

**BASIC DESIGN STUDY REPORT**  
**ON**  
**THE PROJECT FOR ESTABLISHMENT OF**  
**PERMANENT SEAMEN'S TRAINING SCHOOL**  
**IN**  
**THE PEOPLE'S REPUBLIC OF BANGLADESH**

**JANUARY 1992**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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BASIC DESIGN STUDY REPORT ON THE PROJECT FOR ESTABLISHMENT OF PERMANENT SEAMEN'S TRAINING SCHOOL IN THE PEOPLE'S REPUBLIC OF BANGLADESH

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## PREFACE

In response to a request from the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct a basic design study on the Project for Establishment of Permanent Seamen's Training School and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Bangladesh a study team headed by Mr. Kazuyuki NOGAWA, Chief, Educational Affairs Division, Shimizu School for Seamen's Training, Ministry of Transport, from August 29 to September 23, 1991.

The team held discussions with the officials concerned of the Government of Bangladesh and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Bangladesh in order to discuss a draft report and the present report was prepared.

I hope that this report will contribute to the promotion of the Project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the People's Republic of Bangladesh for their close cooperation extended to the teams.

January, 1992

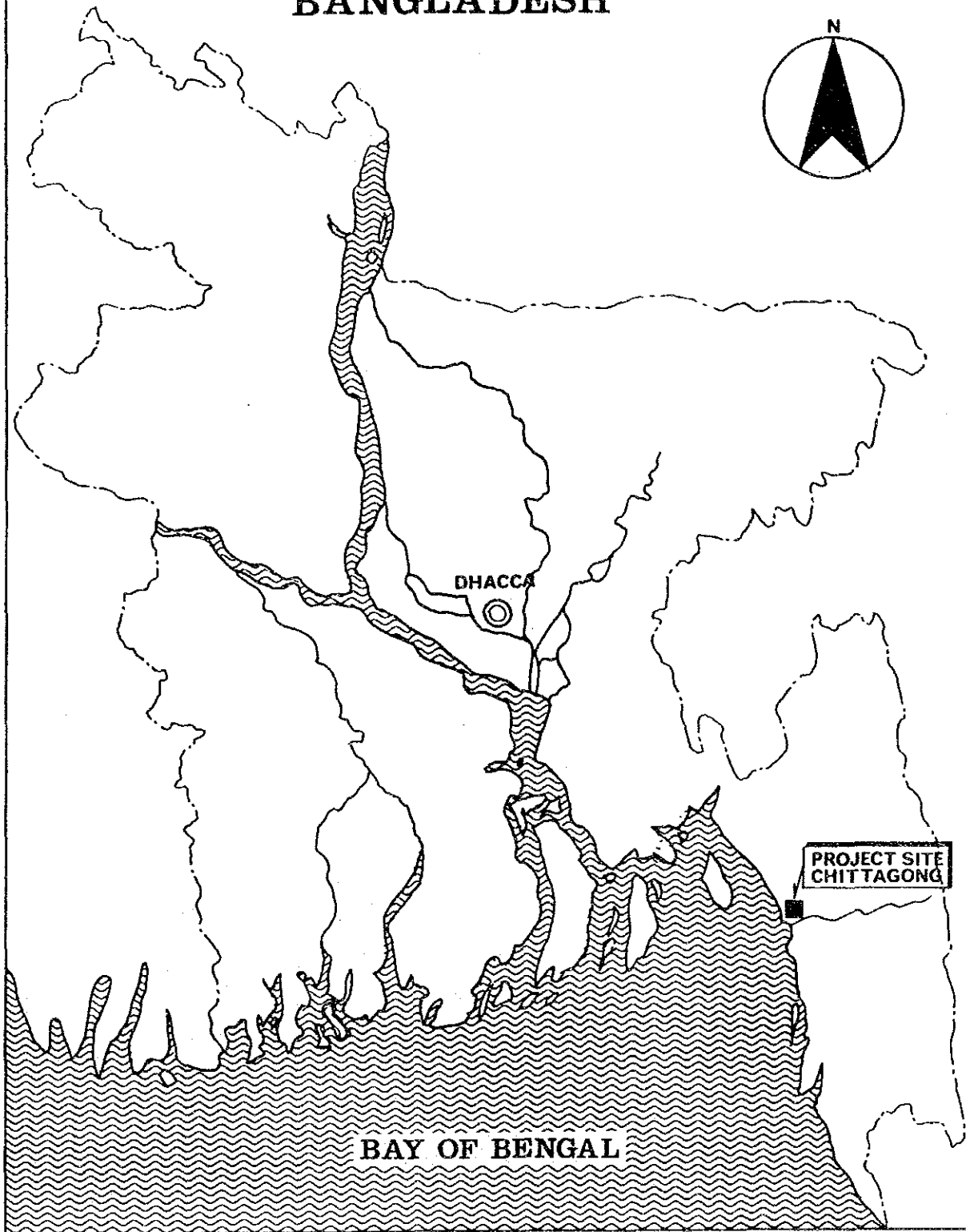
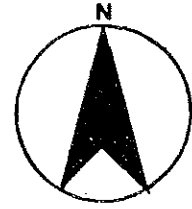


Kensuke Yanagiya  
President

Japan International Cooperation Agency



# BANGLADESH

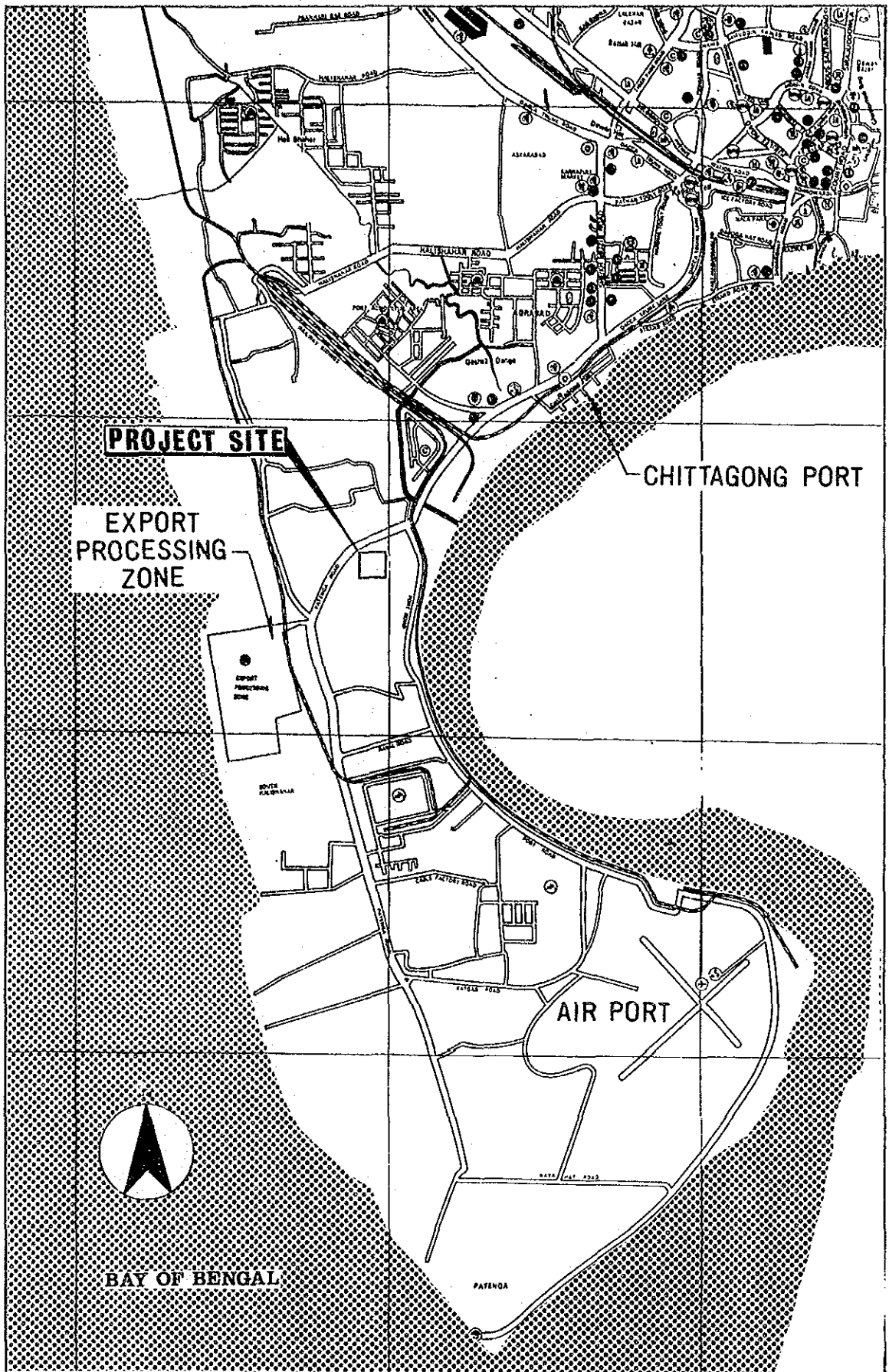


PROJECT SITE  
CHITTAGONG

BAY OF BENGAL













## SUMMARY

Since the majority of the land area of Bangladesh is comprised of a delta formed by the Ganges, Bramaputra, and Meghna Rivers, inland water transportation have developed as the most suitable, lowest cost, and most convenient form of transportation in this country, holding a most important position in the nation's economy. Some 700,000 small vessels ply these inland waterways, and this has generated many employment opportunities for local people. With this foundation, since long before the country achieved its independence, Bangladesh has been a source of seamen, with a reputation for diligence, loyalty, and obedience. These seamen serve on British vessels as well as those of many other countries, earning their country a considerable amount of precious foreign exchange.

However, the number of Bangladesh ratings(\*) working on foreign vessels, after peaking in 1979, has been steadily declining since then. This is due to a combination of factors, including the worldwide slump in the marine shipping industry, the increasing difficulty of unqualified Bangladesh ratings finding employment on foreign vessels, owing to the coming into effect of the STCW Convention in 1978 (International Convention on Standards of Training, certification, and Watchkeeping for Seafarers) of the IMO (International Maritime Organization), the increase in the population of ratings from other Asian countries, and the disappearance of fresher ratings recruits as a result of the suspension of new ratings registrations.

But the most fundamental cause of this situation is the deficiencies in ratings's training in Bangladesh. For this reason, the Bangladesh Government has decided to offer ratings training in accord with the STCW Convention, which is mandatory minimum requirement for all ratings, and so eliminate unqualified persons. In addition, with a view to cultivating a corps of ratings capable of entering the international shipping industry, the government plans to reopen the registration and training of new recruits, which had been suspended. This is intended as a response to the competition from the ratings of other countries, particular Asian, which have been expanding their incentives for overseas work along with ratings' training as a key element in their national development plans. However the Seamen's Training School (STS), the only training institute for ratings in

Bangladesh, has not sufficient training facilities and equipment for ratings and cannot attain to fulfill the requirement.

The Bangladesh Government, therefore, has drafted a Plan to Improve facilities and equipment at the Permanent Seamen's Training School (hereinafter called "the Project") and has formulated a Request to the Government of Japan for grant aid for implementation of this Project.

Upon receiving this Request from the Bangladesh Government, the Japan International Cooperation Agency (JICA) dispatched a Project Formulation Study Team to Bangladesh to examine the Plan to improve facilities and equipment at the Seamen's Training School. This team discussed with concerned parties the current state of ratings's training in Bangladesh, the relationship between the subject Project and superior plans, and the background and objectives of the Project, while also validating the target Project site.

Based on the report of the Project Formulation Study Team, the Government of Japan decided to conduct a Basic Design Study on the Project. For this purpose, JICA dispatched a Basic Design Study Team (hereinafter referred to "the Team") to Bangladesh from August 29 to September 23, 1991.

In order to validate the contents of the Request for improving the facilities of the STS, and examine the appropriateness of the Project as well as the scope of the Project facilities and equipment, the Team conducted a field study covering the present state of seamen's training in Bangladesh, activity patterns of similar and related facilities, the implementation structure and operating plans for the project, along with the topography and geology of the planned construction site.

As a result of its discussions with officials concerned in the Bangladesh Government, the Team reached the conclusion that, in order to implement training programs that would enable Bangladesh ratings to acquire qualifications meeting the minimum requirement of the STCW convention and develop the capabilities needed to procure employment in the international shipping industry, it would be appropriate to provide the equipment prescribed by STCW as well as that needed to develop minimum standards of knowledge and training required of ratings.

Of the items of equipment and facilities required for the Project, trainee dormitories and a canteen, galley, recreation area, dispensary, offices, instructor's room, and a Principal's office, for which the existing facilities of the STS can be used, will be borne by the Bangladesh Government. A seamen's welfare facility, the Seaman's Hostel, will be also borne by the Government of Bangladesh.

Based on a further analysis and examination of the findings of the field survey, the Team has prepared the necessary and optimum facilities and equipment for implementation of the Project. The following shows outline of the optimum facilities and equipment.

### 1. Training Equipment and Machinery

#### (1) Life Saving Appliances

Enclosed type motor life boat	No	1
Davit	No	1
Cutter	No	1
Inflatable Liferaft	No	1

#### (2) Fire Fighting Appliances

Compressor for breath apparatus	No	1
---------------------------------	----	---

#### (3) First Aids Equipment

Lot	1
-----	---

#### (4) Compass and Navigation Apparatus

Gyro compass	No	1
Radar	No	1

#### (5) Meteorology Equipment

Weather fax	No	1
Wind vane	No	1

#### (6) Equipment for Ship Construction & Stability Training

Model of;

a. Bulk cargo ship	No	1
b. Container ship	No	1
c. Tanker	No	1

#### (7) Cargo Handling and Stowage Equipment

Model of derrick & hatch way	No	1
Cargo derrick & hatch way	No	1

#### (8) Equipment for Prevention of Sea Pollution

Lot	1
-----	---

#### (9) Main & Auxiliary Engine

Diesel generator	Nos	2
------------------	-----	---

Frozen cargo store	No	1
Chilled store	No	1
Rice store	No	1
Cut away model of;		
a. 2-cycle Engine	No	1
b. 4-cycle Engine	No	1
c. Marine steam turbine	No	1
d. Oil hydraulic pump	Nos	2
(10) Electric Equipment	Lot	1
(11) Workshop Equipment		
Universal Machine	No	1
Lathe	Nos	4
(12) Steering gear system simulator	Set	1
(13) Seamanship Workshop Equipment	Lot	1
(14) Galley Equipment & Apparatus	Lot	1
(15) Radio Equipment	Lot	1
(16) Library Equipment	Lot	1
(17) Vehicles	Nos	2

## 2. Construction Programme

### (1) Training Facilities

- 1) Training Building 1,860 m<sup>2</sup>  
 (Class rooms for Engine Department, Deck Department and Saloon Department, Model Rooms for Deck and Engine, Machine Workshop, Seamanship Training Room, Training Galley, Storage)

- 2) Fire Fighting Training Facilities 32 m<sup>2</sup>  
 3) Storage 16 m<sup>2</sup>  
 4) Boat Davit 10.8 m X 5.1 m  
 5) Pavement 240 m<sup>2</sup>

### (2) Faculty Quarters

- Faculty Quarters 345m<sup>2</sup>

Total Floor Area 2,253 m<sup>2</sup>



After implementation of the Project, operation of the Seamen's Hostel is to be transferred to the STS, while the STS itself is to be placed under the jurisdiction of the Department of Shipping in the Ministry of Shipping. Total operating costs for the facilities and equipment are estimated at about Tk 3,900,000 per annum. The training materials and equipment for the Plan will not include any highly sophisticated items requiring technical guidance or special training, so that the instructors and staff of the STS should be able to handle them.

The Bangladesh Government is presently making arrangements to complete the proper documents and procedures for the Planning Committee with regard to the operational system and budgetary appropriations following Project implementation. Accordingly, no particular problems are anticipated with either budgets or the staff recruitment.

This Plan has been adopted as a priority project under both the Government's Fourth Five Year Economic Development Plan and the Three Years Rolling Plan. Its implementation, therefore, would play a major role in the country's human resource development program.

If this Project is implemented, it will produce not only direct benefits for the ratings receiving the training but will also make a major contribution to the Bangladesh economy through an increase in foreign exchange earnings, enhanced safety of vessels and vessel personnel, and an ability to provide an outstanding pool of ratings to the marine shipping industry. The Team has, therefore, concluded that there is considerable significance in carrying out the Project with grant aid from the Government of Japan.

(\* ) "Rating" means a member of the ship's crew other than the master or an officer, who works onboard under the command of the master or an officer. "Officer" means a member of the crew, other than the master, designated as such by national law or regulations or in the absence of such designation by collective agreement or custom.



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## CHAPTER 1: INTRODUCTION

The Government of the People's Republic of Bangladesh, based on a human resource development program, intends to improve the quality of ratings' training and bring the Bangladesh ratings up to international standards by providing them with the qualifications required by the STCW and facilitate the employment of Bangladesh persons as ratings on foreign vessels, earning in the process valuable foreign exchange.

The Government of Bangladesh drafted a plan for improving the facilities and equipment of the country's Seamen's Training School (STS) in an effort to improve the quality of ratings' training in accordance with the STCW in 1978 (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers), and has requested a grant aid from the Government of Japan to implement this program.

Upon receiving the Request from the Bangladesh Government, the Japan International Cooperation Agency (JICA) dispatched a Project Formulation Study Team to Bangladesh from February 11 - 25, 1991 to review the Plan for improvement of Facilities and Equipment at the Seamen's Training School. The Team discussed and validated with the officials concerned the current state of ratings's training in Bangladesh, the relationship between the Project and the national development plans, the background and objectives of the Project, while validating the plan site.

Based on the report by the Project Formulation Study Team, the Government of Japan decided to carry out a Basic Design Study on the Project. For this purpose, JICA dispatched a Basic Design Survey Team, headed by Mr. Kazuyuki NOGAWA, Chief, Educational Affairs Division, Shimizu School for Seamen's Training in the Ministry of Transport, to Bangladesh from August 29 to September 23, 1991.

For purposes of validating the contents of the Request relative to the ratings' training program and, in order to examine the appropriateness of the Project and the scale of facilities and equipment at the STS, the Basic Design Study Team carried out a field study on the present state of ratings's training in Bangladesh as well as a topographical and geological survey on the planned site for facility construction.

In the course of the field study, a Minutes of Discussions was formulated, incorporating the discussions between the Basic Design Study Team and the Bangladesh Government, which the parties signed and exchanged. Upon returning to Japan, the Basic Design Study Team analyzed and reviewed the survey findings, while evaluating the effectiveness of the Project in training Bangladesh ratings, and prepared a Basic Design, incorporating the most appropriate scope and types of facilities and equipment for the STS. This was organized into a draft Basic Design Study Report, including project costs, project evaluation, and recommendations.

In order to explain the contents of the report, another team led by Mr. Kazuyuki NOGAWA was sent to Bangladesh from November 16 to 25, 1991. The Team reviewed and discussed with the concerned officials of the Bangladesh Government on the Basic Design Study included in the draft final report.

This report incorporates the above results. Details on Team composition, discussants in Bangladesh, the itinerary of the field study, and the Minutes of Discussions are shown in the Appendix following the report.



## CHAPTER 2: BACKGROUND OF THE PLAN

### 2.1 General Conditions in Bangladesh

#### 2.1.1 Geography and Climate

The great bulk of the land area of Bangladesh is comprised of a delta formed from soil and sand deposits carried by three large rivers: the Ganges, Bramaputra, and Meghna. About half the country's area is lowland, with altitude of 8 m or less, while more than 6% of the total area is comprised of rivers and other waters. Depending on the season, the maximum river water flow varies widely from a minimum of 7,000 m<sup>3</sup> to 100,000 m<sup>3</sup>. River widths too range from a few kilometers to 10 km or more, often causing major changes in the position of river beds as a result of flooding and changes in the earth's crust.

Average annual rainfall in Bangladesh varies considerably, depending on the area, from 1100 mm to 5690 mm, but about 80% of this total falls during the rainy season extending from June to September. With the increase in melted snow from the high ranges of the Himalayas, the water levels of the country's major rivers start to rise in the latter half of March, at the end of the dry season, and, under the influence of concentrated torrential rains during the rainy season, developing from subtropical monsoons, reach peak levels from July to September.

In Bangladesh, even in years of normal precipitation during the rainy season, some 20% of the nation's area is said to be inundated. In addition, if, during this period, there is a further increase in river levels from swells resulting from cyclones that develop in the Bay of Bengal, serious flood damage may develop. This year, during the night of April 29 through the pre-dawn hours of the 30th, a cyclone hit the southern coastal region with a record wind velocity of 62 m/second and record swells of 6 m, resulting in more than 138,000 persons dead, over 139,000 injured, and 1,225 lost. In addition, 819,000 home were totally destroyed, 882,000 partially destroyed, while 1,061,000 head of cattle were lost and 133,000 acres of crops totally destroyed. This was the most damaging cyclone in the country's history.

In Bangladesh, seismic action is low, and recorded major damage from earthquakes has been relatively slight. The most powerful earthquake on record was the so-called the Great Earthquake of 1897, which delivery destruction over a wide area, centering around the Shillong Plateau, which was the quake's epicenter. However, in the Bengal Earthquake of 1885, and the Srimangal Earthquake of 1918, damage has limited to a narrow band centered around the epicenter. In an earthquake in 1950, on the other hand, the flow of the upper reaches of the Bramaputra River protruded as much as 18 feet in places, while the course of the Dibung River shifted. Records show that there were massive landslides as well as abnormal increases in liquid discharge and sediment loads.

### 2.1.2 The Economy

The number one problem of the Bangladesh economy -- albeit its weight has been declining -- is the instability of agricultural production, the most important segment (37.9%) of GDP during 1989/90, which is extremely vulnerable to weather and natural disasters. Agriculture does not meet the grain production level required to satisfy domestic food demand and so, with its rising population, the country is hard pressed to maintain even its current level of food self-sufficiency. In addition, the most important agricultural products -- jute and tea -- are directly affected by changes in international market conditions and so are an unstable source of revenue.

The second major problem is the chronic deficit in the Bangladesh trade accounts. The size of the deficit has been increasing annually, as evidenced by the shortage of foreign exchange holdings and the rapid increase in foreign liabilities. Also, given the government's weak fiscal base, the increase in expenditures, reflecting such factors as increases in salaries of government workers, has accelerated the fiscal deficit, forcing an ever greater depending on foreign aid in the nation's development budgets.

During the latter half of the 1970s, the Bangladesh rate of economic growth ran 7.5% per annum but, during the 1980's, it dropped to the 4% level in 1987/88, and fell further to 2% during 1988/89, as a result of major floods. In 1989/90, thanks to favorable weather conditions which permitted a small expansion in agricultural production, the growth rate recovered to

6.2%. In 1990/91, however, owing to the impact of the Gulf War and the damage wrought by the country's worst cyclone on record in April, 1991, the rate of growth is estimated to have declined again to just over 3%.

### 2.1.3 Population and the Export of Labor

The Bangladesh population broke through the 100 million mark in 1985, reaching 1.8 billion in 1988. In the absence of an industrial base other than agriculture, the GDP has been unable to keep up with this explosive population growth, and the per-capita GNP (1988) stagnates around the \$170 level, making the Bangladesh one of the world's least developed nations.

The annual rate of population growth for the country as a whole is a very high 3%, but it is particularly high in urban areas, at a remarkable 6%. On top of natural growth, this reflects a migration of surplus labor from agricultural communities to the cities in search of employment opportunities, which has aggravated the problems of unemployment and poverty in urban areas.

As a consequence, the central thrust of a string of Bangladesh Governments has been the creation of employment opportunities and manpower resource development, and these objectives have been accorded maximum priority in the country's Five Year Economic Development Plans.

A solution to the unemployment problem appears remote, as the growth in GDP has failed to meet expectations, owing to such problems as the inadequate production base, the explosive growth of population, a series of political upheavals, and frequent flooding. Nevertheless, the export of labor and the resulting overseas remittances showed a relatively high rate of growth from 1980 to 1988. The following chart shows the trends in Bangladesh export earning along with the value of overseas remittances during this period.

