APPENDIX

List of Appendices

APPENDIX-1 Review of Alternative Plans

The technical and economical review was made of the cases for maintaining the fishery port by giving up a part of requests made by the Government of Sri Lanka, decreasing the initial investment for the repair work, and increasing the maintenance dredging. Fig. 1 shows the items and the flow chart for review.

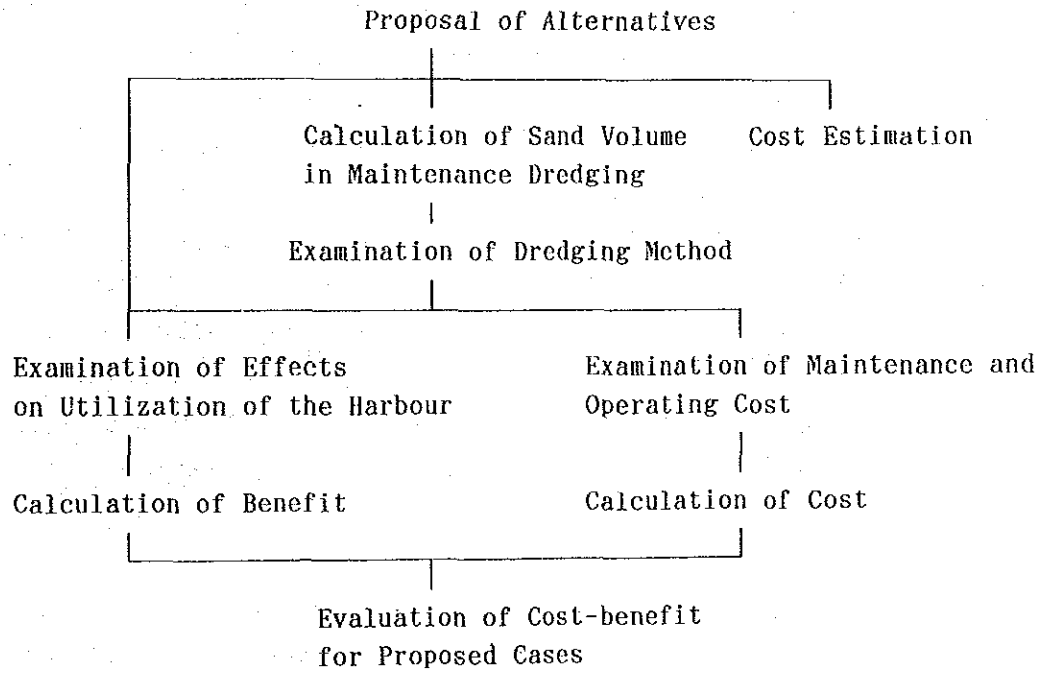


Fig. 1 Block-diagram of Economic Evaluation for Alternatives

1) Proposed facility layout reviewed

Fig. 2 shows three layout cases for the facilities that were reviewed. The cases are discussed below by taking up technical points.

Case 1: The layout proposed in the development study and requested by the Government of Sri Lanka

Case 2: The layout consisting of a newly built jetty at the tip of Kirinda Cape to prevent sand drifts during the SW monsoon season, and extending the main

breakwater by 75 m to achieve better calmness within the port.

Case 3: In addition to the case 2, a sub-breakwater of 150 m will be built to decrease siltation during the NE monsoon season.

The cases 2 and 3 plan to build portions of facilities along the layout proposed in the development study.

2) Review of Maintenance Dredging Amount

Numerical simulations on sand drifts were conducted for the cases 2 and 3 in order to compute the siltation at the port. Computation results were corrected by considering the actual siltation in 1985 when the port was first opened in order to obtain the required maintenance dredging amount. For the case 1, the result of computations performed for the development study was used with necessary amendments

A: Method of numerical simulation

In the development study, the numerical simulations and hydraulic model tests were performed to measure wave deformations and nearshore currents near the port. A hybrid model using these measurements as external force and computing the sand drifts by numerical simulation was used for the siltation.

In the present study, numerical calculations are applied to assess wave deformations and nearshore currents. In computing the wave deformations, an equation for the flux of wave energy was employed by considering characteristics of random waves. As for the effect of breakers, Goda's formula for limiting breaker wave height which considers probability of breaker waves was used.

Using the results of wave deformation computations as input, the nearshore current distribution was obtained by solving the depth averaged equation for the mean currents induced by breaking waves

added with radiation stress term.

As for the calculation results of waves and currents, coefficients, etc. were adjusted by calibration with the experimental results for alignment with the results of present calculation because the previous development study used the result of hydraulic model experiments.

In the last step, the concentration of suspended sands was sought by solving the two dimensional advect-diffusion equation for the depth averaged concentration of suspended sediments, and chronological changes of submarine ground height from the bed load were obtained from the balance of the pickup term and the sedimentation term at the bottom of suspended sand flux and the balance of the sweep current sand based on Sleath's proposal at each calculation grid.

The result of calculation is obtained by iterative calculation which takes non-equilibrium into consideration.

C: Correction of the computation results and estimation of the maintenance dredging volume

According to the previous development study, the computed siltation inside the port during SW monsoon period under the current conditions was approximately 10,000 m^3/year. However, the actual siltation in the port was 40,000 m^3/year, indicating the computed value was only 1/4 of the actual volume. Therefore, it is necessary to assume the actual siltation to be four times more than the computed value for the SW monsoon period obtained in the present computation. On the other hand, the re-evaluation for the NE monsoon period should also be made by increasing the computation result. As the difficulty in reproducing the result is less for the NE period than for the SW period when the waves wheel in from the end of breakwater, the actual siltation will be set to be three times the computed value. By increasing the result of computation in the region 8 as above, the maintenance

dredging volume is estimated as below.

Case 1 10,000 m^3/year or less
(assumed from the result of development study)
Case 2 40,000 m^3/year
Case 3 20,000 m^3/year

3) Computation of Initial Investments for Construction

The initial investments for facility construction for each case are listed below.

Case 1 : Rs. 638 million (2,214 million Yen)
Case 2 : Rs. 435 million (1,510 million Yen)
Case 3 : Rs. 512 million (1,775 million Yen)

4)Study of Maintenance Dredging Methods and Cost Calculation

The operation limiting wave height for dredgers owned by CFHC is set at 0.5 m, and the dredging capacity at 200 m^3/three hours. The development study revealed the probability of the wave height being less than 0.5 m in the Kirinda Sea is less than 1.4%. Therefore, the yearly maximum dredging amount under the conditions that dredging points are not shielded by breakwaters, etc. is merely 4,000 m3 as below.

[365d x 12h x 0.014 x (200m^3/3h) = 4,088m^3/year]

According to the case 1, the dredging points are shielded by the breakwater, and the dredgers currently owned by CFHC can dredge up to 10,000 m3 a year. According to the cases 2 and 3, it is impossible for the current dredgers to dredge the required amount, and therefore, a method of dredging without a dredger must be contrived

A method using a sand pump is conceivable for the cases 2 and 3. A sand pump is suspended from a crane over the breakwater and dredging is performed within the radius of the crane arm. In Japan, this method has been used in maintaining the water depth at the mouth of a small

fishing port. Since there is no record of practical use in Sri Lanka so far, cooperation for machinery procurement and personnel training will be required if this method was to be adopted. As the spoils cannot be disposed offshore, it is necessary to provide a place for disposing the spoils.

