PROVISIONAL LOCAL VESSEL ADVISORY COMMITTEE

Tseung Kwan O Port Development - Mid-stream Site at Area 131

Purpose

The purpose of this paper is to seek Members' comments and views on the feasibility study for Tseung Kwan O port development at Area 131.

Briefing on the Study

A briefing paper on marine aspects of Tseung Kwan O port development at Area 131 in English is attached at Annex. Mr John Berry of Maunsell Consultants Asia Ltd. will present the paper at the 17th Committee Meeting on 31 October 1997. He will also answer any questions Members may have concerning the feasibility study.

Advice

Members are invited to express their comments and views on the study.

Marine Department
Hong Kong Special Administrative Region
October 1997

[PLVAC.CP4-97]

1. BACKGROUND OF STUDY

1.1 The Port and Airport Development Strategy Study (PADS) recommended in 1989 that port facilities should be developed in Tseung Kwan O Area 131. The PADS Development Statement No.5 - Tseung Kwan O Port Development, which was endorsed by LDPC on 3.8.90, identified Area 131 as a suitable site for developing port facilities. The Port Development Strategy Review (1993/94) recommended that Area 131 should be developed as a permanent site to handle cargo arising from nearby mid-stream buoy operations. This recommendation to develop Area 131 as a mid-stream site was endorsed by the Port Progress Committee on 22.6.95.

1.2 Area 131 is considered suitable for mid-stream handling facilities as recommended in the PDSR 1993/94 because of the following merits:

(i) Mid-stream operations require the use of mooring buoys. As Marine Department is considering re-organization of the buoys in Tseung Kwan O, the provision of mid-stream site in Area 131 will reduce the barge traffic in the busy central harbour area.

(ii) Area 131 is distant from densely populated area. The environmental impacts caused by the proposed developments will therefore not have significant effects on the people living in Tseung Kwan O.

(iii) It will be well served by external transport links such as the proposed Western Coast Road and the Cross-Bay Bridge.

1.3. Maunsell Consultants Asia Ltd was appointed to undertake the Feasibility Study for Tseung Kwan O Port Development at Area 131 on behalf of Project Manager/New Territories East Development Office. The primary objective of the study is to draw up proposals of various aspects in civil, geotechnical, traffic and highway engineering, port planning and engineering, programming, and cost estimation to facilitate the early provision of the mid-stream site facility. The other facilities to be provided in Area 131 are a batching plant and a public dumping barge loading point.

2. PREFERRED CONFIGURATION OF AREA 131

2.1. It was agreed at the Steering Group on 2nd June 1997 that the back-up area of the mid-stream site should be planned to contain 15 berths and should occupy a nett area of 18 hectares, in order to keep the annual container throughput within 1.05m million TEUs per annum, which would avoid excessive traffic and environmental impacts.

2.2. Within the constraints of the area, all possible and practical layout forms were considered and assessed on the basis of a detailed scoring methodology taken

into account relevant criteria in the fields of marine operations, planning engineering and traffic factors, cost and implementation factors, and environmental factors.

2.3. The linear layout with offshore breakwater is found to be the best overall and subsequently endorsed for further detailed development in the third Planning and Marine Working Group Meeting on 1st September 1997. The preferred layout with refinements is as shown on Figures 1 and 2.

2.4. The top level of the breakwater at Area 131 is chosen to be +5.5 mPD. This would be above the wave crest level of critical storm events, which is estimated to be +5.44 mPD. Given this top level, the breakwater would effectively dissipate the waves even in the critical event. The quay apron and reclamation, therefore can be kept at a relatively low level. The typical section of breakwater is as shown on Figure 3.

2.5. With the presence of breakwater to shield the reclamation from waves, the cope level can be set at +4.5 mPD with a view to ensuring ease of cargo operation and economic construction while maintaining a sufficient freeboard above the maximum still water level.

2.6. The typical section of the berth structure currently proposed is as shown on Figure 4. The structure is robust and reasonably simple to construct using techniques well established in Hong Kong. The rock slope beneath the deck will help to absorb rather than reflect incident waves, which is important when considering the operation of the barges.