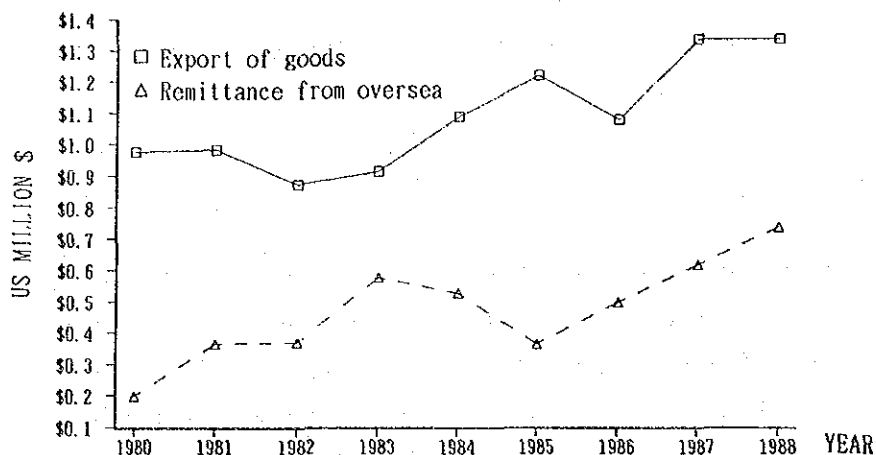


Fig. 2-1 SOURCE OF FOREIGN EXCHANGE (EXCEPT LOAN & GRANT)

(SOURCE: IRDB)

While the former showed a growth of about 30% over the 9-year period, remittances scored a 3-fold expansion, accounting for about half the foreign exchange generated by exports. Though the exact amount of remittances from ratings is not available, the following shows the estimated earnings in foreign exchange by Bangladesh seamen aboard foreign vessels.

Table 2-1 APPROXIMATE EARNINGS IN FOREIGN EXCHANGE BY SEAMEN ONBOARD FOREIGN VESSELS

YEAR	APPROXIMATE EARNINGS IN FOREIGN EXCHANGE BY SEAMEN ONBOARD FOREIGN VESSELS (Tk)
1986	122,300,000
1987	117,500,000
1988	136,200,000
1989	155,000,000
1990	165,000,000

(SOURCE: DEPARTMENT OF SHIPPING, BANGLADESH)

## 2.2 Review of Related Plans

### 2.2.1 The Fourth Five Year Plan

Since the first Five Year Plan in 1973, Economic Development Plans in Bangladesh have evidenced a shift in emphasis from the original strong socialistic leanings to an emphasis on the market mechanism and the role of private enterprise. At present, the country is in the midst of the Fourth

Five Year Economic Development Plan (1990/91 to 1995/96), the main goals of which are:

1. Accelerated economic growth (a target of 5% average annual growth in GDP)
2. Alleviation of poverty through the creation of jobs and human resource development.
3. Development of a self-supporting economy.

The Plan aims particularly at the further activation of the private sector, based on the introduction of foreign capital, with importance also attached to rural development, the participation of women in the Development Plan, and education to help solve the population problem.

#### 2.2.2 Three Years Rolling Plan

In 1991, in an effort to achieve efficient economic development, the Government drafted a 3 year investment plan, the Three Years Rolling Plan, which assigns a series of project priorities.

The Project for Establishment of the Seamen's Training School has been accorded a priority position in both the Fourth Five Year Economic Development Plan and the Three Years Rolling Plan.

### 2.3 Profile of Water Transport in Bangladesh

#### 2.3.1 Inland Water Transport

Given the fact that the bulk of the country's area is comprised of a delta formed by the Ganges, Bramaputra, and Meghna Rivers, water transport has developed as the form most suited to the land patten, occupying a very important position in the nation's transportation structure.

Inland water transport, as a convenient and low-cost means of transport, has played a key role in regional economic development. The Bangladesh Government has established the Bangladesh Inland Water Transport Authority (BIWTA) within the Ministry of Shipping, which is responsible for the construction and administration of river ports, maintaining channels,

navigation safety, and manpower training. The Government has also established the Bangladesh Inland Water Transport Corporation (BIWTC), which is responsible for river transport, including inland water freight and passenger traffic. However, reflecting the orientation toward the private sector in economic planning, the expansion of the BIWTC has been restrained.

### 2.3.2 Ocean Shipping

In the ocean shipping sector, the Bangladesh Shipping Corporation (BSC) was formed in 1972 to promote the development of this sector. The BSC presently operates a fleet of 22 vessels with a total DWT of 340,000, but the growth of private ocean shipping companies has also been impressive, with 9 companies presently operating a total of 17 vessels. Some 40% of the country's foreign trade is carried by Bangladesh-registered vessels.

Table 2-2 FREIGHT POSITION OF BANGLADESH SHIPPING COMPANIES

YEAR	NUMBER OF SHIPS	DWT
1989 - 1989	43	473,187 DWT
1989 - 1990	39	475,039 DWT
1990 - 1991	39	475,039 DWT

(SOURCE: DEPARTMENT OF SHIPPING, BANGLADESH)

## 2.4 General Conditions of Bangladesh Ratings:

### 2.4.1 Bangladesh Seaman

The total length of inland waterways in Bangladesh is about 5,000 miles, of which 3,200 are used as regular ship channels. About 700,000 small vessels ply these routes, providing considerable employment to ratings. Given their aptitude in this area, during the period of British rule, the industrious, loyal, and obedient Bengal seamen contributed to the prosperity of marine transport in the British Empire. The Bangladesh seamen served not only on ships of British registry but also on those of many other flags. This corps of seamen has long been a major source of precious foreign exchange for Bangladesh.

### 2.4.2 Number of Ratings registered and employed

Number of National Ratings by Shipping Company are as follows:

Table 2-3 NUMBER OF BANGLADESH SEAFAIRERS BY COMPANY (JULY 1991)

NAME OF COMPANY	No. OF SHIP ABORD	No. OF BANGLADESH SEAMEN
1. BANK LINE	4	96
2. CLAN LINE	10	200
3. HONEST HAND	2	24
4. CHANDRIS LINE	14	286
5. KUWAIT LIVESTOCK	4	194
6. UNIVAN	7	79
7. SEALAND	8	165
8. MAMONISH	1	11
9. ILYAS INVST	7	100
10. ORS CORPN	6	91
11. SANDISH CORP.	3	42
12. ORIENTSH	10	150
13. ELETSON	11	88
14. TRITEA SH	3	47
15. STAR NAV	3	21
16. GEMASH	2	33
17. TEH HV	3	44
18. SYMCO	2	25
19. TAV RANGE	1	16
20. OTHERS	2	13
No. OF SEAMEN EMPLOYED ON FOREIGN SHIPS		1,725
21. B. S. C.		
22. PRIVATE COMPANY OF BANGLADESH	22 17	574 196
No. OF SEAMEN EMPLOYED ON NATIONAL SHIPS		770
GRAND TOTAL		2,495

(SOURCE: DEPARTMENT OF SHIPPING, BANGLADESH)

The population of employed ratings in Bangladesh has been increasing in response to the growth in the country's marine shipping industry and the expansion of the ranks of ratings working on vessels of Bangladesh registry. However, while the number of registered ratings rose sharply up to 1979, since then there has been a steady decline in these numbers. Despite the huge number of new registrations in that year, a decline had already started

in 1978 in the number of Bangladesh ratings serving aboard foreign vessels, with the total dropping sharply, by 47%, from that year to 1991.

Table 2-4 NUMBER OF SEAMEN REGISTERED AND EMPLOMENT ON NATIONAL AND FOREIGN SHIPS FOR THE LAST 19 YEARS

YEAR	No. OF SEAMEN REGISTERED (A)	No. OF SEAMEN EMPLOYED ON FOREIGN VESSELS (B)	No. OF SEAMEN EMPLOYED ON NATIONAL VESSELS (C)	No. OF SEAMEN ONBOARD (D)=(B)+(C)	No. OF SEAMEN AWAITING (A)-(D)
1972	10,328	1,692	84	1,776	8,552
1973	10,175	2,605	261	2,866	7,309
1974	9,845	3,548	357	3,905	5,940
1975	9,816	3,314	357	3,671	6,145
1976	9,417	3,549	452	4,001	5,416
1977	9,696	4,247	629	4,876	4,820
1978	9,533	3,538	659	4,197	5,336
1979	11,788	2,770	712	3,482	8,306
1980	11,186	2,881	821	3,702	7,484
1981	10,115	2,287	764	3,051	7,064
1982	9,708	1,903	748	2,651	7,057
1983	8,063	1,986	683	2,669	5,394
1984	8,016	2,033	720	2,753	5,263
1985	7,798	2,120	717	2,837	4,961
1986	7,521	1,731	748	2,479	5,042
1987	7,401	1,445	811	2,256	5,145
1988	7,002	1,696	779	2,475	4,527
1989	6,750	1,822	817	2,639	4,111
1990	5,839	1,661	774	2,435	3,404

#### 2.4.3 Suspension of registration for new applicants

In response to the huge increase in unemployment among registered ratings, in 1979, the government suspended the registration of new applicants and, in the case of newly registered ratings, instituted a program of intensive short-term training courses, using the facilities of the Institute of Marine Technology and the Deck Personnel Training Center in addition to those at the Seamen's Training School.

#### 2.4.4 Number of crew aboard ships of Bangladesh registry

In the case of ships of Bangladesh registry, ratings's wages are generally low, and labor-saving practices have not developed. For example, the crew aboard the Banglar Shourabh (built in Denmark in 1987, 5,672 GT, 14,541 DWT, with two 285-BHP engines), belonging to the BSC, which the Basic Design Survey Team had an opportunity to visit, was organized as follows:



1. Officers	Total 16 persons
Master, Chief Officer, 3rd Officer, 3 Cadets (Nautical), Sr.R/Officer, Purser, Chief Engineer, 2nd Engineer, 3rd Engineer, 4 Cadets (Engineer), Sr.Electric Engineer, Electric Engineer	
	Sub Total 16 persons
2. Deck Department	
Deck Serang, Carpenter, Pumpman, 3 Secunnys, 4 Lascal-Is, Lascal-II, 2 Lascal III, Bhandary, Deck Topass	
	Sub Total 15 persons
3. Engine department	
Engine Serang, 2 Diesel Mechanics, 3 Greasers, 3 Firemen	
	Sub Total 10 persons
4. Saloon Department	
Butler, Chief Cook, 2nd Cook, 4 General Stewards, Laundryman, Saloon Topas	
	Sub Total 9 persons
	Grand Total 50 persons

#### 2.4.5 Registry of ratings and Manning Scale

According to the current Seamen Recruitment Rule for Bangladesh ratings, new recruits must be between 17-22 years of age, with a Secondary School Certificate (SSC). With regard to skilled and semi-skilled categories, such as carpenter, electrician, diesel mechanic, and fitter, the age range is 17-28, with both an SSC and a diploma for the respective trade required. When the rating is first registered, his initial ratings are determined by the Seamen's Employment Board, which is made up of the government and employers. Subsequently, in the case of ordinary ratings (i.e., excluding skilled and semi-skilled categories), promotion are determined by the Shipping Master, based on their work experience and letters of recommendations from their captains. Promotion to such positions as Deck Serang, Engine Serang, Butler and Chief Cook are determined on the basis of the Seamen's Promotion Committee, established within the Seamen's Employment Board.

The current Manning Scale for Bangladesh ratings is shown in the Appendix at the back of this report.

Number of ratings in employment are as follows:

NAME OF RATINGS	No. OF SEAMEN AWAITING	No. OF SEAMEN ONBOARD	TOTAL
<b>DECK RATINGS</b>			
1. CARPENTER	37	42	79
2. CARPENTER MATE	-	-	-
3. SERANG	86	100	186
4. DECK MAINTENANCE HAND	2	4	6
5. TINDAL/CASSAB	10	13	23
6. TINDAL	-	-	-
7. ABLE SEAMAN	458	372	830
8. SEAMAN/HELSMAN	(INCLUDED DITTO)	-	-
9. CASSAB	-	-	-
10. SEAMAN-I	291	191	482
11. SEAMAN-II	245	264	509
12. SEAMAN-III	-	-	-
13. BHANDARY	93	62	155
14. BHANDARY MATE	-	-	-
15. GENERAL UTILITY HAND	113	70	183
<b>ENGINE ROOM RATINGS</b>			
1. FITTER	69	52	121
2. ASSISTANT FITTER	-	-	-
3. SERANG	15	21	36
4. PUMPMAN	7	9	16
5. ASSISTANT PUMPMAN	-	-	-
6. TINDAL	3	2	5
7. WINCHMAN	-	-	-
8. CASSAB	(INCLUDED "6.")	-	-
9. DONKEY/GREASER	505	305	810
10. DONKEYMAN	65	58	123
11. ENGINE RATING-I	-	-	-
12. ENGINE RATING-II	-	-	-
13. ENGINE RATING-III	-	-	-
14. FIREMAN	169	105	274
15. ENGINE TOPASS	17	15	32
<b>SALOON RATINGS</b>			
1. BUTLER/CHIEF STEWARD	23	32	55
2. CHIEF COOK/BAKER	68	88	156
3. 2nd COOK	98	84	182
4. CHIEF COOK	(INCLUDED "2.")	-	-
5. CREW COOK	-	-	-
6. 3rd COOK	-	-	-
7. BAKER	-	-	-
8. 2nd BAKER	-	-	-
9. BAKER MATE	-	-	-
10. PANTRYMAN	0	0	0
11. STORE KEEPER	-	-	-
12. NIGHT WATCHMAN	-	-	-
13. NIGHT STEWARD	-	-	-
14. GENERAL STEWARD/MESSBOY	416	263	679
15. SCHALLION STEWARD	-	-	-
16. UTILITY STEWARD	-	-	-
LAUNDRYMAN	21	10	31
17. SCHALLION	15	9	24
SALOON TOPASS	132	55	187
<b>SEAMAN GIVEN UNDER THE FRESHER TRAINING COURSE</b>			
T/SEAMAN	180	0	180
T/FIREMAN	121	3	124
TOPASS	38	0	38
GENERAL STEWARD	25	0	25
2nd COOK	1	0	1
T/FITTER	10	0	10
EX. NAVY	33	0	33
<b>GRAND TOTAL</b>	<b>3,366</b>	<b>2,229</b>	<b>5,595</b>

Table 2-5 NUMBER OF RATING IN EMPLOYMENT (JULY 1991)

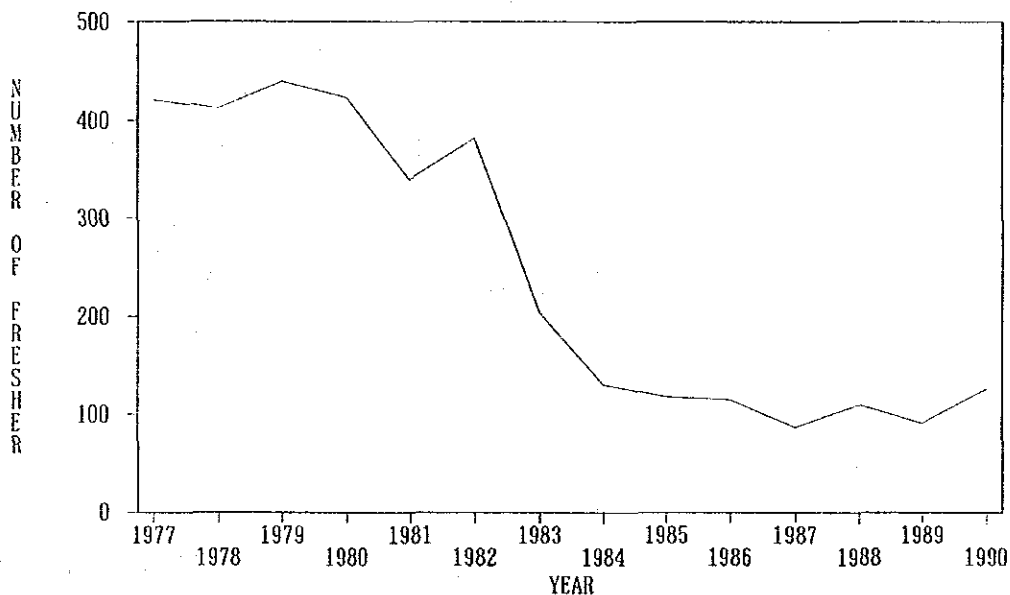
Looking at these figures, we see that the lower the rank -- i.e., the less the experience on board a vessel, the greater the number of ratings awaiting employment opportunities on shore, as opposed to the number afloat, which indicates clearly that vessel owners are looking for able bodies. Ratings given under the Fresher Training Course who were registered as ratings in 1979 and, since that time, have been limited to those who have received intensive training under the crash program, and demonstrates that it is virtually impossible for ratings who have had no experience afloat during the 12 years since their registration to gain employment.

When Bangladesh ratings serve aboard foreign vessels, the present pattern is that they serve, on the average 11 months to a year afloat and then must wait on shore 1 1/2 years for their next posting. The percentage of ratings employed, then, is quite low.

2.4.7 Needs for fresher seaman

Number of absorption of Fresher ratings by year are as follows:

Fig. 2-2 NUMBER OF ABSORPTION OF FRESHER



In recent years, the number of fresher ratings actually finding employment has hovered around 100 persons. But this reflects merely the employment of fresher ratings who had already been on the waiting list prior to the suspension of new registrations in 1979. Thus, given the present lack

of adequate training courses for new ratings, it has been determined that the true latent demand for such training among new ratings is far greater than the actual number hired.

#### 2.4.8 Employment of seamen in the international market

Maritime work, in comparison with other occupations, is characterized by a high degree of mobility, with each country's demand and supply for ratings directly influenced by the international market. According to a report from the Institute for Employment Research at Warwick University in the U.K., the current status and future outlook for ratings and officers employment on a global scale have been outlined as follows:

Table 2-6 SITUATION OF SUPPLY AND DEMAND OF OFFICERS AND SEAMEN RATINGS IN THE WORLD  
(UNIT: Thousand persons)

YEAR	SUPPLY		DEMAND		BALANCE	
	OFFICER	SEAMAN	OFFICER	SEAMAN	OFFICER	SEAMAN
1990	403	838	448	613	-45	225
1995	236	501	500	652	-264	-151
2000	138	300	535	660	-397	-360

(SOURCE: INSTITUTE FOR EMPLOYMENT RESEARCH AT WARWICK UNIVERSITY)

It is forecast that the shortfall in the supply of vessel officer within 10 years will reach a critical level of 400,000 persons. In the case of ratings, the current buyers' market is expected to suddenly evaporate, producing a shortage of 360,000 persons by the year 2000. This forecast is based on the overall demand of officers and ratings within the context of a projected recovery in the marine shipping industry from the depression of the 1980s and the stagnation or decline in the overall supply of officers and ratings in developed countries during this protracted depression.

#### 2.4.9 Supply and demand for Bangladesh ratings

In the case of Bangladesh too, setting up the back-up figures at 2.0, the ratio of manning levels to registered ratings in 1980, as shown in Table 2-5, was:

$$(3,702 \times 2.0) / 11,186 = 0.6618,$$

but in 1990, it had become:

$$(2,435 \times 2.0) / 5,839 = 0.8340.$$

Over this 10-year period, then, the supply/demand ratio improved by some 17%. Furthermore, in Bangladesh, owing to the suspension of new registrations that has been in effect since 1979, there are no longer any fresh recruits. The retirement age for ratings at BSC is 48 and, assuming a constant pattern of age distribution, the attrition in the supply of ratings due to retirement alone comes to:

$$5,839 / (48 - 29) = 307 \text{ persons.}$$

If these trends continue, there will be a complete reversal in the supply-demand balance by 1995.

#### 2.4.10 Component ratio of ratings

Component ratio of Bangladesh ratings by rating are as follows:

Table 2-7 COMPONENT RATIO OF BANGLADESH SEAMEN BY RATINGS

NAME OF RATING	
DECK RATING	47.4%
ENGINE ROOM RATING	27.2%
SALOON RATING	25.4%
TOTAL	100.0%

(SOURCE: D. O. S.)

Under present conditions, the categories into which Bangladesh ratings are divided are very minute; they are both difficult to understand and rather unrealistic. Accordingly, the existing categories and promotion standards are to be revised and simplified will be follows:

#### Deck ratings:

Employed as "ratings"

after 3 years' experience: promoted to "able ratings"

after 2 years' experience: promoted to "serang "(Bosun)

Engine ratings:

Employed as "engine rating"	
after 3 years' experience	promoted to "oiler"
after 2 years' experience:	promoted to "serang"

Saloon ratings:

Employed as "steward"	
after 3 years' experience	promoted to "general steward"
after 2 years' experience	promoted to "chief steward"

2.4.11 Marine disasters

During the 3-year period 1988-90 inclusive, there were 2 marine disasters involving Bangladesh-registered vessels. During the same period, 15 Bangladesh ratings died aboard vessels, with illness the cause of death in 11 cases, accidents in 2 cases, and 2 men missing at sea.

2.5 Present State of Ratings' Training

2.5.1 Training institutes for seamen

Following institutes assume respective area of training for seamen in Bangladesh.

Marine Academy	Ocean-going vessel's officer
Seamen's Training School	Ocean-going vessel's rating
Deck Personnel Training Center	Inland water vessel's crew
Institute of Marine Technology	Engineer for dockyards

The Seamen's Training School in Chittagong is the nation's only training organization for ratings on ocean-going vessels.

During periods when the ad hoc short-term courses are not being offered, the Institute of Marine Technology and Deck Personnel Training Center do not conduct any training for ratings on ocean-going vessels. And, even at the STS, the programs involve only retraining for existing ratings.

In 1978, an International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) was adopted by the IMO in London, and Bangladesh has been a party to this Convention since April, 1984. The Convention was enacted to raise the capabilities of seafarers to levels required by the rapid automation and technological upgrading of vessel equipment. Under the Convention, a Qualifying Certificate is given to ratings who have received certain types of training, and the certificates of all ratings are carefully checked by control officers of the signatory nations while their vessels are in port. Should unqualified personnel be found aboard, steps can be taken to take them off the vessel. Accordingly, signatory countries have undertaken training programs to meet STCW minimum requirements as a means of increasing the number of qualified seafarers.

Such Asian countries as the Philippines, Indonesia, and Taiwan have adopted incentive programs to encourage their nationals to work abroad, and this export of labor has become an important pillar of national policy. In addition, they are seeking to boost employment among their ratings by raising skill levels through well-developed training programs in maritime subjects. The Philippines has been rapidly expanding the number of marine training institutes. Since the number of such schools, both government and privately operated, has now reached 48, future priority is expected to shift to a further upgrading of the qualifications of their graduates. In the Republic of Korea, a national effort is being made to generate employment opportunities in international marine shipping industry by implementing a variety of tangible policies, including amendment of the Seamen's Act, inaugurating a system of ratings registration, and broadening the scope of training programs at the Institute for Training in Marine Technology. In Taiwan, a number of retraining institutions have been established to upgrade ratings capabilities; courses meeting STCW requirements as well as others to promote employment opportunities for vessel officers are now being offered at the National Marine Institute.

## 2.5.3

## Seamen's Training School

(1)

Establishment of the Seamen's Training Center

While the Seamen's Training Centre, predecessor to the Seamen's Training School, was founded in 1952, well before the country achieved independence, its location has been frequently changed, while a lack of adequate budgets has prevented the school from attracting a suitable faculty. For a long period, therefore, this facility has not been able to operate in proper fashion. In 1975, in view of the importance of ratings's training, the Bangladesh Government reorganized the school, but operating budgets were still not adequate to revitalize the organization.