Assuming that 40,000 m3 soil were to be dredged within 5 months under the case 2, the daily dredging amount will be calculated as follow, assuming that the number of working days per month is 25.

$$(40{,}000\ m^3/year)/(5\ month \times 25\ days) = 320\ m^3/day$$

Assuming further that the soil content of a pump is 15% and the number of operation hours per day 5, the required pump discharge will be

$$(320\ m^3/day/0.15\%)/(5\ hr \times 60\ min) = 7.1\ m^3/min.$$

Considering the head efficiency of a pump, two sand pumps of 6 m^3/min type should be used. The following devices will be required as the maintenance dredging system by sand pumps.

Sand pumps(two)	:75 kw type; discharge, 6.0 m3/min; head,30 m
Cranes (two)	:CCH400W (wheel crane); work radius, 27.5 m/2 tons
Power generators(two)	:350 KVA
Flexible hose	:250 m
Iron pipe	:200 m

The annual maintenance dredging costs for three cases using this system are given below. The costs include survey expenses and soil transport expenses.

Case 1	: Rs. 1.4 million (5 million Yen)
Case 2	: Rs. 5.5 million (19 million Yen)
Case 3	: Rs. 3.0 million (10.5 million Yen)

5) Calculation of Port Utilization Efficiency Decrease under Cases 2 and 3

As mentioned in the preceding section, maintenance dredging by sand pumps will be performed throughout the day under the cases 2 and 3. This is expected to hinder the access to the port and lower the operating hours per day. The ratio of decrease is estimated as below

Case 1	: Decrease ratio	0%
Case 2	:	25%
Case 3	:	20%

6)Benefits

As benefits, the effect of increased fish catch decreased fuel costs, and decreased distribution costs were cited. The fish catches under the cases 2 & 3 were decreased at the ratios discussed in the preceding section. Calculation of these benefits are discussed in Chapter 6, Paragraph 6-3 of the text.

7)Calculation of Economic Internal Rate of Return

EIRR was calculated based on the benefits derived from the repair of the port discussed here and the result of study discussed in the preceding sections. Conditions used in calculation are discussed in Chapter 6, Section 6-3-4 of the text. The result is shown in Table 3.

Table 1 Results of EIRR

Case	Construction Cost (Rs.million)	Maintenance Dredging Cost (Rs.million)	Operating Cost (Rs.million)	Fish Catch in future (ton)	EIRR(%) 1983 -2023	EIRR(%) 1991 -2023
1	638	1.4	1.4	2,494	2.01	3.65
				2,728	2.46	4.40
2	435	5.5	1.0	2,494	(0.66)	3.89
				2,728	1.19	4.75
3	512	3.0	1.2	2,494	(0.86)	3.98
				2,728	1.37	4.77

():Benefit/Cost in case the discount rate is zero and B/C is less than 1

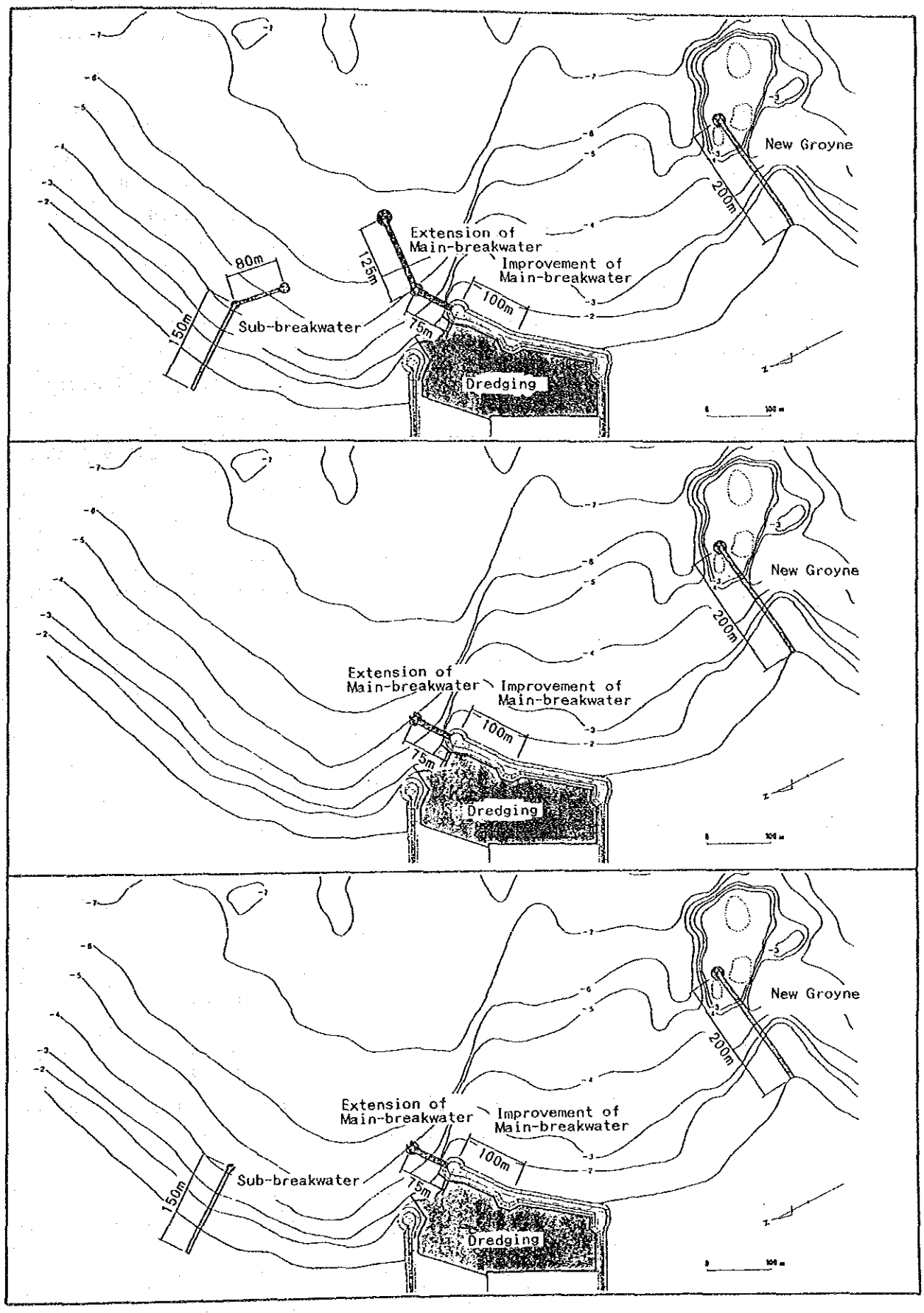


Fig. 2 Layouts of Altenatives

APPENDIX-2 Members of the Basic Design Study Team

(1) The First Time Study Team

Name	Assignment	Position
< Official Member >		
Mr. Shinya Nakai	Team leader	Director Second Basic Design Study Division Grand Aid Study and Design Department, JICA
Mr. Yuji Nishi	Fishing Port Development	Deputy-Director Fishing Port Construction Division Fishing Port Department Fisheries Agency
< Consultant Member >		
Dr. Norio Tanaka	Fishing Port Planning	Nippon Tetrapod Co.,Ltd.
Mr. Yuhei Adachi	Port Civil Engineering	ditto
Mr. Kozo Baba	Fisheries Economy	ditto
Mr. Mamoru Kondou	Facility Design	ditto

(2) The Second Time Study Team

Name	Assignment	Position
Mr. Kozo Baba	Fisheries Economy	Nippon Tetrapod Co.,Ltd.

