

No. ¹⁴
1924

HONGKONG.

REPORT ON THE COMMERCIAL DEVELOPMENT OF THE PORT OF HONGKONG BY
JOHN DUNCAN, M.INST.C.E., CHARTERED CIVIL ENGINEER,
PORT ENGINEER, HONGKONG.

*Laid before the Legislative Council by Command of His Excellency
the Governor on the 29th December, 1924.*

PORT DEVELOPMENT DEPARTMENT,

HONGKONG,

12th December, 1924.

SIR,

In accordance with the terms of my appointment to the post of Port Engineer, head of the Port Development Department, as contained in your letter No. 1110/1924 dated 24th July, 1924, *viz.* :—

“one of the Port Engineer’s first duties will be to prepare and submit for the consideration of the Government a complete scheme for the development of the Port”,

I have the honour to present my report herewith.

I have the honour to be,

Sir,

Your obedient servant,

JOHN DUNCAN, M.INST.C.E.,

Chartered Civil Engineer,

Port Engineer.

To the Honourable,

SIR CLAUD SEVERN, K.B.E., C.M.G., LL.D., M.A.,

Colonial Secretary,

Hongkong.

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SECTION I.



PREAMBLE.

DEVELOPMENT SCHEMES PROPOSED PRIOR TO APRIL, 1924.

Preamble.

Colony of Hongkong.

Since 1841, when the Island and Peninsula were ceded to Great Britain, the Colony of Hongkong has become a thriving centre of industrial and commercial activity, its commercial importance being due to its unique geographical position and its almost unrivalled steamship communication with the rest of the world. Situated at the mouth of the Canton delta into which flow the West, North and East Rivers navigable for a total of about 630 miles by small River Steamboats, and their numerous tributaries and small canals navigated by native craft wherever there is sufficient depth of water, the Colony has developed into a great entrepôt of trade and the principal European-Chinese financial centre for South-east Asia. The leading industries are shipbuilding, sugar refining, rope-making, the manufacture of cement and tiles, besides many native industries such as rattan work, machine knitting, the manufacture of sauces, the building of native craft, furniture-making, canning, and putting the marketing touch on many of the products of the territories of South China.

The Colony, including leased territories, has an area of about 410 square miles and the population approximates one million, whilst Kwangtung, the neighbouring province of South China for which Hongkong is the distributing centre, has an area of about 100,000 square miles and said to have a population of 32 millions, the Customs Authorities' estimate of the population of Canton, the capital of the province, some 95 miles from Hongkong, being $2\frac{1}{2}$ millions.

Hongkong Harbour and need for Development.

In Hongkong we have a natural harbour of almost unrivalled excellence, the development of which has been left to private enterprise. Up to recent years the movement of commerce has been simple being attracted by natural advantages and little competition. It made little difference physically with the business of the Port whether quays or piers exist so long as there is deep water. Strategic water-fronts have been acquired and held by private enterprise but with the growth of business, increased cost of land and consequent increased cost for storage, increased cost of labour and the possibility of deflection of trade, there has come an appreciation of the necessity for development on more modern lines.

Having come to the conclusion that it is highly desirable that Government should have the benefit of the advice of an expert Harbour Engineer on the question of the steps which ought to be taken to improve the Harbour, His Excellency, the Governor, addressed a despatch on the subject to the Secretary of State for the Colonies on the 5th of March, 1920. His Excellency considered that the prospects of linking up the Kowloon-Canton and the Canton-Hankow Railways appeared then to be favourable and that there was some hope that the following few years may see through communication established with the North of China; and that when this has been effected, Kowloon will become a very important railway terminus. The question of laying out of the necessary wharves and quays he considered to be one of importance in regard to which he considered it very desirable to have expert advice. Apart from this he referred to the probability of a considerable increase in size of the ocean-going steamers which will call at this port and decided that it is important that all possible steps should be taken to place the port of Hongkong in a position to deal satisfactorily with any new developments.

In their report dated May 1920, the Shipping and Ship-building Sub-Committee of the Economic Resources Committee, refer to the question of Harbour Improvements as a matter of the utmost importance to the Colony and state that the idea held by those most vitally concerned is, that the harbour is the Colony's only asset and that the Government should not play with improvements suggested by amateurs. They main-

tain that expert advice and properly constituted Port Authorities are required as there is alway a tendency at other places in China to lay out scientifically constructed harbours and that the matter of Harbour Improvements in Hongkong should be thoroughly investigated, in order that the Colony may prepare itself for all possible developments. It considered dredging on a substantial scale to be essential and suggested dredging off Kowloon Point, at the end of the Northern and Central fairways,—the latter to Sulphur Channel,—and also considerable dredging on the North West fairway. Whilst additional Piers or Jetties might with advantage add to the facilities for the handling of cargo, it considered that the Harbour problem is of the utmost importance to the Colony and that it should not be dealt with piece-meal but as a whole.

In consequence, the late Sir Maurice Fitzmaurice, C.M.G., M.Inst.C.E., &c., partner in the firm of Messrs. Coode, Fitzmaurice, Wilson & Mitchell, MM.Inst.C.E., Consulting Engineers to the Crown Agents,—hereinafter referred to as:—the Consulting Engineers,—arrived in the Colony in November, 1920.

The matters on which his firm's advice was sought were:—

- (1) Improvements of the Harbour generally.
- (2) The provision of Wharves and Warehouses provided with railway communication.
- (3) Improvement of the Mongkoktsui Harbour of Refuge.
- (4) The question of dredging plant generally; the re-fitting of the Dredger "*St. Enoch*" being considered in this connection.
- (5) The best means of providing facilities opposite Statue Square for landing from or embarking on launches and small craft generally.

During his visit Sir Maurice Fitzmaurice made investigation of the method of carrying on the business of the Port, and obtained a great deal of information as to the conditions of weather, tides, currents, &c.; the facilities available for supply of materials such as cement, stone, sand, timber, &c.; the supply of labour available, the rates of pay, the cost of work carried out by sub-contract, &c.; and the facilities available for construction and repair of floating plant. Having come to the same conclusion as Mr. Chatham, (late Director of Public Works) and myself, that, so far as wharves provided with railway communication was concerned, Hung Hom Bay was the most suitable site, Sir Maurice Fitzmaurice left instructions with me to obtain additional information to that then obtained of the harbour bottom at Hung Hom Bay and Tai Wan by soundings, borings and prickings and also additional current observations in the vicinity of these localities. The amount of information sought was so extensive that additional staff had to be engaged for this purpose and it was not until November, 1922, that the last instalment of the information required was presented for despatch to the Consulting Engineers.

Having received sufficient information to enable them to report on the main works, they presented through the Crown Agents for the Colonies their report dated 24th November, 1922.

Development Schemes proposed prior to April, 1924.

Consulting Engineers' Scheme.

Drawing
No. 2.

Their complete scheme of wharfage provides for the construction in the bight of Hung Hom Bay of a reclamation of 48½ acres from which will project in a southerly direction a series of 6 jetties of which the particulars are as under:—

JETTY No.	QUAY LENGTH FOR		DEPTH OF WATER AT L.W.O.S.T. FOR		WIDTH.	REMARKS.
	STEAMERS.	JUNKS.	STEAMERS.	JUNKS.		
	feet.	feet.	feet.	feet.	feet.	Two sheds or ware- houses 500 feet in length and 160 feet in width on each Jetty. Roads 50 feet wide between the sheds and the quay face. Open storage space between ends of sheds 160 feet in width and 100 feet in length. Junk basins 140 feet wide.
1	1,400	850	37	16	260	
2	1,200	1,200	37	16	260	
3	1,200	1,200	37	16	260	
4	1,200	1,200	37	16	260	
5	1,200	1,200	37	16	260	
6	2,400	—	37	16	260	
	8,600	5,650				
	1.63 mile	1.07 mile				

The Consulting Engineers have adhered strictly to the terms of reference which did not require them to deal with anything, but engineering issues. In consequence, their report practically resolves itself into one dealing with the construction of the jetties referred to.

They recommend the carrying out of the scheme in two sections, the first embracing the construction of Jetties Nos. 1 and 2 which they estimate at		£ 1,120,000
Reclamation of 7 acres in connection with same		98,000
Dredging Cust Rocks		29,000
Estimated cost of works in the provision of wharfage	£ 1,247,000	
Dredging Belcher Ridge	13,000	
Total Estimated Cost of 1st section of the Scheme	£ 1,260,000	

As the cost of any works carried out will be paid in the currency of the Colony and the costs of alternative works recommended later in this report are estimated in Hongkong dollars, it will be convenient for the purpose of comparison to convert the foregoing estimate. The Consulting Engineers do not state at what rate of exchange their estimated cost in sterling was based, but, it is reasonable to assume that the rate of exchange adopted was 2/6 to the Hongkong dollar.

The average rate of exchange for the months June 1922 to November 1922 varied between a maximum of 2/7½d. to a minimum of 2/4½d. the average for these 6 months being 2/6½d. £1,247,000 @ 2/6 is equivalent to an estimated cost of \$9,976,000; i.e. a total length of 2,600 feet of steamer berthage providing a depth of 37 feet of water at L.W.O.S.T. and suitable for large ocean-going steamers, with the necessary accommodation for Junks and other small craft, they consider, can be constructed at a cost of \$9,976,000. Apportioning this sum over the length of steamer berthage, it is equivalent to a unit cost of \$3,837 per lineal foot. This estimate does not include for the cost of providing warehouses, roadways, railway lines, water supply, lighting, motive power nor for the cost of any handling facilities, such as capstans, cranes, conveyors, &c. No accommodation is provided for coal or oil storage or bunkering and no shelter for craft.

Report referred to Chambers of Commerce.

In May 1923 the report was referred to the Chambers of Commerce for their consideration. At representative meetings of the Hongkong General Chamber of Commerce Committees held during the months June to September 1923, the whole question was discussed "with a pleasing breadth of view shewing a ready apprehension of present and future requirements and full realization of the difficulties and with the will to overcome them openly and public spiritedly". It so happened that, in the period when discussions took place, the Colony experienced the effects of one of the strongest typhoon gales on record. Naturally, the question uppermost in the mind of members of the Chamber's Committee was the protection of craft.

An alternative scheme propounded by Captain W. Davison, Marine Superintendent at Hongkong of the Canadian Pacific Railway Co. and a colleague, Captain Robinson, for a wet dock at Kowloon Point was submitted by them to the Chamber for its consideration.

The question of the provision by Government of wharfage at North Point and Kennedy Town was also discussed but as the requirements of the trade necessitating provision of wharfage in these localities had not been investigated and, in consequence, no comprehensive scheme of development had been decided, the Chamber's discussions were of an exploratory nature. It was well held, however, that the present system of mooring in the stream with overside discharge of cargo into Junks is uneconomical; it entails too many handlings of goods adding to their cost.

In the end it was decided (on the recommendation of Mr. Fletcher, acting Colonial Secretary), to postpone further discussion pending the submission of certain technical questions to me, on my return to the Colony. In his speech on the Budget debate on the 4th of October, 1923, His Excellency the Governor is reported to have said:—

"The Report of the Consulting Engineers has been referred to the Hongkong General Chamber of Commerce and they wish to put certain questions to the Harbour Engineer (on his return from leave) of which perhaps the most important is the practicability of laying out new wharves in the form of a wet dock in which large steamers could shelter during typhoon weather".

In February of this year, Mr. Robert Sutherland presented to the Hongkong General Chamber of Commerce a communication accompanied by drawings illustrating a Scheme for the establishment of a Passenger Depôt on the Island side of the Harbour somewhere in the vicinity of Des Vœux Road. Mr. Sutherland's memorandum was forwarded by the Chamber to Government early in March with a request that the proposals be considered in connection with Port Developments. The Chamber approved the proposals in principle, and, having due regard to general conditions affecting shipping, stated that it would welcome the practical development of such a scheme. On 26th March I received instructions to consider Mr. Sutherland's proposals.

Drawing
No. 2.

With regard to the Schemes proposed other than that of the Consulting Engineers:—

Captain Davison's proposal for a wet dock at Kowloon Point.

There is much to commend this proposal from the point of view of shelter. Whilst, in my opinion, it would be possible to provide moorings sufficiently strong to hold large ocean-going steamers berthed alongside the inner side of the breakwater arm during typhoon gales, I am unable to say that a breakwater in this position will provide sufficient shelter that the effect of typhoon winds may not cause damage to ships or the quay wall alongside which they may be moored. In my opinion, vessels within the enclosed area could not lie with safety alongside the existing piers of the Wharf and Godown Co. during typhoon gales. Having regard to shelter only, the breakwater would be ineffective until wholly completed: To construct say a half of the length of the breakwater as a first section of the scheme would be to provide a trap for any vessel which ventured to shelter behind it during a typhoon which may pass near and to the north of the Colony, as typhoons in this position induce gales from a westerly direction.

It will be recollected that for this same reason the Admiralty found it necessary, as a result of the typhoon in 1908, to extend the breakwater forming their coaling Camber in this vicinity.

As it is improbable that the Admiralty will give up their coaling camber or torpedo boat basin, the coming to grief of a vessel within the dock would not only prejudice the whole internal system but also the movement of Admiralty craft. Such a catastrophe might have serious consequences.

With regard to the effect of such a breakwater on the southern entrance of the Mongkoktsui Harbour of Refuge during typhoon gales from the west, the entrance would be prejudiced so seriously as to make it impossible for craft to enter.

From a commercial point of view, considering the necessity for free movement of merchandise by road, by rail and by small craft generally, I consider the proposal would not secure such efficiency as works, of a similar cost, designed on a somewhat different form. Evidently, Captain Davison sees Port Developments from the point of view of a mariner, *viz.* :—the safety of his ship.

Reclamation (and Wharfage) at North Point.

The Robert Dollar Steamship Company seeing the possibility of the development of this foreshore for shipping purposes, commenced negotiations through a local firm of architects for an area adjoining the Hongkong Electric Co.'s property. So far as I am acquainted, the negotiations were somewhat protracted and in the meantime this steamship company found a suitable site for their business in Shanghai. The firm conducting these negotiations did not inform Government until almost the date of sale that their clients the Robert Dollar Steamship Co. had "dropped out" and that in their place a speculative Chinese builder who was intent on reclaiming the area and developing it for the construction of Chinese tenement houses was then their client. At this stage of the negotiations the matter was referred to me and Government was advised that the development of this foreshore should be considered more seriously with relation to the harbour itself than with the idea of making building land.

Drawing
No. 2.

The sale of the areas now known as "Marine Lots Nos. 430 and 431" North Point could not be delayed pending the consideration and preparation of a scheme of development for North Point foreshore. Fortunately, the purchaser was Mr. Kwik Djoen Eng who foresaw the possibility of developing the site for shipping and is now constructing a quay wall aggregating 1,693 feet in length and providing a depth of 30 feet of water alongside at L.W.O.S.T. The works have been designed to conform with the Scheme of Development for this foreshore recommended later in this report.

The question as to the form of development to be adopted to the eastward of these lots and the type of quay walls or wharves to be constructed was referred to the Consulting Engineers. Whilst offering objections to reclamation of the foreshore in question, they admit that such a scheme of reclamation and wharfage as that proposed for North Point is practicable but consider it would be best to leave the foreshore as it is at present. They were of the opinion that "it would be very inadvisable to divide forces and funds in attempting to construct a limited length of deep water quay in this position rather than concentrate upon Hung Hom Bay where the possibilities of development and extension are infinitely superior".

Reclamation (and Wharfage) at Kennedy Town.

This scheme was likewise subordinated to the consideration of land values during the recent land boom. Although the necessity of providing wharfage at Kennedy Town had not been ascertained, a line of wharfage was shown to indicate the possibility of construction from an engineering point of view. As recommendations for the development of this foreshore are contained in this report, I need make no further comment on this sketch scheme which after all can only be considered of a tentative nature.

Drawing
No. 2.

Mr. Sutherland's Scheme for a Passenger Dépôt at Victoria.

Drawing
No. 2.

The underlying principle of this proposal is the control of river boat passenger traffic with a view to assisting the suppression of piracy, the Excise and Revenue Department in the searching of passengers and their baggage and the control of the spread of disease.

The scheme was discussed on the 15th July last in conference with the Hon. Mr. E. D. C. Wolfe (Captain Superintendent of Police), the Hon. Mr. A. E. Wood (Acting Secretary for Chinese Affairs), Mr. D. Lloyd (Superintendent of Imports and Exports), and Lieut.-Comdr. Hake (Acting Harbour Master).

It was ascertained that the scheme would not allow of any improvement on the present methods regulating the traffic concerned. Its introduction would meet with much opposition from Shipowners due to the fact that each steamer with cargo to load or unload would require to berth at least three times, thus requiring them to keep up steam in port for a much longer period than would otherwise be necessary. Due to the fact that the hours of departure and arrival of the vessels employed on the river trade are about the same time (11 p.m. to 4 a.m.) almost each steamer would require a separate berth. As the scheme holds no provision for dealing with cargo, the berths would thus be vacant for the greater part of the day. The scheme in proportion to its usefulness would therefore be very expensive. It was also ascertained that the searching of cargo is just as important as the searching of passengers and that a scheme is considered essential for their proper control. Recommendations are made later in this report.