(2) IMO Mission

In September, 1984, based on the STCW Convention, an IMO Survey Team was dispatched to Bangladesh to survey the state of ratings' training. Based on a finding that training in compliance with STCW was not being offered, the Team recommended the following remedial measures to improve the quality of ratings' training:

- 1) The Team noted that the STS was leasing a portion of the building at the Haji Camp in Chittagong and that, prior to the departure of the annual pilgrimage to Mecca, all the facilities could not be used for training activities. Accordingly, it was recommended that the existing facility, which has been used as a Seamen's Hostel under the jurisdiction of the Ministry of Labor, be reorganized and placed under the jurisdiction of the Ministry of Shipping.
- 2) In addition to its own facilities, it was recommended that the STS expand the scope of its training activities by also using the workshop belonging to the Bangladesh Shipping Corporation and the Chittagong Dry Dock.
- 3) It was further recommended that the STS develop the quality of its staff, particularly with respect to the recruitment of qualified instructors. It was felt that, for this purpose, it would be necessary to rectify the unduly large gap in salary scales between faculty members and vessel officers.

(3) Crush Training Courses



In response to the huge increase in unemployment among registered ratings, in 1979, the Government of Bangladesh instituted a program of crush training courses, using the facilities of the Institute of Marine Technology and the Deck Personnel Training Center of the IWTA in addition to those at the Seamen's Training School.

Followings are Statement of Training Ratings Given under the Crushed Programme.

Table 2-8 STATEMENT OF TRAINING SEAMEN GIVEN UNDER CRUSHED PROGRAMME

YEAR	S. T. S. CHITTAGONG		B. I. M. T. N' GANJI		P. T. C. N' GANJI		TOTAL
	FRESHER	REFRESHER	FRESHER	REFRESHER	FRESHER	REFRESHER	
1980	146	-	-	-	100	-	246
1981	83	-	85	-	200	-	368
1982	-	-	122	-	128	-	250
1983	-	-	97	-	-	-	97
1984	45	1,433	-	-	-	-	1,478
1985	-	297	-	-	-	-	297
1986	25	186	-	-	-	-	211
/87							
G/TOTAL	299	1,916	304	-	428	-	2,947

(SOURCE: DEPARTMENT OF SHIPPING, BANGLADESH)

(4) Reopening of the Seamen's Training School

Following the conclusion of the crushed training courses, refresher courses for existing ratings, which had been temporarily discontinued, were reopened at the school in December, 1989.

Training period of Refresher courses and number of trained are as follows:

Table 2-9 TRAINING PERIOD OF REFRESHER COURSE AND NUMBER OF TRAINED

NAME OF BATCH	No. OF TRAINED	PERIOD
1 st	45	18.12.1989 - 01.01.1990
2 nd	45	14.01.1990 - 28.01.1990
3 rd	49	10.02.1990 - 25.02.1990
4 th	87	14.03.1990 - 29.03.1990
5 th	105	09.05.1990 - 10.06.1990
6 th	169	16.06.1990 - 17.07.1990
7 th	131	21.07.1990 - 22.08.1990
8 th	152	26.08.1990 - 25.09.1990
9 th	120	01.10.1990 - 31.10.1990
10 th	150	05.11.1990 - 04.12.1990
11 th	150	03.01.1991 - 02.02.1991
12 th	72	11.02.1991 - 14.03.1991
13 th	74	23.04.1991 - 30.05.1991
14 th	86	08.06.1991 - 10.07.1991
15 th	100	24.07.1991 - 22.08.1991
16 th	39	27.08.1991 - 28.09.1991
TOTAL		1,574
17 (PLANNED)	100	01.10.1991 - 31.10.1991
18 (PLANNED)	150	05.11.1991 - 05.12.1991

(SOURCE: S. T. S.)

(5) Curriculum for Refresher Courses in STS

The curriculum for the retraining of existing ratings has been planned essentially in accordance with the recommendations of the IMO Survey Team to comply with the minimum requirements of the STCW Convention. The period of training is one month, comprising a total of 156 hours. Outline of Training Programme for Refresher Course is followed:

Table 2-10 TRAINING PROGRAMME FOR REFRESHER COURSE

NAME OF SUBJECT	THEORY	PRACTICE	TOTAL
1. PERSONAL SURVIVAL TECHNIQUE COURSE	36	23	59
2. BASIC FIRE FIGHTING COURSE	28	12	40
3. FIRST AID AT SEA COURSE	11	1	12
4. PROFESSIONAL COURSE (DECK, ENGINE AND SALOON RATINGS)	21	-	21
5. MISCELLANEOUS	12	-	12
6. EXAMINATIONS	6	6	12
GRAND TOTAL	114	42	156

(SOURCE: S. T. S.)

Based on this training, graduates are issued Certificates of Completion in Personal Survival Techniques, Basic Fire Fighting, and First Aid at Sea, which meet minimum rating requirements.

Within the training schedules of the present program, practical training accounts for only about a third of the time allocated to lectures. It is inevitable that lectures constitute the primary training vehicle, given the almost complete lack of training equipment at STS. At the BIMT, in Naranyanganji, on the other hand, the main emphasis is on practical training as opposed to lectures, with good results being achieved. The ratio of practical training to lectures at BIMT is 4:1 in the case of the Diploma in Marine Engineering, 2:1 in the Marine Diesel Antifier and Shipbuilding Welding Courses, 4:1 in Shipbuilding and Mechanical Draughtsmanship Course, and 3:1 in the Shipwright/Plater Course.

(6) Composition of STS staff

The designated size of the STS staff together with the composition of the faculty and other personnel are shown below:

Table 2-11 SIZE OF STAFF AND COMPOSITION OF FACULTY, STS

PERSONNEL	DESIGNATED	PRESENT	VACANCIES
PRINCIPAL	1	1	0
NAUTICAL INSTRUCTORS	3	2	1
ENGINEER INSTRUCTORS	3	3	0
GENERAL & OTHER INSTRUCTORS	3	1	2
HEAD ASSISTANT	1	1	0
ACCOUNTANT	1	1	0
OTHER STAFF	11	7	4
TOTAL	23	16	7

(SOURCE: S. T. S.)

The primary operational problem faced by the STS is that of securing proper staff. As the IMO Survey Team pointed out, since the very formation of the school, the major difficulty has lain in the recruitment of qualified instructors. Of the total designated staff of 23 persons at the STS, there is only one qualified merchant ship officer who has good knowledge of merchant ships.

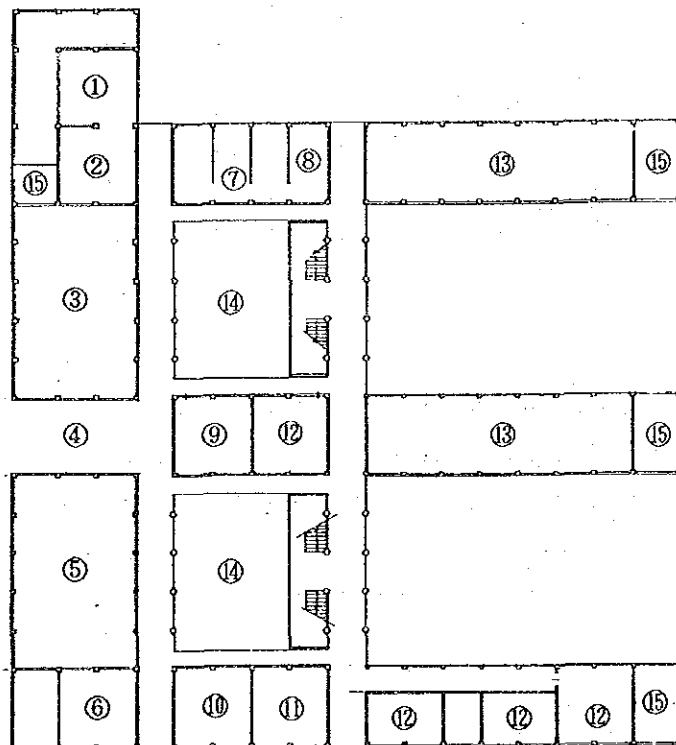
(7) Facilities for STS

In 1990, jurisdiction for the STS was transferred from the Ministry of Labor & Manpower to the Ministry of Shipping. The school is presently located within the Seamen's Hostel. The Seamen's Hostel, while a part of the Ministry of Shipping, is presently attached to the Directorate of Seaman and Emigration Welfare.

The facility is located in the southwest part of Chittagong within an area slightly on the river side of the main road from downtown to the airport. The area of the site is about 20,000 m<sup>2</sup>, but a considerable portion is taken by two large ponds. The site includes a 3-story building, staff quarters, elevated water tank, power house, and a playing ground .

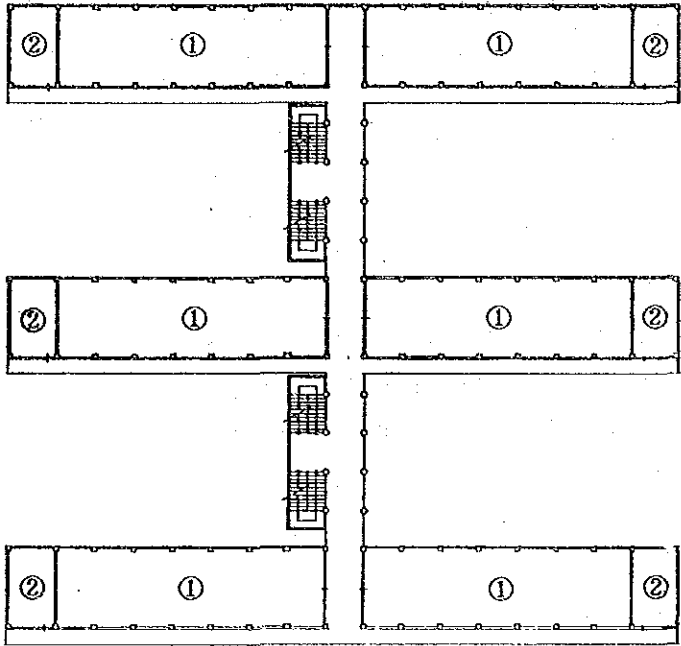
The 3-story structure is presently being used as follows:

- First floor: Dining room, recreation room, dispensary, storeroom, offices for the Seamen's, Hostel, officers' quarters
- Second floor: Seamen's Hostel rooms, trainee quarters
- Third floor: Offices of the STS, classrooms, instructors' room, Principal's office, storage



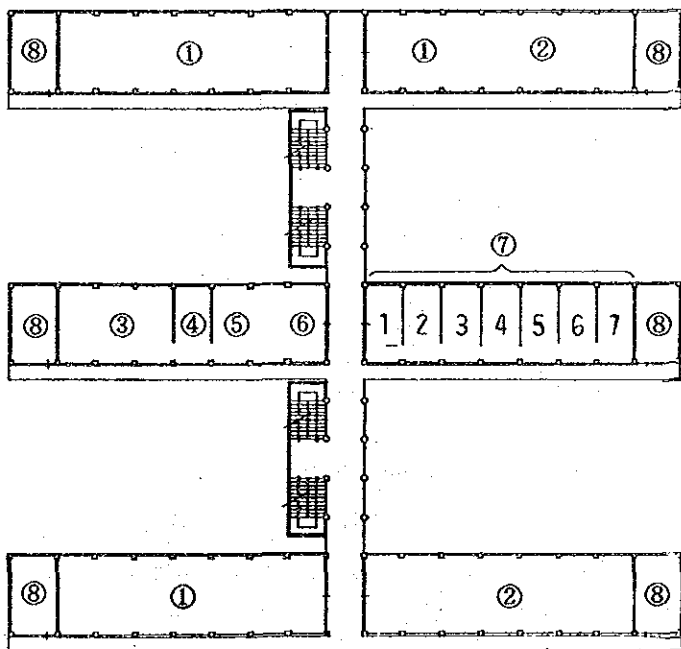
- ① KITCHEN
- ② PANTRY
- ③ DINING HALL
- ④ ENTRANCE HALL
- ⑤ RECREATION ROOM
- ⑥ DIRECTOR'S ROOM (DSEW)
- ⑦ CLINIC
- ⑧ DISPANSARY
- ⑨ LINEN CLOSET
- ⑩ OFFICE (DSEW)
- ⑪ OFFICER'S BEDROOM (SINGLE)
- ⑫ BEDROOM (SINGLE)
- ⑬ TRAINEES DORMITORY (BUNK BED)
- ⑭ PATIO
- ⑮ LAVATORY

**GROUND FLOOR PLAN**



- ① TRAINEES DORMITORY (20p)
- ② LAVATORY

1st FLOOR PLAN



- ① CLASSROOM
- ② MODEL ROOM
- ③ ADMINISTRATION OFFICE
- ④ UTILITY
- ⑤ PRICIPAL'S OFFICE
- ⑥ DRAWING ROOM
- ⑦ INSTRUCTOR'S OFFICES
- ⑧ LAVATORY

2nd FLOOR PLAN

Fig. 2-3 EXISTING FACILITY PLAN

(8) Equipment of STS at present

The equipment presently owned by the STS includes 2 boats, a few models, samples of vessel rigging and fixtures, and fire extinguishers. The training, therefore, is conducted mainly on the basis of lectures.

2.5.2 Condition at Similar Facilities for Seamen's Training

(1) Marine Academy:

Founded in 1962, this is a training facility for merchant ship officer. It is located in Chittagong, on the opposite side of the Chittagong Port, and falls under the jurisdiction of the Department of Shipping, Ministry of Shipping.

(2) Deck Personnel Training Centre (DPTC):

Founded in 1971, this facility trains deck personnel and crew for service on inland water carriers. It is located in Narayanganji. While falling under the jurisdiction of the Bangladesh Inland Water Transportation Authority (BIWTA), it is operated via a joint program with the ILO.

(3) Bangladesh Institute of Marine Technology (BIMT):

This institute was established in 1958, with the assistance of the ILO, by the Bureau of Manpower, Employment, and Training within the Ministry of Labor and Labor Resources to provide vocational training to technicians in the area of vessel repairs. It is also located in Narayanganji, between the DPTC and the dockyard.

(4) National Hotel & Tourism Training Institute:

This institute was founded in 1974 by the Bangladesh Parjatan Corporation to provide vocational training in cooking and hotel and tourism occupations. Graduates of the cooking course at this school are given further instruction as ratings and then placed aboard vessels as stewards. The facility is located in Dhaka and was

established and operates with the the assistance of the ILO/UNDP. It currently has a division for practical hotel and restaurant training and operates as an independent profit center.

(5) Related Seamen's Training Organizations:

Since the STS has very limited training facilities at present, practical field training is carried out using the workshops of the Marine Academy and the Bangladesh Shipping Corporation as well as the facilities of the Chittagong Dry Dock. These organizations are favorably disposed to the subject Plan and are prepared to lend cooperation, as required, by tendering field training areas and repairing machinery and equipment.

1) Bangladesh Shipping Corporation (BSC):

A public corporation, the BSC is a core company in the Bangladesh marine shipping industry. It accepts many cadets and graduates from the Marine Academy and also provides workshop training to trainees from the STS.

2) Chittagong Dry Dock, Ltd.

This company is a division of the Bangladesh Steel & Engineering Corp. (BSEC) and is the nation's only facility for repairing oceangoing vessels. It is composed of shore-based facilities equipped with Japanese equipment, a dry dock, and a fitting-out quay and is capable of handling repairs on vessels up to 16,500 tons.

## 2.6 Background and Nature of the Request

### 2.6.1 History and Background of Request

The reasons for the steady decline in the number of Bangladesh ratings serving aboard foreign vessels since the 1979 peak include the long-depressed state of the international marine transport industry, the adoption of the STCW Convention, the increase in the number of ratings from other Asian countries, and the disappearance of fresh recruits in Bangladesh.

While these factors have converged on Bangladesh at the same time, all of the basic contributory factors, apart from the depressed state of the industry, are related to inadequacies in the country's ratings's training programs. For this reason, the government wishes to significantly improve this training, an area that has previously been neglected, and develop programs that meet STCW minimum requirements, while also reopening the registration and training of fresh recruits, which has been suspended for some time. To achieve these goals, the government has formulated a plan to improve facilities and equipment at the STS.

Chittagong is the premier port in Bangladesh, located on the right bank of the Karnafuli River at a point 9 nautical miles upriver from the Bay of Bengal.

The reasons why Chittagong was selected as the site for the STS may be summarized as follows:

- (1) The city has the country's leading port.
- (2) As a result, it is the national center for ratings's employment.
- (3) It forms the linchpin for transport to other ports and provincial cities.
- (4) The principal organs of the Ministry of Shipping are located in this city.

Before moving to its present location, it was located in Chittagong City at Haji (Pilgrims') Camp. But since the latter site was not used exclusively by the school, courses could not be given throughout the year. In addition, since permission could not be obtained for facility expansion within the site, the school was moved to its current location, which incorporates the Seamen's Hostel.

#### 2.6.2 Nature of the Request

The objectives of the Project are to provide for good and adequate facilities for training of fresher ratings in accordance with up to date requirements and to strengthen the capability and efficiency of the existing ratings by providing mandatory minimum requirement training in accordance with the STCW convention.



Facilities and equipment requested by the Government of Bangladesh are follows:

(1) Machinery and Equipment

- a. Life Saving Appliances
- b. Fire Prevention & Fire fighting Appliances
- c. Compass
- d. Signalling by the International Code of Signals
- e. Meteorology Equipment
- f. Distress Signals
- g. Ship Construction & Stability
- h. Cargo Handling Stowage
- i. Prevention of Sea Pollution
- j. Main & Aux. Prime Movers, Boilers & Vessels Pumping & Piping System
- k. Automatic & Remote Control Systems
- l. Electrical Installations
- m. Workshop Machinery
- n. Testing & Measuring Equipment (Machinery Part)
- o. Testing & Measuring Equipment (Electrical Part)
- p. Tools (Machinery Part)
- q. Steering Gear System
- r. Pilot Ladder & Bulwark
- s. Seamanship (Tools & Equipment)
- t. First Aid
- u. Safety Harness
- v. Galley Equipment
- w. Language Laboratory
- x. Transportation Equipment

(2) Civil & Building Works for improving the Seamen's Training School

- a. Residential Building
- b. Extension of Dormitory

- c. Drainage facilities for fire fighting training equipment
- d. Electric power supply to Machinery & Equipment
- e. Boundary Wall
- f. Construction of new internal roads
- g. Basket Ball court
- h. Site Development & apropos afloat
- i. Catering Block
- j. Others

The site of the Project is located at the premises of Seamen's Hostel in Chittagong.

## CHAPTER 3: DETAILS OF THE PLAN

### 3.1 Objectives

Based on both the Fourth Five Year Plan and the Three Years Rolling Plan of the Bangladesh Government, the subject Plan is intended to improve the quality of ratings' training and bring the capabilities of Bangladesh ratings up to international standards by providing them with the qualifications required by the STCW Convention. At the same time, training programs for fresh ratings recruits are to be revived to open a path to employment aboard foreign vessels. This program will contribute to both manpower resource development and the generation of foreign exchange earnings.

The most immediate problems with respect to ratings' training in Bangladesh are, firstly, to provide training to unqualified ratings which meets the mandatory minimum requirements of the STCW Convention, thereby eliminating the pool of unqualified ratings; and, secondly, to meet the competition from the ratings of other countries, particularly Asian, by nurturing, through improved training programs, a skill level that will facilitate the entry of Bangladesh ratings into the international marine shipping industry and furnishing incentives for working abroad.

For purposes of improving ratings' training in this manner, the Plan is intended to improve equipment and facilities needed to implement these training programs.

### 3.2 Examination of Appropriateness of the Plan

#### 3.2.1 Necessity of Refresher Training

Given the automation and rapid rise in the technical levels of vessel equipment, in order to provide a continuing supply of qualified ratings, it is vital that existing ratings be given retraining opportunities at regular intervals. The establishment of retraining courses at the STS is essential for this purpose.

#### 3.2.2 Necessity of Fresher Training

It is forecast that the shortfall of ratings in the international market at 2000 will reach a level of 360,000 persons. In Bangladesh owing to suspension of registry of fresh recruits ten years ago, average age of Bangladesh ratings is over 40 years old. Thus, it is forecast that the shortfall of ratings at 1995 due to retirement only. For compensating the shortfall, it is necessary to reopen the registry of fresh recruits and fresher training.

### 3.2.3 Training areas:

With regard to the specific training areas, the Plan of the Bangladesh Government calls for courses to be offered to deck, engine, and galley ratings. In the case of deck ratings, training is provided to deck crews on inland routes at the Deck Personnel Training Center in Narayanganji, but the training requirements for inland waterways vessels are totally different from those for ocean-going vessels, and so separate courses are necessary for deck ratings serving aboard such vessels. As to engine ratings, since training courses in this area are not offered by other institutes, they must be provided by the STS. In the case of saloon ratings, considering the differences between on-vessel and shore food preparation techniques -- i.e., the distinct cultural aspects of the diet during long voyages, the special consideration must be given to nutrition and sanitation, as well as the need even among galley personnel for general knowledge and training conform to STCW mandatory minimum requirements, there is a clear need to provide saloon ratings training at STS. Even in Japan, the fields are all covered in the curricula of seamen's training schools, and so we have deemed it appropriate that such training be offered at the STS.

Since facilities and equipment of STS are far from sufficient for implementing those training, it is quite necessary to prepare the necessary equipment and facilities for STS.

## 3.3 Examination of the Plan Contents

### 3.3.1 Number of trainees

#### (1) Refresher trainees

At present, the total number of registered ratings is 5,839, of whom 3,490 persons have been retrained. Of those retrained, only 1,348 have completed instruction in all three areas of the basic required training, Personal Survival Technique, Fire Fighting at Sea and First Aids. As a consequence, retraining courses must be conducted promptly, based on the STCW Convention, for the approximately 2,400 persons who have not received any retraining and the 2,100 who have received only partial training. This goal is considered to be appropriate, based on the number of persons to receive refresher training, as shown in the Request: a total of 1,000 per year, with 125 trainees per course and 8 courses per year. Thus, the immediate goal of the retraining program is to totally eliminate, within five years following the Project implementation, the remaining pool of unqualified ratings.

(2) Fresher trainees

With respect to the training of fresh ratings, in the original Request from the Bangladesh Government, the projected total of trainees was set at 300 per year (based on three 3-month courses with an enrollment of 100 students per course).

On the other hand, looking at international trends in ratings' education in response to the continued upgrading of vessel equipment, several nations are actively working to improve the capabilities of their ratings, and there is a distinct trend toward lengthening training courses as a means of raising educational and training standards.

Considering the situation in various Asian countries, training courses, even for crew members, run a minimum of 5 months. Thus, for Bangladesh ratings to compete internationally against those from other parts of Asia, the training periods must be set at not less than 5 months. This perspective guided the talks between the Basic Design Survey Team and the Ministry of Shipping of the Bangladesh Government, resulting in an agreement to set a target in the fresh seaman training program of 200 trainees per year, based on 2 courses per year of 5 months' duration, with 100 students per course. But, assuming operations at the STS develop smoothly, it is felt that there will be a need in due course to increase the enrollment levels for fresh ratings training.

(3) Distribution of trainees

The distribution of job classifications among Bangladesh ratings show deck ratings at 47%, engine ratings at 28%, and saloon ratings at 25%. Based on the government's plans, the distribution of trainees for the refresher courses will be: deck 40%, engine 40%, and galley 20%, while that for the training of fresh recruits will be: deck 40%, engine 30%, and galley 30%. The higher ratios for engine ratings, as opposed to deck ratings, in the refresher courses and for saloon ratings in the fresh ratings courses reflect the fact that the proportion of existing ratings that do not yet meet STCW mandatory minimum requirements is the highest among the engine ratings component, while saloon ratings in Bangladesh are said to find it relatively easier to secure employment on foreign ships. Since the above proportions are not significantly different from the present composition, the distribution by job classification in the Project is considered to be generally appropriate.

3.3.2 Training Plan

The following syllabus are being considered for the fresher ratings courses.