(3) The Third Time Study Team (Explanation of Draft Final Report)

Name	Assignment	Position
< Official Member >		
Mr.Mikio Nakamura	Team leader	Assesser, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign
Mr.Toshikazu Nagashima	Grant Aid	Director Study Review and Coordination Division, Grand Aid Study and Design Department, JICA
Mr.Yuji Nishi	Fishing Port Development	Deputy-Director Fishing Port Construction Division Fishing Port Department Fisheries Agency
Mr.Katsuhiro Sasaki	Planning & Management	Second Basic Design Study Grant Aid Study and Design Department, JICA

< Consultant Member >

Dr. Norio Tanaka	Fishing Port Planning	Nippon Tetrapod Co.,Ltd.
Mr. Yuhei Adachi	Port Civil Engineering	ditto

APPENDIX-3 Minutes of Discussion (October 31,1990)

MINUTES OF DISCUSSION

OF

THE BASIC DESIGN STUDY

ON THE PROJECT FOR REHABILITATION OF THE KIRINDA FISHERIES HARBOUR IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

In response to the request of the Government of the Democratic Socialist Republic of Sri Lanka (Sri- Lanka), the Government of Japan decided to conduct a basic design study (the Study) on the Project for Rehabilitation of the Kirinda Fisheries Harbour and entrusted the Study to the Japan International Cooperation Agency (JICA). JICA sent to Sri Lanka the Study Team headed by Mr. Shinya NAKAI, Director for Second Basic Design Study Division, Grant Aid Design and Study Department, JICA, from October 24th to November 11th, 1990. The Team had a series of discussion on the Project with the officials concerned of the Government of Sri Lanka headed by Mr. N.V.K.K. WERAGODA, Secretary, Ministry of Fisheries & Aquatic Resources.

As a result of the discussions, both parties agreed the fundamental factors for conducting the Study as attached herewith.

Colombo, October 31st 1990

SHINYA NAKAI
Basic Design Study Team,
Japan International
Cooperation Agency,
(JICA)
JAPAN.

N.V.K.K. WERAGODA
Secretary,
Ministry of Fisheries
& Aquatic Resources,
Sri - Lanka

N. V. K. [illegible]GODA

1

ATTACHMENT

01. Objective of the Project

The objective of the Project is to rehabilitate and improve the function of the Kirinda Fisheries Harbour and accelerate fishing activities around Kirinda through the means to be recommended by the study.

02. Organization

Executive Agency : Ministry of Finance
Implementing Agency : Ministry of Fisheries and Aquatic Resources.

03. Project site

The site of the Project is located at Kirinda in Southern most point of Sri Lanka Coast shown in Annex -1.

04. Major items requested by the Government of Sri lanka for the Project

The outline of the request is shown in the Annex - 2.

05. Japan's Grant Aid Program

The Government of Sri Lanka has understood the system of Japan's Grant Aid Program explained by the Team, which includes a principle and the role of the Japanese consultants and Japanese firms for the implementation of the Project.

06. Provision of Necessary Budget and Personnel including the Maintenance Dredging.

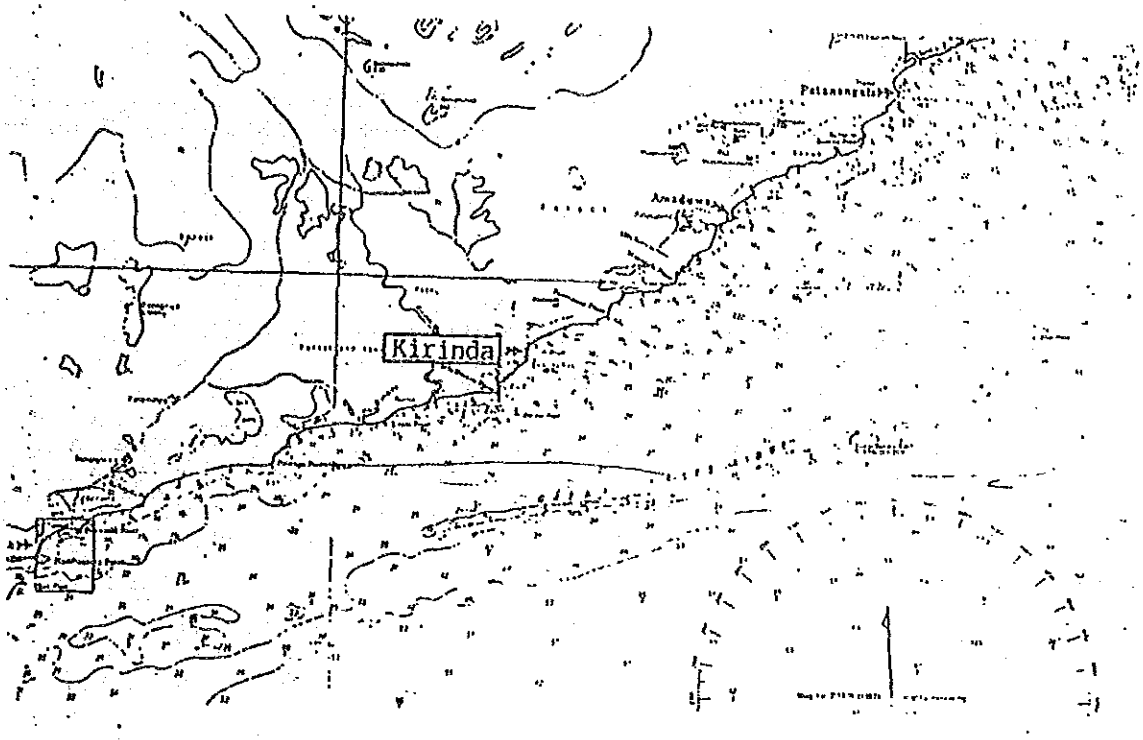
The Government of Sri Lanka will assure the necessary budget and personnel for the operation and maintenance of the facilities (including maintenance dredging) and equipments provided, on condition that the Grant Aid by the Government of japan is extended to the Project.

