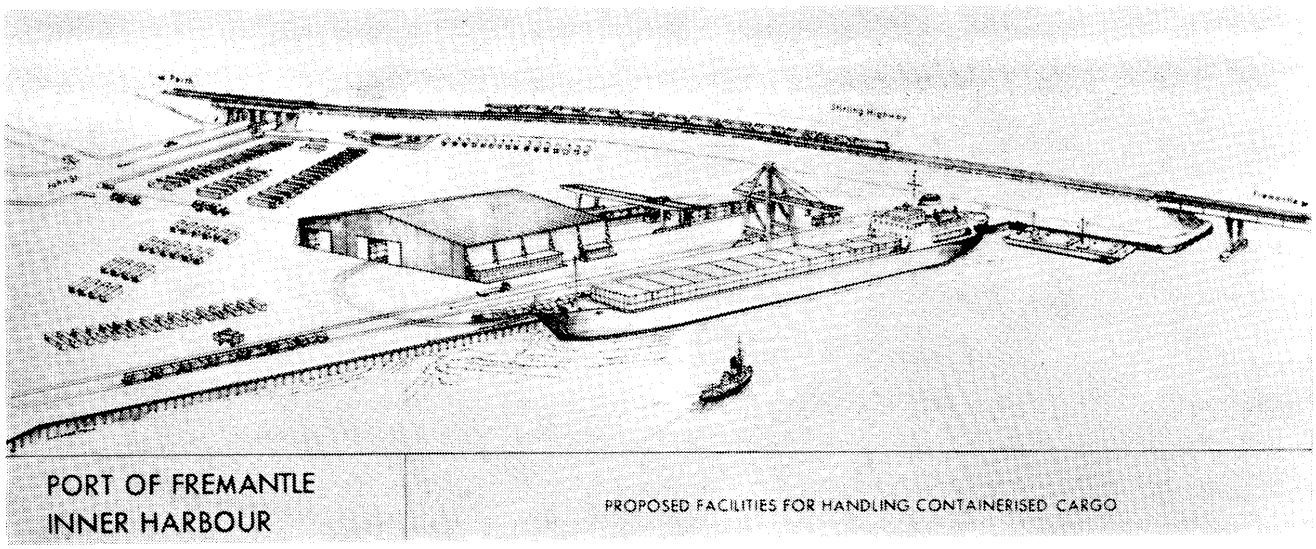

Port of Fremantle Will Look Like This

Fremantle Port Authority

Kaunakakai, in addition to being Molokai's largest community, is the Island's principal port. Pineapple grown on Molokai is shipped on barges to Honolulu for canning. Molokai is the only one of Hawaii's major islands, except privately-owned Lanai, which is not served direct by overseas vessels. The many goods upon which its residents depend on for living must come by barge from Honolulu.

ISLAND OF KAUAI: One-hundred and six nautical miles to the northwest of Honolulu is **Nawiliwili,** principal port for the Garden Island of Kauai. It is located on the southeast coast of the Island. During the war years the port was taken over by the Navy and Coast Guard and used almost exclusively for military cargo.

Ships now call at Nawiliwili to load bulk sugar, canned pineapple, molasses and scrap iron for Mainland United States and foreign ports.

Port Allen is located around the southern hump of Kauai, in Hanapepe Bay on the southwestern coast. The use of Port Allen has declined since bulk sugar loading facilities were installed at Nawiliwili but it is still an important port.

The Fremantle Port Authority, in anticipation of the arrival of overseas container ships toward the end of 1968, is constructing a new Inner Harbour berth specially designed to meet the needs of this rapidly developing method of cargo transportation.

The new berth, to be known as No. 12 Berth, North Wharf, will be immediately downstream from the new railway bridge, and will be the first completed berth in the current programme which, when completed, will provide a three berth up-river extension of the Inner Harbour.

To conform with the existing minimum standard depth of water in the Inner Harbour all new berths will be dredged to a minimum depth of 36 feet, and the dredging programme already well in hand, is scheduled for completion in March 1968.