A. DECK DEPARTMENT	Total	40 units per week
a. Ship operation		5 units per week
1. Outline of Ship's hull construction		
2. Machinery and Articles of Ships		
3. Maintenance of Ship		
4. Fundamentals of manoeuvring		
5. Emergency		
b. Nautical Instrument		3 units per week
1. Logs		
2. Echo sounder		
3. Gyro compass		
4. Auto pilot system		
5. Radio equipment		
c. Radar		2 units per week
1. Principles of Radar and operation		
2. Interpretation and positioning		
3. Plotting and relative motion concepts		

- d. Watch 5 units per week
1. Elementary of Navigation
  2. Charts & Hydrographic Publications
  3. Navigation aids
  4. Watch
  5. Tide and tidal current
  6. Marine meteorology
- e. Operation on Tanker 2 units per week
1. Outline of tankers
    - (1) Construction arrangement
    - (2) Explosion proof equipment
  2. Cargo handling
    - (1) Loading and unloading
    - (2) Tank cleaning
    - (3) Calculation of cargo oil volume
    - (4) Cleaning of crude oil
    - (5) Inert gas system
  3. Cargo gear
    - (1) Cargo oil pump
    - (2) Pumping system
  4. During cargo handling and navigation
    - (1) Preparation prior to cargo handling
    - (2) Confirmation after completion of cargo handling
    - (3) Attentions during ballasting
  5. Prevention of sea pollution
- f. Operation of special purpose vessel 1 unit per week
1. General cargo ship
    - (1) Purpose of General cargo ship
    - (2) Hull construction arrangement
    - (3) Handling of cargo gear (derrick, crane, winch, etc.)
    - (4) Preparation of cargo work
    - (5) Cargo handling
    - (6) Arrangement after finishing cargo work
    - (7) Management during navigation
  2. Heavy cargo ship
    - (1) Purpose of Heavy cargo ship
    - (2) Arrangement of ship
    - (3) Capacity of Heavy derrick

- (4) Attentions during cargo work
- 3. Container ship
  - (1) Construction and arrangement of Container ship
  - (2) Type of Container ship ( LO-I.O, RO-RO)
  - (3) Preparation of cargo work
    - a. Preparation work
    - b. Container handling
    - c. Arrangement after cargo work
    - d. Arrangement during navigation
  - (4) Lashing for containers
- g. Automatic control 2 units per week
  - 1. Elementary of automatic control theory
  - 2. Introduction to automatic control equipment
  - 3. Outline of automation
- h. Electricity 2 units per week
  - 1. Measuring devices and their applications
  - 2. Introduction to electric equipment
  - 3. Introduction to semi-conductor and electronics
- i. Hydraulic equipment 2 units per week
  - 1. Elementary of hydraulic system
  - 2. Hydraulic winch and windlass
  - 3. Hydraulic steering gear system and operation
  - 4. Other hydraulic machinery
- j. Seamanship 5 units per week
  - 1. Handling of rope and wire
    - (1) Knots and hitch
    - (2) Connection of wire
    - (3) Wirework
    - (4) Others
  - 2. Painting
  - 3. Operation of Life saving equipment
    - (1) Life saving equipment
    - (2) Signaling device
- k. Safety control 2 units per week
  - 1. Importance of safety
  - 2. Prevention of accident and sea disaster
  - 3. Handling of safeguard and protection outfits
- l. Survival at Sea 3 unit per week



- m. Fire fighting 2 unit per week
- n. First aid 2 unit per week
- o. English 2 units per week
  - 1. Receiving of a pilot
  - 2. Mooring work
  - 3. Receiving of visitors
  - 4. Cargo works
  - 5. Watch
  - 6. Communication with VHF
- p. Physical training 1 unit per week

B. ENGINE DEPARTMENT Total 40 units per week

- a. Introduction to Marine engine 1 unit per week
  - 1. Characteristics of Marine engine
  - 2. Duties of Engine Department
  - 3. Outline of Machinery in Engine room
  - 4. Propeller and shafting
- b. Marine boiler 1 unit per week
  - 1. Introduction to Marine boiler
  - 2. Types and construction of boiler
  - 3. Accessories and attachments
  - 4. Steam and Supply water system
  - 5. Combustion system
  - 6. Operation
- c. Steam turbine engine 2 unit per week
  - 1. Elementary of Steam turbine
  - 2. Types and construction
  - 3. Operation
  - 4. Introduction to Steam turbine plant
- d. Internal combustion system 3 units per week
  - 1. Theory, types, function and nomenclature of engines
  - 2. Construction of Diesel engine
  - 3. Appurtenance
  - 4. Output and capacity of Diesel engine
  - 5. Operation and maintenance
- e. Auxiliary engine 4 units per week
  - 1. Introduction to Marine pump

- (1) Types and applications
- (2) Outline of Marine pump
- (3) Construction and operation
2. Marine auxiliary machinery of Diesel engine ship
  - (1) Cooling seawater system
  - (2) Cooling freshwater system
  - (3) Fuel oil system
  - (4) Bilge, ballast, sanitary system
  - (5) Compressed air system
  - (6) Freshwater system
  - (7) Lubrication oil system
  - (8) Steam, exhaust and drain system

f. Electricity

4 units per week

1. Electric theory
  - (1) characteristics of Direct current
  - (2) Electric power and heating value
  - (3) Characteristics and function of Magnetics
  - (4) Relation and reciprocal action between electricity and magnet
2. Alternating Current
  - (1) Characteristic of A.C.
  - (2) Elementary of Calculation for A.C.
  - (3) Power and Power factor of A.C.
  - (4) A.C. Three phase
3. Electric Appliances
  - (1) Transformer
  - (2) Induction motor
  - (3) Synchronous machine
4. Cable run
5. Switch and Breaker system
6. Security and protective device for electricity
7. Maintenance of marine electric equipment
8. Starting of Induction motor
9. Marine A.C. switch
10. Application
11. Lighting
12. Semi-conductor and transistor

g. Hydraulic System

2 units per week

1. Introduction to Hydraulic equipment

2. Theory of Hydraulic pump	
3. Principles of Hydraulic actuator	
4. Introduction to diagram of hydraulic circuit	
5. Outline of Hydraulic deck machinery	
h. Refrigeration	2 units per week
1. Theory of refrigeration	
2. Function and construction of compressor, condenser, evaporator and expansion valve	
3. Theory and adjustment of control device	
4. Maintenance and operation of Refrigeration equipment	
5. Troubles and trouble shooting	
i. Safety control	2 units per week
1. Necessity and importance of safety control	
2. Prevention of accident	
3. Safety sign	
j. Automatic Control	2 units per week
1. Introduction to automation	
2. Feedback control	
3. Sequence control	
k. Machine works	8 units per week
1. Lathe works	
2. Arc and Acetylene welding	
3. Emergency repair works onboard	
l. Survival at Sea	3 unit per week
m. Fire fighting	2 unit per week
n. First aid	2 unit per week
o. English	2 units per week
1. Watch in the Engine room	
2. Engine room work	
p. Physical Training	1 unit per week
C. SALOON DEPARTMENT	Total 40 units per week
a. Public Health and Hygiene	4 units per week
b. Nourishment	3 units per week
c. Food stuff	3 units per week
d. Food hygiene	3 units per week
e. Shipping industry	1 unit per week

- f. Theory of cooking 5 units per week
- g. Cooking training 10 units per week
- h. English 3 units per week
- i. Outline of ship 1 unit per week
- j. Room making 1 unit per week
- k. Survival at Sea 3 units per week
- l. Fire fighting 2 units per week
- m. First aid 1 unit per week

Following is the weekly time schedule and curricula for the freshmen training courses based on the suggested syllabus.

Table 3-1 WEEKLY FRESHER TRAINING TIME SCHEDULE & CURRICULA

DAY OF WEEK	PERIOD	DECK DEPT.	INSTRUCTOR	ENGINE DEPT.	INSTRUCTOR	SALOON DEPT.	INSTRUCTOR
SATURDAY	1	OPERATION	DECK	INT. COMB. ENGINE	ENGINE	COOKING THEORY	SOLOON
	2	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	3	ENGLISH	ENGLISH	DITTO	DITTO	COOKING TRAINING	SOLOON
	4	DITTO	DITTO	PHYSICAL TRAINING	PYSICAL (2p)	DITTO	DITTO
	5	AUTO CONTROL	ENGINE	MACHINE WORKS	ENGINE (2p)	ENGLISH	ENGLISH
	6	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	7	FIRST AID	FIRST AID	DITTO	DITTO	SHIP OUTLINE	DECK
SUNDAY	1	HYDRAULIC	ENGINE	MARINE ENGINE INTRO.	ENGINE	FIRE FIGHTING	FIRE (2p)
	2	DITTO	DITTO	BOILER	ENGINE	DITTO	DITTO
	3	RADAR	DECK	ENGLISH	ENGLISH	COOKING TRAINING	SOLOON
	4	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	5	ELECTRICITY	ENGINE	MACHINE WORKS	ENGINE (2p)	ENGLISH	ENGLISH
	6	DITTO	DITTO	DITTO	DITTO	NUTRISHMENT	SOLOON
	7	SAFETY CONTROL	DECK	DITTO	DITTO	DITTO	DITTO
	8	DITTO	DITTO	-----	-----	ROOM MAKING	SOLOON
MONDAY	1	NUATICAL EQUIPMENT	DECK	TURBINE	ENGINE	PUBLIC HEALTH	FIRST AID
	2	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	3	SEAMANSHIP	DECK	FIRE FIGHTING	FIRE (2p)	COOKING TRAINING	SOLOON
	4	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	5	OPERATION	DECK	AUX. ENGINE	ENGINE	SURVIVAL TECHNIQUE	DECK (2p)
	6	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	7	PHYSICAL TRAINING	PYSICAL	ELECTRICITY	ENGINE	DITTO	DITTO
	8	-----	-----	-----	-----	-----	-----
TUESDAY	1	WATCH	DECK	SAFETY CONTROL	DECK	FOOD HYGIENE	SOLOON
	2	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	3	FIRE FIGHTING	FIRE (2p)	ELECTRICITY	ENGINE	COOKING TRAINING	SOLOON
	4	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	5	TANKER OPERATION	DECK	SURVIVAL TECHNIQUE	DECK (2p)	COOKING THEORY	SOLOON
	6	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	7	NUATICAL EQUIPMENT	DECK	DITTO	DITTO	SHIPPING INDUSTRY	GENERAL
WEDNESDAY	1	SPECIAL VESSEL OPER.	DECK	AUTO CONTROL	ENGINE	PUBLIC HEALTH	FIRST AID
	2	SURVIVAL TECHNIQUE	DECK (2p)	DITTO	DITTO	DITTO	DITTO
	3	DITTO	DITTO	HYDRAULIC	ENGINE	COOKING TRAINING	SOLOON
	4	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO
	5	WATCH	DECK	AUX. ENGINE	ENGINE	FIRST AID	FIRST AID
	6	DITTO	DITTO	DITTO	DITTO	FOOD HYGIENE	SOLOON
	7	DITTO	DITTO	FIRST AID	FIRST AID	COOKING THEORY	SOLOON
THURSDAY	1	OPERATION	-----	REFRIGERATION	ENGINE	NUTRISHMENT	SOLOON
	2	SEAMANSHIP	DECK	DITTO	DITTO	STUFF	SOLOON
	3	DITTO	DITTO	MACHINE WORKS	ENGINE (2p)	DITTO	DITTO
	4	DITTO	DITTO	DITTO	DITTO	DITTO	DITTO

### 3.3.3 Implementation and Operating Plan

#### (1) Implementing Organization

The executing agency organization for the Project is to be the Department of Shipping of the Ministry of Shipping. This department has jurisdiction in merchant shipping, inland waters transport and welfare of seamen. It also has jurisdiction over the Marine Academy, the Seamen's Training School, the BSC, BIWTA, and the BIWTC.

A Seamen's Hostel also occupies the STS site. This hostel is presently attached to the Directorate of Seamen and Emigration Welfare but it has been confirmed that, after implementation of this Plan, the hostel will be placed under the aegis of the STS.

#### (2) Operating Budgets

##### 1) Actual budget allocations for the STS

The trend in sanctioned budget grants and actual expenditures for the STS are shown below. The STS had one full-time instructor, while the Director of the Directorate of Seamen's and Emigration Welfare, which operates the Seamen's Hostel, also served as the Principal. At one time, activity was dormant but it resumed with the establishment of the new organization structure in 1990. For this reason, differences in the scope of activities between the first half of 1990/91 and later periods make direct comparisons generally impossible. However, the level of budgets and expenditures have suddenly increased in response to the stepped up pace of activity and, with the implementation of the Project, it is presumed that, if the Bangladesh Government adopts appropriate procedures, satisfactory budgetary provisions can be made for the program.

Table 3-2 BUDGET AND EXPENDITURE OF S. T. S.

YEAR	BUDGET (Tk)	EXPENDITURE (Tk)
1986/87	364,000	326,878
1987/88	586,000	462,000
1988/89	800,000	442,000
1989/90	642,000	543,518
1990/91	596,000	1,048,086
1991/92	546,000	-

(SOURCE: S. T. S.)

Although it is presently a separate organization, we append below the expenditures 1991/92 budget for the Seamen's Hostel, which is to be brought under the wing of the STS under the subject Project.

Table 3-3 BUDGET ALLOCATION FOR THE SEAMEN'S HOSTEL  
(1991/1992)

ITEMS	AMOUNT
1. SALARY	
OFFICERS	43,000
STAFFS	285,000
ALLOWANCES	166,500
2. TELEPHONE	20,000
3. LAND REVENUE FOR MUNICIPALITY	250,000
4. ELECTRICITY	250,000
5. PURCHASING AMENITIES	145,000
TOTAL	1,159,500

(UNIT: TK)

In the Implementation Plan prepared by the Government, annual operating budgets following Project implementation are currently estimated as follows but, based on the Basic Design Report, the Government is to recompute the operating budget and review the Project Proforma.

Table 3-4 PLANNED BUDGET FOR THE S. T. S.

ITEMS	AMOUNT
ELECTRICITY, FUEL	260,000
MANPOWER	2,634,000
MAINTENANCE & OTHERS	750,000
MAINTENANCE (FOREIGN EXCHANGE)	105,000
TOTAL	3,749,000

(UNIT: TK)

2) Budget for the Ministry of Shipping

The operating budget and expenditure of Ministry of Shipping with its sub-ordinate offices are shown below.

Table 3-5 OPERATING BUDGET AND EXPENDITURE OF MINISTRY OF SHIPPING

YEAR	BUDGET (Tk)	EXPENDITURE (Tk)
1986/87	15,253,000	14,725,000
1987/88	19,612,000	22,195,000
1988/89	23,936,000	23,203,000
1989/90	25,896,000	34,107,000
1990/91	38,414,000	35,780,000

(SOURCE: M. O. S.)

Budget allocation for the Ministry of Shipping has grown 2.5 folds for the last five years, and the actual expenditure has developed 2.4 folds. For the last two years, they exceeded over 350 lakh taka. The budget of STS will be 10 percent of it, if as it were. Operating expenses for the Plan facilities are considered in detail in Section 3.5.1 but, based on our examination, no problems are anticipated in securing the operating budgets for the STS facilities.

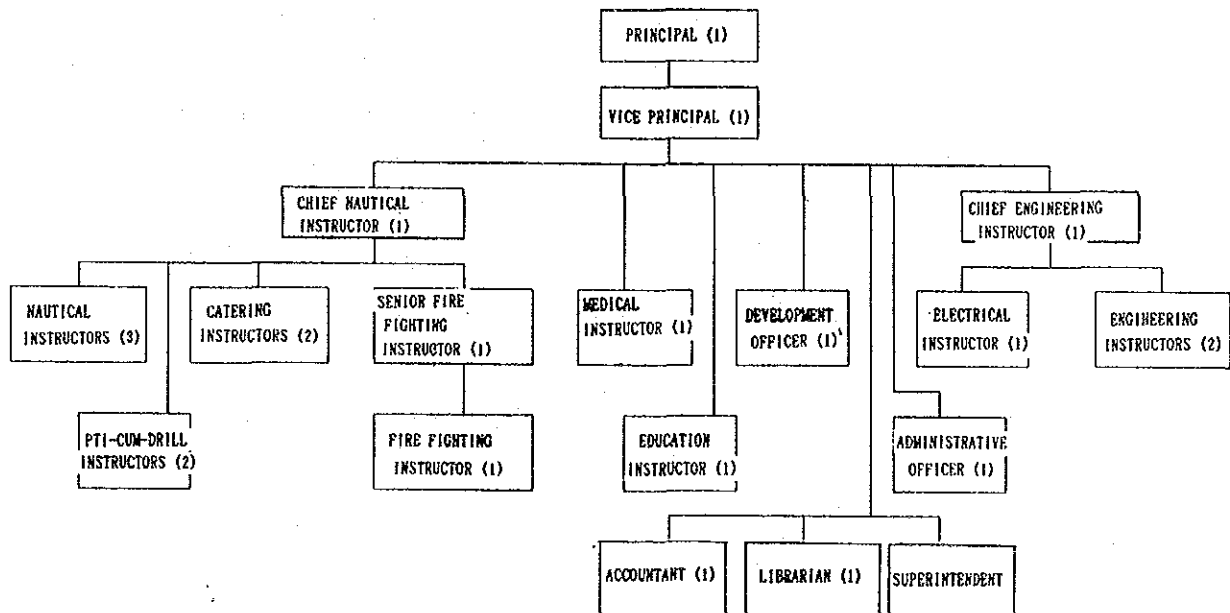
(3) Personnel Plan:

1) Organization of the STS

According to the Plan, the total staff of the STS, following the planned expansion, will increase to 66 persons, of which 20 will be instructors (including 9 qualified officers).

The Organogram of STS is shown below:

Fig. 3-1 ORGANOGRAM OF S. T. S.



2) Number of instructors by course

Number of classes by instructor calculated in accordance with the time schedule of Fresher and Refresher Training courses are as follows:

Table 3-6 TRAINING UNITS BY SUBJECT & REQUIRED INSTRUCTORS FOR S. T. S.

NAME OF SUBJECT	FRESHER COURSE	REFRESHER COURSE	TOTAL	No. OF REQUIRED INSTRUCTORS
DECK	50	57	107	5.94
FIRE FIGHTING	15	18	33	1.83
ENGINE	55	21	76	4.22
SALOON	24	18	42	2.33
PHYSICAL TRAINING	2	18	20	1.11
FIRST AID	7	18	25	1.39
ENGLISH & GENERAL	8	0	8	0.44

(SOURCE: S. T. S.)

Assuming that weekly average classes by each instructor should be 18 hours, six instructors for the deck department, two fire fighting instructors, four instructors for the engine department, two catering instructors, one physical training instructor, one medical/first-aid instructor and one English/general instructor would be required.

The planned total staff, as drafted by the Government, and the present STS staff are presently under the supervision of the Seamen's Hostel but, after the Project is implemented, the breakdown between the Hostel staff, which is to come under the wing of the STS, and the number of additional persons needed to satisfy Project requirements will be as shown below. Staff members not included in the Project but in the Government's plan, such as launch drivers, have been excluded.

Table 3-7 ADDITIONAL REQUIREMENT OF FACULTY & STAFF FOR STS

PERSONNEL	DESIGNATED STAFF (STS)	ALTERNATIVE PLAN	PRESENT STAFF (STS)	PRESENT STAFF (HOSTEL)	ADDITIONAL REQUIREMENT
PRINCIPAL	1	1	1	0	0
VICE PRINCIPAL	1	1	0	0	1
NAUTICAL INSTRUCTOR	4	5	2	0	3
FIRE FIGHTING INSTRUCTOR	2	2	0	0	2
CATERING INSTRUCTOR	2	2	0	0	2
ENGINEERING INSTRUCTOR	4	3	3	0	0
MEDICAL INSTRUCTOR	1	1	0	0	1
PHYSICAL TRAINING INSTRUCTOR	2	1	1	0	0
EDUCATION INSTRUCTOR	2	1	0	0	1
DEVELOPMENT OFFICER	1	1	0	0	1
ADMINISTRATIVE OFFICER	1	1	1	1	0
ACCOUNTANT	1	1	1	1	0
LIBRARIAN	1	1	0	0	1
SUPERINTENDENT	1	1	0	1	0
STAFFS	33	29	7	22	0
TOTAL	57	52	16	25	12

(SOURCE: S. T. S.)



Provided that the Principal would teach for the Deck department and the Vice-Principal would teach for the Engine department, the designated number of nautical, fire fighting, catering and medical instructors are deemed appropriate. The Team feels that those of engine department, physical training and general instructors could be reduced.

3) Recruitment of instructors

The recruitment of general employees presents absolutely no difficulties in Bangladesh, but qualified instructors with merchant ship experience, capable of teaching the nautical and engineer courses, are in short supply. Thus, in view of the considerable differential in treatment of the school faculty vis-a-vis that accorded vessel officers, particularly on foreign ships, certain difficulties must be faced in obtaining the requisite teaching talent. Unless instructors are given favorable treatment in terms of salary and other perquisites, thereby increasing the attractiveness of the positions, it will be difficult to attract a quality faculty or provide quality instruction to the ratings.

The Bangladesh Government feels that, for the time being, it should be possible to attract a certain amount of manpower through the pay increase that has been approved in government workers' salaries and by providing instructor housing. On the basis of these measures, it has been determined that the necessary personnel can be assembled to operate the Project facilities. However, on a more basic level, in order to attract qualified instructors, it will be necessary to offer salaries fully as attractive as those paid to vessel officers. Since this would be difficult to do under the present salary system for government employees, if it were possible to adopt the contract teaching system presently in use at the Marine Academy, we believe that the conditions for attracting good instructors would become much more attractive.

3.3.4 Contents and Evaluation of the Requested Items:

(1) Facilities:

1) Necessary facilities

The training to be carried out at the STS will incorporate both retraining programs for existing ratings, conforming to the mandatory minimum requirements of the STCW Convention, and fresher training courses for new ratings recruits.

Training courses, duration of training and number of trainees are as follows:

Refresher ratings training course

(Each one month duration, 8 batches in a year)

Deck rating trainees 50

Engine rating trainees 50

Saloon rating trainees 25

Sub total 125

125 trainees X 8 batches = 1,000 trainees

Fresher ratings training course

(Each five months duration, two batches in a year)

Deck rating trainees 40

Engine rating trainees 30

Saloon rating trainees 30

Sub total 100

100 trainees X 2 batches = 200 trainees

The Plan facility functions required to implement these programs include:

- 1) Ratings's practical training
- 2) Administration
- 3) Trainee dormitory, and
- 4) Staff living quarters,

in addition to the ratings's welfare function presently performed by the existing facility.

- 2) Plan for the existing facility

Among the above functions, the Bangladesh Government is to take charge of the functions which can be incorporated in the existing School facility: viz., administration of the STS, trainee dormitory, and seamen's welfare.

The plan is to utilize the present 3-story building in the following manner:

**First Floor:**

Dining room, galley, recreation room, welfare area, dispensary, storage areas, offices of the STS, instructors' office, and Principal's office.