2.7. The constraints of the buoy areas are governed by the reclamation line of Area 131, the Cross-Bay Bridge, the sewage reserve and the edge of Fairway. It is known that the edge of buoys should be 100m from the reclamation or structures and the centre of buoys be 50m from the edge of sewage reserve. On the other hand, the edge of buoys could coincide with the edge of Fairway. The constraints of the buoys area are therefore as indicated on Figure 1. The buoy layout shown is believed to be the optimum layout with maximum number of buoys provided, which has one A sized dangenerous goods mooring and 11 other moorings comprising 2 x Super A, 3 x A + 6 x B class moorings. The circulation channel passage between the buoys is at least 40m wide.

3. PROBABLE MARINE IMPACTS AND MITOGATION MEASURES

3.1. According to the revised brief of the study, the mid-stream site at Area 131 is required to be planned for the provision of 15 berths, with each berth handling 70,000 TEUs of containers per annum. This would amount to a total of 1.05 million TEUs.

3.2. The 1.05 million TEUs would be carried by barges which would unload

container ashore and vice versa. The type of barges currently in use in Hong Kong are typically lighters which are 30 to 50 metres in length and 16 metres in breadth. These lighters are generally fitted with their own derrick crane. Containers are either loaded or off-loaded by this derrick crane on the barge berth. Unloading of one container from a barge takes an average of 6 to 8 minutes. Barge capacities generally vary from 100 to 110 TEU's for full containers and from 180 to 200 TEU's for empty containers.

3.3. Clearly mid-stream site operations would cause an addition of barge traffic in the Lei Yue Mun channel as well as the Victoria Harbour, with origin or destination at the mid-stream site (MSS) and/or at the government mooring buoys (GMBs) of Area 131.

3.4. Prior to completion of the MIA study, for purpose of a broad and conservative assessment of effects on Lei Yue Mun caused by developing the TKO MSS, it has been assumed that of the 1.05 million TEUs, 0.22 million would be moved to and from the TKO bay GMBs. This would leave 0.83 million TEUs to be transported between the MSS and the areas to the west of Lei Yue Mun. It is further assumed that of this 0.83 million TEUs, 0.3 million TEUs would be moved to and from the facilities within the Eastern Harbour. This would leave 0.53 million TEUs to be transported through the Victoria Harbour. If a greater proportion of the MSS container throughput were to be serviced by the TKO GMBs, there would be a lower impact on Lei Yue Mun.

3.5. While the number of TEUs carried per lighter would vary, it has been assumed that one lighter would carry, on average, 80 TEUs. On this basis 0.83 million TEUs would require 10375 barge movements per annum, or 30 barge movements per day, or 15 movements in each direction per day, through the Lei Yue Mun channel (assuming 350 working days per year). 0.53 million TEUs through the Victoria Harbour would result in an average daily movement of 19 barges, or 10 movements in each direction. The 0.22 million TEU's being carried between the MSS and the GMBs would amount to 8 barges movements a day, 4 each way. This would only add on a very insignificant amount of marine traffic to the existing traffic densities.

3.6. At the onset of a typhoon, evacuation of the barges would add a sudden burden to the busy harbour.

3.7. Under the assumptions as stated in items 3.4 and 3.5, 38 barge movements per day would be anticipated at Area 131. Evacuation of these numbers of barges should not provide significant operational difficulty. Indeed shelter for the barges could be found within the Area 131 and therefore evacuation is not necessary.

3.8. It is estimated that the sheltered areas would be as follows:-

Total sheltered areas	=	200 m x 825 m
	=	165,000 m^2
Channel width to be maintained	=	4B + cross-wind allowance (B) + safety allowance (B)
	≅	100m, where B is the barge width assumed to be 16.5 m
Available sheltered areas for barges	=	165,000 m^2 - 100 x 825 m^2
	=	82,500 m^2

3.9. Assuming that each barge would occupy an area of 20 x 55 m^2 (i.e. 1,100 m^2), therefore the total no. of barges that can be accommodated in the sheltered areas would be 82,500 m^2 ÷ 1,100m^2 (i.e. 75 numbers), which would be double the number of barges operating in the MSS in any given day.

3.10. It may be of concern that the breakwater would impede the barge traffic between the TKO bay GMBs and MSS. However, given the small throughput from barges per day each way and the multiple entrances in the breakwater, this would not be a problem.

3.11. The provision of a mid-stream site at Area 131 would affect Marine Department's plan to install the maximum number of buoys in the TKO bay. The buoy layout as shown in Figure 1 is believed to be the optimum layout within the constraints of the area.