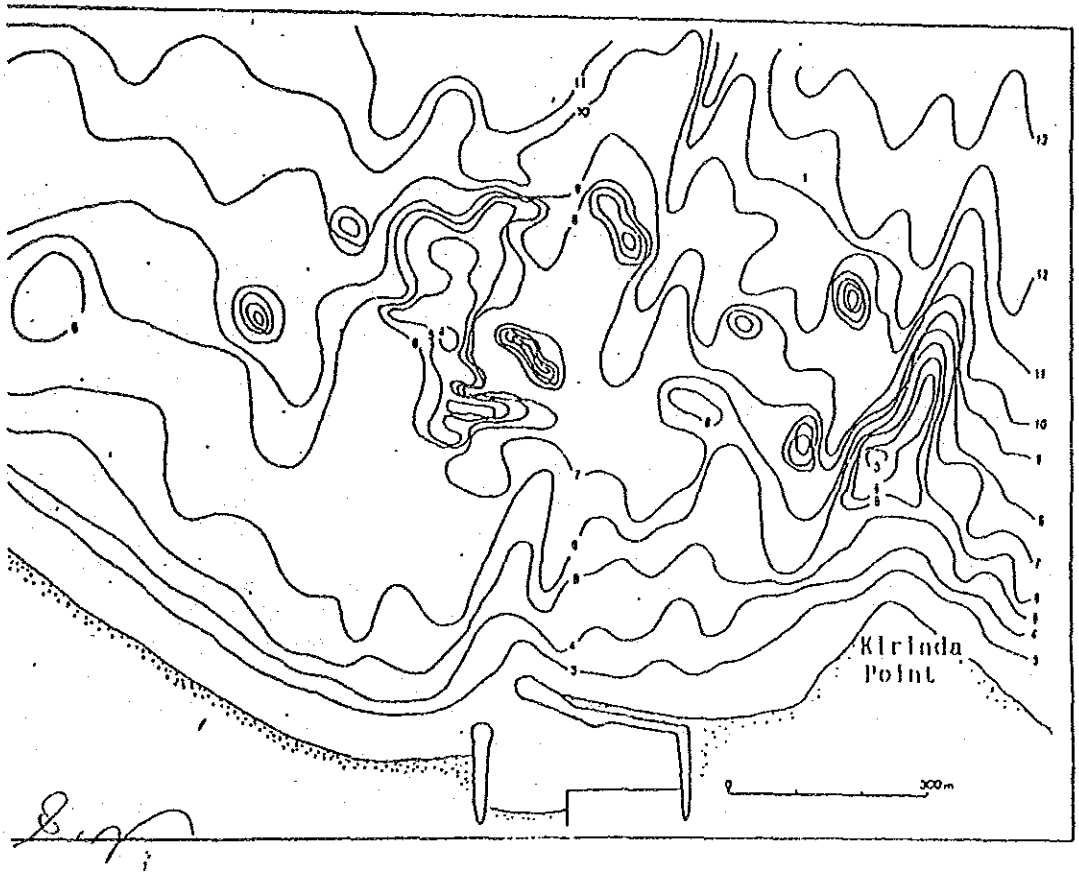
07. Measures to be taken by the Government of Sri Lanka

The Government of Sri Lanka will take necessary measures as listed in Annexe - 3, on condition that the Grant Aid by the Government of Japan would be extended to the Project.

ANNEX - 1.

Project site location Map





ANNEX - 2

Requests made by the Government of Sri Lanka

The following requests have been made on the basis of the study carried out by a survey team of JICA in December 1989, on "Sand Drift in the Southeastern Coast of Sri Lanka".

01. Construction of new facilities

* Groyne at Kirinda Point
* Extension of the main breakwater
* A new sub-breakwater at the North of the Harbour

02. Improvement of the main breakwater

* Increase of the crown height for a part of the main breakwater

03. Overhaul of the cold storage, when needed

04. Dredging

* Dredging at the mouth and the inside of the Harbour

ANNEX - 3

Necessary measures to be taken by the Government of Sri Lanka are as follows:

A. General Items

01. To secure the ownership and/or the right to use the Project site.

02. To clear, level and reclaim the Project site, when needed, prior to the commencement of the Project.

03. To improve the access road to the Project site.

04. To provide facilities for the distribution of the electricity, water supply, drainage, telephone line and other incidental facilities.

05. To bear advising commission of the Authorization to Pay (A/P) and Payment commission to the Japanese foreign exchange bank for banking services based upon the Banking Arrangement (B/A).

06. To ensure prompt unloading, tax exemption, and custom clearance of the goods for the Project at port of disembarkation.

07. To accord Japanese Nationals whose services may be required in connection with the supply of the products and services under the verified contract such facilities as may be necessary for their entry into Sri Lanka and stay therein for the performance of their work.

08. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be inmposed in Sri Lanka with respect to the supply of the products and services under the verified contracts.

09. To maintain and use properly and effectively the facilities constructed and equipment ounder the verified contracts.

10. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment.

11. To coordinate and solve any matters related which any arise with third party and inhabitants living in the Project area during implementation of the Project.

B. Specific Items

01. To ensure the construction of the groyne at Kirinda Point and the approach road from the present harbour to Kirinda Point, when needed, to get permission of Kirinda Temple as well as inhabitant living nearby.

02. To designate the dumping area for the dredged sand.

03. To designate the quarry site and to secure quarrying without any objection.

04. To designate the road for the transportation of the stone material from the quarry site to the Project site and, when needed, to repair the road.

APPENDIX-4 Minutes of Discussion (July 17,1991)

MINUTES OF DISCUSSION
BASIC DESIGN STUDY
ON
THE PROJECT FOR REHABILITATION OF THE KIRINDA FISHERIES HARBOUR IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

(Consultation on draft report)

July 17th, 1991
Colombo, Sri Lanka .

MINUTES OF DISCUSSION
BASIC DESIGN STUDY
ON
THE PROJECT FOR REHABILITATION OF THE KIRINDA FISHERIES HARBOUR IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

(Consultation on draft report)

In October 1990, the Japan International Cooperation Agency (JICA) dispatched the Basic Design team on the Project for Rehabilitation of the Kirinda Fisheries Harbour (hereinafter referred to as "the Project"), to the Democratic Socialist Republic of Sri Lanka, and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

In order to explain and to consult the Sri Lanka side on the components of the draft report, JICA sent to Sri Lanka a study team, which was headed by Mr. Mikio Nakamura, the Senior Assistant for Grant Aid, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, and the team had discussions with the officials concerned of the Government of Sri Lanka from July 11th to 17th, 1991.

As a result of discussions, both sides, confirmed the contents in the attachment with Annexes I and II.

MIKIO NAKAMURA,
Leader,
Draft Report Explanation Team,
JICA,
Japan.

N.V.K.K. WERAGODA,
Secretary,
Ministry of Fisheries
and Aquatic Resources,
Sri Lanka.

July 17th, 1991.
Colombo.

ATTACHMENT

01. Components of Draft Report

The Government of Sri Lanka has agreed and accepted in principle the components of Draft Report proposed by the team.

02. Implementation of maintenance works and allocation of Budget

i) Sri Lanka side assured to conduct regular surveys and monitoring of the topographic changes around the Harbour by means recommended in the report and to inform the findings and the dredging schedule to the Japanese side.

ii) Sri Lanka side agreed that the topographic changes, such as erosion and accreation of sand, would be observed and if necessary preventive measures will be undertaken by them. Approval in terms of environmental protection to be obtained from the Coast Conservation Department and Central Environmental Authority and the Sri Lanka side will inform the Japanese side within one month from the date of signing these minutes.

iii) The Government of Sri Lanka agreed to provide necessary budgetary funds for the maintenance and operation of the Harbour after the completion of the Project.
It was also noted that the Ministry of Finance had assured allocation of the above necessary budget during the discussion on the Consultation Meeting on Technical and Grant Aid Cooperation for the year 1991, between the Government of Sri Lanka and Government of Japan.

03. Japan's Grant Aid Programme

i) The Government of Sri Lanka has understood the system of Japanese Grant Aid explained by the team.

ii) The Government of Sri Lanka will take necessary measures described in Annex I, for smooth implementation of the project on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

04. Further Schedule

i) Sri Lanka side agreed to supply data and information as per attached Annex II requested by Japanese side by the end of Aug. 1991.

ii) JICA will make the Final Report in accordance with the confirmed items, and send it to the Government of Sri Lanka by the end of Oct. 91

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Annex - I : Necessary measures to be taken by the Government of Sri Lanka in case Japan's Grant Aid is extended.