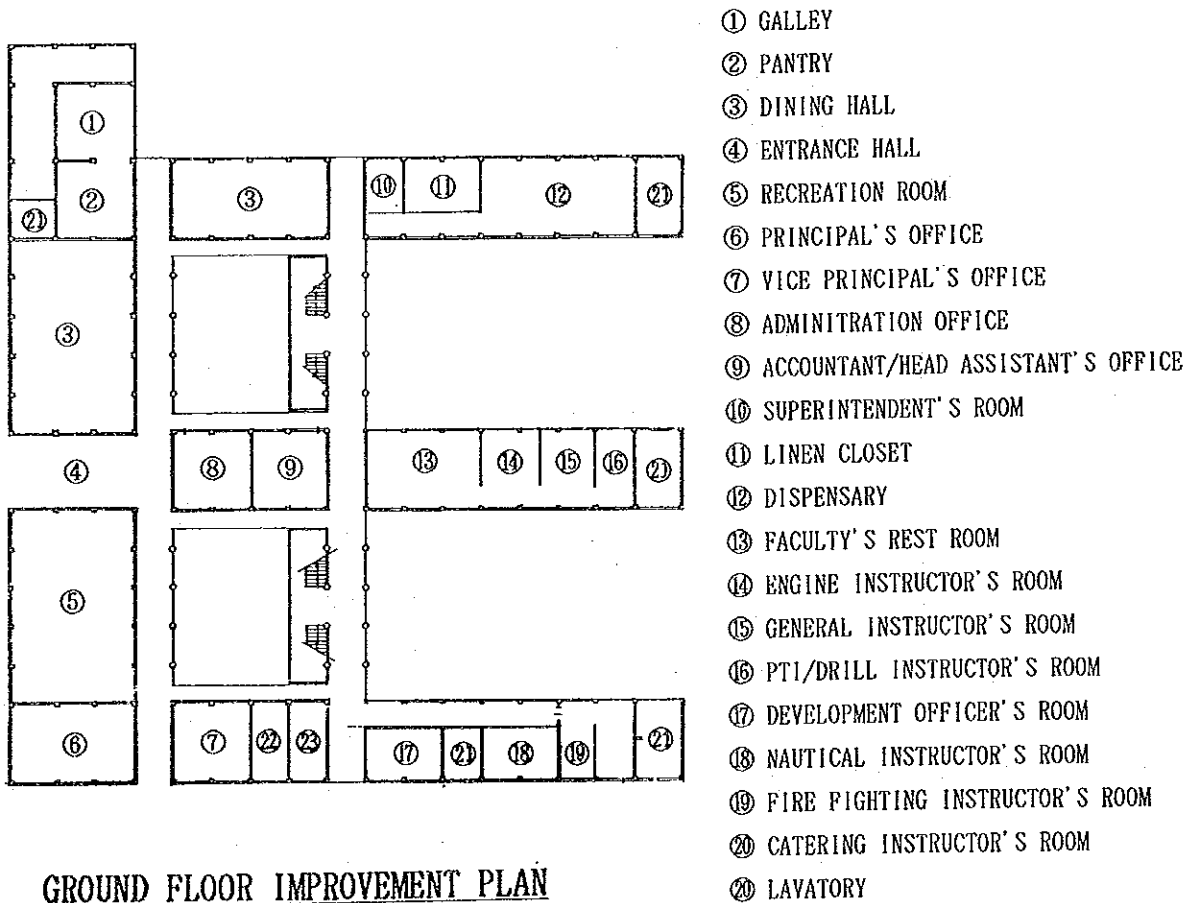
**Second Floor:**

Trainee accommodations

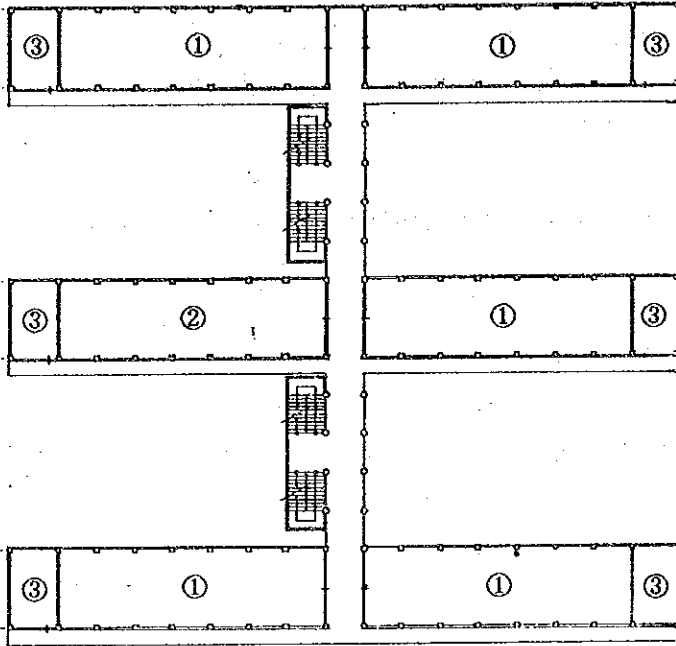
**Third Floor:**

Accommodations for trainees and ratings staying at the Hostel.

The utilizing plan is shown below:

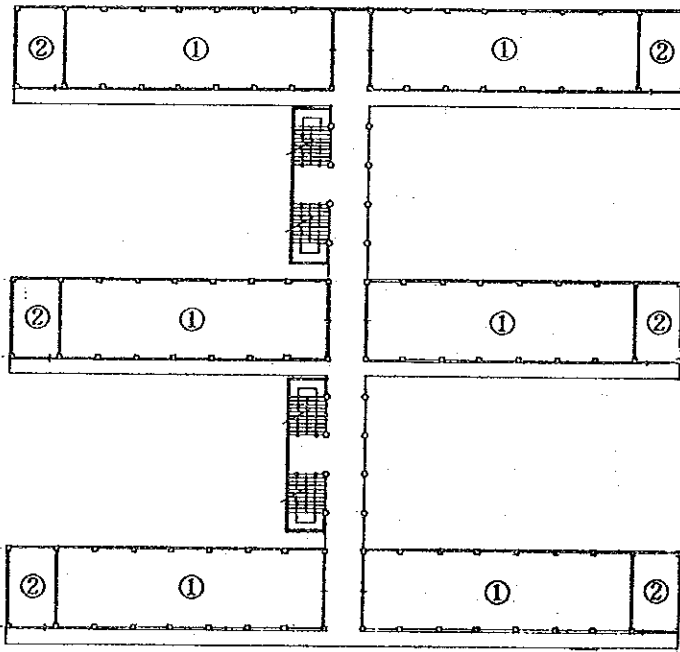


**GROUND FLOOR IMPROVEMENT PLAN**



- ① BEDROOM FOR TRAINEES (BUNK BED, 40p)
- ② LIBRARY/STUDY ROOM
- ③ LAVATORY

1st FLOOR IMPROVEMENT PLAN



- ① BEDROOM FOR TRAINEES (20p)
- ② LAVATORY

2nd FLOOR IMPROVEMENT PLAN

Fig. 3-2 EXISTING FACILITY IMPROVEMENT PLAN

3) Plan facility

a) Functions of the training facilities:

The areas required for the training programs include: classrooms, where lectures will be given; training facilities; model and sample rooms, where training will be offered in equipment use; and storage areas for training equipment and samples/models used in the classrooms.

The training areas will require separate rooms for engine training, deck training, galley training, training in fire-fighting and first aid, and practical training in cargo handling and storage.

The required training rooms will be employed as follows:

Classrooms:	for lectures
Engine training room:	for training in engine operations and machine processing
Deck training room:	for training in the handling of ropes and wires
Galley training room:	for training in food preparation and service.
Area for training in fire-fighting and first-aid techniques:	for training in fire-fighting and rescue operations
Training area for cargo handling :	for training in deck loading and unloading operations

b) Staff living quarters:

Staff living quarters will be divided into faculty and general staff accommodations. The general staff quarters are already provided in the existing facility, and so this Plan is concerned only with the requirement for visiting faculty and night duty instructor quarters.

Justification for the request for faculty quarters was based on the following considerations:

1. The STS is a boarding facility, making it vital that the instructors live on the premises so as to achieve a level of training that meets international standards.
2. Other related or similar facilities, such as the Marine Academy, the Deck Personnel Training Centre, and the Institute of Marine Technology, are also boarding schools which, in principle, require that faculty members stay on the premises.
3. For staying in the premises there is a requirement to have faculty quarters in the premises, which has not been fulfilled. It is necessary to have a dwelling for an instructor who shall take turn a night duty on the premises.
4. It is vital, in the interests of the ratings's training program, that a qualified faculty be recruited. Much experienced instructors from outside institutes including DPTC and BIMT, Narayanganji will be expected. Those visiting instructors need living quarters prepared.

These dormitory facilities constituted an indispensable part of the Plan but that, owing to the slash in budgets as a result of the relief program in the wake of the recent cyclone disaster, it would be difficult to fund this facility by the Government of Bangladesh.

(2) Training equipment:

- 1) Lifesaving equipment; distress and other signals

This is one of the basic training areas called for by the STCW Convention, giving rise to a requirement for a lifeboat, a boat davit, a cutter, a life raft, life-jackets, distress signals, life buoys, a direction finder, a lifeline throwing appliance, safety belts, international signal flags, and hand-signal flags. In the case of the lifeboat, in order to carry out lifeboat lowering training, it is necessary to build a simple jetty, to which a boat davit can be installed, on the bank of a pond in the school site. The life boat will be of total enclosed type to provide drills in

lowering, raising, and securing the boats, boarding and debarkation procedures, and water spray during fires. There will also be various drills in connection with lifesaving operations in the water.

2) Equipment for fire fighting training:

This is one of the basic training areas for marine safety, requiring such equipment as explanatory charts for on-vessel fire alarm systems, fire fighting pump, fire extinguishers, fire alarms, firemen's protective outfits, breathing apparatus, and an air compressor. In order to conduct training on fire fighting and live-saving procedures under actual vessel conditions, it is necessary to install fire fighting and lifesaving training facility, equipped with the same fixtures as would be found on a vessel, such as hatches, ladders, and escape hatches. In addition, to permit training in the use of fire extinguishers and a pump, there is a requirement for a special corner with concrete paving. There is also a need for a storage area for equipment for outdoor use, such as firemen's outfits and a fire fighting pump.

3) Items related to first-aid training:

This is another core training area related to marine safety. There is a requirement for first-aid and medicinals for vessel use, Neil Robertson stretchers, first-aid equipment, artificial respirators, and dummies for resuscitation and cardiac massage.

4) Compasses and other navigational training gear:

Navigational instrument equipment will be selected of a type and in quantities sufficient to allow practical training in geo-navigation and celestial navigation techniques, including magnetic compass, gyro-compass, and sextants.

With regard to electronic navigational techniques, on-shore training will focus mainly on radar but, in the case of other items, actual equipment samples and explanatory maps will be employed, such as a Navtex receiver, which will be mandatory on coastal vessels, as a result of revisions in international rules. Radar training will emphasize equipment handling and

image interpretation and judgment, and the equipment selected will incorporate a VTR.

5) Meteorological equipment:

Meteorological measuring equipment, a hydrometer, a water thermometer, and an weather facsimile will be included.

6) Equipment related to ship construction and stability:

This equipment group will include explanatory maps and charts, showing ship construction configurations and national flags, as well as models and maps of vessel types, so as to give trainees an understanding of vessel structure and vessel stabilization principles.

7) Cargo handling and storage:

Instruction in this area will aim at developing a basic appreciation of cargo handling techniques, using a model of cargo handling gear and explanatory charts relative to cargo and stripping pumps, tank cleaning system, and gas detection system. In addition, actual experience in cargo handling operations will be provided through the use of regular size winches and other equipment. For these purposes, it will be necessary to install equipment that permits practical training in on-vessel cargo handling equipment. The hatchway, with covers, will be identical to those used on ships, thereby permitting realistic drills in operations.

Cargo gear has been specified as Union Purchase System gear, the most popular type in use.

8) Pollution prevention equipment:

Basic knowledge will be provided of marine pollution prevention techniques through the use of explanatory charts for oily water separator.

9) Main and auxiliary engines, boilers, pressure vessels, pumping and piping systems:



This phase of the training program will develop an understanding of diesel and turbine engines through the use of models and explanatory charts. In addition, instruction will be given in the operation and handling of diesel engines as well as parallel-run of generator operations, based on the use of full-size diesel generators. And by means of explanatory charts on L.O. cooler, steam boiler, and freshwater generator as well as automated and remote control equipment, trainees will acquire a knowledge of the basic working of all the above equipment items. In addition, with regard to freezing and refrigeration equipment, instruction will be given in cooling and temperature control via the installation and operation of 3 units of equipment, each with a different temperature setting.

10) Electrical installations:

Trainees will be given an understanding of the construction and operation of electrical equipment, based on the use of actual motors.

11) Workshop machinery, testing and measuring equipment and tools:

Training equipment in this category will be selected with a view to developing a basic understanding of on-vessel workshop operations. It will include a universal machine, which are widely used on the world's vessels, along with lathes and electrical and gas welders, drills, and other general-use machinery. There will also be a requirement for various tools and a fuel valve tester, dial gauges, circuit testers, and other measuring equipment for practical training purposes.

12) Equipment for steering gear training:

Given the lack of a training vessel at the STS, the Plan will provide for the installation of full-size steering gear for use in the course programs along with actual specimen of gyrocompasses and rudder system, which will facilitate easy-to-understand instruction in the construction and operation of steering gear systems.

13) Seamanship workshop tools; pilot and bulwark ladders:

Ship and related fittings will be provided in the required quantities for practical training in deck and anchor operations and rope work -- which is extremely important to the work of deck personnel. In addition, a special rope operations room will be set at the third floor for general training in rope work.

14) Galley equipment:

Galley equipment will be furnished as required by the catering training courses. This will include such basic items as a cooking table for teaching use, other cooking tables, gas tables, a rice cooker, knives, kitchen utensils, a fryer and other standard vessel items. Saloon ratings must acquire a general understanding of how to use this equipment.

15) Radio equipment:

This equipment is intended to provide instruction in the operation and handling of radio equipment, as required for communication with receiving and disembarking pilots and during in-port operations. Actual SSB/VHF equipment will be used, with due regard to the communications regulations set forth in the Radio Code and similar legislation.

16) Equipment for producing training materials:

The equipment needed for this purpose includes a duplicating machine, a cyclostyline machine, and typewriters (both in Bengali and English). Audio-visual equipment is to incorporate a video monitor, video teaching materials, a slide projector, and an overhead projector. There is also a requirement for an on-campus public address system for use in fire fighting drills and other exercises.

17) Vehicles:

Vehicles will be required to transport trainees to and from the Dock Yard, the BSC Workshop, vessels in Chittagong port, and the Marine Academy as well as for field study tours and the movement of training materials.

Chittagong, home of the STS, is the premier port city in Bangladesh as well as the center for seamen employment. It is, therefore, considered ideal as a location for the facilities of this institution. A level site has been secured for the facility, with good soil conditions. The Bangladesh Government is in the process of completing the necessary documents and procedures for the Planning Commission in order to develop a suitable operating structure following the Project implementation, and so no particular problems are anticipated with respect to the securing of budgets or personnel. In addition, the government has assigned the project a high priority in both the Fourth 5-Year Economic Development Plan and the Three Year Rolling Plan. Thus, there is no likelihood of any duplication with other aid or similar programs.

Based on careful consideration of the Request, we see no problems in connection with Project implementation in terms of effect of the Project, practicality, or the implementation capability of Government of Bangladesh. The Project, accordingly, conforms to Japan's system for grant aid programs and so has been deemed appropriate for this purpose. We have, therefore, developed a Basic Design on the assumption that the requested aid will be received from Japan.

### 3.4 Outline of the Project Plan

#### 3.4.1 Management plan

The executing agency of the Project is the Department of Shipping (DOS) of the Ministry of Shipping (MOS). The STS will be managed by the Principal and the Vice-Principal under the aegis of the DOS.

Number of instructors, including Principal, Vice-Principal, Chief Nautical Instructor and Chief Engineering Instructors, 17 persons and number of general and clerical staffs will be 35 persons.

#### 3.4.2 Characteristics of the Project site

(1) Weather Conditions

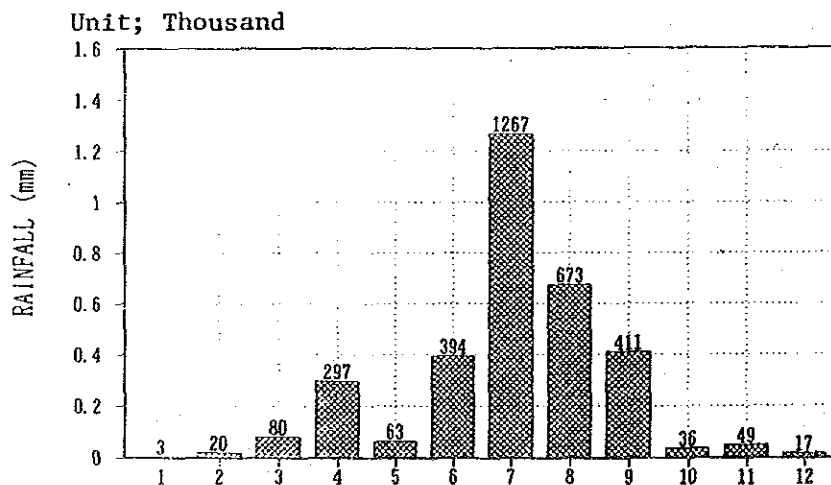
Subject to the seasonal wind from the Indian Ocean, the most part of Bangladesh shows the typical subtropical monsoon climate. A year may be divided into three seasons, winter from November to February, summer from March to May and the rainy season from June to October.

1) Rainfall

With approx. 2,000 mm of the average annual rainfall, Bangladesh is one of the most rain-ridden countries in the world. About 80 % of the total rainfall concentrates from June to October, thereby giving rise to a torrential downpour, the rainfall sometimes reaches 300 to 400 mm per day, in rainy season, and little rain falls in the dry season.

Chittagong lies in the east region of Bangladesh where rainfall is particularly heavy. In the decade 1978-87, the maximum and minimum annual rainfalls in Chittagong were 3,310 mm and 2,517 mm respectively.

Fig. 3-3 MONTHLY RAINFALL IN CHITTAGONG (1987)



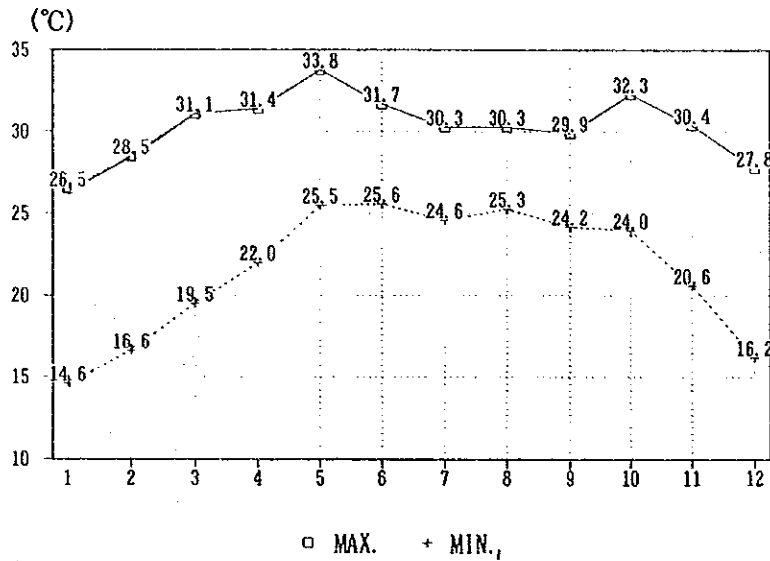
2) Temperature and humidity

The maximum and minimum temperatures (average through the years) in Chittagong are shown in the following figure for each month. It is highly humid in Chittagong, the humidity reaching more than 80 % in the rainy season.

Table 3-9 MONTHLY RELATIVE HUMIDITY IN CHITTAGONG

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
RELATIVE HUMIDITY	74	72	73	79	76	82	90	85	82	80	80	79	79 %

Fig. 3-4 MONTHLY TEMPERATURES IN CHITTAGONG (1987)



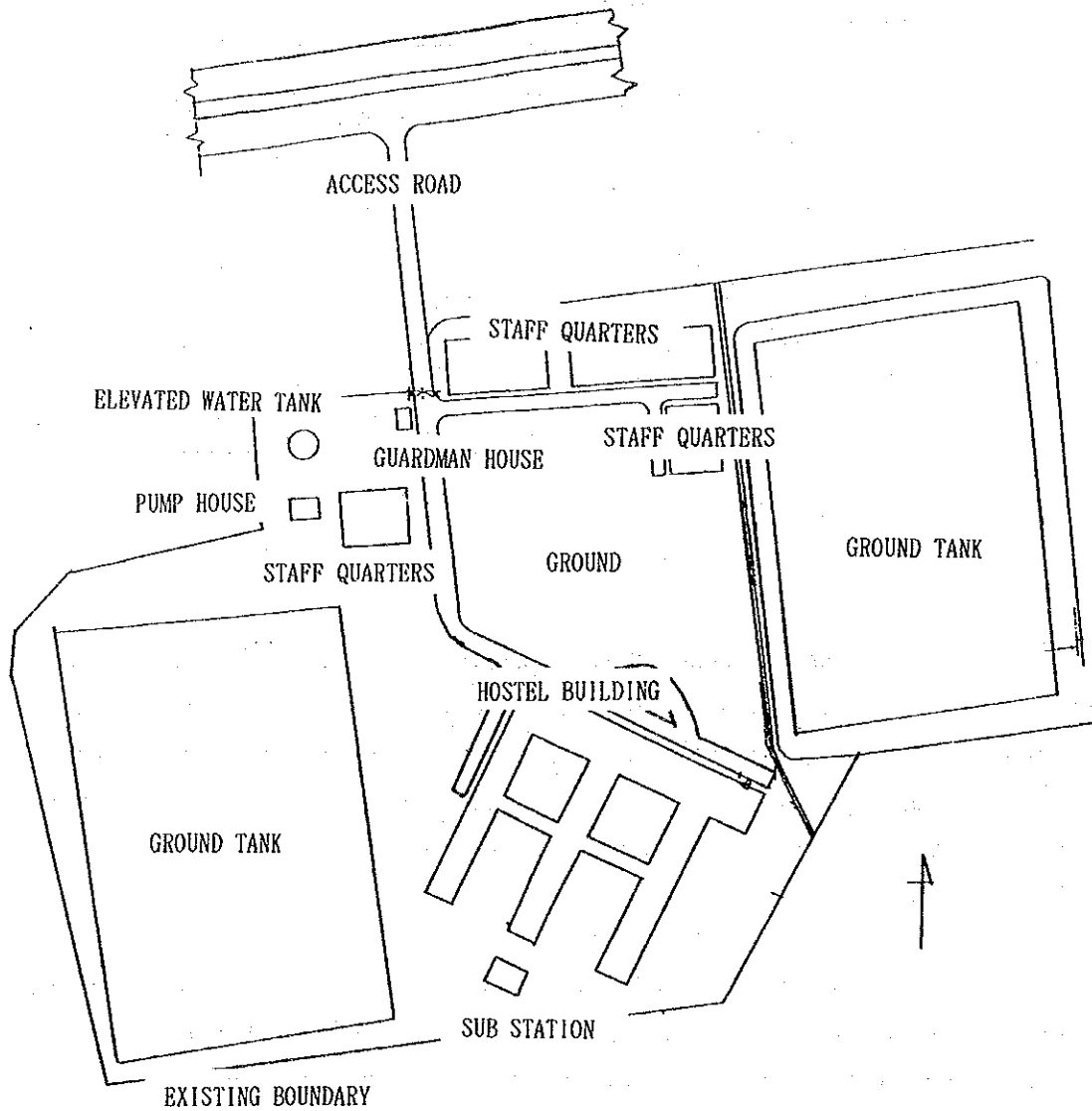
3) Wind

Subject to the monsoon, the prevailing wind direction show a certain pattern in a year. The prevailing wind direction are for the south to southeast from April to September, turns for the east for a while, and then turns again for the north to northeast from November to January. In February and March the wind blows from the west, and changes from the south to southeast in April.

In between of the dry and rainy seasons (i.e. in May, October and November), strong seasonal wind with rain blows from the Bay of Bengal. And sometimes cyclones hit the region, according to the records of the Chittagong Port available in 1989, the maximum velocity at the time of the cyclons were 125 knots (64.3 m/s) in 1960 and 1963 and 138 knots (69.5 m/s) in 1970. When a cyclone hit the port in April of this year, the maximum instantaneous wind velocity reached 62.0 m/s.

(2) The Project site

The project site lies in the south-west of Chittagong, about 50 m off the main road leading to the airport. It comprises approx 20,000 square meters. The following shows the existing site plan.