3.12. It is noted that the planned facilities within the Western Harbour, which includes the construction of Lantau Port, the dredging of West Lamma Channel and the construction of the Lamma Breakwater, would be able to provide a lot of possible sheltered anchorage areas. The "centre of gravity" of the marine operation will tend to move westwards, therefore it is unlikely that ocean-going vessels currently using mid-stream destinations to Victoria Harbour would be attracted to Tseung Kwan O. Given the low throughput at Area 131 and relatively small anchorage area at Tseung Kwan O compared with Kellett Bank and Western Harbour, the percentage of ocean-going vessels at Tseung Kwan O should therefore be relatively low.

3.13. The possible nearest mid-stream destinations for the planned anchorages at TKO include the TKO MSS site, Kwun Tong/Cha Kwo Ling PCWA, Chai Wan, North Point, Hung Hom and Wan Chai. However, it is anticipated that a good proportion of the mid-stream operations at Tseung Kwan O anchorages would be destinated at Area 131 because of the proximity of the shore based facilities.

3.14. A lighter would arrive at a mid-stream site at any time as soon as it has received

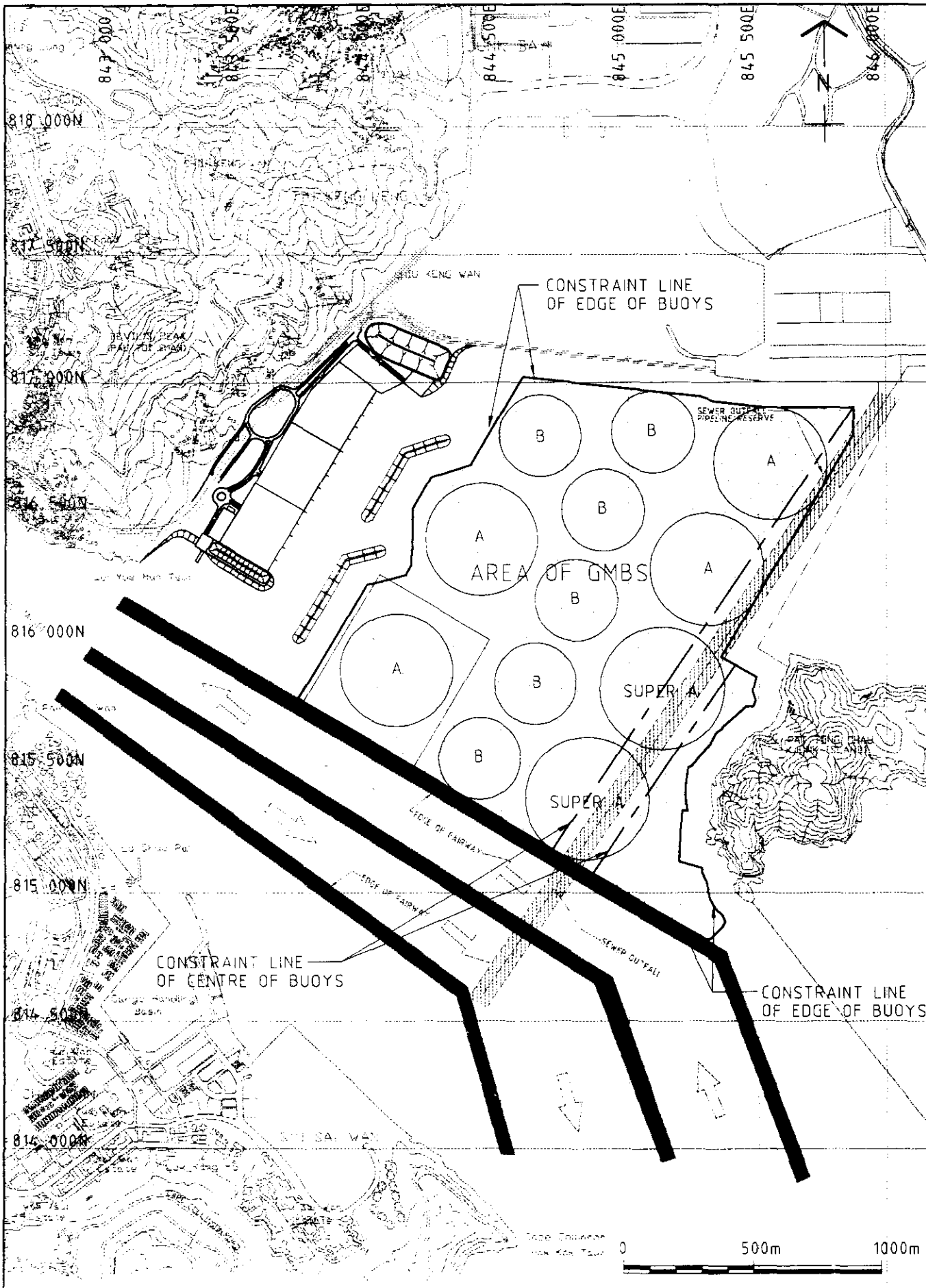
cargo from an ocean going ship, within operating hours. These hours may however be outside the hours sunrise to sunset. Navigation lights at the end of the breakwater should therefore be provided.