Development of the Harbour Front in General.

Drawing
No. 2.

The lines of development shewn edged pink on Drawing No. 2 were laid down by the Town Planning Committee in 1922 principally on the lines recommended by me subject to modification when the Consulting Engineers' report was received. It was anticipated that as they had sought information as to the ownership of all lots on the Harbour frontage and the purpose for which they were being utilized and also information as to the trade of the Port they would deal with the question of its future lines of development.

SECTION II.



CONDITIONS AFFECTING THE PROVISION OF WHARFAGE.

CONDITIONS AFFECTING THE EXTENT OF WHARFAGE.

EXTENT OF ADDITIONAL WHARFAGE REQUIRED.

CONDITIONS AFFECTING THE LOCATIONS OF WHARFAGE.

Conditions Affecting the Provision of Wharfage.

COMMUNICATIONS, PRODUCTS AND INDUSTRIES OF SOUTH AND MIDDLE CHINA.

Before passing to detailed consideration of the present trade and of the developments which will best serve the interests of the Port, it is necessary to consider the nature of the products and the industries and communications of South and Middle China.

Drawing
No. 1.

In his despatch to the Secretary of State referred to on page No. 3, His Excellency refers to the prospects of the Kowloon-Canton and Canton-Hankow Railways being linked up in the near future, and the Consulting Engineers were called in to advise as to the best means of providing the necessary terminal wharves at Kowloon. Although numerous complaints had been received by Government of the high charges obtaining for the handling and storage of the commodities of the present trade and fears expressed on the possibility of its being deflected, the terms of reference to the Consulting Engineers subordinated the consideration of the needs of the present trade of the Port to a railway which is only partly constructed and which in China's unsettled state is unlikely to be completed for many years to come. The question of Port Developments has in my opinion been considered from a wrong premise.

Railway Communication.

At present there exists a single line railway from Kowloon to Tai Sha Tau, Canton, a distance of about 112 miles. The Canton-Hankow Railway commences from Wong Sha, Canton some 6 miles distant from Tai Sha Tau and is constructed as a single line as far as Shiuchow some 125 miles distant from Canton. A length of about 230 miles has yet to be constructed to a point about 50 miles south of Changsha before single line through communication from Canton to North China can be established. Moreover, as far as I have been able to ascertain all railway bridges north of Canton are in a very bad state of repair, so that until considerable expense has also been incurred in the reconstruction of existing works, bulk cargoes such as coal, ore, &c., cannot be conveyed from the North by rail to Canton; and certainly not to Hongkong unless the line from Wong Sha to Tai Sha Tau is constructed, thus connecting the two lines and establishing direct communication from Kowloon to North China.

Let it be supposed that through railway communication to North China is established. What will then be the situation so far as economic transport by rail to Hongkong versus by water *via* the Tung Ting Lake and the Yangtsze to Shanghai? If, for the moment, the transport of perishables and very valuable goods which require maximum expedition be disregarded and the total of transport from the interior of Middle and South China to foreign destinations be considered as the primary factor controlling the export and import movement of tonnage, it will be found,—on the reasonably correct average assumption, based on the rail and water-borne trade in America at the beginning of the Great War that one mile of rail haul is equal to 4 miles of water haul and making due allowance for transshipment at Hankow,—that the “Economic Divide” is somewhere in the vicinity of Hengchow (Hengyang). In this connection it may be of interest to note that in May, 1923, the freight on grain from New York to Liverpool was less than 5*d.* per cwt.: this may be compared with the railway rate from Liverpool to London for the same article of 1/4*d.* per cwt. Of course, many other factors enter into this question such as mobile equipment, transshipment machinery at the intermediate points of handling and at the Ports or “Gateways”, warehousing facilities, transshipment costs and rapid turn-round for vessels in Port, frequent and definite marine sailings at the terminal ports requiring well-balanced port traffic in and out. The most important factors, however, are the charges by rail, by water, terminal and overseas. The “Economic Divide” referred to is based on total transport only. In July of this year, at a dinner given at the British Empire Exhibition (Wembley) by the Commissioners of the Hongkong Section, Sir John Jordan is reported as having said: “It is on the extension of the railways in South and Central China that Hongkong may justly build many hopes. When the line from Canton is through to Hankow, Hongkong, in conjunction with Canton, will become the great outlet for the produce of all China south of the Yangtsze”. In my opinion, there is no likelihood whatever of goods from beyond Changsha coming to Hongkong by rail. They will continue to pass through the Tung Ting Lake to the

Yangtsze, there being navigable channels in this lake area, during the winter months, when the least depth of water is about 4' 6". This extreme shallow depth of water (experienced for a very short period in winter) will not in my opinion be sufficient cause alone to deflect goods,—apart from perishables,—by rail. The depth of water in the Yangtsze between Shanghai and Hankow is such that river steamboats are employed in the trade between these ports throughout the whole year. During part of the summer, coaster and ocean-going steamers are able to proceed to Hankow. At such times river steamboats are able to proceed to Changsha and the tugs and lighters,—which ordinarily carry on the trade between Hankow and Changsha,—are able to proceed as far as Hengchow. At all other times, transshipment from barge to river steamer and vice versa takes place at Hankow.

Trade with Central China *via* the Pacific will, without doubt, be dealt with at Shanghai. Whilst the railway would undoubtedly bring products to Hongkong for shipment to European countries, the question of developments necessary for the trade of the Port as at present carried on, is, in my opinion, of primary importance.

Mineral Products.

With regard to the products South of Changsha, there is little information available. Coal is mined in considerable quantities at Pingsiang, to which place a branch railway about 55 miles in length connects with the main line at Chuchow, some 20 miles south from Changsha. The coal mined there, I understand, is absorbed by the Hankow Iron-works. In any case, it is improbable that it will come to Hongkong whilst coal can be obtained from Hongay in French Indo-China, Formosa, Japan and Chinwangtao, (North China).

On the Drawing referred to, which is copied from a map dated 1922 and edited by Sir Alexander Hosie, M.A., L.L.D., F.R.G.S., formerly H. B. M. Consul General, China, coal-fields are shewn to exist near Hengchow (Hengyang), again to the east of Shiuchow and also near the confluence of the Pei Kiang (North River) and the Kwei Kiang (West River) but as to their extent or the quality of the coal or indeed as to any of the minerals (*viz.*:—zinc, tin, arsenic, asbestos, silver, gold, copper, antimony and iron) indicated as existing in the south of the Hunan Province, I have been unable to ascertain that their recovery is of commercial importance. At present coal can be brought to Hongkong from Chinwangtao or Hongay at a cost of about \$3.50 per ton including loading charges. Based on the present transport charges and on condition that there will be sufficient return traffic, it is estimated that for the same sum at which coal can be loaded at the mines, shipped at Chinwangtao and brought to Hongkong, coal could be loaded and brought by rail to Hongkong from a point about 400 miles distant or near Hengchow. Coal mined in the neighbourhood of Canton or as far north as Yingtak will undoubtedly be water-borne. There therefore remains the area between Yingtak and Hengchow to be served by the railway. From the information available, it would seem that there is little likelihood of the importation of coal and ores from this district in which case there is no necessity at present for considering developments to meet a trade in mineral products: But, by all means reserve an area of the harbour front for dealing with any future possibilities in this direction.

Agricultural Products.

With regard to agricultural products south of Changsha and near the railway, there are indicated on the drawing or map: tea, and tea-oil, ramie grass or fibre, tobacco, hemp, groundnuts, sugar and wheat. The product indicated to be of greatest predominance is tea, grown in the centre of the province of Hunan. With regard to this commodity, it must be borne in mind that, due to competition from India and Ceylon, China has lost the predominant position which she once held in the tea trade and although spasmodic attempts have been made from time to time to recover it, they so far have proved hopeless against India and Ceylon's more scientific methods of preparation. At present, the products of cultivation in the areas in question, to a great extent are consumed locally. Although the Chinese peoples are very conservative clinging tenaciously to established methods and customs, there are many signs that they are now realizing the advantages of western inventions and there is no doubt that in time their present methods will give way to more intensive cultivation on scientific lines and to the preparation of the products in competition with other markets.

Industries.

The manufacture of silk filatures, porcelain, wood and ivory carvings, furniture, grass mats, paper and embroideries constitute the chief industries south of the "Economic Divide". With the exception of silk, these articles of industry are not likely to affect, appreciably, the export trade of the Port.

Until railway communication with Changsha is established and there are signs of the necessary feeder lines and good roads being constructed, I submit there will be no financial justification for Hongkong to embark on works solely on account of the Railway. However, if the shipping interests of the Port advise that wharfage for deep-draughted ocean-going steamers is necessary for the trade as at present carried on and will guarantee a reasonable return on the capital expenditure, then by all means provide the wharfage and let it be designed to provide for future railway communication.

ANALYSIS OF THE TRADE OF THE PORT.

The Consulting Engineers recommend,—to the exclusion of other parts of the Harbour, notably North Point,—the construction of Jetties in Hung Hom Bay having a depth of water alongside of 37 feet at Low Water of Ordinary Spring Tides (L.W.O.S.T.). As the increase in the cost of constructing solid quay walls is out of all proportion to the additional depth provided, it is necessary to determine by analysis of the trade, the class of vessel for which such facilities are to be designed.

The trade returns of the Colony shew that articles imported and exported are of a very miscellaneous nature, being made up of about 650 items. It is impossible to deal with the list in its entirety for China now demands everything made and in use in more sophisticated countries as well as much that appeals only to the Chinese palate. Amongst the principal commodities handled are:—rice, sugar, wheat-floor, tea, nuts, fish and fishery products, Chinese medicines, ginseng, sandalwood, cotton piece goods, silk piece goods, hides, rattans, coal, oils, iron and steel, tin, &c.

With regard to import goods arriving by a steamer which gives overside delivery in the stream, they generally go into transit shed (the Bill of Lading covering 7 days' "free storage") unless they have been stowed specially for direct transshipment in which case the lighter or junk transports the cargo to the outgoing ships. Cargo received by consignees (commission agents or brokers) in the Colony is not exported in bulk to any extent but is traded to smaller dealers, yet brokers, who in turn dispose of it in small lots. Ordinarily, goods after importation pass through the hands of five or six grades of intermediate men before they eventually reach the consumer or are exported. The result is that export cargo is made up of goods collected in small lots from various points but due to the unsettled state of the neighbouring provinces the mode of transport is not quite normal at present. Whereas, ordinarily, a large amount of goods such as rice, coal, chemicals, &c., go to Canton and as far as Wuchow on the West River by junk or lighter, it now happens that the greater part of the trade with Canton and West River ports is transported by river steamer; flour being damaged easily, is consigned, usually by river steamer. Due to the difference between the native and Maritime Customs' taxes, the cost of merchandise exported by native craft is much less than if carried by British or other ships foreign to China. Here enters the question of time but to the great mass of the Chinese its value is unknown. Junks are thus in a very favoured position to compete against river steamers for trade to and from riverine ports.

Diagrams Nos. 1 and 2 have been drawn up to illustrate the trade of the Port and to determine the requirements for handling it most economically.

Diagram No. 1 serves to indicate the values of merchandise imported from and exported to the various countries with which commerce was interchanged during the year 1923; also the mode of transport as far as I have been able to ascertain. As no values, weights or particulars are on record of the numerous packages of cargo transhipped on through Bills of Lading, it is impossible to include consideration of it in this analysis. The diagram is incomplete in that the Trade returns of the Colony do not include:

Diagram
No. 1.

- (a) Articles imported or exported by the Colonial Government or Naval and Military Authorities.
- (b) Cargo (except Ores and Tobacco) arriving from Ports in China south of Swatow and from Macao.
- (c) A portion of the cargo arriving from the Chinese ports of Swatow, Amoy and Foochow ("Middle China").
- (d) Passengers' luggage.
- (e) Inward cargo landed into warehouses and left unclaimed on 31st December, 1923.
- (f) Inward cargo delivered under "suspense" permits, documents not having come to hand on or before 31st December, 1923.
- (g) Ships' Stores.

Import and export movements of treasure have been excluded.

It will be noted that the Total Value of Imports of merchandise during 1923 amounted to £61,955,000. As far as I have been able to ascertain, the mode of transport of the merchandise is as represented in the diagram and may be summarised as follows:—

IMPORTS.

Principally by coaster-steamer.

Merchandise to the value of

£25,788,000 = 41.63%	came from French Indo-China, Netherlands East Indies, Siam, Phillipine Islands, and British North Borneo.
£ 7,841,000 = 12.66%	„ North China.
£ 6,675,000 = 10.77%	„ Japan, Korea and Formosa.
£ 119,000 = 0.19%	„ Middle China.
£ 13,000 = 0.02%.	„ South China.

£40,436,000 = 65.27% of the Total Value.

Principally by ocean-going steamer.

Merchandise to the value of

£ 9,491,000 = 15.32%	came via Suez.
£ 6,319,000 = 10.20%	„ the Pacific.
£ 4,763,000 = 7.69%	„ from India, Burmah, Straits Settlements, Federated Malay States, Mauritius, and Ceylon.
£ 695,000 = 1.12%	„ „ Australia.
£ 251,000 = 0.40%	„ „ other Countries.

£21,519,000 = 34.73% of the Total Value.

That is to say:—Of the value of merchandise imported during 1923, 65¼ per centum was borne principally by coaster-steamer and 34¾ per centum by ocean-going steamer.

With regard to export of merchandise during 1923, it will be noted that the total value amounted to £61,373,000. The mode of transport may be summarised as follows :—

EXPORTS.

Partly by Coaster-steamer, River Steamboat and Junk.

(Probably a small proportion by ocean-going steamer).

Merchandise to the value of

£24,991,000=40.72%	went to South China.
£ 9,739,000=15.87%	„ North China.
£ 9,093,000=14.81%	„ French Indo-China, Siam, Netherlands East Indies, Phillipine Islands, and British North Borneo.
£ 4,306,000= 7.02%	„ Middle China.
£ 3,593,000= 5.85%	„ Japan, Korea and Formosa.
<hr/>	
£51,722,000=84.27%	of the Total Value of Export Trade.
<hr/>	

By Ocean-going steamers.

Merchandise to the value of

£ 4,423,000= 7.21%	went to Straits Settlements, Federated Malay States, India, Burmah, Mauritius, and Ceylon.
£ 3,351,000= 5.46%	„ via the Pacific.
£ 1,245,000= 2.03%	„ via Suez.
£ 405,000= 0.66%	„ to Australia.
£ 227,000= 0.37%	„ „ other Countries.
<hr/>	
£ 9,651,000=15.73%	of the Total Value of Export Trade.
<hr/>	

That is to say : Of the value of merchandise exported during 1923, 84½ per centum was borne principally by coaster-steamer, river steamboat and junk and 15¾ per centum, by ocean-going steamer.

Considering the Total Value of both Imports and Exports of merchandise, 74¾ per centum was borne by coaster-steamer, river steamboat, and junk and 25¼ per centum by ocean-going steamer ; a ratio of 3 to 1 approximately.

As already stated, it is impossible to deal with every article imported and/or exported. Out of the 639 Items which appear in the Trade Returns for 1923, I have selected the eight commodities of highest value, estimated their tonnages,—which after all is of primary importance from the view of Port Developments,—and analysed their “flow”.

Diagram
No. 2.

Diagram No. 2 serves to illustrate the following remarks :—

Tables shewing Imports and Exports of the eight commodities of highest value handled in 1923.

IMPORTS.

COMMODITY.	VALUE £	PERCENTAGE OF TOTAL IMPORT VALUE (£61,955,000)	APPROXIMATE WEIGHT IN TONS.
Rice (white, broken, cargo, in husk, meal, glutinous and red)	13,878,024	22.40	1,381,750
Sugar (raw)	6,278,563	10.13	263,370
Cotton yarn	3,077,084	4.97	22,070
Kerosene Oil	2,166,480	3.50	130,580
Wheat Flour	1,655,320	2.67	108,600
Coal	1,618,989	2.61	1,037,530
Sugar (refined)	950,975	1.53	37,220
Fuel Oil	519,452	0.84	140,120
TOTALS.....	£30,144,887	48.65%	3,121,240 Tons.

EXPORTS.

COMMODITY.	VALUE £	PERCENTAGE OF TOTAL EXPORT TRADE (£61,373,000)	APPROXIMATE WEIGHT IN TONS.
Rice (white, broken, in husk, meal, cargo, glutinous and red)	12,693,830	20.68	1,223,430
Sugar (refined)	5,621,754	9.16	208,690
Cotton yarn	3,054,963	4.98	22,990
Sugar (raw)	2,245,316	3.66	109,840
Kerosene	2,021,607	3.29	120,490
Wheat flour	1,469,312	2.39	99,530
Coal :—			
Exported	290,352	0.47	205,140
Bunkered (approx.)	1,221,548	1.99	606,060
Fuel Oil :—			
Exported	55,109	0.09	15,250
Bunkered (approx.)	464,343	0.76	124,870
TOTALS.....	£29,138,134	47.47 %	2,736,290 tons.