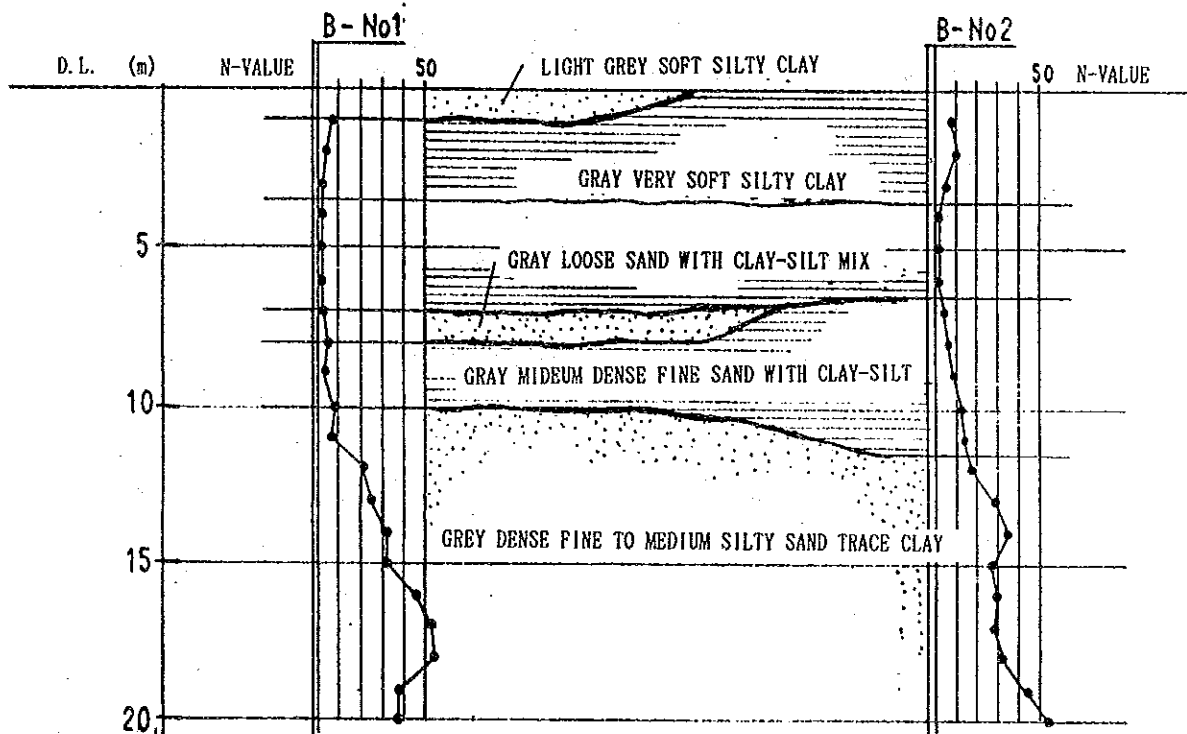


(3) Geological features

Bangladesh lies at the eastern edge of the Indian Subcontinent. With three large rivers, the Ganges, Bramaputra and Megna, running through it, the land of Bangladesh is one of the widest alluvial plains that were formed with sediments by rivers. Generally, alluvial plains comprise an alluvial fan at the base of mountains, a natural levee, and a delta plain near the sea. Most part of Bangladesh comprises natural levee and delta. The various rivers run like net meshes in the flatland. The average land height is 8 meters or less.

For the foundation design, to acquire the characteristics of the soil conditions on the site, we carried out a drilling survey at two points on the premises. The following figure shows the soil layers based on the result of the soil survey.

Fig. 3-6 ASSUMED SOIL PROFILE



The top clay layer (10-11.5 m) is followed by sand layer down to the bottom of the surveyed point (i.e 20 m depth). Standard penetration tests show that, although the upper clay layer to approx. 2 m depth is relatively firm (N=5-10), the clay layer from 2 m to 4 m depth is extremely soft (N=1). The upper sand layer has softish or medium relative density (N=9-35), while the lower sand layer is firm (N=30-56).

The soil layers of the No.1 point and No. 2 point show approximately the same pattern except that a small sand layer is found in the middle of the clay layer of the No.1 point, and that clay is mixed in the lower sand layer of the No. 2 point.

The boring logs are shown in the Appendix.

#### (4) Natural Disasters (flood, tidal surge and earthquake)

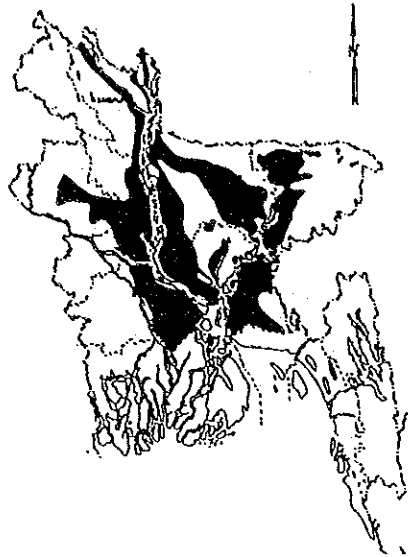
Bangladesh has been frequently hit by floods and water surge, which have inflicted wide-ranged losses and thus had significant adverse influence on the society and economy. The damage resulting from floods and surges had been estimated at more than 200 million dollars per year until 1986. In 1987 and 1988, large scale floods hit the country about 60 % of the land was inundated, and the damage was huge.

##### 1) Flood

Bangladesh is affected by floods almost every year. Floods are caused by various factors such as in a low alluvial land, rise of water level of rivers as a result of snow thaws of the Himalaya Mountains, heavy rain in the rainy season, vast amount of flow in three large rivers (in the himalayan region where the flow area is vast has 2,000-10,000 mm of annual rainfall on average). In the past, devastating floods were recorded several times. Even in a normal year, about 20% of the whole land is flooded.



Fig. 3-7 AREA NORMALLY FLOODED IN BANGLADESH



### 2) Water surge

The seaside of Bangladesh is often struck by storm surges caused by cyclones in the Bay of Bengal. When a cyclone hits, height of a surge reaches 10 m, and damage spreads upto 50 km in the seashore. The records at the Chittagong Port show a great deal of damage inflicted by surges in the past. The site was suffered 5 ft flood in April of this year.

### 3) Earthquake

The report, "Seismic Zoning Map of Bangladesh and Outline of a Code for Earthquake Resistant Design Structure" prepared by the Geological Survey of Bangladesh, lists the earthquakes in the past 150 years. The epicenters of the earthquakes are mostly in Myammar, Nepal and India. Only two of them (in 1885 and 1918) were located their epicenter in Bangladesh. Although the range of damage are not recorded in detail, it is reported that an earthquake in 1897 was felt in the whole land of Bangladesh and inflicted considerable losses in the Sylhet area in the north and the Rangpur area in the east. The distribution of epicenters is shown in the Appendix.

#### 3.4.3 Outline of the facilities and equipment planned:

The Project is intended to provide certain equipment and facilities needed to carry out training to qualify Bangladesh ratings under the STCW Convention as well as to develop the skills that will enable them to enter

the international shipping industry. It will also furnish facilities required to provide ratings' training in the use of the above equipment.

Since training must be conducted in accordance with the STCW Convention, training equipment has been requested to meet these requirements.

- a. Life Saving Appliances
- b. Fire Prevention & Fire fighting Appliances
- c. Compass
- d. Signalling by the International Code of Signals
- e. Meteorology Equipment
- f. Distress Signals
- g. Ship Construction & Stability
- h. Cargo Handling Stowage
- i. Prevention of Sea Pollution
- j. Main & Aux. Prime Movers, Boilers & Vessels Pumping & Piping System
- k. Automatic & Remote Control Systems
- l. Electrical Installations
- m. Workshop Machinery
- n. Testing & Measuring Equipment (Machinery Part)
- o. Testing & Measuring Equipment (Electrical Part)
- p. Tools (Machinery Part)
- q. Steering Gear System
- r. Pilot Ladder & Bulwark
- s. Seamanship (Tools & Equipment)
- t. First Aid
- u. Safety Harness
- v. Galley Equipment
- w. Language Laboratory
- x. Transportation Equipment

The specific items must be selected in accordance with the specified curricula for the target training categories.

Facilities required for ratings' training will include training classrooms, model and sample rooms, workshops, a galley training room, and a training facility for fire-fighting and first-aid techniques.

The STS should be a boarding institution, as is the case with training programs in other countries for ratings. And since there is a need for continuing instruction in everyday vessel life, it is essential that the instructors also stay at the school. For this purpose, a trainee dormitory and a night duty instructor's and visiting faculty living quarters are required. In addition, as welfare facilities for the trainee dormitory, there is a requirement for a canteen, galley, recreation room, welfare room, and dispensary. Administrative facilities will include the School administrative offices, storage areas, faculty room, and the Principal's office.

Although not directly related to ratings's training, the Seamen's Hostel, which currently functions as a seamen's welfare facility, is to be brought under the jurisdiction of the STS after the Project implementation, which creates a requirement for a ratings's lodging function.

Among the above functions, the Bangladesh Government is to defray the costs of the Hostel (as a seamen's welfare facility), the trainee dormitory, canteen, galley, recreation room, welfare room, and dispensary (as trainee welfare facilities), and the STS administrative offices, storage areas, faculty offices, and Principal's office (as administrative facilities).

Thus, the facilities to be provided under this Plan include training equipment, training classrooms, model and sample rooms, workshops, a training galley, facility for fire-fighting and first-aid training, and night duty and visiting faculty quarters.

### 3.5 Maintenance and Administration Plan

The projected maintenance and administration costs of the subject facilities upon completion of the Project comprise operating and maintenance expenses for the facilities and equipment and instructors' remuneration. The

premises for calculating maintenance and administration costs were as follows:

No. of days refresher trainees will be in training:

240 days / year (30 days x 8 cycles)

No. of days freshman trainees will be in training:

300 days / year (150 days x 2 cycles)

No. of days the Seamen's Hostel will be utilized

365 days/year

Power costs Tk 1.65 / kwh

Water costs For industrial use:

Tk 42.56 / 000 gallons

(basic charge: Tk 9.12)

For residential use:

Tk 15.12/000 gallons

(basic charge: Tk 3.35)

However, since the Plan facilities will use well water, water power costs have been based on the power consumption of the lifting motor.

### 3.5.1 Operating costs

#### (1) Electricity

Training Bldg. 128 Kwh X 300 days = 38,400 Kwh

Administration Bldg. 40 Kwh X 365 days = 14,600 Kwh

Total 53,000 Kwh

53,000 Kwh X Tk 1.65 /Kwh = Tk 87,450 / year

By scheduling the welding training concurrently with that for engines and generators operation, the power requirements will be greatly reduced.

#### (2) Gas

Gas is the fuel used during cooking courses. There will be 9 gas ranges with 3 burners each. Assuming that the ranges are in use 30% of the

total class time, with concurrent usage at 60% and a load factor of 30%, gas consumption will be as follows.

$$\begin{aligned} &42 \text{ weeks} \times 10 \text{ Hrs} \times 3 \text{ burners} \times 9 \text{ units} \times 1 \text{ cu.m/hr} \times 0.3 \\ &\quad \times 0.6 \times 0.3 = 612.36 \text{ cu.m/year} \\ &612.36 \text{ cu.m} \times \text{Tk } 164.56/\text{cu.m} = \text{Tk } 100.733/\text{year} \end{aligned}$$

(3) Diesel fuel

The amount of diesel fuel that will be consumed in the operation of engine generators during training sessions, based on one hour's use per week, will be:

$$\begin{aligned} &38 \text{ PS} \times 2 \text{ units} \times 200 \text{ g / ps /hr.} \times 42 \text{ weeks} \\ &\quad \times 1 \text{ hr.} \times 1 / 0.83 = 769 \text{ lit/year} \\ &769 \text{ lit} \times \text{Tk } 14.0/\text{lit} = \text{Tk } 10,766/\text{year} \end{aligned}$$

(4) Lubrication oil

Consumption has been estimated at 10% of the diesel oil requirements.

$$\text{Tk } 10,766 \times 0.1 = \text{Tk } 1,076/\text{year}$$

(5) Welding rods, oxygen, acetylene, and other expendable items:

The total has been set at Tk 10,000 per annum.

(6) Ingredients for cooking classes

The cost for ingredients for cooking training courses is Tk 30 per meal. At present, meals for residents at the Seamen's Hostel are served in the first-floor canteen by a concessionaire, with residents paying an average of Tk 15 per meal. Since this burden is believed to be within the financial capacity of trainees and since the food prepared during training sessions is consumed by the trainees, based on the trainees defraying half the cost, ingredient costs have been set at the present Tk 15 per meal.

$$\text{Tk } 15 \times 30 \text{ trainees} \times 5 \text{ class/week} \times 42 \text{ weeks} = \text{Tk } 94,500/\text{year}$$

(7) Telephone costs

Based on experience to date at the Seamen's Hostel, these costs have been set at Tk 20,000 / year.

3.5.2 Maintenance and administrative costs

(1) Facilities

The budget for maintenance and repair of the Plan facilities has been set at Tk 150,000 per year.

(2) Equipment

Maintenance costs of the Plan equipment will mostly entail the purchase of replacement parts. The total has been set at Tk 200,000 / year.

(3) Expendable items

Based on past experience at the Seamen's Hostel, the cost of expendable items, such as sheets and pillow cases at the Hostel and trainee dormitory, has been estimated at Tk 145,000 per annum.

(4) Land revenue for Municipality

The present Seamen's Hostel budgets TK 250,000 per year for Land revenue for Municipality. Tax assessments on the new facilities are as yet unknown but, estimating these in proportion to the relative building areas, we have allowed a total of Tk 380,000 for these taxes, including those on the existing buildings.

3.5.3 Personnel costs

These have been based on the Project Proforma drawn up by the Bangladesh Government. Excluding launch operators and other personnel included in the Request but not involved in the Project, total personnel costs have been set at Tk 2,498,000 per year.

The following table summarized the annual expenditure expected at the new institute.

Table 3-8 ANNUAL OPERATION AND MAINTENANCE COST FOR S. T. S.

	FACILITY	EQUIPMENT (INCLUDED FACILITY)	TOTAL
OPERATION COST	324,525		324,525
MAINTENANCE COST	900,000	200,000	1,100,000
PERSONNEL COST	2,498,000	-	2,498,000
		GRAND TOTAL	3,922,525 Tk

In the Project Proforma originally drawn up by the Bangladesh Government, an annual budget of Tk 3,749,000 has been appropriated, and, based on the Basic Design Report, the Bangladesh Government has promised to review this budget.

The operating costs after the Project implementation total Tk 3,922,525 (See Tab.3-8) and the total amount of the budget allocations of the STS (See Tab.3-2) and the expenditure of the Seamen's Hostel (See Tab.3-3) is Tk 3,705,500. Difference between them, Tk 217,025, is 0.6 % of the expenditure of the Ministry of Shipping 1990/1991 (See Tab. 3-5). Since the difference is not large, and there is the prospect of generating new operating revenues, as discussed below, The Team feel that no problems should arise with respect to securing operating budgets.

#### 3.5.4 Operating revenue

Against the operating costs, the following revenue sources have been estimated for the STS under the Project.

Based on the Bangladesh budgetary system, all income is paid into the national treasury and so is not available for direct use by the STS, but the income estimates have been shown for reference purposes.

##### (1) Room revenue

Room revenue at the Seamen's Hostel is presently as follows:

Off Article ratings(unemployed) Tk 5 / night  
 On Article ratings (employed) Tk 20 / night (paid by the employer)  
 Cadets, Officers Tk 20 / night

Room revenues of Seamen's Hostel in 1989/90 and 1990/91 are shown below.

	(Unit Taka)	
	1989/90	1990/91
Off Article ratings	95,582	205,161
On Article ratings	48,650	61,260
Cadets & Officers	<u>31,040</u>	<u>55,015</u>
Total	175,272	321,436

Boarding charges at the trainee dormitory run Tk 5 per capita. Assuming a charge of Tk 20 in the case of trainees dispatched by their companies, and based on the following training schedule:

Refresher trainees: 125 persons x 1 month x 8 cycles  
 Freshmen trainees: 100 persons x 5 months x 2 cycles,

and further assuming that 40% of the refresher trainees will be sent by shipping companies, revenues can be estimated as follows:

Refresher trainees (individuals)	
Tk 5 x 75 x 30 x 8 =	90,000
Refresher trainees (dispatched)	
Tk 20 x 50 x 30 x 8 =	240,000
Freshmen trainees	
Tk 5 x 100 x 5 x 30 x 2 =	<u>150,000</u>
Total	480,000

(2) Canteen usage fee

The Canteen on the first floor of the Seamen's Hostel is operated as a concession, with the concessionaire selected annually on the basis of open bidding on the usage charge. This year, the successful bid was Tk 1,000 / month, or Tk 12,000 per year.



The following plans can be considered as sources of revenue to offset maintenance and operating costs of the STS, apart from the above concession income that will accrue when the Seamen's Hostel is transferred to STS control.

1. It should be possible to collection tuition of about Tk 10 per course from the refresher trainees. This would amount to an income of for the STS of Tk 1,250 per year.
  
2. There is an ordinance on the books (enacted in 1983) which enables seamen's educational institutes to collect a subsidy of up to Tk 10 per 100 GRT from Bangladesh-registered vessels. Negotiations with shipowners under this ordinance have not yet been undertaken by the Ministry of Shipping, but there is a likelihood that an assessment of about Tk 7 could be obtained. If so, the annual revenue for the STS from this source would come to:

$$\text{Tk } 7 \times 356,000 \text{ GRT} / 100 = \text{Tk } 24,920.$$

### 3.6 Technical Cooperation

Neither the Ministry of Shipping nor the Department of Shipping raised the request of technical assistance for the Project with the Basic Design Study Team. The list of equipment items contained in the Project does not include any highly sophisticated equipment that might require technical guidance or special training, while it has been established that the Bangladesh authorities are amply equipped to manage the program. Over the longer term, however, since the STS has not implemented full-scale ratings' training programs and a specialist in the planning of such programs has not been brought up, there is a major need for technical cooperation in training a specialist able to set appropriate target levels for ratings's training programs and provide advice on their development, including planning on optimum training methods to attain these goals. The value of such cooperation would, in our view, be considerable.

## CHAPTER 4: BASIC DESIGN

### 4.1 Basic Policies

The Project forms a key part of the national effort to develop manpower resources. It seeks to provide training to Bangladesh ratings that will qualify them under STCW mandatory minimum requirement while also training new ratings recruits in vessel operating techniques so as to facilitate employment aboard foreign vessels. Vessel operating technology, in contrast to other fields, have a high degree of commonality. Once a vessel leaves port, it must operate without recourse to shore support, and so operations are necessarily characterized by a high degree of self-reliance. Accordingly, a seaman's work involves a variety of tasks, from the operation of machinery to the use of hand-gear. Thus, in training ratings for such operations, there is a requirement for instruction in certain basic technology to provide the requisite skills and familiarize them with the operation of tools and equipment. Training is also necessary in the techniques of survival at sea, emergency medical care, and other skills required to ensure safety in emergencies.

To satisfy the above requirements, the Plan facilities and equipment are to comprise practical field training, which is indispensable in vocational training programs, along with instructional materials and classrooms for technical training. This requires the development of an organic placement plan to organize these various functions. In addition, since the functions relating to school administration, trainee accommodations, and seamen's welfare services are to be incorporated in the existing facilities, Plan facilities must be carefully coordinated with existing facilities.

#### (1) Training Equipment

In training ratings, while it is felt that the optimum method should focus primarily on practical training aboard a training vessel, under present conditions, the Team feel that it would be difficult for the STS to operate and maintain its own training vessel. Accordingly, for the time being, it is planned to place primary emphasis on sedentary on-shore training. In order, therefore, to achieve results comparable to on-vessel

instruction, we have selected as training equipment actual equipment items or appropriate models, as needed to provide a realistic training environment.

In light of the above, the Plan has been formulated in accordance with the following basic policies:

- 1) Training should be conformed to the requirement of the STCW convention.
- 2) Training equipment will conform to the requirements of the curricula and training methods.

(2) Facilities

In addition to facilities for training equipment, the Project must also provide facilities for the training courses for fresher ratings that will be newly offered as well as the refresher ratings training programs already offered by STS.

In light of the above, the Plan has been formulated in accordance with the following basic policies:

- 1) The Plan will maintain harmony between the existing and new facilities.
- 2) Facilities will conform to the requirements of the curricula and training methods.
- 3) Facilities will be appropriate to the natural environment at the project site, particularly the high temperature and humidity.
- 4) Facilities will be suitable to the peripheral environment as well as the site conditions.
- 5) Careful consideration will be given to local construction conditions in the selection of structural and construction

methods and materials. In implementing the Plan, local labor, materials, and construction equipment will be utilized to the maximum possible extent, with a view to contributing to the vitalisation of the regional economy.

## 4.2 Consideration of Design Conditions

### 4.2.1 Code and standards

Marine equipment will be in accordance with the rules and regulations by the Vessel Safety Law in Japan or the Classification Society, Nippon Kaiji Kyokai (NK).

Although P.W.D had used the British Standards for civil works, in these days the standards of the American Concrete Institute (ACI) are employed. Those standards, however, are not necessarily applied to the foreign aid projects, and thus donating countries are apt to adopt their own standards. In the Basic Design, the local standards and normal practices will be applied for space and other aspects, while the Japanese standards will be applied for structural design.

### 4.2.2 Seismic Strength

The seismic loads will be determined pursuant to the formula shown in the "Seismic Zoning Map of Bangladesh and Outline of a Code for Earthquake Resistant Design Structure" (Final Report, 1979). The formula is as follows:

$$V = ZIKCSW$$

V: Base shear coefficient

Z: Zoning coefficient, Z=0.05 for Chittagong

I: Importance coefficient (public building) I=1.5

K: Structural characteristics coefficient K=1.0

C: Tremor characteristics coefficient C=1.0

$$T=N/10=3/10=0.33\text{sec.} \rightarrow 1$$

S: Soil coefficient S=1.0

W: Loading diminishing coefficient

By applying the above values into the formula, the Base shear coefficient is calculated to be 0.075. The structural calculation in the Basic Design uses this coefficient.

The seismic zoning coefficient by area is illustrated in the following.

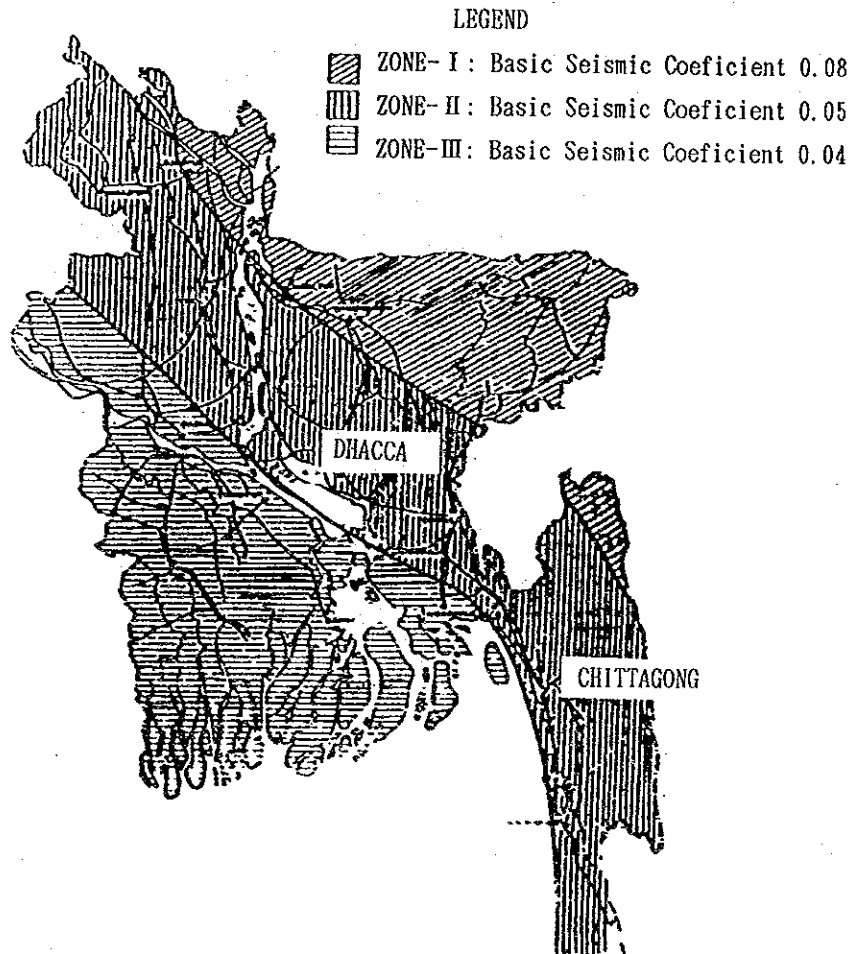


Fig. 4-1 SEISMIC ZONING MAP OF BANGLADESH

## 4.3 Basic Plan

### 4.3.1 Training Equipment

#### 1) Lifesaving equipment

Life boat and life raft shall be in accordance with the International Convention for the Safety of Life at Sea (SOLAS 1983 Amendment). Lifeboat shall be total enclosed type for 30 persons. Inflatable life raft shall be of dropping type with GRP container for 15 persons. Boat davit shall be of gravity type. Rowing cutter shall be made of GRP for 11 persons with sailing appliances .