4. CONCLUSION & RECOMMENDATION

4.1. The proposed developments at TKO Area 131 is considered to have insignificant effect on traffic and on safety within the harbour areas due to the anticipated relatively small increase in barge traffic.

4.2. The mix of the buoy size in the TKO bay would need a review by the relevant committees as time of construction of the MSS became closer, and then-current shipping trends are clearer.

4.3. The integrated development with anchorage areas and close proximity of shore-based facilities should be promoted in Hong Kong water to reduce the travel distance and therefore internal traffic flows, and thereby improve the busy conditions of the harbour.



FEASIBILITY STUDY FOR TSEUNG KWAN O PORT DEVELOPMENT
AT AREA 131
WP8 REPORT

SITE LAYOUT WITH 'HOCKEY-STICK' BREAKWATER

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APPROVED 批准	
DATE 日期	08-10-97
DRG. NO. 圖紙編號	Figure 1

MAUNSELL CONSULTANTS ASIA LTD. 茂盛(亞洲)工程顧問有限公司

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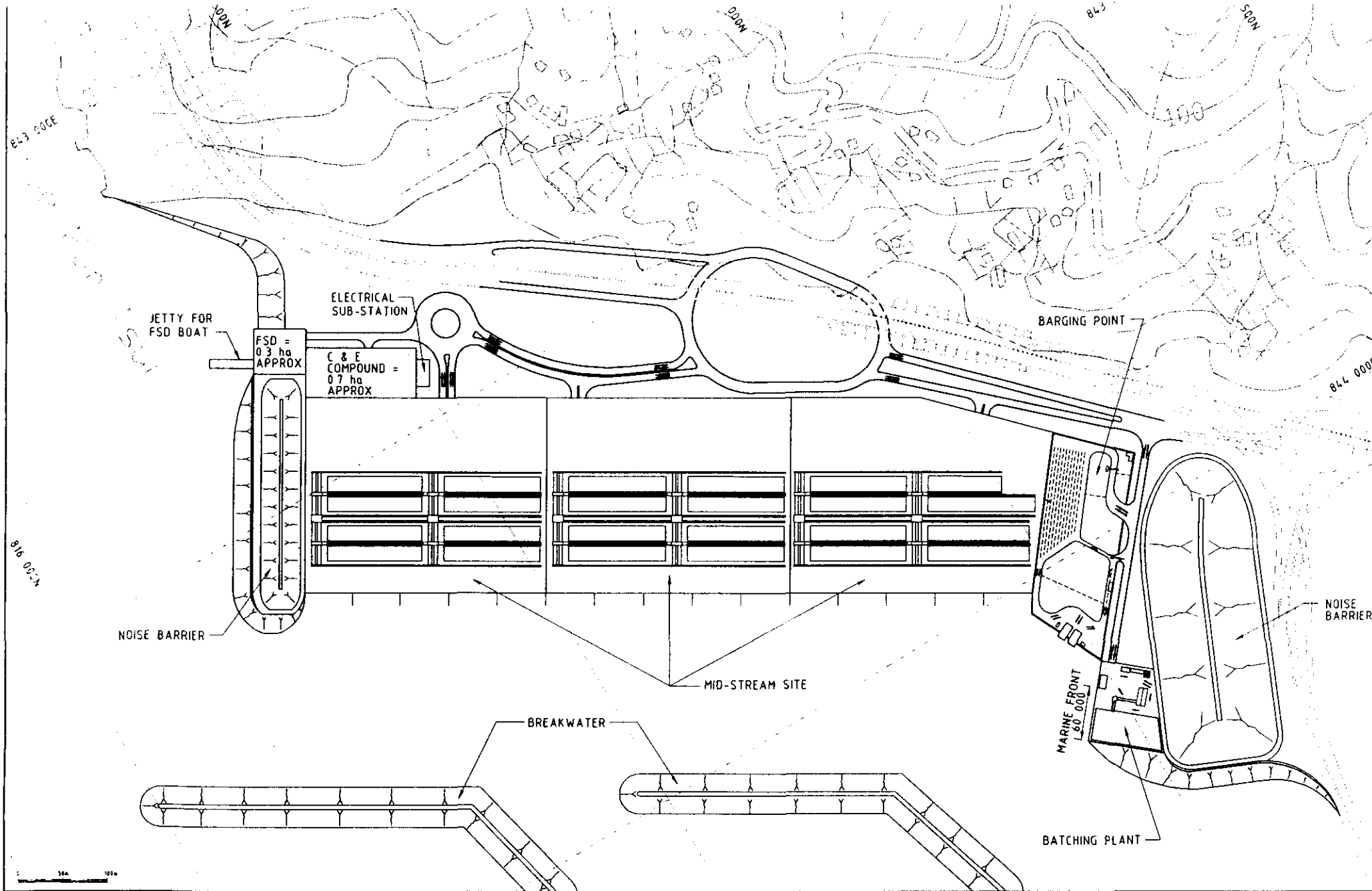