From the foregoing tables, it will be seen that these eight commodities represent practically half the value of imports and exports of merchandise during 1923.

It will be observed that the commodities of greatest predominance in weight are rice, coal and raw sugar imported from French Indo-China, Siam, Japan, Korea and

Formosa and Netherlands East Indies and except for raw sugar which is refined in the Colony and exported principally to North China, of the other two commodities:—rice is almost wholly exported to South China and coal partly to South China but delivered mostly to ships in bunkers.

The production of rice in China being insufficient to feed the rice-eating population, it has to be supplemented by imports mainly from French Indo-China, Siam and Burmah: Hence the reason for the very large trade in this commodity of which in 1923 the amount imported weighed 1,381,750 tons and represented 22.40% of the Total Value of Imports. Of this amount, 1,223,430 Tons representing 20.68% of the Total Value of Exports were exported, mainly to South China.

The mode of transport of the eight commodities under consideration as far as can be ascertained was as follows:—

IMPORTS.	PERCENTAGE WEIGHT CARRIED BY	
	COASTER-STEAMER, RIVER STEAMBOAT OR JUNK.	OCEAN-GOING STEAMER.
Imports	85½	14½
Exports.....	96½	3½
Average on Total Imports and Exports of these eight commodities	91 %	9 %

i.e. a ratio of 9 to 1.

Any of these eight articles of trade when imported are likely to form the greater bulk of the ship's cargo consigned to Hongkong, and as they are transported in bags, cases, or bales of more or less uniform size (in the case of coal and fuel oil "in bulk") it is possible to obtain by such means as mechanical conveyors a continuous stream of discharge movement from a ship alongside a quay wall to the transit shed, storage warehouse or dump; in the case of oil by pipe-line to the oil Tanks. The degree of expedition and economy in handling which it is possible to obtain in the transport of such a commodity as rice,—a necessity of life to the Chinese,—and which alone represents over 20% of the Value of the Import and Export Trade of the Port, I submit, justifies this trade being considered of primary importance in any schemes of Port Developments.

Size of Vessels engaged in the present trade.

The maximum draught (fully loaded) and length of vesels frequenting the Port is as follows:—

CLASS OF VESSEL.	MAXIMUM DRAUGHT (FULLY LOADED) FT. INCHES.	LENGTH (OVERALL) FEET.
Ocean-going	32-0	627
Coaster	22-6	325
River Steamboats.....	13-0	290
Junks.....	11-0	70
Barges	7-6	80

With regard to the size of ocean-going steamers for which accommodation should be provided, it must be borne in mind that for vessels on the Pacific run, Hongkong is their terminal Port and for vessels arriving from Suez, they travel as far as Japan and do not generally enter or clear Hongkong on their outward or homeward journeys with full cargoes, and are therefore not loaded down to their maximum draught.

CONSIDERATION OF THE PROBABLE INCREASE IN THE DRAUGHT OF
OCEAN-GOING STEAMERS.

As Hongkong is served both by the Suez and Panama Canals, it is necessary to consider carefully their present depths and projected improvements, and also the existing and projected shipping accommodation at Shanghai, Japan and at Ports on the Pacific coast of Canada and America, bearing in mind the statement made in the preceding paragraph.

Suez and Panama Canals.

In a communication to the International Congress of Navigation held in London in July, 1923, Ed. Quellenec, Esq., Technical Adviser to the Suez Canal Co., states with regard to the draft of ships successively allowed in the past and foreseen for the future in the Suez Canal:—

“The Statistics of the Company show that while up to 1906 when ships with a draft of 27 feet were allowed to transit, shipping was kept waiting for Canal Improvements; this is no longer the case since then and at present the number of ships ready to make full use of the facilities offered (*viz.*:— 31 feet draught) is practically negligible.

During 1921 and 1922, when the draught allowed was increased from 29 feet to 30 and to 31 feet respectively, only 6 and 5 ships during these years, respectively, made use of the extra depths; *i.e.* one per thousand of the total number of passages.

Generally speaking, the number of ships of great draught is still very small; for instance, in 1922 ships with a draught above 28 feet made only 113 passages or 2.6% of the total number of passages. Nevertheless the Suez Canal Co. keeps on improving the canal without interruption: A new increase of one foot, bringing up to 32 feet the authorized draught, is expected for the beginning of 1924 and after completion of the 1912 programme,—interrupted by the Great War,—that is in 1925 the transit of ships with a draught of 33 feet might be allowed.

This much for the near future: Then the 1921 programme, the works of which have already been started by the Company, will allow when completed the increase of the authorized draught to 35 feet and even to 36 feet if needed.

The Suez Canal will then be in a better position than the Panama Canal since 36 feet in the former is nearly equivalent to 37 feet in the latter, where ships travelling in fresh water sink deeper than in salt water. Moreover a draught of more than 37 feet would leave insufficient margin between 37 feet and 40 feet the total depth in the Panama Canal”.

With regard to the tonnage statistics of the Suez Canal Co. he states:—

“On the whole, ships measuring less than 6,000 tons gross are decreasing in number while those above 6,000 tons are increasing but the increase is practically negligible for merchant ships above 12,000 tons.

The number of ships of very large tonnage is still very limited; in 1922 only 5 ships measuring more than 16,000 tons have transited the Suez Canal, one of them being the British man-of-war *Renown*. Considering that the Canal can receive ships with a draught of 31 feet, that in 1922 no ships made use of this facility; that also in 1922 there were only 29 passages with more than 29 feet draught and 113 passages with more than 28 feet draught, it is evident that the Suez Canal to-day is in no way a limitation to the expansion of shipbuilding”.

XIIIth. International Congress of Navigation, London 1923.

As deep draughted ships necessitate a very large capital outlay at ports to accommodate them in comparison with ships of moderate draught, the question was considered by the International Congress of Navigation with the view to either justifying or condemning the policy of building ships of great draught, solely with regard to the economical running of these ships without taking into consideration the capital cost of providing wharfage to accommodate them at all their ports of call.

The conclusions arrived at were :—

1. That with regard to the probable future dimensions of ships, there is a tendency for economic reasons connected only with the cost of running, to a general increase in the draught, but that, although the percentage of ships drawing 30 feet and over is likely to be greater, this increase will be limited by the leading dimensions of certain marine waterways and the principal harbours of the world, which should tend to check this increase in draught.
2. That there will be an increase in the average tonnage more especially in that of ships from 5,000 tons to 8,000 tons but not in the tonnage of the largest pre-war ships, in the very near future.
3. That the accommodation to be provided for ships should be guided by considerations of true economy and that against any anticipated saving in the cost of running a ship due to increased draught, the additional expenditure entailed at all Ports at which such vessels will trade
* * * * * should be taken into account * * * * *
4. That the provision of the facilities for the rapid and economical despatch of goods on arrival at a Port is as important as the provision of deep water quays, &c.
5. * * * * *
6. * * * * *
7. That except for the Atlantic service it is considered that when everything is taken into account, it will be difficult to justify the necessity for a depth of water at the quay side of more than 35 feet at L.W.O.S.T. for many years to come; while a Port providing 30 feet of water at L.W.O.S.T. would be considered a first-class port.
8. That each nation should make an exhaustive study by a committee of various interests concerned, *viz.* :—Shipbuilders, Ship-owners, Dock Authorities, Dock Engineers, and Railway Administrations, and that they be instructed to consider the question of establishing systematic research in the whole subject of economic dimensions of ships and docks as the want of co-ordination in the past seems to have prevented the development of Ports and Ships on economic lines.

The matter was referred to the next Congress.

Depths of water available at Shanghai and at ports in Japan and on the Pacific coast of Canada and United States of America.

With regard to the Port of Shanghai, ports in Japan and on the Pacific coast of Canada and the U.S.A., the following table gives the minimum depths of water in their approach channels and the maximum depths available at "Open Quays"; and also projected depths.

PORT.	MINIMUM DEPTH OF WATER IN THE CHANNEL OR ON THE BAR.						MAXIMUM DEPTH AT OPEN QUAYS.			
	ATTAINED AT				PROJECTED AT		AVAILABLE AT		PROJECTED AT	
	L.W.O.S.T.		H.W.O.N.T.		L.W.O.S.T.		L.W.O.S.T.		L.W.O.S.T.	
	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.
Shanghai	25	0	31	0	30	0	35	0	—	—
Kobe.....	36	0	—	—	—	—	36	0	—	—
Yokohama (pre Earthquake, 1923)	33	0	37	6	—	—	35	0	—	—
Victoria	30	0	36	0	—	—	30	0	35	0
Vancouver	35	0	43	3	35	0	35	0	—	—
Seattle	600	0	607	0	—	—	43	0	—	—
Portland (Oregon)	33	0	37	6	40	0	28	0	35	0
San Francisco ...	32	9	36	0	—	—	35	0	—	—

The foregoing information would indicate that ships with a draught of more than 34 feet are not likely to frequent the port for many years to come. Quay Walls to accommodate vessels drawing 34 feet will require to have 36 feet depth of water alongside at L.W.O.S.T.

The Consulting Engineers in their Scheme at Hung Hom Bay recommend that the maximum depth of 37 feet at L.W.O.S.T. be provided at all quays. One would not mind providing any maximum at every quay if there is sufficient percentage of ships to make full use of it but it is a very unattractive proposition to see the depth occupied occasionally and being the rest of its time used by ships of the coaster class, the present maximum draught of which vessels as already stated being 22'-6". The shipping interests of the Port might be satisfied that any works provided, conform to a reasonable ideal if at some part or parts of the scheme of development, provision is made to accommodate vessels loaded to a draught of 34 feet at the time of L.W.O.S.T.

CONSIDERATION OF THE PROBABLE INCREASE IN THE DRAUGHT OF COASTER STEAMERS.

Controlling depths of Water at Coast Port and draughts to which vessels may load at same.

The following table gives the controlling depth of water at L.W.O.S.T. to or at the coast ports mentioned therein and the draught to which vessels may load to enter or leave these ports at High Water of Neap Tides.

PORT.	AVAILABLE DEPTH IN APPROACH CHANNELS OR AT THE PORT AT L.W.O.S.T.	MAXIMUM DRAUGHT TO WHICH VESSELS MAY BE LOADED TO ENTER OR LEAVE AT H.W.O.N.T.
	feet.	feet.
Bangkok (bar)	4 to 6	11 to 15
Koh-si-chang (outside Bangkok bar)	Vessels can load to any draught.	
Saigon	23	25½
Haiphong	15¾	24
Hongay	12	20
Canton	7¾ (Tai Mei barrier)	14
	10 (Tai Sheik barrier)	
Swatow	16	18
Amoy	Vessels can load to any draught.	
Foochow	8 to 9	24½
Shanghai	25	28

Taking into account the possibility of improvement of these ports with which coaster-borne merchandise is interchanged, I consider that any wharfage accommodation for the coaster-steamer should provide a depth of 30 feet of water alongside the quay walls at L.W.O.S.T. This will accommodate vessels drawing 28 feet of water.

CONSIDERATION OF THE DRAUGHT OF RIVER STEAMBOATS, JUNKS AND BARGES.

River Steamboats.

The maximum draught to which vessels, trading with riverine ports, may load at present is 14 feet and at that draught they can only proceed up or down the Canton delta over the barriers at H.W.O.N.T. A project for the improvement of the "Front Reach" at Canton to a depth of 15 feet below the lowest low water is now under consideration. These improvements, if successful, will provide better facilities for steamers at Canton but will not allow for any increase in the draught of vessels. Although a depth of 16 feet of water at L.W.O.S.T. alongside any pier or wharf would be sufficient to accommodate river steamboats; due to the type of construction recommended later in this report, it will be more economical to provide a depth of 20 feet. This depth is also considered ample for vessels engaged in the Macao trade. In regard to the trade between Hongkong and such place as Kwongchow, a depth of 15 feet should be sufficient.

Junks and Barges.

As far as I have been able to ascertain, the maximum draughts, loaded, of Junks and Barges are 11'-0" and 7'-6" respectively. In this connection it may be of interest to note that the largest lighter belonging to Messrs. Alfred Holt & Co. has a capacity of 500 tons

and when fully laden has a draught of only 7'-6". It is considered that a depth of water of 12 feet at L.W.O.S.T. alongside any wharfage designed to accommodate this class of craft will be sufficient.

DATUM.

The tide tables have been compiled from the result of the analysis of the tidal observations taken at the Kowloon tidal observatory, under the direction of Dr. Doberck, during the years 1887, 1888 and 1889. Since then, systematic observations have not been recorded. The tables for 1924 predict only 7 occasions when the tides may be expected to ebb below the level adopted as Low Water of Ordinary Spring Tides (L.W.O.S.T.) and then only to a maximum of 0.33 foot. Whilst the wind force (apart from the greater effect of typhoons) may increase or diminish the rise or fall of the tide, the information necessary to determine the extent of such variation is not available. The level of Low Water of Extraordinary Spring Tides (L.W.E.S.T.) is about 1.03 feet below the level of L.W.O.S.T. and is the datum adopted by the Consulting Engineers. On the information available, I do not consider this datum a reasonable basis on which all shipping accommodation should be designed. Such a coincidence as a vessel arriving in the port at the hour of L.W.E.S.T., or when the wind has caused the tide to fall to an abnormally low level, and, at the same time loaded to its maximum draught, does not justify, in my opinion, the extra cost of constructing all solid quay walls providing the extra depth between these two data, *viz.* :—one foot.

The datum to which all works recommended in this report is therefore L.W.O.S.T. or Ordnance Datum, or 17'-10" below "Rifleman's" copper bolt on the N.W. corner of one of the storehouses in His Majesty's Dockyard, Hongkong.

HEIGHT OF QUAY WALLS.

From the observations taken during the years 1887, 1888 and 1889, the level adopted as High Water of Extraordinary Spring Tides (H.W.E.S.T.) is 7.70 feet above L.W.O.S.T. During these three years the highest water level recorded was 8.55 feet above datum. The effect of a typhoon is to raise the level of the sea but to what extent the effect produced is felt within the harbour there is little information available. As 8 a.m. (the hour of high water) on the 20th of September, 1922, a typhoon passed at a distance of about 270 miles and to the South of the Colony: It was then noticed that there was an abnormal rise in the level of the tide over that predicted, which was 7.19 feet above L.W.O.S.T., and observations were made. It was ascertained that the actual height of the tide was 10.05 feet above datum, being an increase of 2.86 feet.

In determining the height of the copes of quay walls, consideration must be given to the handling of cargo by vessels moored alongside. The construction of quay walls to such a level to prevent a certain amount of flooding of the wharves caused by the impact of waves against the face of the quay would increase the cost of handling cargo. I consider it would better to provide in the design of the transit sheds, precautions for the prevention of their flooding rather than increase the height of the quay walls beyond the level of 14.50 feet above L.W.O.S.T., which is an economic height for the handling of cargo.

TYPHOONS.

The records of the Royal Observatory, Hongkong, for the years 1884 to 1923 shew that, in that period of 40 years, 60 typhoon gales were experienced in the Colony. The particulars of them may be summarised as follows :—

NO. OF TIMES OF OCCURRENCE.	DIRECTION OF STRONGEST WINDS.	VELOCITY OF WIND (AVERAGE) MILES PER HOUR.
$\frac{2}{3}$ } 5.	N.N.E.	98
	NE. by E.	54
$\frac{7}{7}$ } 42.	E.N.E.	66
11	E. by N.	65
10	E.	60
7	E. by S.	65
	E.S.E.	60
$\frac{1}{1}$ } 4.	S.E.	62
1	SE. by S.	85
2	S.S.E.	72
$\frac{3}{3}$ } 9.	S.S.W.	68
1	SW. by S.	65
1	SW. by W.	56
1	W. by N.	61
	N.W.	59

With the exception of the typhoon gale experienced on the 18th of September, 1906, there is no record of winds of typhoon force blowing from the South. It would appear therefore that, in any system of docks to be provided, a Southerly direction requires least protection from typhoon gales.

COST AS AFFECTING THE PROVISION OF WHARFAGE.

The existing berthage in the harbour is unsuitable in design to allow of the most economical handling of cargo being obtained. Berthage provided with transit sheds at the back of the wharf road, although more expensive to construct, is the more suitable design in that it secures more rapid expedition for shipping, less dependence on unskilled labour, less damage to goods and less actual cost for the transport of goods between ship and shed. The advantage of this form of berthage,—taking into account its higher cost of construction,—will be found to be the more economical and has therefore been adopted.

In the carrying out of any of the schemes of wharfage recommended later in this report, areas of reclamation will be formed. However, as the market value of any land formed will be much in excess of the actual cost of the filling material, it is therefore necessary to consider only the cost of providing a quay wall to allow steamers to berth.

That the cost of handling charges may not be increased by the provision of deep water berthage, it is necessary that the return on the capital expense involved in the construction of such berthage should not exceed the cost of taking delivery of cargo from ships anchored in the stream and conveying it ashore through the medium of junks and barges. Whilst it will be admitted that the cost of discharging a ton of cargo into sheds from a ship berthed alongside would be somewhat less than the cost of handling the same weight of cargo under the present conditions from a junk or lighter alongside a praya wall, I have assumed for the purpose of comparison the worse condition, *viz.* : that the cost in either case would be the same.