#### 2) Equipment for fire fighting training;

Air compressor for the breathing apparatus shall be of high pressure type at 200 kg/sq.cm.

#### 3) Items related to first-aids training

Items and number of medicines, surgical equipment, instruments and supplies in the ship's chest shall be prepared in accordance with recommendation in "International Medical Guide for Ships" by WHO.

#### 4) Compasses and other nautical training gear

Magnetic compass and gyro-compass shall be incorporated in the steering gear simulator. Magnetic compass shall be of 165 mm dia, stand type. Gyro-compass shall be of compact type, with gyro-compass pilot system. Radar training will emphasize image interpretation and judgement, and equipment shall be of 10 KW, 14 inch type with VTR.

#### 5) Meteorological equipment

Weather facsimile receiver shall be of thermal paper type, effective scanning line 296 mm. Sensor of the wind vane anemometer shall be installed at the derrick top of the cargo handling training facility, and the recorder shall be equipped in the classroom for deck department.

6) Equipment related to ship construction and stability

For giving trainees an understanding of vessel structure and stability, model ships shall be of a typical cargo ship, a container carrier and a crude oil tanker.

7) Equipment for cargo handling & stowage

Model of cargo handling gear shall be of typical ocean going vessel type. Cargo handling training facility shall compose of hatchway with covers, cargo winches, topping winches and cargo booms, which permits practical training. Cargo gear shall be of Union Purchase System. The facility shall be installed on the roof of the training building.

8) Training equipment for main and auxiliary engines

The diesel generator engines shall be 2 units of 38 PS, 30 KVA, which is the minimum capacity to operate in parallel-run. Models of the swash-flow pump, 2-cycle marine diesel engine, 4-cycle marine diesel engine, marine turbine engine shall be of cut-model which show constructions of the equipment.

Freezing and refrigeration equipment shall be of prefabricated type with a different temperature setting, - 25 C degree, - 5 C degree and + 3 C degree.

9) Workshop equipment

The universal machine tools, a combined lathe, shaper, drill and milling machine, shall be of 2.2 KW capacity. The lathe machine shall have a capacity of 800 mm distance between centers.

10) Equipment for steering gear training

The steering gear simulator shall compose of a steering gear with a 1.5 ton-m electro-hydraulic pump unit, a magnetic compass, a gyro-compass and a steering stand on a turn table, which will facilitate easy-to-understand instruction in operation of steering gear system.

Following is an outline chart of the equipment to be provided under this heading.

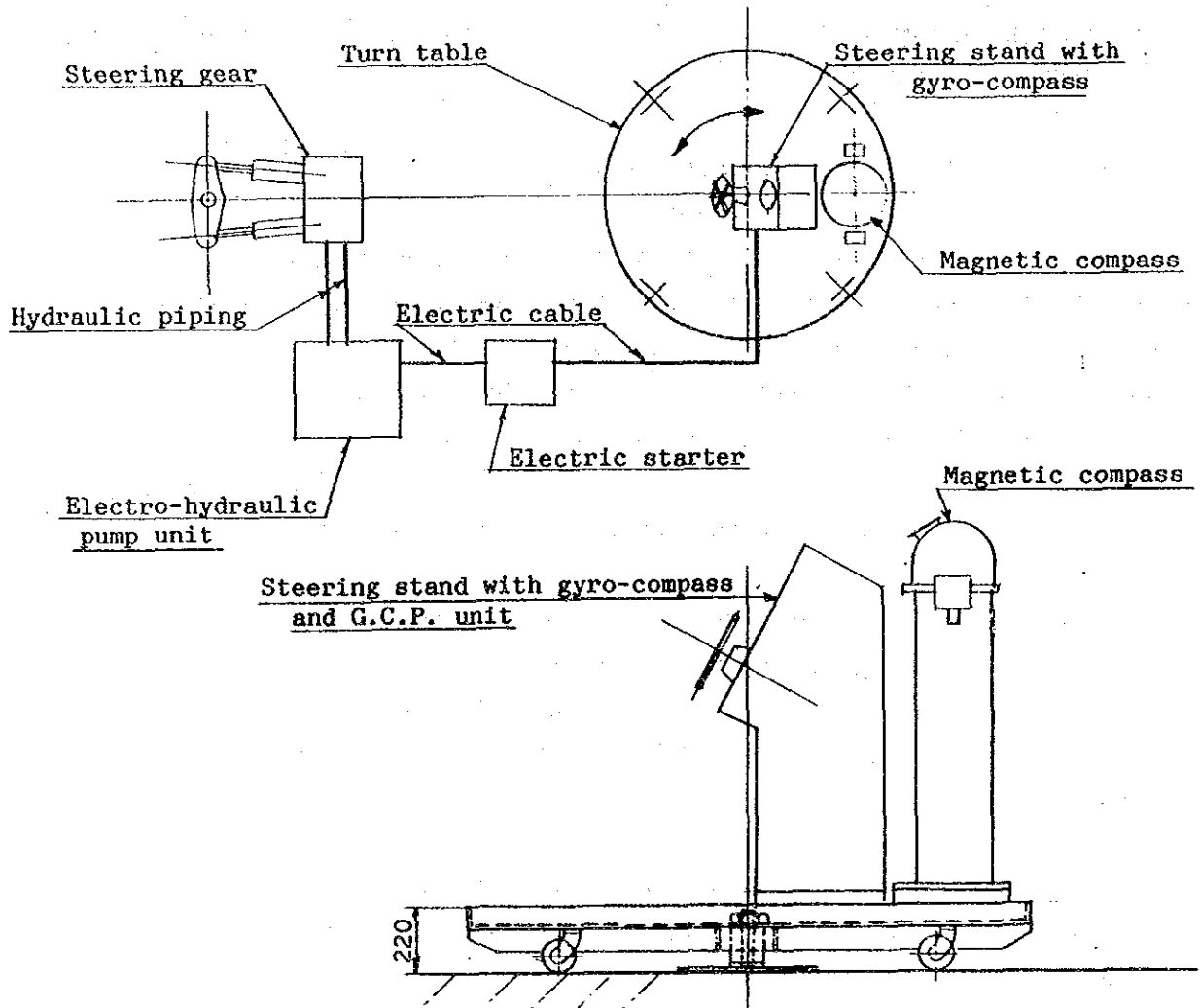


Fig.4-2 STEERING GEAR SIMULATOR

11) Galley equipment

Universal cooking mixer shall have bowl capacity of 20 quart. Dish washer shall be made of stainless steel.

12) Radio equipment

SSB radio shall be of 150 W.







Width;  $Y = 2.33 \times 3 + 1.0 = 7.99 \text{ --- } 8.0 \text{ m}$   
 Depth;  $X = 0.93 \times 9 + 2.55 = 10.92 \text{ --- } 11.25 \text{ m}$   
 Necessary Area;  $8.0 \times 11.25 = 90 \text{ sq.m}$

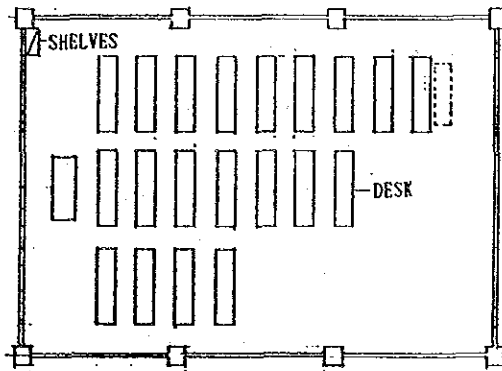


Fig. 4-4 PLAN OF CLASSROOM FOR 50 TRAINEES

CLASSROOM FOR 30 TRAINEES

Width;  $Y = 2.33 \times 3 + 1.0 = 7.99 \text{ --- } 8.0 \text{ m}$   
 Depth;  $X = 0.93 \times 5 + 2.55 = 7.20 \text{ --- } 7.50 \text{ m}$   
 Necessary Area;  $8.0 \times 7.50 = 60 \text{ sq.m}$

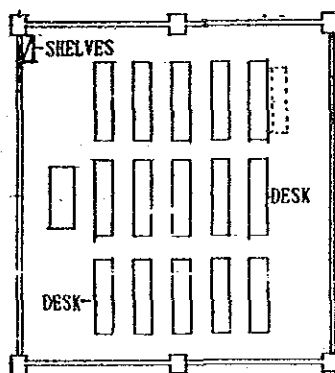


Fig. 4-5 PLAN OF CLASSROOM FOR 30 TRAINEES

(2) Model room in the deck department

The following training equipment and materials will be stored in the model room in the deck department.

- a. Compass
- b. Signalling by the International Code of Signals
- c. Meteorology Equipment
- d. Distress Signals
- e. Ship Construction & Stability
- f. Cargo Handling Equipment
- g. Steering Gear Simulator

With regard to the storage methods, a display counter will be installed for the radar equipment, while the hull and derrick models will be displayed on a special platform. Compasses and steering simulator will be installed at floor level to permit proper training in their operation. The other items of equipment will be stored on shelves and taken down as needed.

This equipment will be used almost exclusively by deck trainees, with a maximum of 50 students to be accommodated for instruction based on both models and practical training. The layout for equipment and fixtures, based on suitable lead space, is as shown in the following chart. The required area has been calculated at 90.0 m<sup>2</sup>.

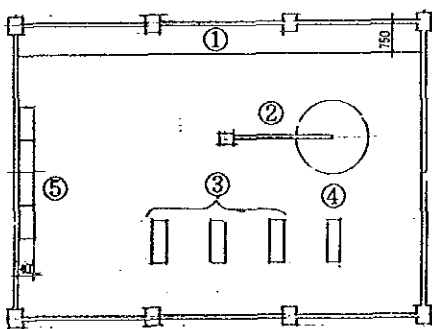


Fig. 4-6 NAUTICAL EQUIPMENT MODEL ROOM PLAN

- ① NAUTICAL EQUIPMENT DISPLAY TABLE
- ② STEERING GEAR SYSTEM SIMULATOR
- ③ SHIP MODELS (3 Nos.)
- ④ DERRICK MODEL (1 No.)
- ⑤ SHELVES

(3) Model room for the engine department

The following items of equipment are to be stored in the model room in the engine department.

- a. Prevention of Sea Pollution
- b. Main & Aux. Prime Movers, Boilers & Vessels  
Pumping & Piping System
- c. Automatic & Remote Control Systems
- d. Electrical Installations

The 5 pump models, 2 diesel engines, the turbine engine, and 2 full-size motors will be displayed on their own special tables, with the other items to be stored on shelves.

This room is to be used almost entirely by the engine trainees, so that the capacity of the room has been set at 50 persons during training sessions. The following chart presents the layout plan for the subject equipment and fixtures, after due allowance for lead space. The required area has been calculated at 90.0 m<sup>2</sup>.

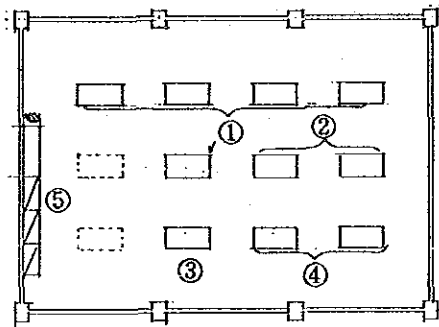


Fig. 4-7 ENGINE MODEL ROOM PLAN

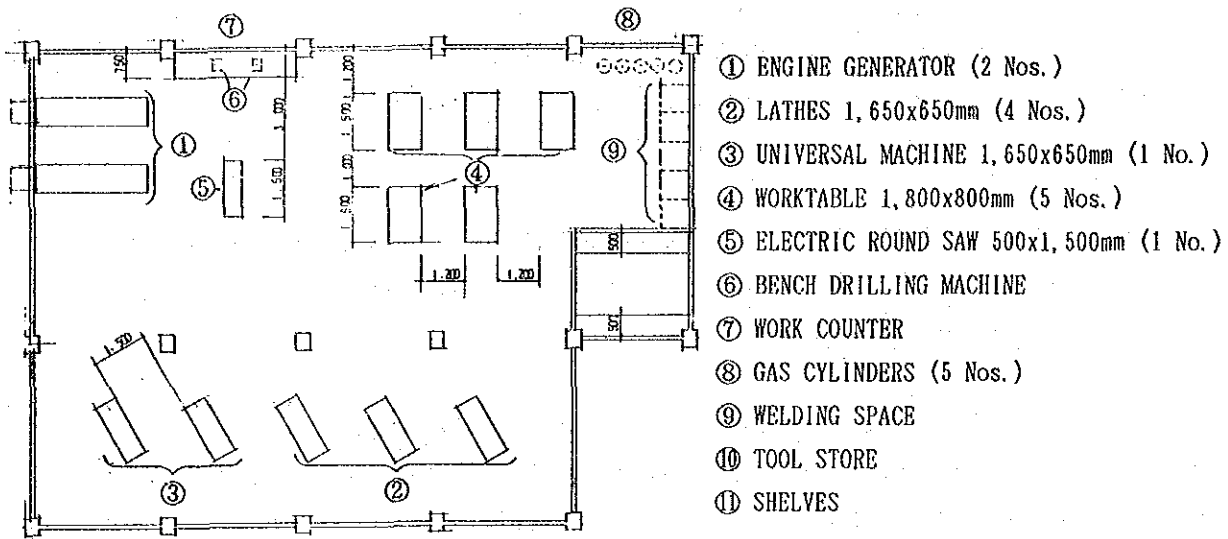
- ① PUMP MODELS (5 Nos.)
- ② DIESEL ENGINE (2 Nos.)
- ③ TURBIN ENGINE (1 No.)
- ④ MOTOR (1 No.)
- ⑤ SHELVES

(4) Machine Workshop for the engine department

This space will be devoted to training in the operation and handling of full-size diesel generators and machine tools, basic training in machine tools on a work table, and practical instruction in electric welders and various kinds of tools.

A tool shed will be constructed as a storage area for the test and measuring equipment and tools, with interior shelves to be installed. Work tables will be provided for tool operations using drills and vices. The layout plan for this room, after allowance for lead space, is as shown in the following diagram. The required area has been designated as 225 m<sup>2</sup>.

Fig. 4-8 MACHINE WORKSHOP



(5) Seamanship Workshop

This room will be used to provide training in deck and anchor operations and rope work. For the rope training, supports of about 1 meter will be built in the each corner. An iron tube of 50 mm diameter will be mounted horizontally on the top of the support to permit the hanging of ropes.

Since much of the ropework will be done while seated on the floor, the floors in the ropework area will generally be planked, while the main training area will also have planked floors. The supports will be removable so that they can be used in other training applications as well.

The tools for seamanship will cover a wide spectrum of sizes in considerable numbers. The smaller items will be stored on shelves, while the larger will be stored in a specially built storage.

The first-aid items, such as the resuscitation and cardiac massage dummies, will be stored in this room for use in the appropriate training exercises.

Space requirements have been formulated as shown below, after a suitable allowance for both ropework and anchor training operations. Room area has been set at 90 m<sup>2</sup>.

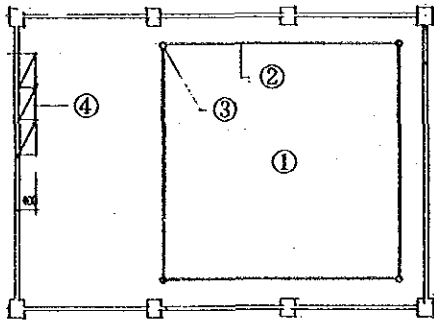


Fig. 4-9 SEAMANSHIP WORKSHOP PLAN

- ① ROPEWORK AREA (PLANKED)
- ② BAR FOR ROPE WORK
- ③ POST
- ④ SHELVES 400x900mm

(6) Training Galley

Saloon training courses are planned for classes of 30 trainees. Since the usual number of students per cooking table is not more than 4, a total of 8 tables will be required for trainees, plus another table for instructor use, making a total of 9 tables in all. One table with shelves will be provided with each cooking table for storage of cooking utensils and as a food preparation area. In the vicinity of the instructor's table will be a rice cooker, thermos (water heater), and fryer.

A requirement also exists for a tasting room and a pantry, to be attached to the food preparation room. The tasting room will be equipped with 6 tables for testing purposes plus a closet and a desk for the instructor's use. The open space in the tasting room will also be used for training in room-making.

The pantry area will contain a freezer, refrigerator, and a rice storage unit. This area will also be used to provide training in the engine courses on freezer and refrigeration equipment.

The following charts show the plans for the food preparation room, the tasting room, and the pantry. Total areas will be 112.5 m<sup>2</sup>, 60 m<sup>2</sup>, and 37.5 m<sup>2</sup> respectively.

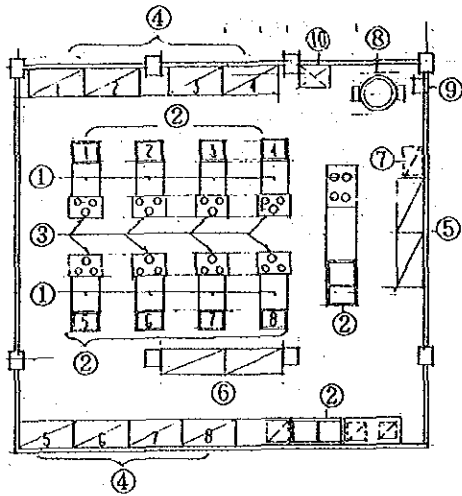


Fig. 4-10 TRAINING GALLEY PLAN

- ① COOKING TABLE
- ② SINK
- ③ GAS RANGE
- ④ COUNTER
- ⑤ CABINET 750x1,800mm
- ⑥ PAN RACK
- ⑦ REFRIGERATOR
- ⑧ RICE COOKER
- ⑨ WATER BOILER
- ⑩ FLYER

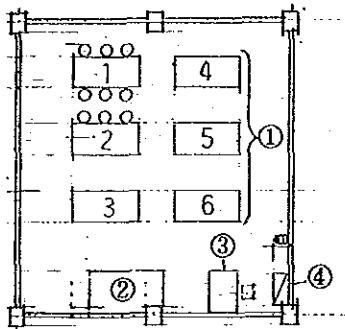


Fig. 4-11 TASTING ROOM PLAN

- ① TASTING TABLE 800x1,800mm (6 Nos.)
- ② BED
- ③ DESK
- ④ SHELVES

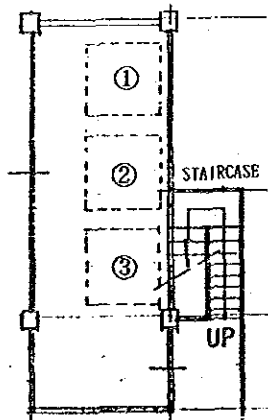


Fig. 4-12 PANTORY PLAN

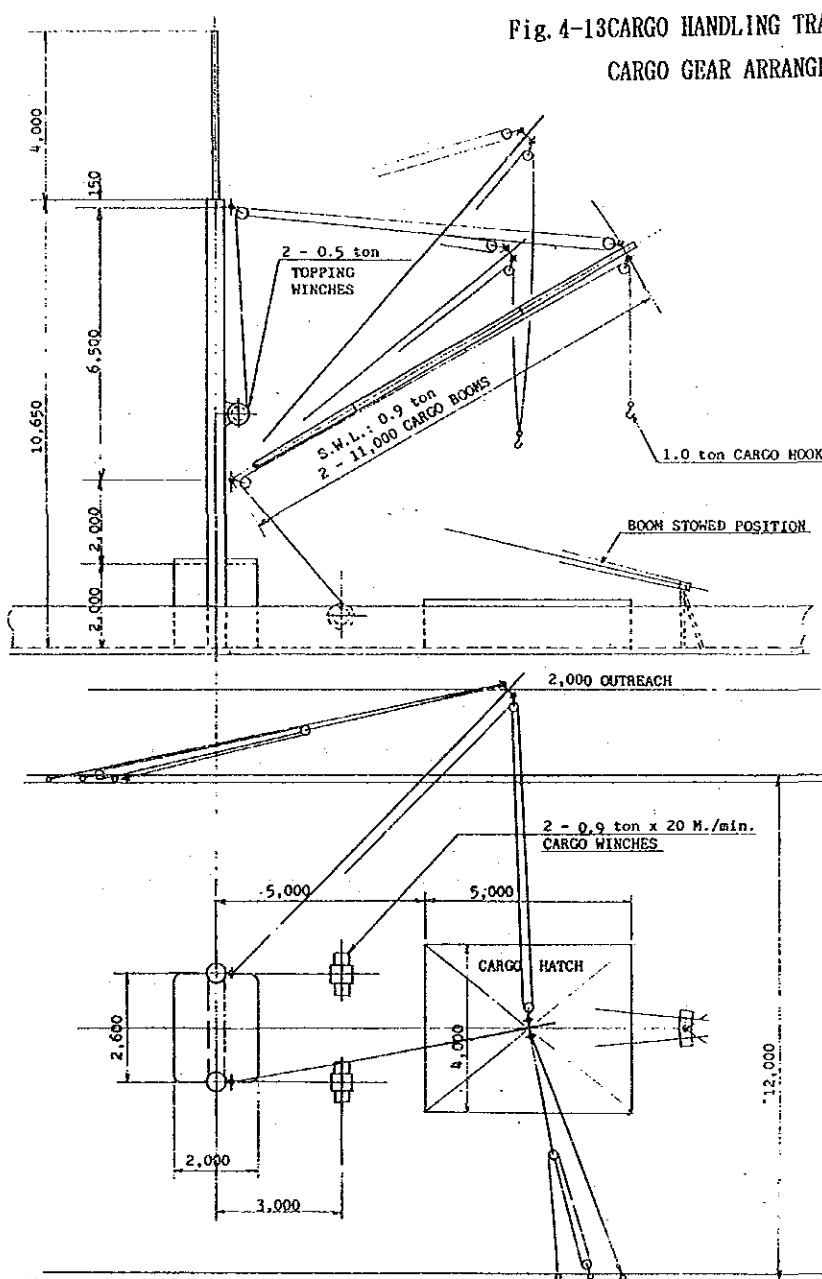
- ① FREEZER
- ② REFRIGERATOR
- ③ RICE STORE



(7) Training facilities for cargo handling

A 1-ton cargo handling facility is to be installed on the roof of the Training Building to permit realistic training in cargo operations. There will also be provisions for training in painting techniques, which constitute a very important daily activity for deck hands, as well as in the maintenance of cargo handling equipment.

The following charts show elevation and plans for the cargo handling facility.