A. Specific Terms

Sri Lanka side assured to make necessary arrangements for the following items.

1. Agreement from the Kirinda Temple

To obtain the agreement letter from the Kirinda Temple on the construction of the new groyne and approach road in front of the temple and send a copy of agreement to Japanese side.

2. Quarrying Work:

i) To designate "Binkeramahela" at Bogahapelessa Village for quarry site, to supply the stones for the Project.

ii) To relocate the residents living close to quarry site on an alternate site and/or compensate.

iii) To allocate necessary budget for the repairing the road and construction of waiting area between the quarry site and the Project site.

iv) To determine/confirm the transportation route between the quarry site and the project site and inform to Japanese side for the purpose of estimating project cost.

v) To obtain clearence from the Ministry of Defence for the transportation, storage and usage of explosives for the Project.

3. Restriction of usage of Project area

The government of Sri Lanka will ensure that no encroachment of the backshore area is permitted.

B. General Terms

01. To secure the ownership and/or the right of the site for the Project.

02. To clear, level and reclaim the site, prior to the commencement of the Project.

03. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.

04. To provide Electricity, water supply, ~~drainage~~, telephone line and other incidental facilities to both the Project site and Quarry site.

i) Electricity distributing line to the sites.
ii) City water distribution main to the sites.
iii) Telephone trunk line to the main distribution panel of building.

05. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

06. To exempt taxes and to take necessary measures for custom clearance of the materials and equipment brought for the Project at port of disembarkation.

07. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contract such facilities as may be necessary for their entry into Sri Lanka and stay therein for the performance of their work.

08. To maintain and use properly and effectively the facilities constructed and equipment purchased under the Grant.

09. To bear all other expenses other than those to be borne by the Grant.

Annexe - II

01. Copy of letter from the Government Agent, Hambantota permiting the CFHC to use the quarry site.

02. Copy of letter from the Government Agent, Hambantota agreeing to the relocation of residents living around the quarry site.

03. Copy of letter from the Road Development Authority (RDA) for use of the road designated for transportation of stones and the route map.

04. Copy of letter from the Coast Conservation Dept.agreeing to the dumping site for the dredged sand requested by CFHC.

05. Cost for reparing the roads and the construction of waiting areas which allow the traffic to pass each other.

06. Cost for the relocation of residents living around quarry site.

07. Cost for aerial photographing of the Project area.

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APPENDIX-5 Schedule of Study Team (First Time)

No.	Date(1990)	
1	Oct. 23 Tue.	·Mr.Nishi, Dr.Tanaka, Mr.Baba, Mr.Kondo and Mr.Adachi departed for Colombo.
2	24 Wed.	·Visited CFHC(for Natural Condition Survey). ·Visited MBSLL(for Socio-economic Survey).
3	25 Thu.	·Investigated fish market in Colombo. ·Mr.Nishi, Dr.Tanaka, Mr.Baba, Mr.Kondo and Mr.Adachi visited JICA office and Embassy of Japan in Sri Lanka. ·Mr.Nishi, Dr.Tanaka, Mr.Baba, Mr.Kondo and Mr.Adachi paid a courtesy visit to DOER. ·Had a meeting with CFHC and MBSLL. ·Team Leader: Mr.Nakai arrived from Male to Colombo.
4	26 Fri.	·Investigated fish market in Colombo. ·Team Leader: Mr.Nakai, Mr.Nishi, Dr.Tanaka, Mr.Baba, Mr.Kondo and Mr.Adachi paid a courtesy visit to MOF and held an official meeting with officials concerned and explained the Inception Report of the Basic Design Study and the Japanese Grant Aid System. ·Visited DOER and held a meeting to explain the basic Design Study. ·Had a meeting with CFHC and MBSLL.
5	27 Sat.	·Team Leader: Mr.Nakai, Mr.Nishi, Dr.Tanaka, Mr.Baba, Mr.Kondo and Mr.Adachi left for Kirinda and on the way, made on-the-spot inspections of several fisheries harbour[Panadura, Beruwala, Balapitiya, Ambalangoda, Hikkaduwa, Dodanduwa, Galle, Mirrissa, Kottegoda, Tangalla].
6	28 Sun.	·Made an inspection of the Kirinda Fisheries Harbour. ·Made an inspection of the quarry site. ·Made an interview survey to fishermen. ·Made an inspection of Kataragama Town and an interview survey to the inhabitants.
7	29 Mon.	·Team Leader: Mr.Nakai, Mr.Nishi, Dr.Tanaka, Mr.Baba, Mr.Kondo and Mr.Adachi returned to Colombo.

			·Held a meeting at HIRDEP(Mr. Baba and Mr. Kondo).
			·Mr. Baba visited Sarvodaya District Center.
			·Mr. Kondo made interview surveys around Kirinda.
			·Team Leader: Mr.Nakai, Mr.Nishi and Dr.Tanaka made a internal meeting.
8		30 Tue.	·Mr. Baba and Mr. Kondo collected data in Tangalla DFEO, CFC and CFHC.
			·Team Leader: Mr.Nakai, Mr.Nishi, Dr.Tanaka, Mr.Baba, and Mr.Adachi held an official meeting with the officials concerned to discuss the contents of the Minutes.
			·Paid a courtesy visit to the Minister of MOFAR.
9		31 Wed.	·Collected socio-economic data.
			·Had a meeting with MBSLL for the contract.
			·Contracted with CFHC for the field Survey.
			·The signing of the Minutes of Discussions was made.
10	Nov.	1 thu.	·Had a meeting with MBSLL for the socio-economic survey.
			·Held an internal meeting.
			·Team Leader: Mr.Nakai, Mr.Nishi, Dr.Tanaka, Mr.Baba, Mr.Kondo and Mr.Adachi visited the Embassy of Japan in Sri Lanka and explained the Minutes of Discussions.
11		2 Fri.	·Team Leader: Mr.Nakai and Mr.Nishi left for Japan.
			·Held an internal meeting and classified collected data.
12		3 Sat.	·Made an inspection of Negombo Harbour.
			·Classified collected data.
			·Team Leader: Mr.Nakai and Mr.Nishi arrived at Japan.
13		4 Sun.	·Mr. Baba and Mr. Adachi left for Japan.
			·Held an internal meeting and classified collected data.
14		5 Mon.	·Held a meeting with CFHC with respect to the maintenance dredging.
			·Made a data collection at MOF.
15		6 Tue.	·Held a meeting with MOFAR and with JICA office regarding the contract of the socio-economic survey.
			·Made a data collection at NARA and EDB.
16		7 Wed.	·Made a data collection at GOBU-CEYNOR and JETRO.
17		8 Thu.	·Made a data collection at CFHC, Survey Dept. the Embassy of Norway and CFC.
			·Classified collected data.
18		9 Fri.	·Held a final meeting with MOFAR.

		·Held a meeting with CFHC and collected data.
19	10 Sat.	·Made an inspection of Negombo and Chilaw Harbour.
		·Classified collected data.
20	11 Sun.	·Made an contract of the socio-economic survey with MBSLL.
		·Dr. Tanaka and Mr. Kondo left for Japan.
21	12 Mon.	·Dr. Tanaka and Mr. Kondo arrived at Japan.