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FEASIBILITY STUDY FOR TSEUNG KWAN O PORT DEVELOPMENT AT AREA 131

WP8 REPORT

ENLARGED LAYOUT PLAN

Territory Development Department, Hong Kong
Kowloon Development Office

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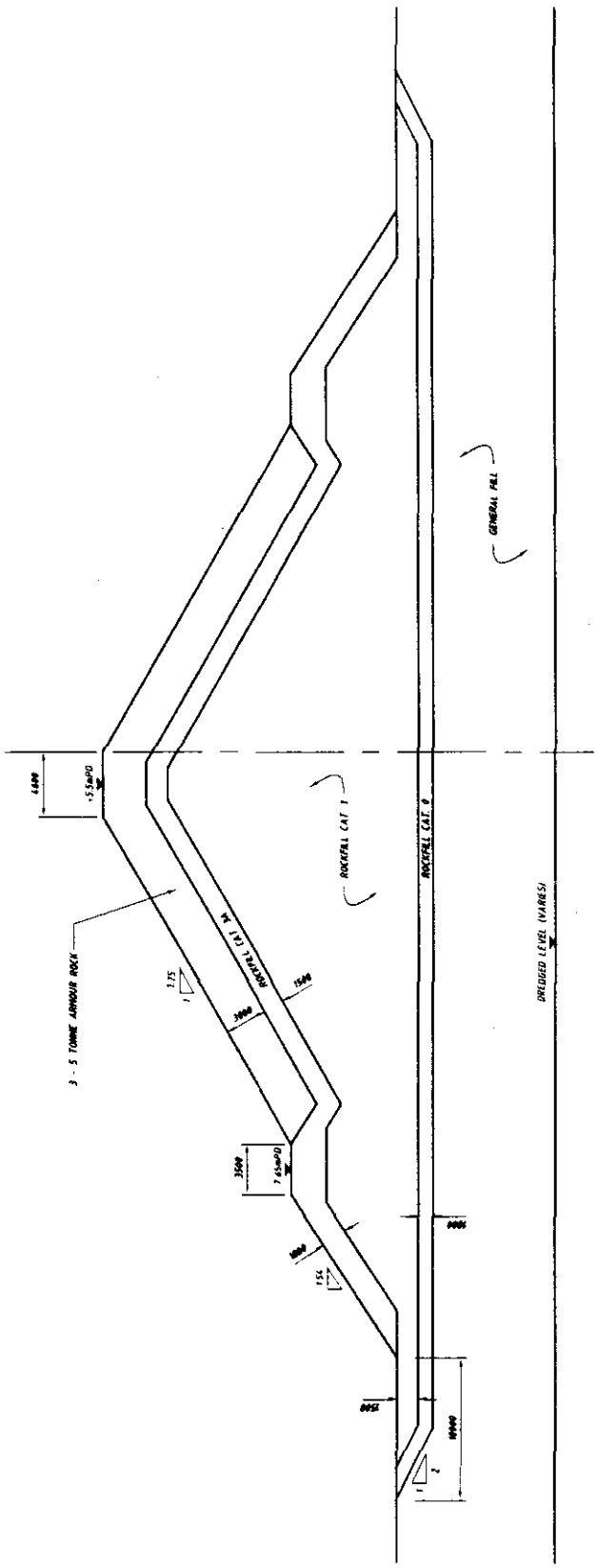