The driving of steel sheet piling for the new berths is in an advanced stage and the land area to the rear

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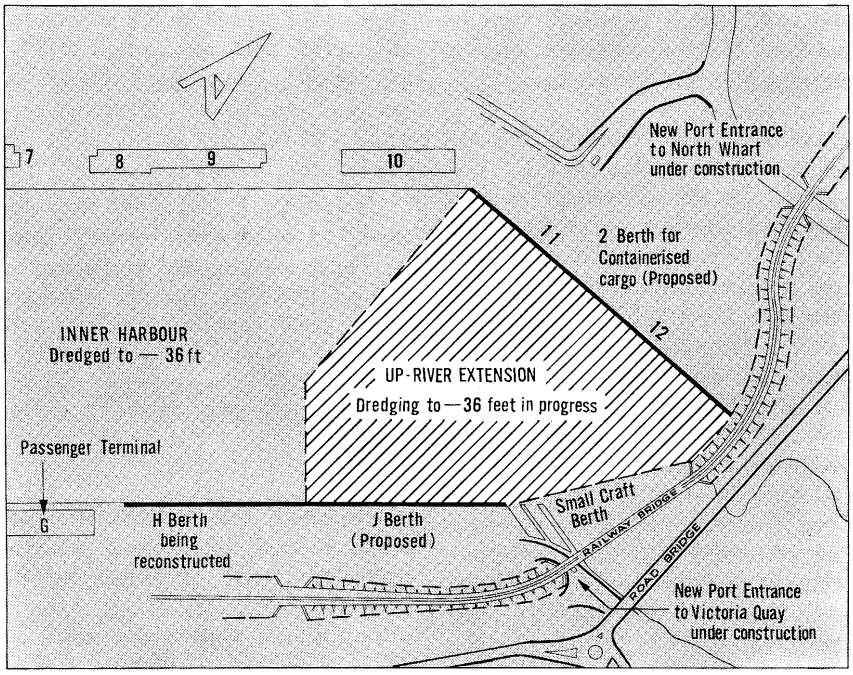

Diagram showing the area currently being dredged as part of the Uu-river extensions programme.

Port of Seattle Statement of Purpose and Objectives

Statement Adopted by Port Commission on March 14, 1967

(Reprinted from "Port of Seattle Reporter")

Introduction

The concept of public port authorities dates back at least ten centuries to the advent of commercial water-borne trading in the Mediterranean and Hanseatic nations. Most world ports can trace their present form of management and responsibilities to the begining of the nineteenth century—the early years of colonization and the industrial revolution. New standards of living demanded that increasing quantities of raw materials and manufactured goods flow through specially-located transshipment points.

The trend of development and administration of United States ports was generally by public trusts in conjunction and cooperation with privately-operated terminals. It became apparent in the early days of port development, however, that the endeavors of these public trusts needed the support of the citizenry where extensive port facilities were required.

In the case of Seattle, the city had been established during the period 1960-1910 as a regional center for Alaska and Pacific Rim commerce. As the construction of the Panama Canal came closer to completion, it was apparent that Seattle would also soon be involved in direct intercoastal, European, and South Atlantic trading.

To meet impending demands for adequate facilities, therefore, the Port of Seattle was established in 1911 by the voters of King County pursuant to state-enabling legislation enacted during the same year. The geographic boundaries of the Port of Seattle were established as identical with those of King County. From time to time since then, the state legislature has seen fit to amend the statutes under which the Port operates, generally to broaden the powers of the Port.

The Port of Seattle functions as a limited-purpose municipal corporation under the direction of five commissioners elected by the voters of the Port district. The commissioners establish policy, meet in public session twice a month to conduct necessary business and employ a general manager and staff to carry out the Port's purposes and policies.

Basic Purposes and Powers

The basic purpose of the Port—and the reason for public involvement in this enterprise—is the enhancement of the flow of commerce through the Port district, both passenger and freight. Experience has demonstrated that the planning and development of marine terminal and airport facilities cannot be accomplished adequately by unaided private enterprise. The public benefits inherent in commerce justify a subsidy through the use of tax funds and/or the removal of properties from the tax rolls.

Since its inception, the Port of Seattle has grown into a diversified complex of modern facilities constructed at a substantial expenditure of public funds. The annual economic impact of Port-related functions upon the district is estimated at more than one-half billion dollars and the benefits are increasing annually at a substantial rate.