APPENDIX-6 Schedule of Study Team (Second Time)

No.	Date(1991)	
1	Jan. 17 Thu.	·Mr. Baba departed for Colombo.
2	18 Fri.	·Visited JICA office and Embassy of Japan in Sri Lanka and explained the contents of the study. ·Visited MBSLL(for Socio-economic Survey).
3	19 Sat.	·Examined the program of the study.
4	20 Sun.	·Examined the program of the study.
5	21 Mon.	·Held a meeting with MBSLL to discuss the interim report of the socio-economic survey.
6	22 Tue.	·Held a meeting with MOFAR and CFHC.
7	23 Wed.	·Held a meeting with CFHC and CFC.
8	24 Thu.	·Made data collection at Galle CFHC and Tangalla CFC.
9	25 Fri.	·Made an inspection of the Kirinda Harbour.
10	26 Sat.	·Made an investigation of fish distribution in inland area.
11	27 Sun.	·Made an interview survey in Colombo.
12	28 Mon.	·Obtained the interim report of the socio-economic survey from MBSLL. ·Visited JICA office and Embassy of Japan in Sri Lanka and explained the results of the study.
14	29 Tue.	·Mr. Baba left for Japan.
15	30 Tue.	·Mr. Baba arrived at Japan.

APPENDIX-7 Schedule of Study Team (Third Time)

No.	Date(1990)	
1	10 Wed.	·Mr.Nishi, Mr. Sasaki, Dr.Tanaka and Mr.Adachi departed for Colombo.(Team Leader: Mr. Nakamura had arrived at Colombo on 6th)
2	11 Thu.	·Team Leader: Mr.Nakamura, Mr.Nishi, Mr. Sasaki, Dr.Tanaka and Mr.Adachi visited JICA office and the Embassy of Japan in Sri Lanka. ·Team Leader: Mr.Nakamura, Mr.Nishi, Mr. Sasaki, Dr.Tanaka and Mr.Adachi paid a courtesy visit DOER and MOFAR. ·Held an official meeting with the officials concerned at MOFAR and discussed the time schedule. ·Held a meeting with CFHC
3	12 Fri.	·Held an official meeting with the officials concerned at MOFAR and proposed the Draft Final Reports and the Questionnaire and the draft of the Minutes.
4	13 Sat.	·Team Leader: Mr.Nakamura, Mr.Nishi, Mr. Sasaki, Dr.Tanaka and Mr.Adachi left for Kirinda and made an inspections of the Kirinda Fisheries Harbour.
5	14 Sun.	·Investigated the beach and the backshore area near the Kirinda Harbour. ·Made an inspection of the quarry site.
6	15 Mon.	·Visited the Hambantota G.A. and obtained information about the use of the quarry site and the backshore area of the Harbour. ·Made on-the-spot inspections of three Fisheries Harbours[Tangalla, Millissa, Galle] on the way to Colombo.
7	16 Tue.	·Held a meeting at MOFAR and explained the Draft Final Report and discussed the contents of the Minutes and made the draft of the Minutes.
8	17 Wed.	·The Minutes of Discussions was signed.
9	18 Thu.	·Team Leader: Mr.Nakamura, Mr.Nishi, Mr. Sasaki, Dr.Tanaka and Mr.Adachi visited JICA office and the Embassy of Japan to explain the Minutes of Discussions.
10	19 Fri.	·Team Leader: Mr.Nakamura, Mr.Nishi, Mr. Sasaki, Dr.Tanaka

and Mr.Adachi left for Japan.

11 20 Sat. ·Team Leader: Mr.Nakamura, Mr.Nishi, Mr. Sasaki, Dr.Tanaka and Mr.Adachi arrived at Japan

APPENDIX-8 List of Interviewed Personnel(First Visit)

Government of Sri Lanka

Name	Organization	Position
Mr.Joseph Michael Perera	Ministry of Fisheries & Aquatic Resources	Minister
Mr.N.V.K.K. Weragoda	ditto	Secretary
Mr.S.Weerapana	Department of External Resources	Assistant Director
Mr.A.R.Atapattu	Ministry of Fisheries & Aquatic Resources	Director(Marine)
Mr.S.Wewelwala	ditto	Director(Development)
Mr.P.S.M.Muthukuda	ditto	Director(Planning and Programming)
Mr.L.I.F.Gunawavunasuriya	Ceylon Fishery Harbours Corporation	Actg. General Manager
Mr.S.V.Fernando	ditto	Supdt. Engineer
Mr.M.A.Senevirathne	Ministry of Fisheries & Aquatic Resources	Project Manager
Mr.K.Nissanga	Hambantota Integrated Rural Development Programme	Fisheries Project Manager

Private Sector

Name	Company	Position
Mr. Nihal S. Dissanayake	Merchant Bank of Sri Lanka Limited	Senior Management Consultant
Mr.R.A.M.C.Wanigatne	Marga Institute	Director
Mr.Upali Jayawardena	ditto	Asst. Director
Mr.Rl de Alwis	Peoples Bank	

APPENDIX-9 List of Interviewed Personnel(Second Visit)

Government of Sri Lanka

Name	Organization	Position
Mr.P.S.M.Muthukuda	Ministry of Fisheries & Aquatic Resources	Director(Planning and Programming)
Mr.L.I.F.Gunawavunasuriya	Ceylon Fishery Harbours Corporation	Actg. General Manager
Mr.S.V.Fernando	ditto	Supdt. Engineer
Mr.M.A.Senevirathne	Ministry of Fisheries & Aquatic Resources	Project Manager
Mr.K.Nissanga	Hambantota Integrated Rural Development Programme	Fisheries Project Manager
Mr.Sahahanda	Ceylon Fishery Corporation	

Private Sector

Name	Company	Position
Mr. Nihal S.Dissanayake	Merchant Bank of Sri Lanka Limited	Senior Management Consultant

APPENDIX-10 List of Interviewed Personnel(Third Visit)

Government of Sri Lanka

Name	Organization	Position
Mr.N.V.K.K. Weragoda	Ministry of Fisheries & Aquatic Resources	Secretary
Mr.S.Weerapana	Department of External Resources	Assistant Director
Mr.B.S.Kahawita	Coast Conservation Department	Director
Mr.A.Hettiarachchi	Ministry of Fisheries & Aquatic Resources	Director(Planning)
Mr.G.Pyasena	ditto	Deputy Director(ditto)
Mr.N.Senanayake	Ceylon Fishery Harbours Corporation	Chairman
Mr.L.I.F.Gunawavunasuriya	ditto	Actg. General Manager
Mr.M.R.P.Molligoda	National Aquatic Resources Agency	Chairman
Mr.Upah Jayaseke	ditto	Director General
Mr.R.de.S.S.AMARASEKARA	ditto	Head National Hydrographic Office
Miss C.Aman Siri	ditto	Research Officer
Mr.N.P.Wijayanamada	ditto	OIC,Oceanography Division
Miss Padmiri de Alwis	ditto	Head,Environmental unit

APPENDIX-11 Report Form on the Topographic Change of Shore and Sea Bed around the Kirinda Fisheries Harbour

The report form will consist of the following items and a Table(in next page). The designation of zones for arrangement of the topographic changes is illustrated in Fig.1. The detailed limits of these zones will be determined in the Detailed Design Study.

1. Date of Report

2. Name and Position of Reporter

3. General Situation of the Topographic Change

3-1 Period of the Field Survey

* Sounding
* Shoreline Survey

3-2 Noteworthily Topographic Change

3-3 Operation of Maintenance Works(such as Maintenance Dredging

* Kind of works
* Period of Operation
* Scale of Works

4. Data to be appended

* Sounding Map obtained in Reporting Period
* Result of Shoreline Survey.
* Comparative Map of Sounding Result between the Newest and Previous One
* Comparative Map of Result of Shoreline Survey between the Newest and Previous One.