Assuming that maintenance charges on quay walls, including dredging, will amount to about 1% on the capital expenditure, that money is borrowed at 5% and a sinking fund of 1% is allowed for, which would redeem the cost in a period of about 36 years; then, about 7% return on the capital expenditure must be assured before embarking on

a scheme to provide the necessary quay walls. Provided vessels maintain a rate of working of 200 tons of cargo per annum per lineal foot of wharf,—which rate is well within the limits of actual practice,—then to yield 7% return, it will be necessary to make a charge of 55 cents per ton on general cargo discharged at a quay wall having a depth of 34 feet of water alongside at L.W.O.S.T. The costs being so favourable as compared with the charges now levied for the transport of goods between steamers anchored in the stream and the shore, the expense of providing wharfage would appear to be justified.

ADVANTAGES OF WHARFAGE.

Whilst in calm weather the rate of discharge or loading of a vessel may not be increased as compared with the present method of discharging or loading in the stream, there can be no question as to the greater expedition which can be given to vessels loading or discharging goods at a quay wall during the typhoon season. The financial loss to shipowners, junk and lighter people, caused year by year through delays consequent upon typhoon weather and more especially the fear of same must be enormous.

The advantages of berthing a vessel for discharge or loading at a wharf having shed accommodation alongside, compared with a vessel anchored in the stream may be enumerated as follows:—

1. Reduction in handling costs.
2. Quick turn-about of vessels in port more particularly during the typhoon season and because of being independent on the consignees for junks or lighters.
3. Less broaching of packages and less risk of pilferage.
4. Less frequent handling; (an important factor in the case of flour).
5. Less dependence on unskilled labour; (an important factor as borne out by the strike of 1922).
6. Water and oil fuel can be obtained at less cost direct from pipes laid along the quays.
7. Less road congestion as under present conditions the whole Praya is practically one long wharf occupied by junks and barges loading and discharging goods which are carried by streams of coolies through the thoroughfares of the city to the various godowns of the Chinese.

Conditions Affecting the Extent of Wharfage.

SHIPPING.

From such information as is available of the world's great seaports, considering Hongkong and Shanghai on their shipping and trade returns for the year 1923, London, Liverpool and Glasgow on their 1921 returns, New York, Manchester, Hull, Montreal, Bremen and New Orleans on their 1920 returns and Hamburg, Antwerp, and Marseilles on their pre-war figures, Hongkong ranks, commercially, fourth port in the Empire and tenth port in the world, while in the matter of tonnage it is the largest port in the world.

In regard to the amount of shipping entering and clearing at ports in the Colony, the following figures have been extracted from the Harbour Master's reports for the years 1923 and 1913, the latter being the last normal year before the Great War. The percentage increase or decrease in the numbers and tonnage of the various classes of vessels during 1923 as compared with 1913 and the daily average number of vessels entering and clearing during both years have been added.

CLASS OF VESSEL.	1923.		1913.	
	NUMBER.	TONNAGE.	NUMBER.	TONNAGE.
Ocean-going vessels including steamers of the coaster class	12,637	25,894,058	8,889	17,722,168
River Steamers	7,899	6,356,080	8,404	5,027,963
Steamships under 60 Tons (Foreign trade)	4,811	142,392	4,574	189,003
Junks (Foreign trade).....	24,553	2,619,003	25,653	2,882,518

CLASS OF VESSEL.	PERCENTAGE INCREASE IN		PERCENTAGE DECREASE IN		DAILY AVERAGE NUMBERS ENTERING & CLEARING.	
	No.	TONNAGE.	No.	TONNAGE.	1923.	1913.
Ocean-going vessels including steamers of the coaster class.....	42.2	46.1	—	—	34.6	24.4
River Steamers	—	26.4	6	—	21.7	23.0
Steamships under 60 Tons (Foreign trade)...	5.2	—	—	24.7	13.2	12.5
Junks (Foreign trade) ...	—	—	4.2	9.2	67.3	70.3

It is of interest to note, in regard to the junks engaged in foreign trade, entering and clearing at ports in the Colony, that of the tonnages recorded for the various years, during the period 1867 to 1923, the maximum tonnage was 3,700,000 tons approximate in 1883 and the minimum, 2,400,000 tons in 1911 (the year of the revolution in China), the tonnage recorded for the year 1867 being 2,700,000 tons. Thus the tonnage of junks engaged in foreign trade has been practically constant between the years 1867 and 1923. In the period 1913 to 1923 there has been a slight decrease on the average size of Junks.

Although the foregoing tables shew the increase or decrease in the numbers and tonnage of vessels and in this respect are instructive, it is not possible to deduce from such information as is published the requirements in regard to wharfage necessary to accommodate the shipping recorded. The daily average number of vessels of the ocean-going and coaster classes which entered the port during 1923 was about 17.3 whilst the daily average number of these vessels in port was 91. It is anticipated that the provision of additional berthage will reduce the latter figure but it is unlikely that it will ever be much below 70.

FREE STORAGE.

A very important factor in the consideration of the extent of wharfage required is the length of time which consignees are granted "free occupancy" of transit sheds or open space for their goods. In Hongkong the period of "free storage" is 7 days whereas in the United Kingdom and in most foreign ports, the time is limited from 48 to 72 hours. To a great extent the period of "free occupancy" determines the quay and shed accommodation which has to be provided and thus the capital to be spent and the charges

necessary to be levied on the trade. The fact that Shanghai gives 10 days, Singapore 7 days and Kobe 7 days, can not be adduced as argument in support of Hongkong continuing to grant 7 days' "free occupancy" of transit sheds or open space. The sheds at the wharves are "transit sheds", fundamentally a covered protected working area, a space for temporary holding of freight for assorting and distribution but for holding only a limited period of time after which, if not taken delivery of, should be transferred to the "reservoir" or storage warehouse so that the fullest possible use of the berth for steamer discharge may be obtained.

The great trouble experienced at most ports in regard to traffic is that, as a rule, far too long time is occupied in removing goods away from the sheds. Owing to transit space being fully occupied, it happens, frequently, that wharf owners are unable to berth a steamer for discharge. It is not that there is not room for her alongside the quay but there is not room in the shed for her cargo. The result is delay, resulting in loss of earning power for the vessel which ultimately increases the cost of goods, because after all, all charges for freight, &c., fall on the goods and have to be paid by the consumer. It is therefore necessary that a supporting warehouse be provided adjoining the transit or quay shed or storage space be given by the provision of upper floors to a transit shed, thus converting it into what may be termed a "transit warehouse"; but in any case the goods should be removed from transit space within a period of 72 hours.

EXTENT OF PRESENT ACCOMMODATION FOR SHIPPING.

Excluding any accommodation for colliers and oil tankers, the present accommodation,—including wharfage under construction in the port,—as affected by any of the schemes for development referred to later in this report, with the exception of the development scheme adjoining the Hongkong and Kowloon Wharf and Godown Co.'s property at Kowloon Point, will be as shewn in the following table :—

LOCATION.	MAXIMUM DRAUGHT OF VESSELS WHICH MAY BERTH ALONGSIDE AT L.W.O.S.T.	NUMBER OF VESSELS WHICH MAY BERTH SIMULTANEOUSLY.
	feet	
HONGKONG.		
China Merchants' Pier and Jardine's Wharf (West Point).....	23	3
Douglas Pier (Central).....	26	2
Ching Siong Land Investment Co's. wharves under con- struction. (North Point).....	28	3
KOWLOON.		
H.K. & K. Wharf & Godown Cos.' Piers and Holt's Wharves.	25 28 30 32	4 2 2 2
Total Number of Vessels which may berth simultaneously		18

Extent of Additional Wharfage Required.

PROVISION OF WHARFAGE.

For Ocean-going Steamers and Coasters.

Whilst it is impossible to determine with accuracy the number of vessels requiring wharfage accommodation, it may be safely assumed that of the estimated average daily number of vessels (*viz.* :—70) which will be in port, the number may be as high as 50% : *i.e.* berths for 35 vessels, not including for colliers and oil tankers. As far as can be ascertained from analysis of the trade of the port, and provided that too long a period of free occupancy of transit space does not limit the use of berths, at least 15 of these berths would be required to provide for steamers of the coaster class engaged in the rice, sugar and cotton yarn trades; and also to land wheat flour which is imported mostly from America. The remaining number of berths, *viz.* : 20, would be required to accommodate coasters engaged in other trades and ocean-going steamers as distinct from coasters.

It would seem, therefore, that 17 additional berths may be required. Of that total 9 might be required for vessels engaged in the rice, sugar, cotton yarn and wheat trades, the remaining number, *viz.* : 8, being required by steamers of the ocean-going and coaster classes. Berths suitable for coaster and ocean-going steamers at present frequenting the port should be from 350 feet to 450 feet in length and from 550 feet to 650 feet in length respectively.

For River Steamboats.

With regard to accommodation required for river steamboats, the foregoing table of shipping indicates that the daily average number which entered the port during 1923 was about 11 and that since 1913, there has been a decrease of .65 in the daily average number. Of these 11 vessels, 8 are essentially passenger boats carrying cargo. As these passenger-cargo vessels should clear from their berths within 24 hours, and an application has already been received for a berth to accommodate vessels now being built, it would seem that, to accommodate this class of craft, a total of 9 berths are required. The maximum length of river passenger steamboats is 290 feet.

For Junks and Barges.

As a large proportion of the export trade, as at present carried on, is transported by junks and barges, provision should be made to accommodate such small craft in any scheme, whether it be designed for the accommodation of deep-draughted ocean-going vessels or steamers of the coaster class.

Conditions Affecting the Locations of Wharfage.

CONDITIONS AFFECTING THE LOCATION AND DESIGN OF SCHEMES FOR THE DEVELOPMENT OF THE PORT.

Harbour Limits.

The official limits of Victoria Harbour are as follows :—

On the East :—A line drawn from a pillar marked “Harbour Limits” at North Point on the Island of Hongkong to the most easterly point of Kowloon City Pier.

On the West :—A line drawn from the westernmost point of the Island of Hongkong to the western side of Green Island, continued to the western point of Stonecutters’ Island, thence to the north point of Stonecutters’ Island and thence to the Harbour Department Station at Shamshuipo.

Scope of Report.

It is not possible to provide within the present “Harbour Limits” satisfactory schemes for the accommodation of the present shipping using the Harbour, having in view the necessity of expansion for a possible increase in trade. The harbour limits

Drawing
No. 3.

should be extended to Lyemun on the East and the inclusion of Laichikok on the West as shewn by broken lines in green colour on Drawing No. 3, the area of the harbour so defined being about 17 square miles. Within these extended limits the present, and, as can be foreseen, the future needs of the Colony's shipping and trade can be accommodated and developed with advantage. The Schemes, referred to later, for the development of the Port are located, therefore, within these extended limits.

General Considerations.

The determination of the locations where developments should take place and the form of their design has necessitated consideration of many factors such as :—

- (a) Most convenient position for the various trades of the Port having regard to frontage available.
- (b) Suitable depth of water existing or susceptible of improvement at reasonable cost by artificial means.
- (c) Practicability of economic construction.
- (d) Direction and intensity of prevailing winds.
- (e) Direction and speed of tidal currents and their probable scouring or silting effect by the construction of new works.
- (f) Accessibility.
- (g) Practicability of providing junk basins contiguous with transit sheds and storage warehouses.
- (h) Practicability of providing shelter whereby steamers and small craft need not leave wharves or basins during a typhoon gale.

LOCATIONS OF PRESENT TRADE.

Hongkong (West Point).

Drawing
No. 2.

Staple trades such as rice, sugar and flour are centered in the western part of Victoria and as they comprise a large percentage of the trade of the Port, it is necessary that consideration be given to the practicability of development in this section of the harbour front, where in addition, some business is carried on in general cargo and oil in cases.

In 1922 the China Provident Loan & Mortgage Co. who carry on a large godown business in this vicinity applied for permission to erect piers in front of their lots and at the request of the Chairman of the Town Planning Committee, a joint report drawn up by the Superintendent of Crown Lands and myself was presented to and discussed by that Committee on 1st September, 1922. The principal recommendations contained in that report were :—

“On the clear understanding that Government will exercise its rights in 1949 and take possession of all existing pier sites, the leasing of which may hinder the carrying out of such policy of harbour frontage development as may be decided upon, we consider it would be politic to allow applicants to construct piers or wharves opposite their properties. * * * * * Government should acquire properties behind the harbour front road between the Western Market and Queen's Street and from Whitty Street to Sands Street for the purpose of constructing a back road to which the Low Level Tramway Co.'s lines may be diverted. We consider a passenger tramway service on a frontage road of a width of 75 feet would incommode seriously the handling and transport of cargo”.

The Town Planning Committee opposed the placing of any large piers along the front of Victoria for the accommodation of steamers of the coaster or ocean-going classes. To quote Mr. Fletcher :—

“This part of the town is getting less and less adapted for cargo handling. The place is full of tenement houses and restaurants and the roads already carry

their full complement of traffic. The land is constantly rising in value. It does not seem to be wise to add to the existing congestion by berthing large steamers in this area".

At a joint meeting of the General Committee and the Shipping Sub-Committee of the Hongkong General Chamber of Commerce held on the 4th of September 1923, Mr. Fletcher (acting Colonial Secretary) is reported to have said:—

"The idea of making provision in West Point was abandoned for two reasons, the main one being that the district was already very congested. Handling difficulties would only be increased if the attempt were made to provide further wharfage facilities in a district in which traffic was already heavy. The area would be a jumble of goods wagons, trams and other traffic and it must be remembered that it was already densely populated. The alternatives were either to remove godown business from that part of the town, giving it up to office purposes only, or take the risk of further congesting it, thereby sending up the value of land enormously and making cargo business impracticable on account of the enormous expense. Precise details had not been gone into thoroughly but Mr. Duncan assures me that the cost of developing the West Point district with wharves and transit godowns would be prohibitive. If the thing was to be done properly, it would be necessary to remove the tramway from the harbour front and so provide free access to godowns. An estimate was obtained by the Government for driving a short length of road at Western Market in order to join Des Voeux Road Central and Des Voeux Road West, and it was estimated that it would cost \$4,500,000 merely to resume the land. If the scheme actually went forward, it would probably cost a much greater sum. If enormous costs were to be piled up in this way, it would be impossible to make any harbour scheme profitable".

Nevertheless, to decide definitely whether development in this area is practicable by reclamation and the erection of transit sheds and warehouses thereon so that the existing front road would become a back road and congestion be thereby relieved, I had 39 borings of the harbour bottom taken between the Western Market and Kennedy Town. The minimum and maximum depths reached were 63' 7" and 118' 9", respectively, below the level of L.W.O.S.T., the minimum and maximum penetration mostly in very soft mud being 28' 0" and 83' 0", respectively, below the surface of the harbour bottom. The depths at which suitable foundations exist varies from 50 feet to 100½ feet below L.W.O.S.T. The present depth of water in this vicinity is about 24 feet at L.W.O.S.T.; having regard to future requirements this depth is not considered sufficient. Whilst it is susceptible of improvement, it would be necessary to dredge a channel from the China Merchants' Pier to Sulphur Channel; but such dredged channel, in my opinion, could only be maintained at a high recurrent cost. For the foregoing reasons, an economic and practicable scheme on this portion of the harbour front can not be designed. Provision for the economic handling of the rice, sugar and flour trades must therefore be made at another locality and if possible, on the Hongkong side of the harbour on which side business in these commodities is largely carried on.

Hongkong (Central)

The large passenger and cargo trade with riverine ports, local ferry services and an amount of local trade, are centred between the Western and Central Markets. These trades should continue to be carried on in this locality which is best suited for them, and where economic provision can be constructed to accommodate the craft engaged and to better regulate the passenger traffic and improve the present congestion on Connaught Road Central.

Drawing
No. 2.

Hongkong (Causeway Bay and Kennedy Town).

Under the present system of importing frozen meat, delivery is taken by junks and lighters from ships moored in the stream and conveyed to cold storage at Causeway Bay. Delay, exposure and frequent man handling of frozen meat should be eliminated as far as possible in its importation. No provision exists on the Hongkong side of the harbour whereby steamers, engaged in the importation, for slaughter, of live cattle, sheep and swine, can go alongside wharves convenient to lairage. The method at present adopted

Drawing
No. 2.

is for vessels to moor in the stream, the animals being disembarked by junks and driven through the crowded thoroughfares to the slaughter houses which are so situated that fresh meat to be placed in cold storage has to be transported a considerable distance. The question of reconstructing and extending the Cattle Dépôt on its present site at Kennedy Town has been under consideration and a scheme involving an expenditure of \$565,000.00 has been recommended recently by the Public Works Department. It is considered that, in the scheme of Port Developments, berthage should be provided for vessels importing live cattle and frozen meat. Lairages, slaughter-house and cold storage should be provided in close proximity to the wharves: In this respect the above sum could be utilized in re-provisioning.

Hongkong (North Point).

Drawing
No. 2.