In addition to broad powers with respect to development and operation of marine terminals and airports, the Port is authorized also to develop.

(1) Other transportation terminals, including rail and highway;

(2) Moorage and facilities for fishing vessels;

(3) Marinas or boat havens for non-commercial boats;

(4) Toll bridges and tunnels (with the consent of the State Highway Commission); and

(5) Industrial development districts.

It is a further responsibility of the Port to promote the use of its facilities and the flow of commerce over them.

The Commission is authorized by law to levy taxes on the assessed valuation of the taxable property in the port district as follows:

A. (1) Not to exceed two mills, for general Port purposes.

(2) An additional millage as required (currently 1.7 mills) to service interest and principal payments on general obligation bonds, and

(3) Not to exceed two mills for industrial development, limited to

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of each berth has been filled and levelled.

The new container berth, here depicted by artist's impression, will be 800 feet long and will be equipped with a 45 ton capacity fast operating gantry crane and other specialised facilities for handling both refrigerated and general cargo containers. About 20 acres of land to the rear of the berth is available for operations involving the stacking, marshalling and distribution of the container units.

A modern dual carriage road system serving the new berth and marshalling area is connected to the State's main highways at controlled traffic points, these approaches giving first-class access to heavy road transport. Provision has also been made for road services at the berth connected to the 3'6" and 4'8½" gauge State railway systems.

The Fremantle Port Authority has called tenders for the construction of the new berth. It is anticipated that work on the construction of the berth will commence in April 1967 and the project is scheduled for completion by October 1968, in time for the arrival of the first overseas container ship.

six consecutive years commencing in 1963.

B. General-obligation bonds of the Port are by law limited in amount as follows:

(1) Without the approval of the voters of the port district, general-obligation bonds may be issued in an amount not to exceed (together with any existing indebtedness of the port district not authorized by the voters) one percent of the assessed valuation of the taxable property of the district.

(2) With the assent of three-fifth of the voters of the district, general-obligation bonds may be issued in an amount not to exceed (together with any existing indebtedness of the port district not authorized by the voters) three percent of the assessed valuation of the taxable property in the district.

There is no legal limit on the amount of revenue bonds which may be issued by the Port.

Objectives and Present Policies

The basic objective of the Port is development of a maximum flow of commerce through the district to the end of broadening and strengthing the industrial base. This requires the provision of modern water and air-terminal facilities to maintain the best competitive situation compatible with the Port's geographic location. At the same time, it is necessary to obtain maximum use of the facilities to realize revenues sufficient for operations and, as an ultimate goal, additional capital-improvement needs. A large element of flexibility is needed in adapting to changing conditions of competition, commodity flow, and handling methods. Accordingly, the statements which follow are to be regarded as policies, subject to change as conditions warrant:

(1) The primary purposes of the Port relate to the development, maintenance and operation of adequate terminal facilities for water and air transportation.

(2) The Port has accepted a responsibility to provide moorage and facilities for fishing vessels but endeavors to do so at rates which cover all expenses, including overhead and depreciation, and therefore divert no funds from marine terminal and airport operations.

(3) The Port has created a Lower Duwamish Industrial Development District by adoption, following a public hearing, of a comprehensive scheme relating thereto. In implementing this program, the Port of Seattle acquires, develops and promotes and use, by sale or lease, of suitable land sites by industries requiring water transportation for raw materials or finished products. The special two-mill levy for industrial development is used to establish a revolving fund for this purpose. Purchase of property for this purpose is at fair-market value and sale or lease is calculated whenever feasible, to recover the Port's investments.

(4) The Port has not accepted a general responsibility to provide marinas and boat havens for non-commercial boats, but may engage in such activity when a public purpose will be served and when private capital is unable to meet the need. The rates charged at such facilities will be equal to those for comparable private facilities and will be designed insofar as feasible to cover all expenses, including overhead and depreciation, and return some profit to the Port.

(5) Tax funds were used, quite properly, in the initial development of the Seattle-Tacoma International Airport. For the foreseeable future, however, it is expected that this phase of the Port's operation will be self-supporting and that capital requirements will be met through the use of revenue bonds.