Situation of Topographic Change in Each Zone around the Kirinda Fisheries Harbour

Name and Area of the Zone	Situation of Topographic Change*	Average Water Depth in the Zone	
		Current	Previous
A		m	m
B		m	m
C		m	m
D		m	m
E		m	m
F		m	m
G		m	m
H		m	m
I		m	m
J		m	m
K		m	m
L		m	m
M		m	m
N		m	m

Describe using following words such as "Severe Erosion", "Moderate Accretion", " Stable" and so on.

Severe :Change of Water Depth exceeded 1 m/year.
Remarkable:Change of Water Depth was in the Range of 1 - 0.5 m/year.
Moderate :Change of Water Depth was in the Range of 0.2 - 0.5 m/year.
Stable :Change of Water Depth was less than 0.2 m/year

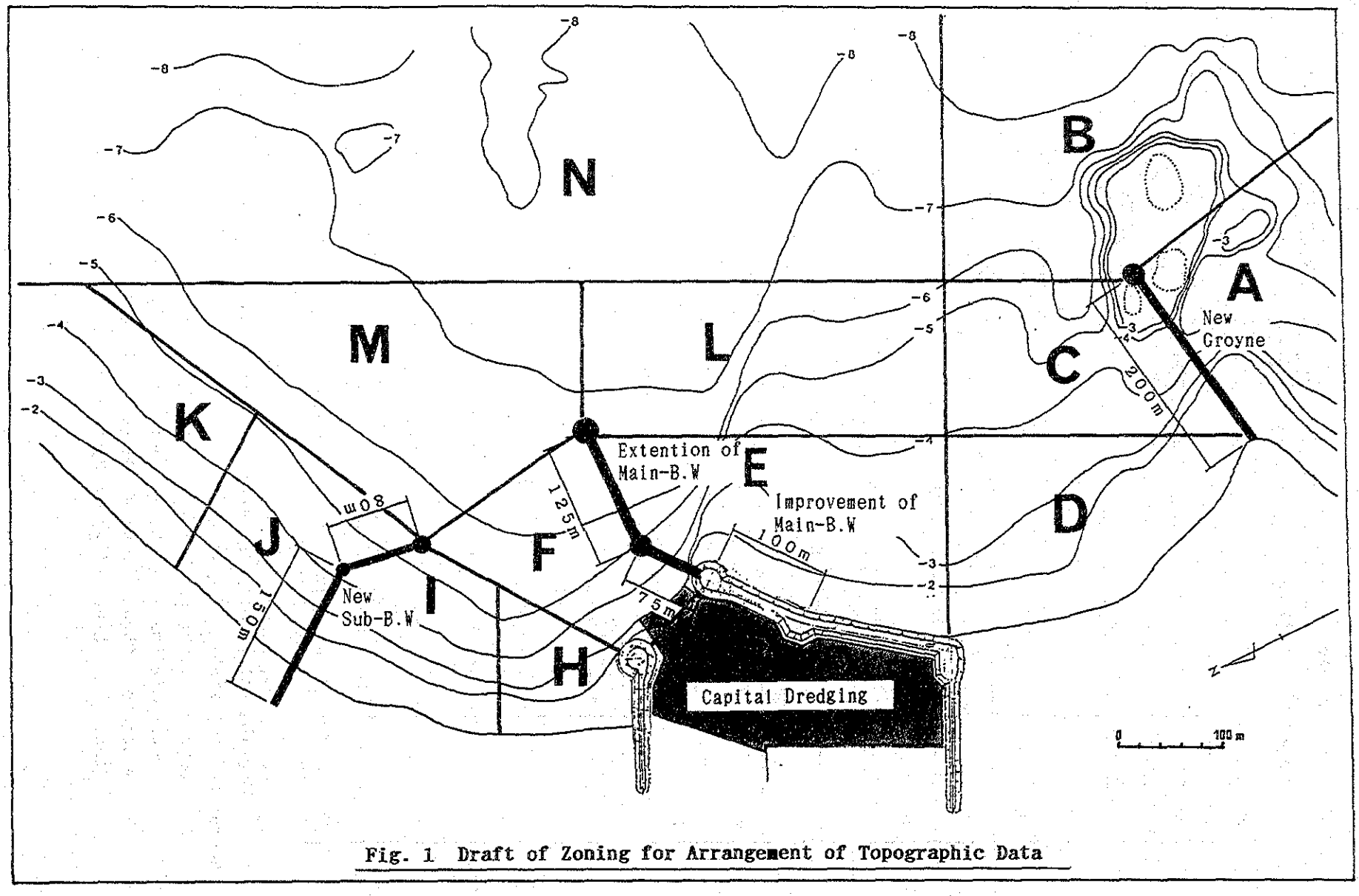
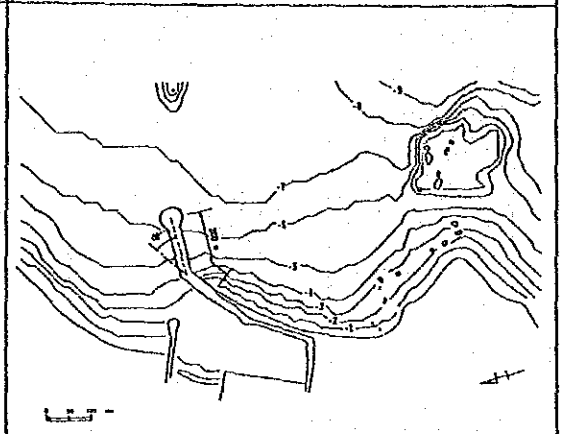
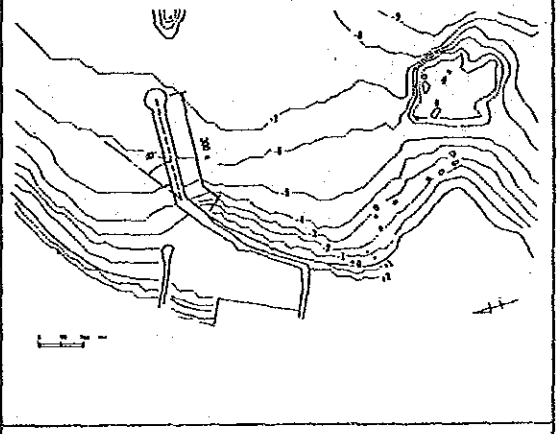
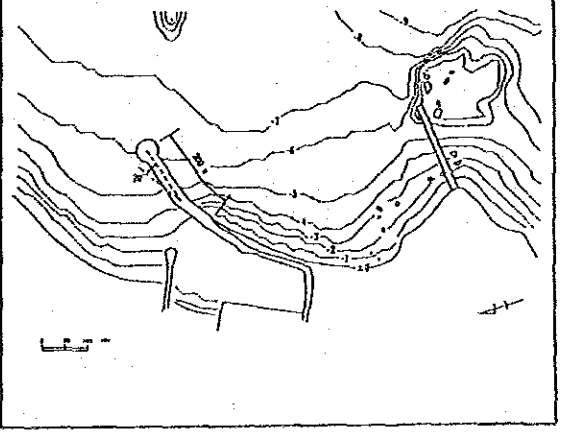
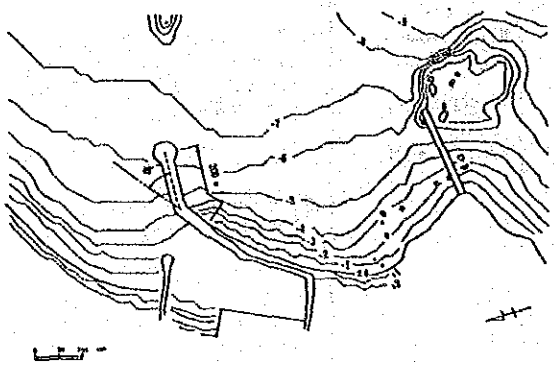
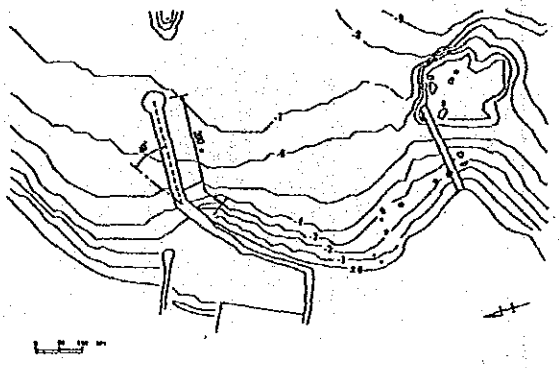
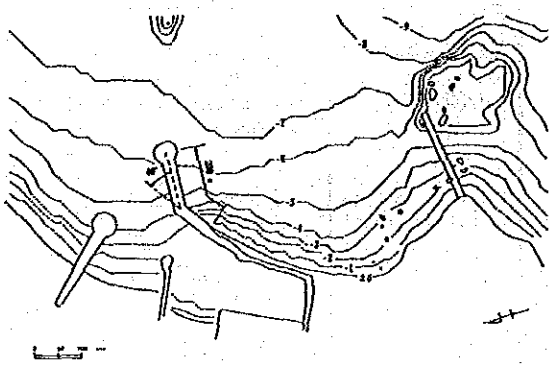
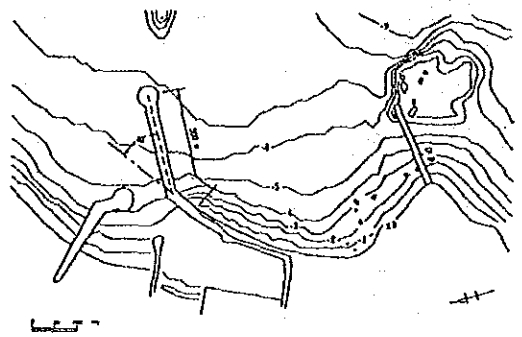
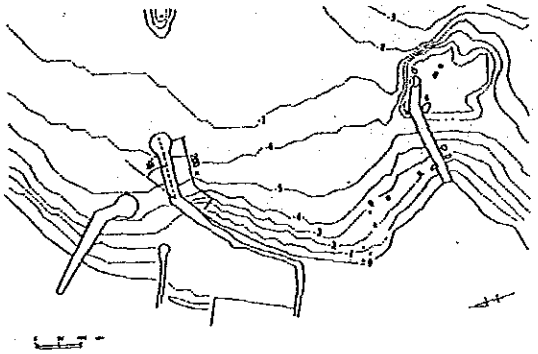
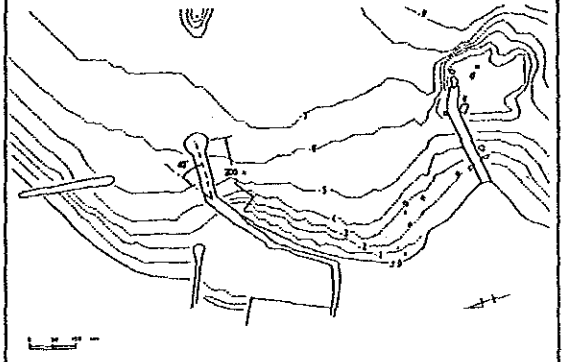