The business at present carried on in this locality is confined mostly to handling oil in bulk. For this purpose the Asiatic Petroleum Company have provided a pier with pipe lines and also a small basin for the accommodation of oil carrying lighters. For the importation of fuel oil in bulk the design of the installation is satisfactory and it is situated advantageously for the bunkering of vessels, having regard to the scheme for the development of North Point foreshore, (referred to later in this report).

Kowloon and Blackhead Points.

Drawing
No. 2.

General cargo is largely dealt with at the piers of the Hongkong and Kowloon Wharf & Godown Co. and at Holt's Wharves. As these localities seem suitable for dealing with general cargo, any schemes for its more efficient handling may be centred in these neighbourhoods, there being no considerations which preclude development on economic lines.

Kowloon (Yaumati, Taikoktsui and Lai Chi Kok).

Drawing
No. 2.

With the exception of that imported by the Admiralty, and by local industrial and shipping companies, coal is handled by lighters and temporary coal yards exist at many points on the harbour front. On completion of works now under construction the storage will be located at Yaumati and Lai Chi Kok, one berth being provided at the latter to enable colliers to give direct discharge to the storage ground there. The cost of handling coal to and from Yaumati is expensive and Lai Chi Kok is distant from the shipping centre. Recommendations are therefore made, (later in this report), for the provision of up-to-date accommodation in localities more convenient to the shipping centre, which provision will allow of more economic bunkering of vessels than can be accomplished by the facilities at present existing and under construction.

On the Kowloon side of the harbour,—excluding consideration of the Admiralty's oil installation near Yaumati,—oil imported is discharged and stored at Taikoktsui, by the Asiatic Petroleum Company and at Lai Chi Kok, by the Standard Oil Company of New York. Although the designs of these installations are satisfactory for the economic discharge of oil fuel imported, they are too distant and at too low levels to enable economic bunkering of ships from pipe lines connecting the installations and the wharves recommended in the Hung Hom Bay and Kowloon Point schemes. As bunkering by lighters is costly, it is considered that, in connection with the schemes referred to, provision should be made for an oil fuel installation in their vicinity.

Ferry Services.

Drawing
No. 2.

The routes of the existing services and the points on the Hongkong and Kowloon sides of the harbour between which the ferries ply, are shewn on Drawing No. 2. With the exception of the Star Ferry boats, other ferries berth at Victoria at various points between the Central Market and Eastern Street. To overcome as far as possible the disadvantages of the present arrangements such as congestion on Connaught Road, difficulty of control and the crossing of ferry routes, recommendations are made later in this report for the provision of more satisfactory accommodation. With the exception of new provision to be made at the end of Jordan Road for vehicular ferries, it is not proposed to make recommendations in regard to new accommodation on the Kowloon side of the harbour or at Shaukiwan on the Hongkong side pending the completion of projected works.

TYPHOON SHELTER FOR SMALL CRAFT IN RELATION TO WHARFAGE.

The present method of handling cargo is largely dependent on junks and lighters which require to seek shelter in the Harbours of Refuge at Causeway Bay and Mongkok-tsui when typhoon warning signals are hoisted. It happens, invariably, that small craft do not return to work for some time after the signals have been lowered, thus causing great delay to shipping. Although the areas of these shelters are sufficient to accommodate all small craft, it is considered that a very necessary provision in any scheme of wharfage would be shelter from typhoon weather for junks and barges in order that work may be continued as long as possible and be resumed as soon as weather conditions permit.

Drawing
No. 2.

FACILITIES FOR SHIP REPAIR.

In regard to ship repair facilities in the Ports of the Colony, it is considered that the present accommodation together with that under construction and projected will meet the needs of shipping for many years to come. It is therefore not proposed to recommend the provision of any extension.

This concludes reference to the most important of many considerations which have determined the location, design and order of present importance of the Schemes of Port Development described in the following Section of this report.

SECTION III.

SCHEMES OF DEVELOPMENT AND EXTENT OF WORKS
RECOMMENDED FOR IMMEDIATE CONSTRUCTION.

DEVELOPMENTS OF THE HARBOUR FRONT IN GENERAL.

IMPROVEMENTS OF THE HARBOUR GENERALLY.

Schemes of Development and Extent of Works Recommended for Immediate Construction.

GENERAL.

Whilst, as already stated, it would seem that 17 additional berths might be required for the more economical handling of the import trade of the Port, the programme of Port Development works to be constructed by Government in the near future must necessarily be limited to the amount of berthage which there is no doubt would either become immediately remunerative or the return of the cost be assured by the disposal of land reclaimed in connection with its construction. Otherwise, to secure a return on the capital expense involved in the construction of berthage in excess of that taken up, would necessitate either the levying of higher charges for the use of that portion taken up or increased taxation on shipping. The latter may not only result in driving away existing trade but discourage new trade. The extent of the works recommended for immediate construction is therefore limited by these considerations.

The locations of the various Schemes of Development designed to meet the present and possible future needs of the shipping and trade of the Port are shewn on Drawing No. 3. With regard to the order of precedence of the construction of the individual schemes, the sections shewn coloured light pink cross-hatched darker pink, if required, may be proceeded with at any time. In the individual schemes the construction of the portions shewn coloured yellow should not be proceeded with until the sections shewn coloured pink have been completed, except the reclamation of the area shewn coloured yellow and cross-hatched pink, on Drawings Nos. 3, 8 and 9.

Drawing
No 3.

This report does not deal with the actual construction of railways on the wharves, the supply of cargo-handling equipment, electric power and light, or the provision of pipe lines on the wharves for water-supply and oil bunkering, as these items can be dealt with as occasion arises.

Roads.

For economic road transport, serviceable and adequate road communication is essential, and as it is probable that the growth of motor transport will increase very rapidly when new berthage is brought into operation, I therefore recommend that immediate consideration should be given to the strengthening, where necessary, of all roads required to carry heavy traffic. In order that it may not be necessary to close down any section of wharfage for road repairs and to obviate high maintenance costs, the design of the wharf roads will require special consideration. By the completion of works now under construction and those recommended in this report, it is considered that adequate road access will be provided to the new wharfage.

Warehouses.

With the exception of the structures referred to in the Hongkong Central and the Kennedy Town schemes, it is not proposed to make any recommendations with regard to warehouses as the type of each individual building to be erected is a matter which will require to be considered in connection with its particular use.

NORTH POINT.

Description of Scheme.

As an economic and practical scheme cannot be designed at West Point for the handling of the trade now carried on there and at the same time relieve congestion on that section of the harbour front, a more suitable location has to be found. On the Island side of the harbour, it is considered that North Point foreshore is the only place where not only suitable berthage can be constructed but also sufficient area of land can be provided at reasonable costs for the carrying on of this trade. With the exception of flour, the commodities handled at West Point are imported principally by coaster, so that the major portions of the works to be constructed at North Point should be designed to accommodate this class of vessel: *i.e.*, a depth of 30 feet of water alongside quay walls at L.W.O.S.T. should be provided. As it is also proposed to accommodate the import trade in flour, a section of this scheme should be designed to allow ocean-going

Drawings
Nos 3, 5
and 11.

steamers to berth alongside. In this connection it is considered that a depth of water of 34 feet at L.W.O.S.T. will be sufficient.

In regard to the accommodation required for coaster-steamers, lengths of quay wall aggregating 1,693 feet are now under construction by private enterprise. It will be seen from Drawing No. 5 that a further 3,000 feet length of quay wall is designed for the accommodation of this class of vessel making a total berthage for coaster-steamers, of 4,693 feet. In continuation of this accommodation, 1,500 feet length of berthage is designed for ocean-going steamers.

The width of road between the face of the quay wall and the "transit warehouses" is 35 feet. This is found to be a suitable width for the economic handling of cargo and is considered ample in view of the provision of a road 75 feet in width at the rear of the "transit warehouses" which are 120 feet in width. The easterly section of this 75 feet road for a length of about 2,785 feet is margined by a basin 160 feet in width, having depths of water of 12 feet and 15 feet at L.W.O.S.T. for the accommodation of junks working cargo, launches and other small craft for the shelter of which during typhoon weather a protecting arm is provided. For the convenience of road transport a bascule bridge connects the two sides of the junk basin about the middle of its length. On the south-easterly side of this basin provision has been made for the repair of Government craft, for the storage of coal and firewood, and an area reserved for police and fire stations, Government stores and for housing excise officers and also men engaged in the repair dépôt.

With regard to the layout of the land,—excluding areas reserved for "transit warehouses" and open spaces; areas for the storage of coal and firewood; and for Government purposes; there are shewn areas marked "Storage Warehouses" and other areas shewn coloured pink and yellow which aggregate a total of about 830,400 square feet. Before any of the latter areas are alienated, special consideration should be given to the requirements of the trade for which this scheme is designed and the manner in which it may be conducted.

Summarized particulars of the North Point Scheme, including wharfage now under construction, but excluding provision for the repair of Government craft, and for the storage of coal and firewood, are as under :—

LOCATION OF WHARFAGE.	QUAY LENGTH FOR		DEPTH OF WATER AT L.W.O.S.T. FOR		REMARKS.
	STEAMERS.	JUNKS.	STEAMERS.	JUNKS.	
	feet.	feet.	feet.	feet.	
At M. Ls. 430 and 431 (under construction)	1,693	—	30	—	The widths of wharves and the dimensions of "transit warehouses", open storage spaces, junk basins, &c., are shewn on Drawing No. 5.
Extension shewn coloured Pink on Drawing No. 5	1,500	—	30	—	
Further Extensions shewn coloured yellow on Drawing No. 5	1,500	2,470	30	12	The Extensions shewn coloured Pink and Yellow will provide for 9 steamers berthing simultaneously.
	1,500	880	34	12	
		1,040		15	
	6,193	4,390			
	1.17 mile.	0.83 mile.			

Type of Construction.

With regard to the actual construction and carrying out of the scheme, I recommend that the quay walls both for the accommodation of steamers and junks be constructed in blockwork founded on rubble mounds deposited in trenches dredged to depths at which suitable foundations exist. The blockwork construction should be brought up to the level of about 3 feet above L.W.O.S.T. and the wall completed in masonry faced with granite ashlar. To prevent damage to steamers moored alongside the quay, the face of the wall should be provided with wood fenders. The actual construction of the breakwater arm at the south-eastern extremity of the scheme should be carried out to a design somewhat similar to that of the breakwater at Mongkoktsui Harbour of Refuge.

A typical cross section of the scheme is shewn on Drawing No. 11.

Extent of Works recommended for immediate construction.

The extent of works recommended for immediate construction is that portion of the scheme shewn coloured pink on the drawings. The carrying out of this section will provide 1,500 feet length of berthage for coaster steamers and on the layout of the land as designed will provide areas for building and open storage aggregating about 784,450 square feet. Pending construction of the second section shewn coloured yellow on plan, it is proposed to protect the eastern boundary of the area shewn coloured pink by the rubble mound foundation and one side wall of a future nullah.

The estimated cost of constructing berthage accommodation, constructing portion of nullah works, reclaiming the area shewn coloured pink, and dredging (to a depth of 30 feet below L.W.O.S.T.) the area of approach channel shewn coloured light pink cross-hatched in red dashes, including 10 per cent for contingencies, is as follows:—

Quay Wall	\$ 2,200,000.00
Nullah Works	390,000.00
Reclamation	560,000.00
Dredging	130,000.00
	<hr/>
	\$ 3,280,000.00
	<hr/>

This estimated cost, apportioned over the areas of land available as building sites and for open storage, aggregating about 784,450 square feet, amounts to \$4.18 per square foot which is considered well within the market value of land in this locality.

HONGKONG CENTRAL.—(LOCAL PASSENGER & CARGO DEPÔT, FERRY PIERS, &c.).

Description of Scheme.

The scheme which is shewn on Drawings Nos. 3, 8, 9 and 10 is designed to accommodate the local passenger and cargo trade, ferry services, &c., and to satisfy the requirements for its better control and extends from near Douglas Street to the Western Market, over which length of about 2,960 feet of frontage economic construction is possible.

Drawings
Nos. 3, 8, 9
and 10.

With regard to its design, it is proposed to reclaim about 150 feet seaward of the existing praya wall and from the new sea wall to project piers. The area reclaimed will provide for the accommodation required by the trades to be carried on under this scheme and allow for the widening from 75 feet to 124 feet of Connaught Road. At the eastern end of the scheme, it is proposed to accommodate the Eastern and Central Ferry Services and the handling of mails by the General Post Office. Six berths are provided for ferry boats, one of these berths being designed in the form of a dock for the use of boats engaged in the carrying of both passengers and vehicles. One berth is provided for the use of the G.P.O. At the western end of the scheme, it is proposed to accommodate the Western Ferry Services for which three berths are provided. By this arrangement the routes of ferry services will not pass through an area which is likely to be used extensively by other craft.

Adjoining the eastern ferry piers, provision is made to accommodate the present river passenger and cargo trade by the construction of five piers 300 feet in length, 40 feet in width and 200 feet apart, the width of the piers being divided by a close partition, giving each vessel a wharf about 20 feet wide. In order to provide for the better control of cargo, one storey transit sheds, 70 feet wide and of a length of 90 feet per berth, are arranged for its reception. In regard to the passenger trade, provision is made for a central booking office and waiting rooms on the ground floor, the passengers being subject to police and medical inspection on leaving the waiting rooms. The searching rooms are situated on the first floor. Passengers, after having passed through them, proceed along a passage-way over the top of the transit sheds and downstairs to the particular berth at which they wish to embark. In-coming passengers ascend to another passage-way which likewise passes over the transit sheds to the searching rooms. On leaving them, passengers pass down stairs for medical and police inspection and thence to a passage leading to the street. The design of the arrangements is such that in-coming and out-going passengers can be prevented from communicating with each other except when in the searching rooms. Passengers and cargo can also be separated entirely if the scheme is operated as arranged; viz.:—that the discharge of cargo should not be commenced until the passengers have entered the passage-ways leading to the searching rooms and the loading of cargo should cease before gates are opened to admit passengers to the piers from the passageways leading from the searching rooms.

Whatever decisions may be taken in regard to leasing out the accommodation, it is recommended that Government should control the arrangements for regulating the local passenger and cargo trade.

A considerable portion of the new frontage is reserved for public use, convenient access being given by roadways between the transit sheds.

To the west of the five piers referred to, a pier 160 feet long and 42 feet wide and warehouse and office accommodation on a space 140 feet long and 80 feet wide are arranged for the use of the Imports and Exports Department, adjoining which, a pier 160 feet long and 38 feet wide is arranged for the use of craft operated by the Harbour and Police Departments.

To provide for expansion in the local passenger and cargo trade, three piers of the same size together with similar arrangements as those already recommended for the carrying on of this trade have been laid out to the westward of the pier designed for the use of Harbour and Police Departments' craft. In continuation of this system of piers and adjoining the Western Ferry Services, a pier about 160 feet in length and 42 feet in width is recommended for the landing of building materials and an area 195 feet in length and 70 feet in width reserved on the new reclamation for their temporary storage. Provided the storage time is limited, strictly to that necessary to remove the materials to their destination, it is considered that this area will be sufficient.

Type of Construction.

In regard to the Eastern and Central Ferry Services' accommodation, the ferry berths which form the arms of the vehicular ferry boat basin should be constructed in re-inforced concrete, all other ferry boat berths and also that for Post Office launches being formed by quay walls, (similar to that recommended in the North Point Scheme), constructed in blackwork on a pell-mell rubble mound, the latter being founded by dredging to depths at which suitable foundations exist. The depths of water to be provided alongside quay walls should be 12 feet at L.W.O.S.T., with the exception of that for vehicular ferry boats which should be 15 feet. Selected filling material should be used to reclaim the area within these quay walls. Two storied buildings on this reclamation provide office and passenger waiting accommodation for the ferry services, the ground floor being reserved for 2nd and 3rd class passengers and the first floor for 1st class passengers. Provision is made for embarking and disembarking by double-decked ramps which will be raised and lowered by mechanical power according to the rise or fall of the tide. In the case of the vehicular ferry service ramp, the lower deck is 25 feet wide and provides a central passage-way 10 feet in width for vehicles, and two passage-ways each about 6 feet in width for passengers. In front of the building

ample area is reserved for the accommodation of road traffic. Opposite the Post Office berth an area is reserved for a shed in which mails may be handled. A sketch front elevation of the building and a type longitudinal section through the vehicular ferry ramp are shewn on Drawing No. 10.

In regard to the Western Ferry Services' accommodation, it is proposed to construct the berths in reinforced concrete, a rubble mound to the level of L.W.O.S.T. with a pitched slope superstructure being provided to protect the reclamation on which the berths abut. The arrangements providing for the passenger traffic are similar to those proposed for the Eastern and Central Ferry Services.

It is proposed to construct all piers, recommended in this scheme, in reinforced concrete and to increase their stability and also that of the reinforced concrete work carried out at the ferry berths, by the deposition of pell-mell rubble around the piles, brought to a level of 20 feet below L.W.O.S.T. Due to the higher maintenance cost of reinforced concrete construction as compared with solid quay walls, the latter has been considered as an alternative type of construction; the much higher initial cost and the obstruction it would cause to the free flow of tidal currents preclude its adoption.