(6) The total operations of the Port are conducted, insofar as feasible, with the objective of earning sufficient net income to cover operating and administrative costs and depreciation. It is the ultimate objective that operating profit will be sufficient to cover the required investment in new and improved facilities. For the foreseeable future, however, the operating profit will be supplemented by investment of the two-mill general purpose levy in marine terminal facilities. Hopefully, the additional levy for debt service can be phased out as present general obligation bonds are paid off. Revenue bonds will be used whenever feasible for new facilities.

(7) The Port maintains a schedule of capital improvements and fund requirements projected at least five years into the future and beyond that, estimates the broad needs for marine terminal and airport facilities as far into the future as possible. Properties required for marine terminal and airport development within the approved capital improvements program are acquired by negotiation or condemnation at fair-market value. Other properties consistent with the long-range needs may be acquired by negotiation, when offered at a fair price, and held for future development.

(8) The Port accepts the responsibility of assuring the necessary terminal facilities for water and air transportation. It encourages the development of whatever portion of such facilities as is feasible by private capital, however, and leases its own facilities for private operation whenever this can be done without added cost or sacrifice of service to the public and when compatible with the most efficient utilization of such facilities.

(9) All lease of Port property, insofar as feasible, are made with a view to the value of the property and the customary return on investment in such class of property.

(10) Rate structures for Port-operated facilities are established at levels designed to recoup the Port's investment, but with flexibility to attract customers and to meet competitive situations.

(11) The Port accepts the development and operation of a World Trade Center as part of its trade promotion responsibility.

(12) The Port cooperates fully with other ports and labor, management and other public organizations in matters relating to reducing the impediments to trade, improving the efficiency of port operations, and establishing equitable and compensatory charges for services.

(13) The Commission obtains and intends to retain competent management and staff to implement the objectives of the Port and avoids unnecessary interference in the execution and administration of Port business.

(14) Salaries of Port management and staff are reviewed periodically with a view to maintaining

levels which are competitive with other public agencies and comparable private employment.

(15) Salary increases are based on a combination of merit and length of service.

(16) The compensation of hourly wage employees is fixed and reviewed in conformity with agreements between the appropriate unions and private employers in the area.

Conclusion

The Port has enjoyed a remarkable growth of both its physical facilities and its volume of air and waterborne commerce. The impact of its operations on the economy of the area runs to hundreds of millions of dollars a year. We are currently, however, at the threshold of a vast expansion of transportation facilities, both water and air, which requires that the Port more than ever be alert to its opportunities.

We are going to see vessels designed to carry well over 200,000 tons of cargo at fast speeds. Vessels with draft in excess of 40 feet will be commonplace, and for the sake of economy and fast turn-around time, these huge vessels will prefer, if not demand, a limited number of ports of loading and unloading in the Far East as well as on the U.S. Pacific Coast.

At the same time, we will have aircraft soon that will carry over 100 tons of cargo at rates of 3¢ per ton-mile or less. We will see more and more rail cars with capacities in excess of 100 tons and fast transcontinental speeds. Truck lines now carry goods cheaply at speeds of 1,000 miles per day. Any port that does not plan for the coming revolution in transportation and world commerce will be by-passed.

We can conclude that the legal framework of the Port of Seattle is broad and general, as it should be. The policies and procedures of the Port must be examined frequently to meet the challenge and provide the facilities for the transportation revolution which lies immediately ahead.

(The Port of Seattle Statement of Purposes and Objectives is available in booklet form, free of charge, by notifying the Port Public Relations Dept., Port of Seattle, P.O. Box 1209, Seattle, Washington 98111, U.S.A.)

Impressions of Tokyo Conference

By Hamilton K. Biney, Managing Director and John Newland, Deputy General Manager, Ghana Cargo Handling Company Ltd.

We shall long remember our visit to Japan. Everything was so well organised that it was almost impossible to find oneself in the wrong place or at the wrong time. We enjoyed every minute.

The Conference will provide food for thought for some time to come. The degree of emphasis on containerisation as the key to a new era in port affairs was rather disturbing. We hope that, by the next Conference, some of the learned and renowned men we heard will have found time to give some thought to the problem of the small ports which form the majority of development of the non-containerised unit load than from containerisation.