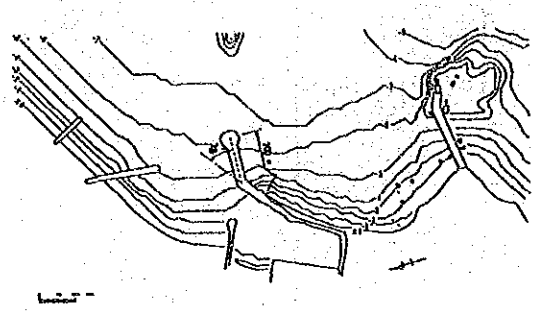
Fig. 1 Draft of Zoning for Arrangement of Topographic Data

APPENDIX-12 Layouts of Countermeasures Examined in Technical Study

Countermeasure	Aim	No.	Layout
Main breakwater extension (1:200m, 40°) (2:300m, 40°)	1) To intensify the flushing effect of waves by placing the head of the main breakwater 200m offshore from present location. 2) To improve the calmness inside the harbour. 3) To increase confinement capability of sand between Kirinda Point and main breakwater. 4) To suppress the deposition around the head of the main breakwater.	1	
		2	
Main breakwater extension (200m, 20°) + Submerged groyne at Kirinda Point	5) To weaken the waves and currents and to reduce sand volume deposited from the south-east in the SW monsoon season.	3	

Countermeasure	Aim	No.	Layout
Main breakwater extension (200m, 40°) + Submerged groyne at Kirinda Point	To effect more suppression of deposition near the head of the main breakwater by shifting the direction of the main breakwater extension to the offshoreside.	4	
Main breakwater extension (300m, 40°) + Submerged groyne at Kirinda Point	To enhance the effects 1)~4) through a 300m extension of main breakwater.	5	
Main breakwater extension (200m, 40°) + Submerged groyne at Kirinda Point + New sub breakwater (Type b)	6) To reduce the sand deposited near the harbour mouth resulting from circulation currents in the SW monsoon season by constructing a new sub breakwater. 7) To prevent littoral sand transport into the harbour.	6	

Countermeasure	Aim	No.	Layout
Main breakwater extension (300m, 40°) + Submerged groyne at Kirinda Point + New sub breakwater (Type a)	To intensify effects 1)～ 4) by a 300m extension of main breakwater in addition to layout 6.	7	
Main breakwater extension (200m, 40°) + Groyne at Kirinda Point + New sub breakwater (Type a)	To enhance the ability to inhibit sand transport at Kirinda Point by adopting an extended groyne. (not submerged)	8	
Main breakwater extension (200m, 40°) + Groyne at Kirinda Point + New sub breakwater (Type c)	6) To reduce the sand deposited near the harbour mouth resulting from circulation currents in the SW monsoon season by constructing a new sub breakwater. 7) To prevent littoral sand transport into the harbour.	9	

Countermeasure	Aim	No.	Layout
Main breakwater extension (200m, 40°) + Groyne at Kirinda Point + New sub breakwater (Type c) + Groyne at northern coast	To enhance the ability to reduce littoral sand transport in the NE monsoon season.	10	
Main breakwater extension (200m, 40°) + Groyne at Kirinda Point + New sub breakwater (Type d)	To investigate the intensified effect of a variation in alignment of new sub breakwater in the NE monsoon season.	11