The carrying out of the reclamation should proceed continuously until completed, the type of construction for the new sea wall being similar to that of the existing wall on this frontage. The reinforced concrete piles to support the approaches to all piers should be driven before the work of depositing pell-mell rubble for the new sea wall foundations is commenced. Selected material should be used as filling for this reclamation.

A sketch elevation of the scheme fronting Connaught Road, together with cross sections through searching room and "transit warehouse" and also a side elevation of one of the river-boat piers are shewn on Drawing No. 10.

Extent of Works recommended for immediate construction.

The sections of the scheme which it is recommended should be developed for immediate use are those shewn coloured pink on Drawings Nos. 3, 8 and 9.

The estimated cost of carrying out the works recommended including 10 per cent. for contingencies is as follows:—

Reclamation of the areas shewn coloured pink and yellow cross-hatched pink (about 465,000 square feet) including the cost of the sea wall	\$1,370,000.00
(equivalent to \$2.95 per square foot of area reclaimed).	
Eastern and Central Ferry Services' accommodation including the erection of buildings and ferry ramps, &c.	1,400,000.00
Berthage and shed accommodation for the use of the General Post Office	170,000.00
Western Ferry Services' accommodation, including the erection of buildings and ferry ramps, &c.	370,000.00
Five piers for the use of river passenger and cargo steamers ...	2,180,000.00
"Transit Warehouses"	580,000.00
Central booking offices, searching rooms, passage ways to piers, barriers, gates, &c.	595,000.00
Customs Pier	145,000.00
Customs warehouse and office accommodation, (building 140 feet × 80 feet and 3 storeys high)	345,000.00
Harbour and Police Pier	125,000.00
Pier for handling building materials	160,000.00
	<hr/>
	\$7,440,000.00

VEHICULAR FERRY PIER AT JORDAN ROAD, KOWLOON.

Projected ferry Routes.

Drawings
Nos. 3, 8
and 9.

The projected routes for ferry services are shewn on Drawing No. 3, that of the combined passenger and vehicular service being between the new Eastern and Central Ferry Services, Hongkong, and the end of Jordan Road, Kowloon. The provision, at Jordan Road, of the accommodation shewn on Drawings Nos. 8 and 9 will serve the district now using the Yaumati ferry. The existing ferry pier at Public Square Street, Yaumati, will then become available for public purposes.

Description.

By the resumption of a portion of Kowloon Marine Lot No. 49 and reclaiming strips of land about 80 feet wide to the south of and about 50 feet eastward,—at the end of,—Jordan Road, sufficient area will be obtained for the requirements of the vehicular and passenger traffic. Two arms extending in a south-westerly direction form a basin within which the vehicular ferry boats will berth. Whilst the basins and ramps have been designed for boats 120 feet in length with a lower deck width of 45 feet to carry vehicles and 2nd and 3rd class passengers and to carry 1st class passengers on the upper deck, the design can be modified to suit whatever size of boat that may be decided upon. The buildings, provision for embarking and disembarking, accommodation of road traffic, &c., are similar to that recommended in connection with this service on the Hongkong side.

Type of Construction.

The formation of the additional land required should be carried out as an ordinary type reclamation. The arms forming the basin should be constructed in reinforced concrete, the piles over the base of the sea wall rubble mound being driven before pell-mell rubble is deposited. The deposition of pell-mell rubble around the piles, as recommended previously, should extend over the whole length of the arms.

Extent of Works recommended for immediate construction.

It is recommended that the whole of the construction in connection with the Vehicular Ferry Service at the end of Jordan Road should be proceeded with immediately.

The estimated cost of the works recommended including 10 per cent. for contingencies and including the resumption of a portion of K. M. L. No. 49 is as follows:—

Resumption of about 15,000 square feet of K. M. L. No. 49 @ \$8.00 per square foot	\$ 120,000.00
Reclamations including the cost of the sea walls	145,000.00
Ferry Service accommodation including the construction of reinforced concrete arms forming the basin, the erection of buildings and ferry ramps, subway for rickshaws, &c., but not including for the cost of erecting car stands	425,000.00
	<hr/>
	\$ 690,000.00
	<hr/>

KENNEDY TOWN.

Description of Scheme.

Drawings
Nos. 3, 6,
and 11.

To provide better facilities for the disembarking of cattle, sheep and swine imported for slaughter purposes, also convenient lairages for their reception, with slaughter house and cold storage in close proximity, &c., it is proposed to reclaim Kennedy Town foreshore for an average depth of about 200 feet and extending westward from Cadogan Street for a distance of about 2,470 feet; also to construct a wharf 350 feet in length having a depth of 30 feet of water alongside at L.W.O.S.T. which is considered sufficient

for any vessel engaged in importing animals for slaughter. A ramped berth 90 feet in length having a depth of 12 feet of water alongside at L.W.O.S.T. will accommodate the smaller craft engaged in this trade. A T-shaped pier extending seaward of the sea wall for a distance of about 70 feet, with a berthage length of about 100 feet and two mooring dolphins about 100 feet on either side are provided opposite the area reserved for cold storage for the delivery of frozen meat from ships. This amount of wharfage is considered sufficient for the meat trade to be dealt with in this locality. A site of further wharfage is shewn on Drawing No. 6 should such be required in connection with the carrying on of any other business on this reclamation.

By carrying out this reclamation building areas of about 458,000 square feet to the north and about 107,250 square feet to the south of the new alignment of Jubilee Road become available for development. In regard to the former area which abuts on the new sea front, it is proposed to utilize the western portion for a Cattle Dépôt, comprising lairages, slaughter-house, chill room, crematorium, offices, stores and Asiatic staff quarters; and also for a poultry-market, dogs' home and disinfecting station. Two storey lairages providing floor areas of about 300,000 square feet are recommended, which accommodation will provide for housing 1,750 head of cattle, 600 sheep and 3,000 swine. On the eastern portion, areas of about 83,600 square feet and about 16,500 square feet are reserved for cold storage and opium refinery, respectively. The remaining areas on the reclamation about 95,650 square feet and about 35,750 square feet, also the areas to the south of the New Jubilee Road become available for other purposes.

Type of Construction.

It is proposed to construct the 350 feet steamer berth and the 90 feet ramped berth in blockwork on rubble mounds founded by dredging to depths at which suitable foundations exist, the mounds being brought up to levels of 30 feet and 12 feet respectively below L.W.O.S.T. Due to the great depths at which suitable foundations exist on the eastern frontage of the reclamation, the construction of berthage in blockwork would be too costly. The T-shaped pier, dolphins and any other berthage required, should therefore be carried out in reinforced concrete, the piles being driven before the pell-mell rubble,—to form the foundation of the sea wall,—is deposited. With the exception of those portions of the frontage where quay walls are to be constructed, it is proposed to protect the reclamation by the construction of an ordinary type sea wall founded on a rubble mound brought up to the level of L.W.O.S.T. By cutting back to form the new alignment of Jubilee Road and forming the areas shewn to the south of same, it is estimated that sufficient material will be obtained to fill in the area to be reclaimed.

A typical cross section of the scheme is shewn on Drawing No. 11.

Extent of Works recommended for immediate construction.

It is recommended that the whole of the works described and shewn coloured pink on Drawing No. 6 should be proceeded with immediately, with the exception of the re-inforced concrete wharf, shewn cross-hatched in pink, which should only be proceeded with if additional wharfage is required in this locality.

The estimated cost of the works recommended including 10 per cent. for contingencies is as follows:—

Quay Wall having a depth of 30 feet of water alongside at L.W.O.S.T. and Returns.....	\$ 540,000.00
Quay Wall having a depth of 12 feet of water alongside at L.W.O.S.T. and Returns.....	65,000.00
T-shaped Pier and mooring Dolphins.....	115,000.00
Reclamation including the cost of Sea Walls...	900,000.00
Dredging Approach to Quay wall ..	6,000 00
	<hr/>
	\$ 1,626,000.00
Carried forward.....	<hr/>
	\$ 1,626,000.00

Brought forward..... \$ 1,626,000.00

This cost, apportioned over the whole of the building areas, aggregating about 565,250 square feet, formed to the north and south of the New Jubilee Road, is equivalent to \$2.88 per square foot.

Reprovisioning on the reclamation; Cattle Dépôt Disinfecting Station, Opium Refinery, &c.

Cattle Dépôt	3,210,000.00
Poultry Market, Disinfecting Station, &c.	545,000.00
Opium Refinery	135,000.00
	<hr/>
	\$ 5,516,000.00

By the re-provisioning recommended, the present Cattle Dépôt site at Kennedy Town, shewn edged and coloured indigo blue on Drawing No. 6 and the site of the Disinfecting Station below Caine Road (near No. 8 Police Station) valued at \$1,155,000.00 and \$200,000.00 respectively, will become available for disposal\$1,355,000.00

The new areas of land formed and not required for re-provisioning are valued at \$1,505,000.00 to the north and \$643,000.00 to the south of New Jubilee Road 2,148,000.00

Estimated Amount recoverable by disposal of land \$ 3,503,000.00

Resultant Cost to Government by carrying out this scheme... \$ 2,013,000.00

HUNG HOM BAY.

Description of Scheme.

Drawings
Nos. 3, 4
and 11.

In April, 1923, Messrs. Butterfield and Swire made application for additional berthing accommodation to the extent of 1,200 feet to the north of Messrs. Alfred Holt & Co.'s present wharfage. The south-west portion of the Scheme shewn coloured light pink and cross-hatched in darker pink on Drawings Nos. 3 and 4 will allow for extending, by 80 feet, the present berthage, making Holt's East Wharf 550 feet in length. Extending in a northerly direction, a length of 1,300 feet of additional wharfage, having a depth of 34 feet of water alongside at L.W.O.S.T., may be constructed and for the purpose of erecting "transit warehouses" contiguous with the wharfage, sufficient area of land can be provided by reclamation.

With regard to the principal portion of the scheme shewn coloured pink and yellow, it is proposed to reclaim areas adjoining the railway reclamation and to project from the new reclamation three jetties in an easterly direction. These jetties together with a quay wall protecting the northern area of new reclamation form a ship basin 1,200 feet long and 400 feet wide, having berthage 2,400 feet in length with a depth of 34 feet (or if required 36 feet) of water alongside at L.W.O.S.T. and two junk basins 160 feet wide, having berthage of about 4,240 feet in length, with a depth of 12 feet of water alongside. The Southern area of the new reclamation will be protected by a quay wall 1,200 feet in length with a depth of 34 feet of water, in continuation of which Jetty No. 1 having the same depth of water on its south side and 12 feet on its north side extends for a distance of 1,250 feet. The continuation of this jetty in a north-easterly direction provides on its south-east side 900 feet of berthage and on its north-west side

750 feet of berthage with a depth of 36 feet of water alongside. Jetty No. 4 projected in a south-easterly direction from the extremity of the quay wall protecting the northern area of new reclamation provides for 420 feet of berthage on its inner side and 500 feet of berthage on its outer side, having a depth of 30 feet of water alongside at L.W.O.S.T. Jetties Nos. 1 and 4 will protect the ship and junk basins from typhoon seas and afford excellent shelter for small craft. An opening 430 feet wide between the ends of these jetties forms an entrance to the basins. Drawing No. 4 illustrates tentative proposals for railway sidings and lines running on to the quays. The extent of area and depths to which dredging will require to be carried out are also shewn on this drawing. It is not considered that tidal currents will cause any difficulties to ships coming alongside or leaving the wharves proposed.

Whilst Hung Hom Bay, due to its sheltered position and depth of water in the approaches offers the best site on the harbour front for the provision of wharfage with which,—if required,—railway communication can be readily given, the taking up of any berthage is not yet assured; and, as the cost of construction cannot be recovered by the disposal of land reclaimed in connection with the scheme, it is proposed to only indicate the order in which instalments of the works may be carried out and to give Estimates of their cost.

In order to provide for the discharge and storage of imported coal and oil fuel, it is proposed to utilize the north-east corner of Hung Hom Bay shewn coloured light pink cross-hatched darker pink on Drawings Nos. 3 and 4 and a portion of higher ground to the north of same, the site of which is indicated on Drawing No. 3, and will be used for the erection of oil tanks.

In regard to the arrangements for the handling and storage of coal, it is proposed to provide storage areas on each side and to the north of a basin 250 feet wide and of an average length of about 562 feet, having berthage of about 1,375 feet and to be dredged to a minimum depth of 12 feet at L.W.O.S.T. Convenient access is given by road to these storage areas. For berthing colliers, two piers, each 350 feet long, 40 feet wide and 250 feet apart, having a depth of 30 feet of water alongside, are provided, one on either side of the entrance to the coaling basin. The design is suitable for the erection of mechanical conveyors whereby coal may be delivered direct from colliers to the storage areas or loaded to craft at the piers or in the basin, thus providing for the more economical handling of this trade. The storage area will accommodate 75,000 tons of coal which, excluding the stocks of local industrial and shipping companies, is approximately the normal amount stored in the Colony; and in view of the fact that the percentage of ships using oil fuel is increasing, it is considered that this storage capacity will be sufficient unless the recovery of coal in South China is found to be of commercial importance, in which case additional provision will be required. For this purpose, the area of Tai Wan shewn coloured yellow and marked "Proposed future Reclamation" on Drawings Nos. 3 and 4 should be reserved, there being no considerations which preclude economic development of the sea bed adjoining this area.

It is anticipated that sufficient accommodation can also be provided in this locality to deal with any ores that may possibly be imported by rail. The necessary land should be reserved for railway communication. A line proposed by the Town Planning Committee is shewn on Drawings Nos. 3 and 4.

A strip of land 15 feet wide alongside the 60 feet road to the west of the coal storage areas is reserved for pipe lines connecting with the oil storage tanks. At the seaward end, the pipes will be laid on a pier 300 feet long and 40 feet wide, having a depth of 30 feet of water alongside. This pier together with a dolphin provides berthing accommodation for two oil tankers, which may discharge the oil fuel direct to the storage tanks. The proximity and elevation of the latter should admit of the satisfactory oil fuel bunkering of vessels alongside berths at Hung Hom Bay or Kowloon Point.

Summarized particulars of the Hung Hom Bay Scheme,—excluding provision for coal and oil fuel,—are as under:

LOCATION OF WHARFAGE.	QUAY LENGTH FOR		DEPTH OF WATER AT L.W.O.S.T. FOR		REMARKS.
	STEAMERS.	JUNKS.	STEAMERS.	JUNKS.	
	feet.	feet.	feet.	feet.	
Extensions at Holt's Wharf.....	1,380	—	34	—	The widths of Jetties and Wharves and the dimensions of "transit warehouses", open storage spaces, ship and junk basins, &c., are shewn on Drawing No. 4.
At Southern Area of New Recla- mation	1,200	—	34	—	
Jetty No. 1	1,250	1,205	34	12	
	1,650	—	36	—	
Jetty No. 2	1,200	1,100	34 or 36	12	The Scheme provides for about 15 steamers berthing simultaneously.
Jetty No. 3	1,200	900	34 or 36	12	
Jetty No. 4	920	—	30	—	
At Northern Area of New Recla- mation	—	1,035	—	12	
	8,800	4,240			
	1.66 mile.	0.80 mile.			

I have ascertained that the Hongkong and Whampoa Dock Company desire to construct a pier for the handling of heavy machinery near the entrance to the New Graving Dock now under construction. The position and extent of area which may be occupied for this purpose, without prejudicing this scheme of development, is shewn coloured light pink cross-hatched darker pink on Drawings Nos. 3 and 4.

Type of Construction.

It is recommended that all the quay walls in this scheme be constructed in blockwork with ashlar-faced masonry superstructure. It will be found possible by dredging to found portions of the quay walls upon natural ground; and where hard ground is not obtained at suitable depths to be reached by the blockwork, the walls should be founded on pell-mell rubble mounds deposited in trenches dredged to depths at which suitable foundations do exist. A pitched slope superstructure founded on a rubble mound brought to the level of low water will protect the south side of the coal dépôt and the frontage adjoining Jetty No. 4. In regard to the three piers and dolphin, it is proposed to carry out their construction in reinforced concrete: Groups of steel piles encased in concrete and suitably braced above low water level will carry an ordinary type reinforced concrete decking. The piles over the base of the mound referred to should be driven before pell-mell rubble is deposited. Selected filling material should be used to fill in the spaces between the walls of the jetties and also behind all other quay walls for a distance of about 250 feet where the widths will allow. The remaining areas of reclamation may be filled in with material dredged in connection with the carrying out of the scheme, the surplus being deposited within the areas of proposed further reclamation at Shamshuipo. Having regard to the development of the reclaimed areas, careful consideration will require to be given to the question of lower initial cost of reclamation by the deposition of dredged material as against the higher initial cost by the use of more suitable filling.

A typical cross section of the scheme is shewn on Drawing No. 11.

Estimates of Cost.