Outside the Conference, there was so much to see, do and taste that it is difficult to know which special impressions to mention, but food and drink come high on the list. We particularly enjoyed the magnificent sea food, Kobe steak, the fruit—especially the strawberries—and the Tokyo parties; enormous tables laden with a wide variety of cold food and stalls at which equally delicious food like shushi and tempura were prepared.

For the Post-Conference Tour, our hosts, obviously keen that we should relax, had arranged a varied programme and certainly ensured that we enjoyed ourselves.

In Kyoto, the Palace, the Castle, temples, shrines and gardens showed a Japan very unlike the bustle and the concrete and glass of Tokyo.

One memory of Kobe stands out beyond all others; more than the Centennial Ceremony, more than the 1,500 ton crane, more than the vast earth-moving operation, it was the traditional dancing that made the biggest impression—the ladies of Kobe, a thousand or more, for as far as the eye could see, each local contingent with its distinctively patterned yukata and obi, and advancing and retreating, turning and bobbing, each with the grace of a ballerina, all with the precision of the Brigade of Guards.

From Kobe, it was a delightful journey among the Rokko Mountains to Arima Spa where our hosts had thoughtfully arranged that we should spend a night in a Japanese style hotel. It was our first experience of the Japanese bath, of a Japanese banquet and of the yukata. The banquet was definitely a new experience as unaccustomed muscles and joints made clear, but the food and drink so delightfully served soon made up for any discomfort; any aches and pains that sake could not soothe, a dip in the big baths soon cured. And as for the yukata, many were bought next morning and it is ideal for a hot evening at home.

The smooth, swift Hikari train journey from Osaka to Tokyo provided an opportunity of seeing the countryside—and drinking beer while watching the speedometer showing 210 kilometers an hour. What a train.

So many memories, so many impressions; it is difficult to select a few—schoolchildren in yellow hats, Kobe's swiss farm, the mournful and all too frequent wail of the ambulance, the lights of Ginza, massage, tree-shaping in the grounds of the Imperial Palace at Kyoto, Tokyo Tower at night, taxis with the rear doors opened and shut from the driver's seat, the attractive and helpful hostesses of the Japan Air Terminal Company, Kobe steak, strawberries, prawns, Suntory whisky, magnificent motorways, familiar T.V. programmes with the stars speaking Japanese—all these and many more will be remembered for a long time to come.

The Conference provided an invaluable opportunity to enlarge our knowledge of port matters both through the official proceedings and from informal conversations with other port people from all over the world—perhaps the most valuable part of any conference. It also gave us our first chance of meeting Japanese friends and seeing something of Japan. We take this opportunity of thanking our hosts who worked so hard to make our visit interesting and enjoyable.

Shipping— The Next 100 Years

The PLA Monthly, June 1967

This is the title of a pamphlet published by J. & J. Denholm Ltd., and whose quality and thought-provoking ideas deserve wide attention. It contains four essays by well-known experts among whom Professor S. G. Sturmey, the author of the first essay, is very widely respected in shipping circles for his book British Shipping and World Competition, published in 1962 by the University of London Athlone Press.

Dealing with Trends in Shipping Economics in the new pamphlet. Professor Sturmey points out that in the last 100 years there has been a dramatic drop in the real costs of transport. Today, only one crew member, on average, is required for each 115 tons of British shipping whereas 100 years ago two were required. Nuclear propulsion, he considers, will become general, increasing speeds without increasing costs. Sealed engines will eliminate engine room crews and the real costs per propulsive mile will be reduced. At present there is a sharp conflict between reduction in costs per ton/mile by saving costs through higher speeds, and the sharp increase in fuel costs to achieve these higher speeds. The curve relating power output to cost in a nuclear ship is much flatter than that for a contemporary turbine or diesel engine.

It is not yet clear, he considers, whether time will be saved in port by container operation and similar techniques, or by separating the propulsive and cargo-carrying sections of a ship. Nuclear propulsion would seem to favour the latter solution.