TYPICAL SECTION OF RUBBLE MOUND BREAKWATER

1 500

FEASIBILITY STUDY FOR TSEUNG KWAN O PORT DEVELOPMENT AT AREA 131

TYPICAL SECTION OF RUBBLE MOUND BREAKWATER

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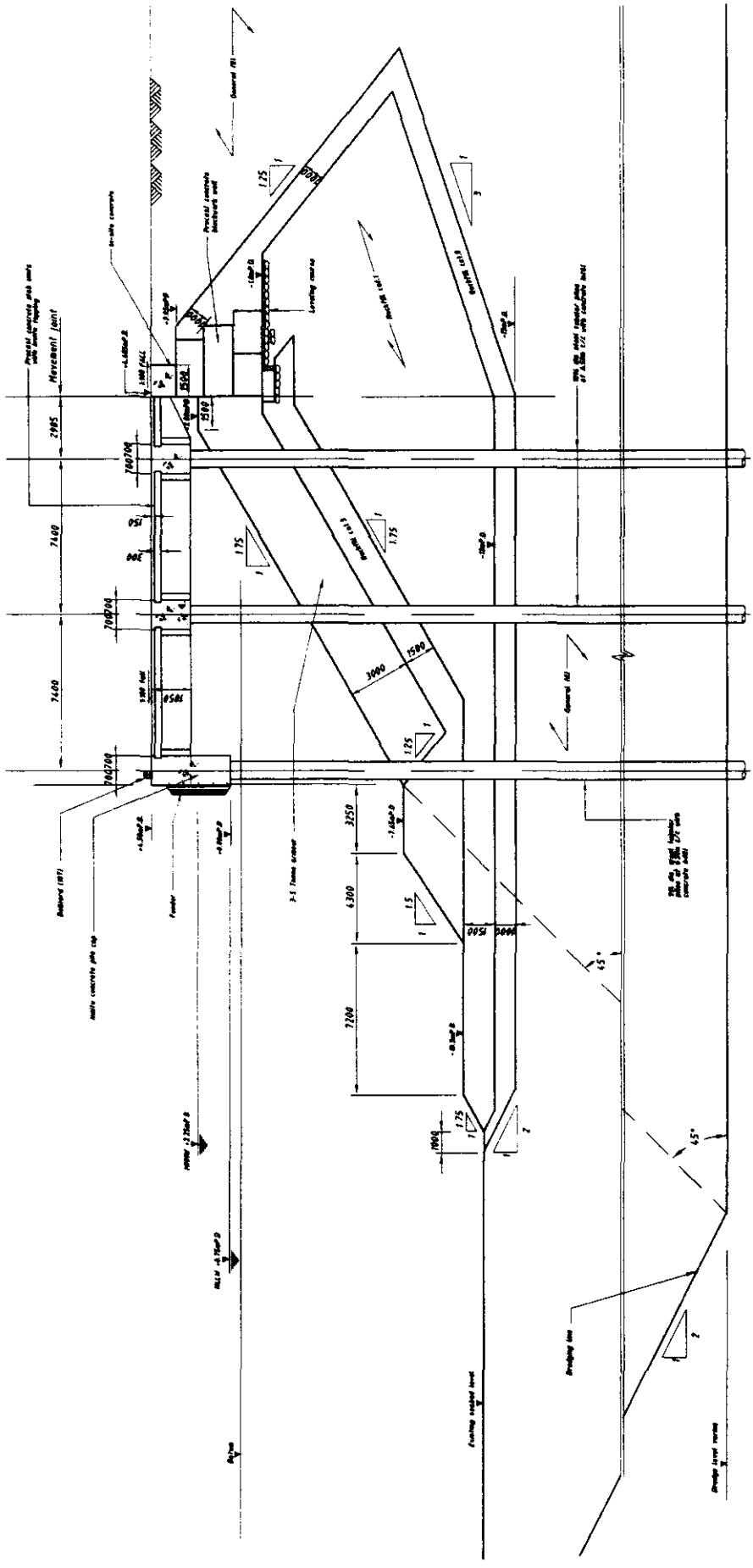
Figure 3



CROSS SECTION OF TYPICAL BAY
1 300

FEASIBILITY STUDY FOR TSEUNG KWAN O PORT DEVELOPMENT
AT AREA 131

CROSS SECTION OF TYPICAL BAY

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