(a) *Coal Dépôt, &c.*

The construction of the coal dépôt including provision for berthing oil tankers may be proceeded with at any time independent of the carrying out of the rest of the scheme. The estimated cost of the works involved including 10 per cent. for contingencies is as follows :—

Reclamation including protective works on the south and west sides	\$ 265,000.00	
Formation of basin by dredging and including cost of constructing quay walls	755,000.00	
Two coaling piers	730,000.00	
Dredging; excluding the cost of dredging which it will be necessary to carry out in connection with the principal portion of the scheme for the development of this Bay	150,000.00	
		\$ 1,900,000.00
Apportioning this sum over the area, about 389,300 square feet, provided for the storage of coal, it is equivalent to a unit cost of \$4.88 per square foot.		
Oil fuel pier and dolphin		320,000.00
Dredging; excluding the cost of dredging which it will be necessary to carry out in connection with the principal portion of the scheme for the development of the Bay ...		70,000.00
		<u>\$ 2,290,000.00</u>

(b) *Wharfage adjoining Holt's Wharf.*

The construction of the wharfage and area of reclamation adjoining and to the north of Holt's wharves (shewn coloured light pink cross-hatched darker pink on Drawings Nos. 3 and 4) may be carried out at any time independent of the carrying out of the rest of the scheme. The estimated cost of the works involved including 10 per cent for contingencies is as follows :—

Quay Walls.....	\$ 2,025,000.00
Reclamation	190,000.00
Temporary protective works, the cost of which will be saved if this wharfage is carried out simultaneously with the adjoining portion of the scheme	85,000.00
Dredging outside line of wall	25,000.00
	<u>\$ 2,325,000.00</u>

With regard to the area shewn coloured pink, the 1,200 feet length of quay wall to the south area of reclamation and adjoining the wharfage above described together with the construction of the back area of reclamation and the 100 feet road may be proceeded with at any time independent of the rest of the scheme. The construction of Jetty No. 1 should not be undertaken until work on the quay wall to the southern area of reclamation is well in hand. This jetty may be carried out in two instalments, the first section providing berthage of 1,250 feet on its outer side and 1,205 feet on its inner side for the use of steamers and junks respectively. The second section providing 1,650 feet length of steamer berthage may be commenced simultaneously with or subsequent to the carrying out of the first section.

The estimated cost of the works involved on the area shewn coloured pink on Drawings Nos. 3 and 4 including 10 per cent. for contingencies is as follows :—

(c) *Quay Walls and South Area of Reclamation.*

Quay Wall	\$ 1,675,000.00
Reclamation of areas to be used in connection with wharfage...	320,000.00
Temporary Protective Works. It is estimated that \$80,000.00 will be saved if this wharfage is carried out simultaneously with the adjoining portions of the scheme	110,000.00
	<hr/>
	\$ 2,105,000.00
Reclamation (about 11½ acres) which includes area of the 100 feet roadway and temporary protective works.....	280,000.00
	<hr/>
	\$ 2,385,000.00
	<hr/>

Jetty No. 1.

(d) *First Section.*

Quay Wall on outer side for use of steamers	\$ 1,730,000.00
Filling in connection with jetty	215,000.00
Temporary Protective Works, the cost of which will be saved if the first and second sections were carried out conjointly	55,000.00
Quay Wall on inner side for the use of junks	610,000.00
	<hr/>
	\$ 2,610,000.00
	<hr/>

(e) *Second Section.*

Quay Walls and Return	\$ 3,010,000.00
(including heavy moorings).	
Filling in connection with jetty	175,000.00
	<hr/>
	\$ 3,185,000.00
	<hr/>

(f) *Dredging.*

Outside line of quay wall at south area of reclamation	\$ 110,000.00
Outside line of wall of Jetty No. 1 (first section)	350,000.00
Outside line of wall of Jetty No. 1 (second section) and Approach Channel	815,000.00
	<hr/>
	\$ 1,275,000.00
	<hr/>

The estimated cost of constructing the portion of the scheme shewn coloured pink on Drawing No. 4 if carried out continuously, including the cost of dredging, amounts to \$9,405,000.00 for which sum a total length of 4,100 feet of steamer berthage, having depths of 34 and 36 feet of water alongside at L.W.O.S.T., with the necessary accommodation for junks and other small craft can be provided. Apportioning this sum over the length of steamer berthage, it is equivalent to a unit cost of \$2,294 per lineal foot.

KOWLOON POINT.

Description of Scheme.

Drawings
Nos. 3, 4
and 11.

This scheme which is shewn on Drawings Nos. 3 and 4 has been designed to provide for expansion of the present accommodation for shipping at Kowloon Point and to meet the conditions outlined in Section II of this report.

I would point out, however, that the carrying out of this scheme together with that at Hongkong Central will restrict the width of the harbour and increase to some extent the speed of the tidal currents in this vicinity. It is not anticipated, however, that such currents will cause any difficulties to ships coming alongside or leaving the wharves or piers proposed.

It will be seen that the carrying out of the scheme involves the closing of the entrance to the R.N. Torpedo-boat basin and the opening of a new entrance on its north side.

It is proposed to reclaim a strip of land about 100 feet in width parallel to the present frontage road to the Hongkong and Kowloon Wharf and Godown Co.'s premises and to project, therefrom, in a south-westerly direction, four jetties forming ship and junk basins. The seaward portion of Jetty No. 1 for a length of 1,000 feet will be returned in a southerly direction and Jetty No. 4 for a length of 500 feet in a westerly direction, an opening 350 feet in width between their ends being left to form an entrance to the ship and junk basins. The jetties themselves will protect the basins from typhoon seas and afford shelter for small craft.

The re-entrant angle formed by Jetty No. 1 with the breakwater of the R.N. Torpedo-boat basin may increase sea disturbance in this vicinity during typhoon gales from a westerly direction. If found necessary the angle should be filled in by depositing 5 ton blocks pell-mell so that such seas may be absorbed.

Summarized particulars of this scheme are as under:—

LOCATION OF WHARFAGE.	QUAY LENGTH FOR		DEPTH OF WATER AT L.W.O.S.T. FOR		REMARKS.
	STEAMERS.	JUNKS.	STEAMERS.	JUNKS.	
	feet.	feet.	feet.	feet.	
Jetty No. 1	1,800	1,350	30	12	The widths of Jetties and Wharves and the dimensions of "transit warehouses", open storage spaces, ship and junk basins, &c., are shewn on Drawing No. 4.
	1,000	—	30	—	
	600	—	36	—	
Jetty No. 2	1,200	1,200	34 or 36	12	The scheme provides for about 13 steamers berthing simultaneously.
Jetty No. 3	1,200	1,110	34 or 36	12	
Jetty No. 4	{ 840	860	30	12	
	{ 500	410	30	12	
	7,140	4,930			
	1.35 mile.	0.93 mile.			

Tentative proposals for railway lines running on to the quays from sidings on land now occupied by the Military are illustrated on Drawing No. 4. It will also be seen that it is proposed to connect these sidings with the main line by a railway running under the crossing of Austin and Nathan Roads, thence along the north side of Austin Road.

Type of Construction.

It is recommended that all quay walls in this scheme be constructed in blockwork with ashlar-faced masonry superstructure, the blocks being founded on rubble mounds

deposited in trenches dredged to depths at which suitable foundations exist. The mounds should be brought up to the levels determined by the depths to be provided for the accommodation of craft alongside the wall. Selected material, which can be obtained by the levelling of the adjoining land at present occupied by the Military, should be used for all filling required in the carrying out of the scheme, dredged material being disposed of by dumping on the areas of proposed further reclamation at Sham-shuipo.

A typical cross section of the scheme is shewn on Drawing No. 11.

Estimates of Cost.

The Hongkong and Kowloon Wharf and Godown Company desire additional wharf and warehouse accommodation, their proposal for the provision of the former being the construction of a pier 700 feet long and 50 feet wide between Pier No. 1 and the R.N. Torpedo-boat basin entrance. As such a pier is not included in the form of development now submitted and the taking up of any berthage, if constructed, is not yet assured, it is not proposed to make recommendations for the immediate construction of any portion of the scheme; but, as, during the carrying out of any section, the amount of berthage now available will be reduced, temporarily, it is proposed to indicate how the scheme can be developed and at the same time the greatest possible use of the present shipping facilities be retained; also, to give estimates of cost.

Having regard to the above considerations, the following order of procedure with the work of construction is recommended:—

First Instalment.

Construction of 1,800 feet length of Jetty No. 1. This work involves the construction of the new entrance and closing of the existing entrance to the R.N. Torpedo-boat basin; also the removal of the seaward portion of Pier No. 1 to the extent of 200 feet (shewn hatched in green colour on Drawings Nos. 3 and 4), thus reducing its length to 450 feet. This pier will then provide on its south side, berthage suitable for a vessel 400 feet long whilst its north side may then be used only by junks and other small craft.

The net result of carrying out this section of the scheme will be the provision of two additional berths for steamers, permanent and temporary berthage aggregating about 2,100 feet in length for the use of junks, and additional areas on which "transit warehouses" may be constructed contiguous with the wharfage.

The estimated cost of the works involved including 10 per cent. for contingencies is as follows:—

New Entrance to R.N. Torpedo-boat basin.....	\$ 80,000.00
Closing existing Entrance.....	30,000.00
Removing a length of 200 feet of Pier No. 1	30,000.00
Quay Wall for the use of steamers,	2,415,000.00
Quay Wall for use of junks, including protection to reclamation	885,000.00
Filling in connection with jetty	245,000.00
Temporary Protective Works, the cost of which will be saved if the work of constructing the whole of Jetty No. 1 is proceeded with continuously.....	75,000.00
	<hr/>
	\$ 3,760,000.00

Second Instalment.

Construction of the seaward portion, (1,000 feet in length) of Jetty No. 1.

The net result of carrying out this section of the scheme will be the provision of three more berths and additional areas on which "transit warehouses" may be constructed contiguous with the wharfage.

The estimated cost of the works involved including 10 per cent. for contingencies is as follows:—

Quay Walls and Return (including heavy moorings)	\$ 3,545,000.00
Filling in connection with jetty	170,000.00
	<hr/>
	\$ 3,715,000.00
	<hr/>

Dredging.

Outside line of quay wall (first instalment).....	\$ 40,000.00
Do. Do. (second instalment), and Approach Channel.....	145,000.00
	<hr/>
	\$ 185,000.00
	<hr/>

The estimated cost of constructing the portion shewn coloured pink on Drawing No. 4 (first and second instalments), if carried out simultaneously, including the cost of dredging, amounts to \$7,585,000.00 for which sum a total length of 3,400 feet of steamer berthage having depths of 30 feet and 36 feet of water alongside at L.W.O.S.T. with the necessary accommodation for junks and other small craft can be provided. Apportioning this sum over the length of steamer berthage, it is equivalent to a unit cost of \$2,231 per lineal foot.

Third Instalment.

Construction of Jetty No. 4 which involves the removal of Piers Nos. 4 and 5.

The net result of carrying out this section of the scheme will be the provision of one more additional berth for the use of steamers, 1,270 feet more berthage for the use of junks, additional areas on which "transit warehouses" may be constructed contiguous with the wharfage and together with Jetty No. 1 protection of the enclosed area from typhoon seas, thus providing shelter for small craft.

The estimated cost of the works involved in carrying out this Instalment, including 10 per cent. for contingencies is as follows:—

Removing Piers Nos. 4 and 5	\$ 115,000.00
Quay Walls for the use of steamers and Returns to jetty.....	2,485,000.00
Quay Walls for the use of junks including protection to reclamation.....	975,000.00
Filling in connection with jetty	165,000.00
Dredging outside line of quay wall	2,000.00
	<hr/>
	\$ 3,742,000.00
	<hr/>

When the foregoing instalments of the scheme have been completed, 9 new berths for the use of steamers will be provided, and, of the facilities now existing, there will remain Pier No. 1 (reduced in length) and Piers Nos. 2 and 3 providing berthage for 5 steamers; thus, the provision of the total number of 14 berths for the use of steamers with berthage aggregating 3,370 feet in length for the use of junks. Whilst the construction of Jetties Nos. 2 and 3, in lieu of the piers then remaining, will result in the provision of more up-to-date accommodation, the number of steamer berths will be reduced, the net result being a reduction in the total number of berths from 14 to 13; but, there will be an increase of 1,560 feet in the length of berthage for the use of junks and there will be provided additional areas on which "transit warehouses" may be constructed contiguous with the new wharfage, with which railway communication can readily be given. The form of the design within the area enclosed by Jetties Nos. 1 and 4 is therefore submitted as an alternative to the form of Pier design now existing.

WANCHAI BAY.

General.

Drawings
Nos. 3
and 7.

Having regard to the schemes now recommended for the development of North Point foreshore, Hung Hom Bay, Kowloon Point and at Hongkong Central, it is considered that further reclamation seaward of the boundary of the works now under construction in Wanchai Bay would be to the detriment of the harbour generally. The new sea front should therefore be regarded as the final limit of reclamation, in which case permanent piers may be constructed for the accommodation of river steamboats engaged in carrying cargo.

In their Report dated 7th October, 1922, on the proposal to develop North Point foreshore for shipping, the Consulting Engineers state :—

“When our partner Sir Maurice Fitzmaurice visited Hongkong in November, 1920, he drew special attention to the danger which might result to the harbour from indiscriminate reclamation schemes. He was made fully aware of the large reclamation which at that time had been arranged for between the Naval Yard and East Point, and made certain suggestions in connection therewith”.

The suggestion to which they refer and which had not been lost sight of by me was the advisability of protecting the western entrance to the Causeway Bay Shelter from typhoon seas propagated by westerly gales. The effect of the construction of the new sea wall will be to deflect seas coming from this direction direct into the shelter. Under former conditions waves would be trapped at East Point and their force expended on the foreshore within the area now being reclaimed.

Description of Scheme.

For the purpose of protecting the western entrance to Causeway Bay Shelter, it is proposed to reclaim an area of about 241,600 square feet shewn to the east of the wet dock and coloured pink on Drawings Nos. 3 and 7. The eastern boundary of the reclamation will allow for a width of entrance the same as that now existing and the northern boundary will not impede the free flow of currents or tend to cause silting up.

In regard to accommodation which may be required for the use of river steamboats carrying cargo, piers may be constructed in the positions shewn on Drawing No. 7, projected at right angles to the line of the new sea wall for an average distance of about 75 feet and thence for a distance of 300 feet in a north-easterly direction, the latter portion being constructed to a width of 100 feet, suitable for the erection of “transit warehouses” thereon. The inner portion of each pier may be used by launches, ferry boats or other small craft.

Type of Construction.

It is proposed to protect the reclamation on its eastern side by a pitched slope superstructure and on the northern side by an ordinary type sea wall, both being founded on a pell-mell rubble mound brought up to the level of about L.W.O.S.T. Suitable material for filling in the reclamation area can be obtained in the vicinity. In regard to the wet dock, it is to be constructed by Messrs. Jardine Matheson & Co. for the accommodation of their small craft. Contract plans have already been prepared.

If and when required, the piers should be constructed in open reinforced concrete work, to provide as far as possible for the free flow of tidal currents. It is considered that the width and inertia of the structure if properly braced will be sufficient to secure stability. It is anticipated that the rubble mound foundation of the new sea wall will be completed before the construction of any of these piers is commenced: In this event the portion of the pier decking over the base of the mound may be satisfactorily carried on columns planted in the rubble.

Extent of Work recommended for immediate construction.

As work on the Praya East Reclamation sea wall is now well in hand, construction of the proposed reclamation should be carried out at an early date.

The estimated cost of reclamation works to the east of the wet dock including 10 per cent for contingencies is as follows :—

Sea Wall, Pitched Slope and Rubble Mounds,	\$	156,000.00
Filling		72,000.00
	\$	<u>228,000.00</u>

This is equivalent to a unit cost of \$0.95 per square foot of reclamation.

Development of the Harbour Front in General.

HONGKONG.

Whitfield.

It is considered that explosives stored in the magazines on Kellett Island will be in too close proximity to the reclamation necessary to protect the Causeway Bay Shelter. It is recommended therefore, that another site more remote from populated districts should be allocated for this purpose. Kellett Island, after the repeal of Ordinance No. 2 of 1898, will then become available as a permanent "home" for the Royal Hongkong Yacht Club, the area now occupied by it at Whitfield being surrendered to Government. Thus, the large artificial embayment now existing between the properties of the Asiatic Petroleum Co. (M.L. 277) and the Hongkong Electric Co. (M.L. 321) may be filled in to provide much needed building sites in this locality. The land reclaimed should be protected by an ordinary type sea wall.

Drawings
Nos. 3 and
5.

Shaukiwan.

In the Hongkong General Chamber of Commerce discussions,—previously referred to,—the Chairman is reported to have said :—

Drawing
No. 3.

"A new question which might arise but which has not yet been before the Shipping Sub-Committee is that of a typhoon refuge at Shaukiwan on account of the growth of the shipping and population in that neighbourhood and its distance from Causeway Bay and Mongkoktsui. The toll during the recent typhoon (on the 18th of August 1923) was very marked there and apparently always will be when winds reaching typhoon force come from an easterly direction".