Dealing with trade patterns he draws attention to the fact that world sea-borne trade since 1960 has been dominated by oil followed by ore, grain and coal. Grain demands from Asia are likely to increase but the possibility of scientific work on food production makes the future pattern uncertain. Over the next 30 years or so, however, Professor Sturmey foresees an increase in the bulk cargo trades with ever larger vessels used. In 80 to 100 years he thinks that these trades will largely have gone.

In the field of general cargo it is considered that the proliferation of industrialised economies will lead to more trade, not less. Hovercraft at present do not seem to show any marked advantages over aircraft.

"For the distant future one sees the end of the general cargo ship, forced out by the dual dis-economies of water resistance and the need for trans-shipment".

Some form of regulation other than the conference pattern is thought likely. Air-freight is likely to take over more of the high value cargoes. Liners will be left with more and more of the low-rate cargo and the decline in the sea-borne carriage of general cargo will eventually eliminate liner fleets.

The second essay is Future Developments in Merchant Ships, by J. M. Murray, formerly Chief Ship Surveyor of Lloyd's Register of Shipping. Mr. Murray's opening gambit is solidly practical; "World trade is growing at the rate of about seven per cent, per year...it will have doubled by 1980...To look further ahead involves 'science fiction speculation'."

Tankers, Mr. Murray considers, will increase in size but there are limits because of the physical limitations of the loading and discharging points and elsewere. For instance the Malacca Straits in the Persian Gulf/Far East run provides little more than 60ft. of water.

Bulk carriers are not likely to grow in the same way as tankers. It seems likely that in the immediate future, the bulk carrier will be around the 800,000 d.w.t. mark. Again in the short term, Mr. Murray considers that there will be increasing scope for the general cargo carrier and he is of the view that the proportion of these in the world cargo fleet may increase. Container ships of 1,000ft. can be expected on such routes as the North Atlantic.

On the question of speed he points out that if the water flow round hulls could be changed from the turbulent to the laminar mode, savings would be impressive. He is doubtful if hovercraft or cushion craft could ever attain importance as carriers of bulk or general cargoes.

In the distant future, he considers that the submarine carrier, made possible by nuclear propulsion, may be more used provided turbulent flow can be eliminated. In the far distant future bulk cargo may be piped across the oceans, a point also made by Professor Sturmey.

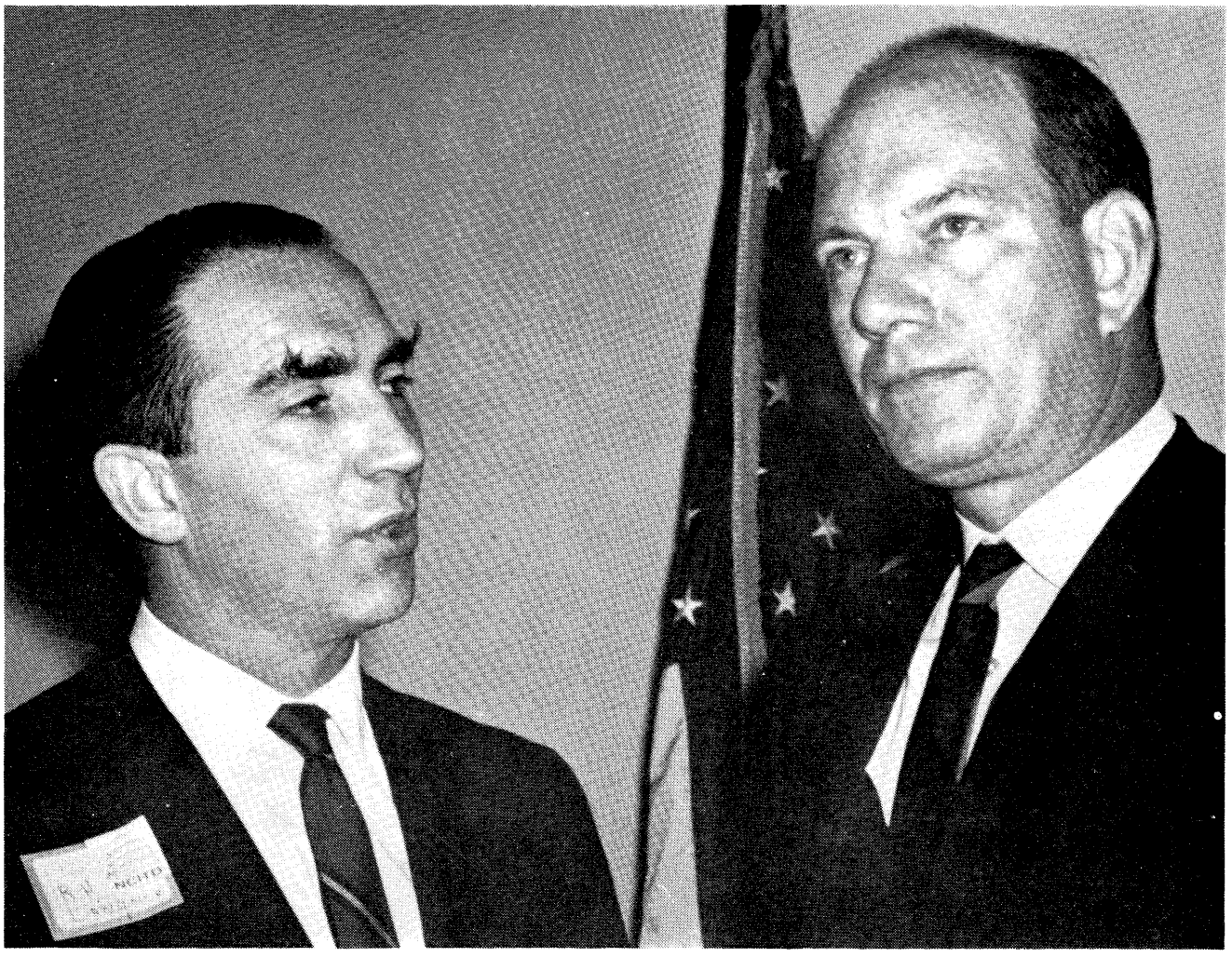
The third essay, by W. Kilchenmann, is a technical one dealing with Further Developments in Marine Propulsion but it contains an interesting section of the rate at which world oil resources are being depleted. Mr. Kilchenmann's conclusion is that the development of other power sources (nuclear, fuel cells, direct conversion of atomic energy, etc.), is inevitable.

The Future of Management is the title of the fourth essay by N. Perry and R. Wilkie of the University of Strathclyde. Mr. Wilkie is at present seconded as director of administration and personnel to J. & J. Denholm (Management) Ltd. Mr. Perry is currently engaged on research on the shipping industry.

Management problems today, it is pointed out, are much concerned with the management of innovation and in many areas, the existence of a management structure appropriate to an earlier stages of industrial development, militates against the effective management of innovation. The essay is much too concentrated to be amenable to fair summary but, at the risk of butchering the authors' thesis, one might hazard the generalisation that the "organismic' type of structure they advocate is characterised by lateral, rather than

(Continued on Next Page Bottom)

Let's Cut Shipping "Red Tape"



San Francisco, Calif., July 24:—Pacific Coaster Robert H. Langner, San Francisco Marine Exchange manager, confirmed with Department of Transportation Secretary Alan S. Boyd (right), following the latter's pledge of full DOT support for new industry plans to expedite U.S. world trade through standardizing and simplifying paperwork and procedures. Secretary Boyd addressed a recent Washington, D. C. organizing meeting of the National Committee on International Trade Documentation, attended by 150 government and shipping leaders at which 62 major companies and banks were represented. Langner, a member of the NCITD working committee, said an estimated $5 billion annually could be saved through eliminating "red tape" in the nation's export-import trade. (San Francisco Marine Exchange)

the old-fashioned type of vertical, responsibilities. They recognise and favour the "professionalisation" of management and consider that the current trends toward "meritocracy" may help reduce the gulf, especially the communication gulf, between workers and management.

One point they make is important; "Historically based arguments which view present trends as a higher-order duplication of the Industrial Revolution are mistaken. The new techniques are so different in degree as to be different in kind". A characteristic of the technological age, one might remark, discerned by Professor Hermann Levy as long ago as the 1930s—a comment perhaps, on the time it takes British management to make use of the progressive thinking of people like the authors of this important essay.