The foreshores immediately within Lyemun should remain as far as possible in their natural state so that seas entering the harbour through the eastern entrance may disperse and expend their force rather than be propagated up the harbour.

In the development of Shaukiwan, the boundary shewn coloured yellow on Drawing No. 3 was recommended by me as the seaward limit to which works may be carried out in Aldrich Bay without serious detriment to the harbour. The area of foreshore enclosed within that limit might have been utilized for the formation of a typhoon shelter but the demand for land in this vicinity and the excessive cost of constructing a typhoon refuge in proportion to the area of shelter provided, have determined that the development of this foreshore be by reclamation. To minimize as far as possible the effect of carrying out the reclamation, it is recommended that it be protected by a pitched slope superstructure founded on a rubble mound brought to the level of about L.W.O.S.T.

In regard to the provision of typhoon shelter for small craft engaged in the vicinity of Shaukiwan, it is considered that sufficient accommodation will be available when the North Point Scheme is completed, provided the better found craft proceed to Causeway Bay or Mongkoktsui pending the construction of the alternative shelter provided for in the schemes of development now recommended.

KOWLOON AND NEW TERRITORIES.

Chung Lai and Yau Tong Bays.

The foreshores of these bays should remain in their natural state. No development is therefore recommended.

Kun Tong Bay.

A scheme for the development of this bay is shewn coloured pink (cross-hatched) and yellow on Drawing No. 3. It will not be possible, however, to determine if works to the extent shewn may be constructed until the effect on the harbour by the construction of the works involved in the various schemes already recommended and in the development of the harbour front in general, has been ascertained. The scheme illustrated in yellow colour should be regarded, therefore, as purely tentative. It is not considered that it would be to the detriment of the harbour to reclaim the two areas shewn cross-hatched in pink colour but their development should be considered in connection with the possibility of the construction of the scheme referred to.

In regard to the actual construction of these areas, the reclamations should be protected by pitched slope superstructure founded on rubble mounds brought up to the level of L.W.O.S.T.

Kowloon Bay.

The final lines to which reclamation may be carried out were fixed by the Town Planning Committee as recommended by me in 1922 and are shewn edged in yellow colour on Drawing No. 3.

Provision is made on the east side of the Bay for the junk-building industry and on the west side for the timber trade. In both cases it will not be necessary to enclose the reclamations along the greater part of their frontages; in consequence, it is not anticipated that the effect of these works will increase, to any extent, sea disturbance in the harbour during typhoon gales.

At Kwo Lo Wan by the construction of a rubble embankment, it is proposed to shelter an area which may be used as a typhoon refuge pending its reclamation when the rubble embankment will serve for the foundation of the protecting sea wall.

Tai Wan.

As already referred to in the description of the Hung Hom Bay scheme, the greater portion of the areas which can be acquired at Tai Wan should be reserved for the purpose of dealing with any coal or ores that may possibly be imported by rail.

Application has been received from the China Light and Power Co. for an extension to their present property. In response to this application, the area (about 69,000 square feet) shewn coloured light pink cross-hatched darker pink may be granted without prejudice to a scheme for the handling of the commodities referred to.

Mongkoktsui.

The Town Planning Committee in 1922 recommended the construction of a road 100 feet wide, (shewn in pink colour on Drawing No. 2) along the frontage of the properties now abutting on the east side of the Mongkoktsui Harbour of Refuge and extension of the road southward through Kowloon Marine Lot No. 49, thence through the area of Admiralty property now developed for the storage of coal and oil fuel, thence across Military Lands and connecting with Nathan Road.

So far as I am aware, the reasons for the Committee's recommendation were to provide for:—

- (a) A greater area of frontage for the discharge from or loading to craft of materials consigned to or from the back areas of Mongkoktsui.

Under present conditions the Marine Lots leased along this frontage extend to the cope of the sea wall so that the only spaces available for public use are at the ends of the various roads.

- (b) Better police control along this water front.

- (c) The construction when necessary of a railway line. The Committee has indicated a line, shewn by pink dashes on Drawing No. 2, connecting with the main line beyond Yaumati Railway Station and terminating at Jordan Road.

Drawings
Nos. 3
and 4.

Drawings
Nos. 2 and
3.

It is by no means clear that there will ever be sufficient trade in this vicinity requiring railway transport to warrant the construction of the proposed line. In consequence, I am not in agreement with the Town Planning Committee's recommendation, and consider that the proposal for the construction of a railway line from the North-east corner of the Hongkong and Whampoa Dock Co.'s property (Cosmopolitan Dock) to Jordan Road should be abandoned. In this connection the expenditure now being incurred to provide railway bridges over the nullah at Taikoktsui should be curtailed as far as possible.

It is considered that ample space will be provided for the handling of materials and for the better police control of this frontage of the Harbour of Refuge by the construction of the 100 feet road indicated by pink colour cross-hatched by pink lines on Drawing No. 3 and extending from Argyle Street at the north to Tung Kun Street at the south. To continue the road farther south would be to the detriment of the Harbour of Refuge and would involve the loss of the reinforced concrete pier constructed recently at the end of Public Square Street and which cost about \$50,000, the loss of the pier and slipway at the Government launch-repairing and coaling yard and the cost of resuming a portion of K.M.L. No. 49 and a considerable area of the land now occupied by the Admiralty and Military Authorities. In any case, having regard to the scheme now recommended for the development of Kowloon Point, it will not be practicable to extend the proposed road across the Military Lands. It would seem, therefore, that no useful purpose will be served by building that portion of the road on Admiralty property.

Whilst a road crossing K.M.L. No. 49 on or about the line of the road proposed by the Town Planning Committee will assist to some extent in regulating traffic when the vehicular and passenger ferry service connecting at Jordan Road is brought into operation, it is not quite clear that an increase in width over the width of 40 feet necessary to develop the lot will be required if the proposal to construct that portion of the frontage road from Tung Kun Street to K.M.L. No. 49 is abandoned.

Fuk Tsun Heung to Lai Chi Kok.

The final line of reclamation of Cheung Sha Wan (Bay) shewn on both Drawings Nos. 2 and 3 is that fixed by the Town Planning Committee in 1922 on my recommendation.

Drawings
Nos. 2 and
3.

It is recommended that an ordinary type sea wall founded on a pell-mell rubble mound deposited in a dredged trench and brought to the level of about L.W.O.S.T. should be provided to protect the land reclaimed. From this wall,—if required,—piers of open work construction may be projected in a southerly direction for a distance of about 350 feet.

A scheme has been submitted by Messrs. W. S. Bailey & Co., for the development of an area on the western frontage of this reclamation as an engineering, ship-building and ship-repairing yard. Their proposals are illustrated on Drawing No. 3 and include the provision of a basin and three graving docks. It is considered that the site is well suited for this purpose.

Areas to the eastward of the proposed new site for Messrs. W. S. Bailey & Co.'s shipyard should be reserved for the purpose of accommodating the firms now engaged in a somewhat similar industry at Fuk Tsun Heung and Ma Tau Kok and whose present accommodation will become useless for this purpose when the portions of reclamations in front of their properties are carried out.

HARBOURS OF REFUGE.

General.

In regard to typhoon shelter for junks and other small craft, it must be borne in mind that the tonnage of junks engaged in foreign trade has been practically constant between the years 1867 and 1923; that, in 1923 there was actually a decrease of 4.2 per cent. in their number and 9.2 per cent. in their tonnage as compared with the records for the year 1913: Also, that the immediate effect of the provision of wharfage for steamers will be to reduce the number of small craft engaged in transporting goods between the shore and ships anchored in the stream.

As already stated the areas of the Causeway Bay and Mongkoktsui shelters are considered sufficient for the present to accommodate all small craft in the harbour and ample warning is given of a typhoon approaching the Colony to enable them all to enter one or other of these shelters before the effects of the storm are felt. However, the delay now experienced by shipping during typhoon weather could be minimized to some extent if shelter were provided at other points on the harbour front.

Having regard to future requirements, bearing in mind the opinion that the number of small craft is likely to decrease and that, when the schemes for the development of North Point, Hung Hom Bay and Kowloon Point have been completed and are in operation, a large number of junks, barges, launches, &c., will be sheltered in the basins which are necessary for the efficient handling of cargo, it would seem that there is no justification for recommending the construction of any additional typhoon shelters; but, as the greater portion of work necessary in the construction of a temporary typhoon refuge at Kwo Lo Wan would be utilized in protective works when the area enclosed is reclaimed, little cost would be involved by the provision of this temporary shelter which would be convenient for craft operating in the eastern portion of the harbour. As the shelter which will be acquired by the carrying out of the schemes of development now recommended will be in most cases as conveniently situated as this temporary refuge, its existence will then be no longer justified.

Drawings
Nos. 2
and 3.

The only remaining question now to be dealt with as regards the existing harbours of refuge is effectiveness of their protective works to shelter the water areas enclosed.

Causeway Bay Shelter.

Protection of this shelter,—necessitated by the carrying out of the Praya East Reclamation scheme now in progress,—has already been dealt with in the scheme recommended for the development of Wanchai Bay. When completed it is considered that excellent shelter will be secured for small craft.

Mongkoktsui Harbour of Refuge.

Drawings
Nos. 2
and 3.

Due to damage having been caused during typhoon weather to small craft moored within this refuge, more particularly on the southern portion, the question of its improvement was referred to the Consulting Engineers. Whilst they indicate the position of a spur for the protection of the northern entrance, they are unwilling to recommend its construction. The only work which they propose should be carried out at present is the construction of a spur from the existing breakwater to protect the southern entrance. Their estimate of the cost of this work is \$630,000.00. The spurs referred to are shewn in pink colour on Drawing No. 2.

Whilst I agree that the work recommended by the Consulting Engineers would shelter effectively the southern area of this refuge from typhoon seas, I am of the opinion that, without the additional protection of the spurs there will be sufficient area of the refuge closed to westerly gales to accommodate all the small craft likely to make use of this shelter when the new accommodation in the schemes recommended is available. To give immediate relief and thus avoid the necessity for craft using the portions of the refuge disturbed by gales blowing from west to south-west, I recommend the provision of alternative accommodation at Kwo Lo Wan pending provision of shelter by the construction of wharfage.

The estimated cost of the works necessary to construct this temporary refuge, including the cost of reclaiming an area of about 79,000 square feet, amounts to \$810,000.00. As already stated the works constructed for this purpose will be utilized in the future reclamation of the area enclosed.

Improvements of the Harbour Generally.

General.

In 1905 the Consulting Engineers reported on shoaling in the harbour and in consequence of the great importance they attached to the question and the lack of information available, recommended that a very complete survey of certain portions of the harbour should be made.

In paragraph No. 72 of their report dated 24th November, 1922, they state :—

“ We have been unable to find that any systematic observations has been made at regular intervals of the depth of water in different parts of the harbour. It is of great importance in every harbour that a proper and complete history of the changes which occur from time to time should be available ”.

Whilst I have no hesitation in recommending the dredging of Belcher Ridge down to a depth of 36 feet below L.W.O.S.T. over the area cross-hatched pink on Drawing No. 3 at an estimated cost of \$45,000.00—due to the fact that no records exist other than such information as may be deduced from Admiralty Charts and which is by no means sufficient on which to formulate any scheme likely to result in permanent improvement of the harbour, without large maintenance cost,—I regret that I am unable to make any further recommendation for the improvement of the harbour generally.

Drawing
No. 3.

Harbour Surveys and Records.

I agree with the Consulting Engineers as to the importance of proper records of surveys, tide and current observations, sea action and other matters which form a complete history of any changes which may occur in the harbour from time to time. Due, however, to the lack of proper and effective centralized control under the conditions now existing, it would be exceedingly difficult to obtain satisfactory and reliable data. I would therefore recommend that the design and control of the construction of new works, dumping on unprotected foreshores or elsewhere in the harbour, the supervision and keeping of the necessary records of existing works, dredging and all matters which may make their influence felt in the waters of the Colony should be centered under one Authority.

Whilst the harbour west of a line north and south through the Observatory could be improved by dredging a deep water channel, the recurrent cost of maintenance might be high. I have therefore deferred making any recommendations in this respect until certain definite information is available. To obtain a portion of the data required, the two self recording tide gauges which have arrived from London should now be erected, one at Lyemun, the other inside Sulphur Channel. When in London, I discussed with the late Sir Maurice Fitzmaurice the necessity for the erection of a third tide gauge at Kowloon Point; he agreed that this might be required.

SECTION IV.

POLICY, CONTROL, MANAGEMENT AND ADMINISTRATION.

Policy, Control, Management and Administration.

In my opinion a properly-constituted Advisory Port Authority, Board, or Impartial Tribunal is the first need. It will be observed in Section I of this report that the Economic Resources Committee in 1920 also advised the constitution of Port Authorities.

To enable the Government to appraise intelligently the needs of the Port, the Board should study and observe traffic and port conditions and advise and make recommendations as to whether the results of these studies indicate the desirability of greater channel accommodation by deepening the fairways; the provision of berthage, increased storage space, road and railway transport facilities, bunkering, ship-repair and dry-docking facilities, cheaper handling facilities; change in the disposition of buoys, lights, &c.; modification of the tariffs or advice in any matters which concern the efficient working of the Port.

Whilst I have obtained much information to enable me to prepare this report, the various Schemes of Development are recommended with some reserve as the information available is insufficient from which to deduce with any degree of accuracy the nature and extent of actual requirements. In the light of further information the various schemes may require to be modified in detail.

So far the development of the Port has been left to private enterprise and adequate accommodation has not been made for shipping. Without the provision of the most economic handling and storage facilities possible, the present developments together with the advantages of the security pertaining to British Administration, the Colony's banking facilities and its excellent harbour are unlikely to be sufficient inducement for the producer to send forward his traffic so that Hongkong may deal with the trade its strategic position should secure.

Private companies, however, can not be expected to meet the cost of development works which are necessary to secure true efficiency and economy in the handling of cargoes as the return on the capital cost is subject to trade being handled over the works constructed. In this respect it may be mentioned that the Port derives little benefit from the large transshipment business at Hongkong on through Bills of Lading. Nevertheless private enterprise should be encouraged rather than abandoned. All obstacles such as any marine and pier rights or other domination of the water front in the way of creating modern accommodation for shipping should be removed if unable to be co-ordinated in the general plan of developments. Port facilities are in the service not only of the Colony but of South China and indeed of the many ports with which commerce is interchanged. The control of the Port itself and of port facilities as well as of all other matters relating to the waterways, construction of quay accommodation, supervision of all port works under construction, and the general maintenance, amelioration and extension of the accommodation for the exploitation of the waters of the Colony should therefore be retained in the hands of the Government.

Since the shipping or godown companies themselves cannot be expected to initiate necessary reforms, Government should put into operation such works as are recommended and such extensions as with the advice of the Advisory Authority it is considered will best serve the interests of the Port. The construction of the quays, harbour roads and the carrying out of all necessary dredging should be undertaken by Government which would lease the steamer berths to private operators on long term leases. The junk basins, being as necessary an adjunct to transport as roads and railways and at the same time providing shelter for small craft during typhoon weather should not be a charge on the lessee of the steamer berth. Private enterprise, however, should be required to provide the shed, cargo handling and all other facilities. In regard to the granting of exclusive and particularly long term leases for the use of the piers and wharves, it would seem well to observe some degree of caution. The recent experience in America has been that such leases may result in less efficient use of the facilities than is desirable for the best interests of the Port. A lessee, for example, may keep his wharf idle rather than permit its use by an actual or potential competitor or he may make such high charges as to drive business away from the port. This actually happened in New York during the Great War. If leases are made, they should preferably be in the form of first call on the berth, Government reserving to itself the right when the berth is vacant to assign to it vessels other than those belonging to the lessee or in which he may hold a direct or indirect interest.

The basis of this policy is that, while there would be the broad impartial outlook of Government which would provide the costly works and lease them on reasonable term for the exploitation of the Port, the administration of business would be carried out by commercial people who should be interested in despatch, efficiency, and economy on the method of Profit and Loss.

In making careful investigation of the present conditions at the Port and of the possibilities of new trade, I have obtained a great deal of information from Mr. J. D. Lloyd, Superintendent of Imports and Exports, from Lieut.-Commander Hake, Assistant (then Acting) Harbour Master, from Mr. R. Baker, M.Inst.C.E., Engineer of Way and Works, Kowloon-Canton Railway, from Captain W. J. E. Mackenzie, M.C., M.R.C.V.S., Colonial Veterinary Surgeon, and from other Government Officials; also from the Representatives of the Shipping and Godown Companies, and others, and I am under great obligation to these gentlemen for the way in which they freely gave me such information. I am also indebted to Mr. A. W. Tickle, F.R.I.B.A., F.S.I., for preparing the sketch elevation shewn on Drawing No. 10.

In conclusion, I have pleasure in acknowledging the assistance which I have received from the Senior Assistant Engineer, Mr. Andrew Nicol, Assoc.M.Inst.C.E., in the preparation of Drawings and Estimates, and in particular, the assistance which I have received from the Deputy Port Engineer, Mr. Adam Anderson, B.E., B.A., who has taken a very keen interest in the study of this important problem and in the preparation of this Report.

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