One other of their remarks is worth quoting: "A straight line projection cannot escape the blinkers of conventional habits of thought. It may be that we will understand tomorrow's world only by way of intuitive insights belonging more to the creative artist than to the management specialist".

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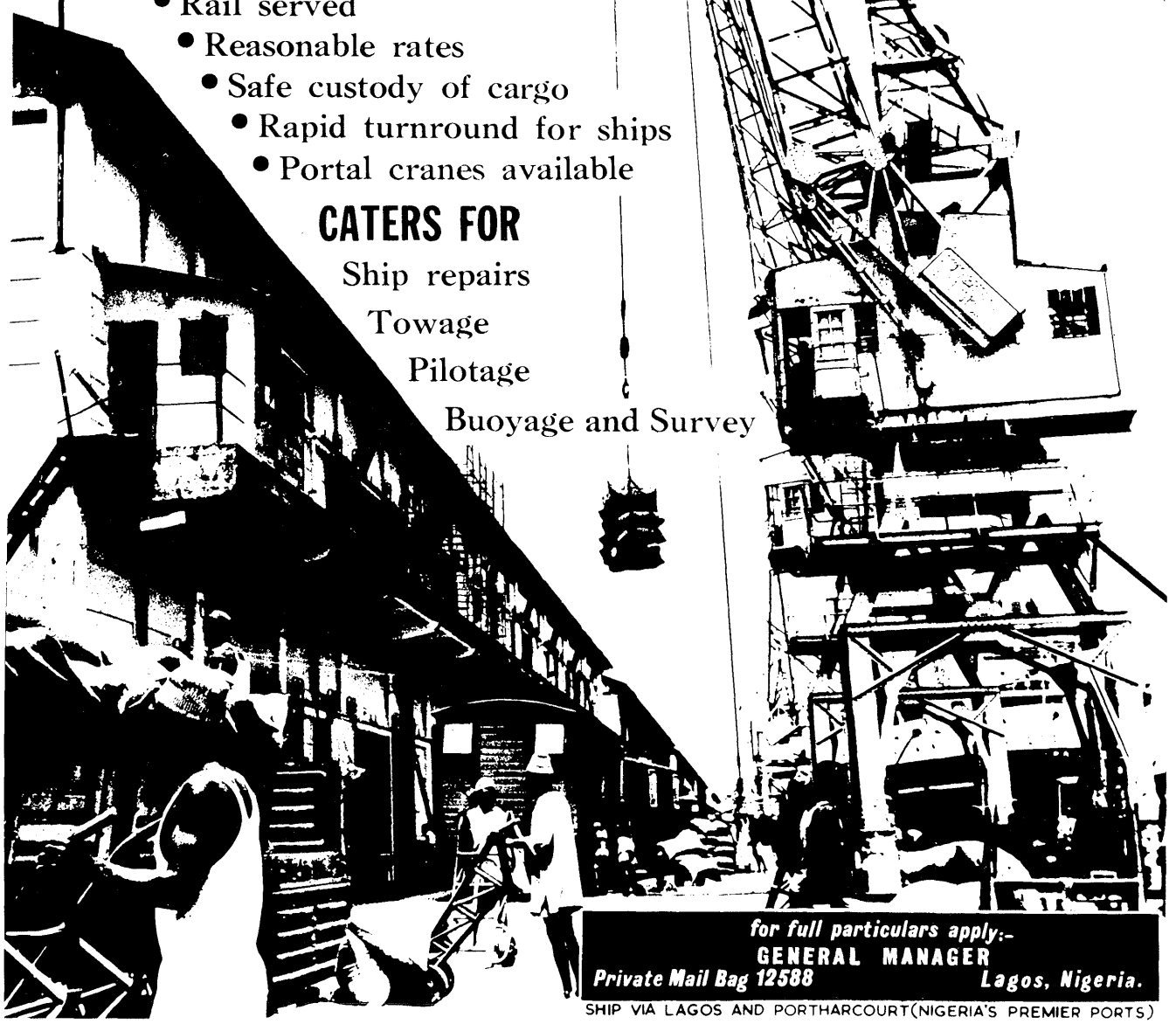

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