(8) Fire prevention and lifesaving facility:

A 2-story facility will be built to provide training in the use of fire prevention and lifesaving equipment that will simulate the actual conditions encountered in engine room fires. A simple jetty will be required to install boat davits for survival training at sea, using the pond on the school grounds for this purpose. A storage area is also needed for life jackets, fire fighting pumps, and firemen's outfits.

This fire prevention and lifesaving equipment is intended to replicate that found in vessel engine rooms as well as the structure of bridges and related facilities, but their size will be only about 1/2 that of the items currently being used at the Marine Academy. Out of maintenance considerations, they will be of brick construction. However, the hatches involved in this phase of the training will be genuine units.

(9) Faculty quarters:

This facility is to provide living quarters for visiting instructors and a night duty instructor.

Two apartments for visiting instructors from outside institutes and one apartment for night duty instructor will be needed.

1) Determination of room composition and area requirements

Since the Plan facilities are to be government-owned, in designing the staff quarters, we have applied the prevailing housing criteria for Bangladesh civil servants.

These provisions provide 4 classes of housing for government workers: A, B, C, and D. Class A accommodations are intended for high-ranking officials (e.g., the Commander of the Marine Academy), Class B for senior instructors, Class C for instructors, and Class D for general staff at the Academy.

While slight differences may develop on the basis of the particular construction period, the room composition of the various classes of quarters (excluding Class A) may be generally established as follows:

Class B:

Bedrooms (3), with bath

Drawing room

Kitchen and pantry

Dining room

(However, recently built homes tend to use a dining/ kitchen configuration.)

Class C:

Bedrooms (3), with bath

Drawing room

Dining/kitchen

Class D:

Bedrooms (3), with bath

Living/dining room

Kitchen

The Plan facility will be in accordance with Class C criteria -- i.e., those for ordinary instructors at the Marine Academy.

Older accommodations have an area of about 200 m<sup>2</sup>, but, in more recent buildings, the typical size has been about 100 m<sup>2</sup>.

Based on the above, the room composition and required living space have been established as follows for the Plan accommodations:

Room Composition:	Bedrooms (3), with bath
	Drawing room
	Dining/kitchen

2) Floor plan for living quarters

After giving due consideration to the required number of rooms, privacy, and lead space for occupants, and based on a total area of about 100 m<sup>2</sup> per apartment, the basic unit will have a 10 m x 10 m square configuration, with each apartment designed to afford maximum light and ventilation. The floor plan for the living quarters is as shown below:

Bed Rm (1):	30.0 m <sup>2</sup>
Bed Rm (2):	16.0 m <sup>2</sup>
Bed Rm (3):	16.0 m <sup>2</sup>
Drawing Rm:	20.0 m <sup>2</sup>
Kichen/Dining Rm:	10.0 m <sup>2</sup>
<u>Bath Rm &amp; others:</u>	<u>8.0 m<sup>2</sup></u>
Living area	100 m <sup>2</sup>

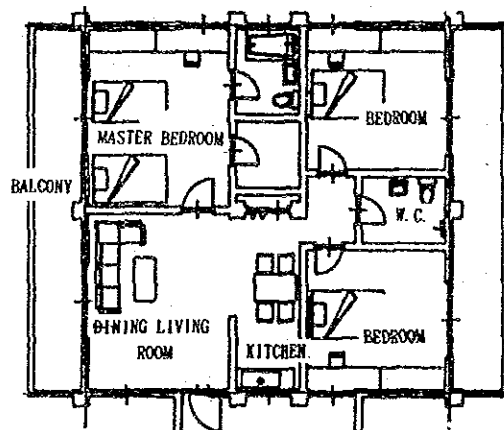


Fig. 4-14DWELLING UNIT PLAN OF FACULTY QUARTERS

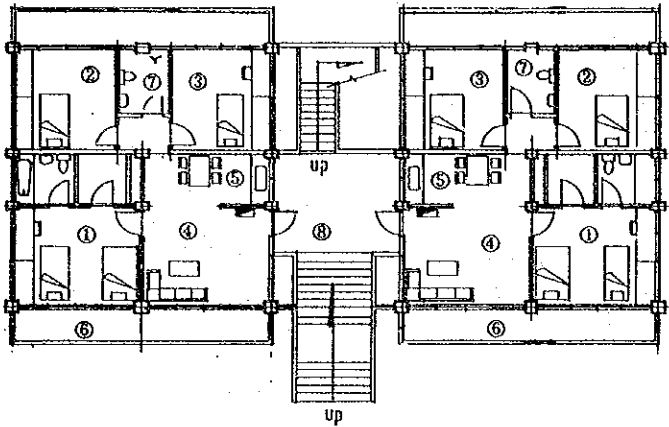
### 3) Plan for Faculty Quarters

The site for this facility is on the western side of the School grounds, facing the playground. The site has a "T" configuration, with an area of about 750 m<sup>2</sup>.

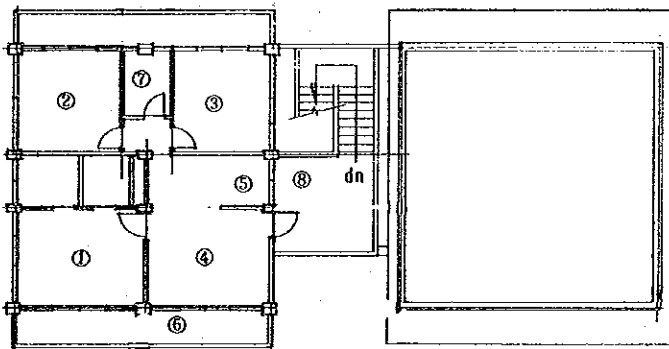
Based on this floor plan, the common areas will comprise 45 m<sup>2</sup>. Accordingly, the total floor space for the facility becomes  $100 \times 3 + 45 = 345 \text{ m}^2$ .

The floor plan is shown below.

Fig. 4-15 FACULTY QUARTERS PLAN



GROUND FLOOR PLAN



FIRST FLOOR PLAN

- ① MASTER BEDROOM
- ② BEDROOM
- ③ BEDROOM
- ④ DINING LIVING ROOM
- ⑤ KITCHEN
- ⑥ BALCONY
- ⑦ W. C.
- ⑧ ENTRANCE

(10) Exterior areas

A covered walk will be required between the Training Building and the Administration Building, incorporating the faculty offices and trainee quarters, so as to facilitate commuting to classes.

Summarizing the preceding sections, the required scope of Project facilities has been established as shown below:

Table 4-2 REQUIRED SCALE OF PLANNED FACILITIES

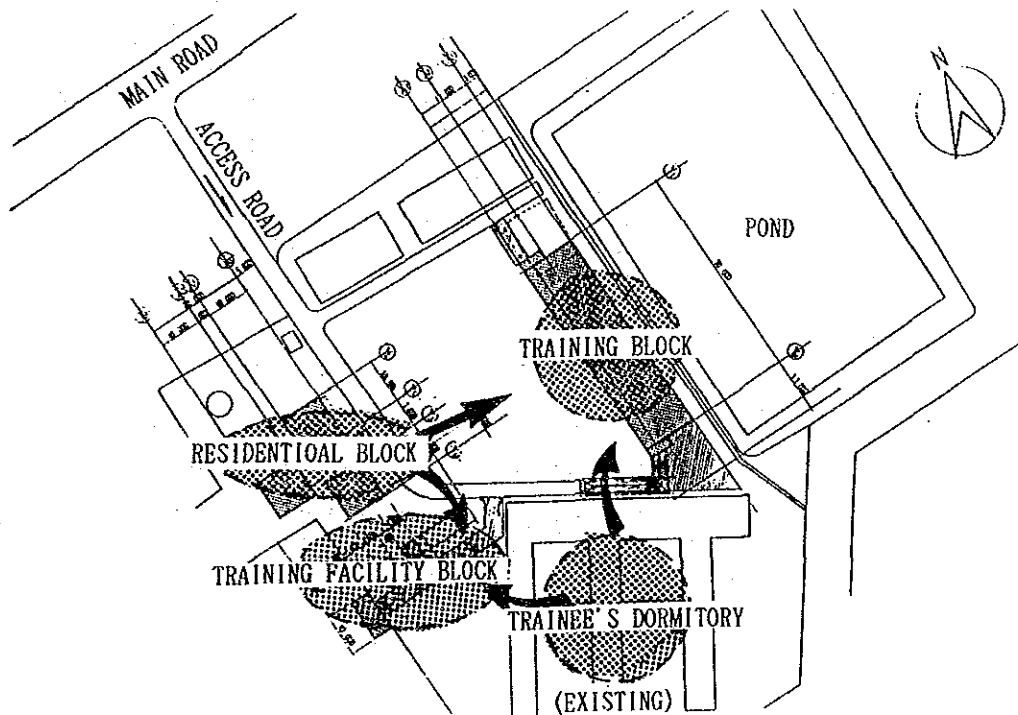
- ARCHITECTURAL FACILITIES

ROOM DESIGNATION		ROOM NAME	PLANNED AREA PER ROOM	No. OF ROOM	AREA (sq. m)	
TRAINING BLDG.	TRAINING FACILITY	CLASSROOM (ENGINE DEPT.)	90.000 sq. m	2	180.000	
		ORDINARY CLASS ROOM	CLASSROOM (DECK DEPT.)	90.000 sq. m	2	180.000
			CLASSROOM (SALOON DEPT.)	60.000 sq. m	2	120.000
		SPECIAL CLASS ROOM	ENGINE MODEL ROOM	90.000 sq. m	1	90.000
			NAUTICAL EQUIPMENT MODEL ROOM	90.000 sq. m	1	90.000
	SUB TOTAL					660.000
	PRACTICE FACILITY	WORKSHOP (incl. STORE)		225.000 sq. m	1	225.000
		TRAINING GALLEY		118.125 sq. m	1	118.125
		TASTING ROOM		60.000 sq. m	1	60.000
		PANTORY		39.375 sq. m	1	39.375
		SEAMANSHIP WORKSHOP (incl. STORAGE)		120.000 sq. m	1	120.000
	SUB TOTAL					562.500
	W. C.	W. C. (incl. ANTE ROOM)		90.000 sq. m	1	90.000
	COMMON SPACE	ENTRANCE HALL, STAIRCASE, CORRIDOR, etc.		547.500 sq. m		547.500
TOTAL					1,860.000	
FACULTY QUARTERS	PRIVATE QUARTERS	PRIVATE QUARTERS	100.000 sq. m	3	300.000	
	COMMON SPACE	CORRIDOR	45.000 sq. m		45.000	
TOTAL					345.000	
FIRE FIGHTING TRAINING FACILITY	FIRE FIGHTING TRAINING HOUSE		16.000 sq. m	2	32.000	
	TOTAL					32.000
STORAGE	STORAGE		16.000 sq. m	1	16.000	
	TOTAL					16.000
- OTHER FACILITIES						
BOAT DAVIT FACILITY	SMALL JETTY FOR BOAT DAVIT (10.50 x 5.10 m)		55.080 sq. m	1	55.080	
COVERED WALK	COVERED WALK		26.000 m	1		
PAVEMENT	PAVEMENT		160.000 sq. m	1	160.000	
	PASSAGE PAVEMENT		80.000 sq. m	1	80.000	
GRAND TOTAL					2,548.080	

Although it comprises a large area (approx. 20,000 square meters), the space available for facilities construction is rather limited because the area includes two large ponds in the east and west side of the site, three-story Seamen's Hostel, and staff quarters.

The following figure shows the zoning plan.

Fig. 4-16 ZONING PLAN



For the layout of the facilities, the following are taken into account.

- 1) Since each facility has distinct functions, they should be independent, and at the same time related to each other.
- 2) Since the space is limited, the independent character of the facilities should be realized by combing the dispersion of the facilities all over the premises and the concentration of the main facilities.

3) The climate surrounding the premises is of the typical subtropical monsoon type characterized by high humidity and heavy rain. Hence the layout should be determined by taking account of low incident angle of sunshine in the morning and evening; the prevailing wind direction and other natural conditions.

#### (1) Training Building

In addition to the class rooms, the training building contains a seamanship workshop, a machine workshop, a training galley and model rooms where practical training is carried out. It provides the main function of the whole facilities. For good connection with the existing building (which has instructors offices, administration offices and trainees' dormitory) and other training facilities, the training building will be placed at the north of the existing building and at the east of the playground, thereby making the transportation from the access road easy.

#### (2) Faculty Quarters

The faculty quarters is private space for visiting instructors and their families, so it should be placed in quiet environment away from other facilities. The best candidate is the front side of the western pond where a staff house is situated. This place provides the best environment in the premises.

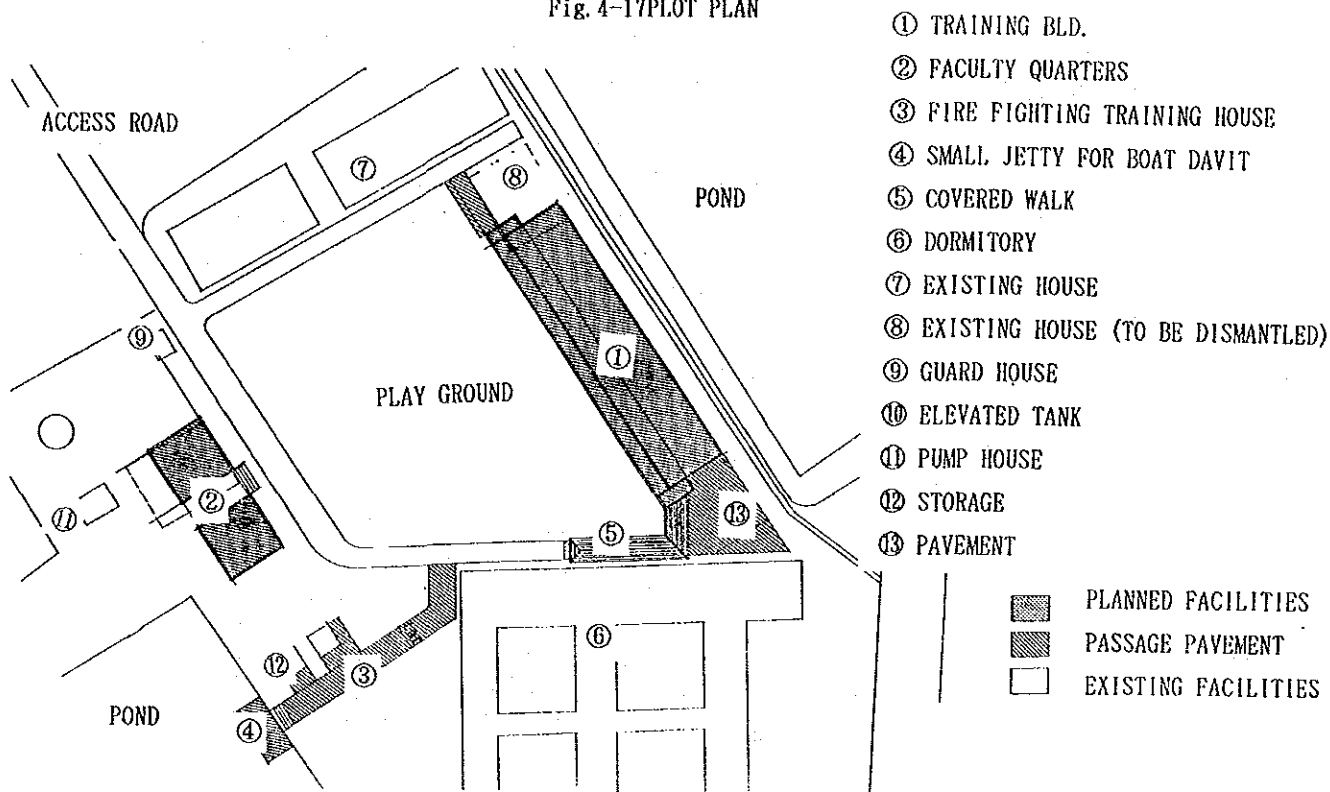
#### (3) Other training facilities

For the other facilities such as the fire fighting training house and boat davit to function properly, they need to be placed in the vicinity of a pond. Thus they will be placed near the pond on the west side of the existing building.

The following figure shows the plot plan.



Fig. 4-17 PLOT PLAN



4.3.4

Construction Plan

Around the play ground, there are two large ponds (one on the east side and the other on the west side), a three-story Seamen's hostel on the south side, and four one-story staff quarters on the north side. The space for construction, therefore, is very limited. For this reason, except the fire fighting training facilities, other training facilities ( classrooms, model rooms, machine workshop, training galley, and cargo handling training facilities) are concentrated in a multi-stories complex building.

- \* Access of teachers and trainees from the existing facilities (administration and trainees' dormitory)
- \* Connection with the seamanship workshop, machine workshop and training galley and accompanying model rooms and class rooms
- \* The workshop must accommodate heavy machines. Also transport of training equipment, and vibration and noise generated by engine generators and machine tools must be considered.

\* The training galley needs drain and gas facilities. Transport of cooking stuff must be also considered.

On the basis of the above considerations, the layout of stories is planned as shown by the following cross section of the training building.

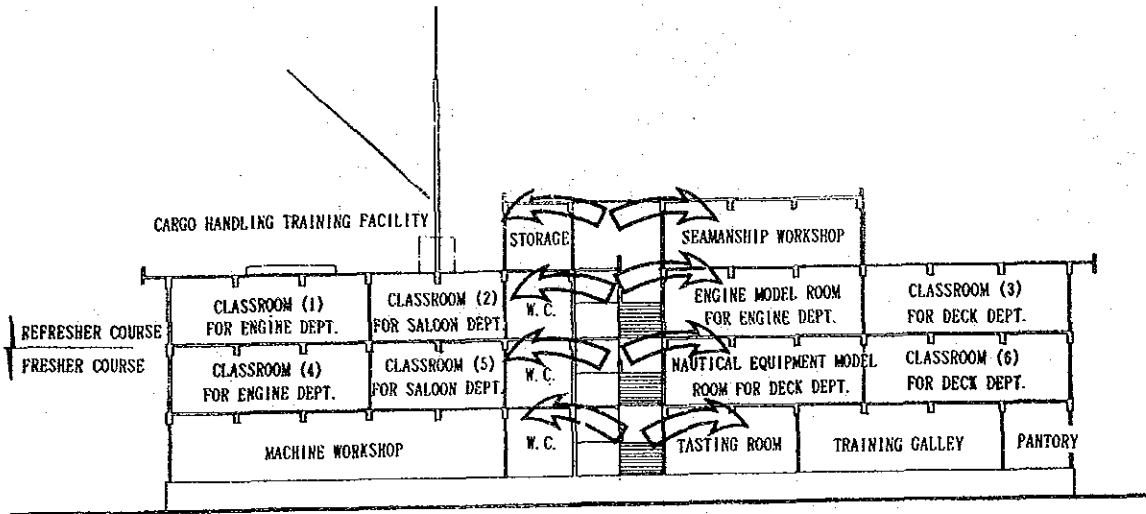


Fig. 4-18 TRAINING BLDG. SECTION

As stated above, the project site has been often hit by floods and surges. When the cyclone hit this year, the site was inundated up to five feet. As the workshop, set at the ground floor of the training building and it will accommodate a lot of engines and machinery, the floor must be set enough to prevent those machines from submerged. For the training building and the faculty quarters, the ground floor level will be set at 1.5 m higher than the present ground level.

As the training building requires sufficient ventilation and day light, the open corridor system that can secure a direct opening to the outside will be applied.

We plan to install a balcony accompanying the opening, because it will be very effective to protect the inside from rain, adjust the lighting and to prevent strong glare and direct sunlight on desk surfaces.

Besides ventilation, high ceilings making is one of the effective ways in this region to cope with the heat problem. For the buildings similar to planned ones, the ceiling are 2.5-3.5 m high for ordinary small rooms and 3.5-5.0 m high for medium-sized rooms. The ceilings height in the planned buildings have been set at based on the above survey findings.

#### 4.3.5 Structural Plan

The plan includes the training facilities and faculty quarters. The structures of the buildings will be determined by taking account of purposes, sizes, procurement of construction materials and maintenance.

##### (1) Structuring method

Based on the intended usage and scale of the facilities possible, structures would be construction of wood, brick, concrete, or reinforced concrete. In Bangladesh, for the buildings similar to those in this project, it is common to use the pure rigid frames of reinforced concrete for pillars and beams, bricks for walls, and concrete slabs topped with waterproof roof. The existing buildings around the premises are no exceptions. For this project, too, in view of fire resistance and durability, the local method, that's reinforced concrete for main structures, bricks for walls and the rigid frame method for structuring, will be employed.

##### (2) Concrete

Since ready-mixed concrete is not available, it is common to use in-situ mixed concrete on the site and cast it manually from the pan-like containers carried on the heads of workers. Two types of concrete are available. One is Jhama concrete using brick chips as aggregate, and the other is normal concrete using crushed stones as aggregate. In Bangladesh, Jhama concrete is usually used for low story buildings. For this project, we plan to use normal concrete for such structures as pillars and beams and use Jhama concrete as leveling concrete and concrete for the roofs.

##### (3) Foundation Structure

The soil formation in the Project is composed area of a soft clay layer from the surface to 11 m depth and a sand layer below it.

As the planned building is a three story (in part four story) building, in case of the direct foundation method, around eight tons per square meter of load would be imposed. On the soft clay layer, however, the allowable long-term load bearing strength would be at the most three tons per square meter. In addition, the problem from the consolidation settlement would be prospected. Therefore, the direct support method has not be selected.

For this project, we will employ the pile foundation supported on the firm sand layer below the clay layer. In Bangladesh, since ready-made concrete piles are not available, cast-in-site piles (the pile diameter is 400-500 mm) are common. The digging method is likes the some part of earth drill method and some part of the Benoto method commonly practiced in Japan. With this digging method, projecting hole walls with mud, and dig a hole the steel casing of about 3m is dropped with a crane

For fire fighting training facilities and a store room that are of low stories and light load, the direct foundation method will be employed.

#### 4.3.6 Building Component Plan

The conditions governing the selection of building components should include the following.

- \* Guarding against tidal surges and salt damage owing to the seaside.

- \* Climatic conditions

- A large amount of rainfall concentrated in a short period.

- High temperature and humidity.

- \* Procurement of the balk of the Components in Bangladesh.

- (1) Exterior finishing

- 1) Roof

For the waterproofing of the roofs, lime terracing is popular in Bangladesh. Lime terracing is made by mixing plaster, brick powder, brick chips and water, tamping it firmly after casting, and finishing it with plaster mortar. With plaster mortar finishing, it is 150 - 200 mm in thickness (thicker than asphalt waterproofing materials). Despite the disadvantage of heavy load, lime terracing may be effective in heat insulation. However, since the roof of the training building will be installed with cargo handling gear, it must be secured for waterproofing. The roof, therefore, should be waterproofed with asphalt and have 100 mm of protective concrete placed on it.

2) Outer walls

In Bangladesh, most of walls are made of bricks. As for finishing, either bricks are directly exposed to the outside or have mortar coated on them.

Bricks are traditional building material in Bangladesh and are not expensive. For this project, too, bricks for walls will be utilized with a view to availability and workability.

3) Opening

In Bangladesh, wooden windows are common for ordinal openings, Steel doors are used in factories. Locally manufactured aluminum sliding windows are available, but of low quality.

For this project, we have specified wooden windows commonly used.

(2) Interior finishing

1) Floor finishing

In Bangladesh, common practice floors of factories are concrete slabs with mortar finishing, while terrazzo finishing is popular for floors of offices and houses. In some cases, simple bricks are used for floor finishing.

For this project, we plan to use terrazzo for the floors of the class rooms, model room and drawing rooms of the facility quarters. For the workshops and fire fighting training house, the floors will be of mortar finish.

For the Seamanship workshop, rope work space will be planked on the concrete slab.

2) Finishing of ceilings and walls

For ceilings and walls, we plan to use the following materials as appropriate.

- \* Ceiling: Plank finishing, acoustical board, plywood board, waterproof board with paint finishing
- \* Wall: Mortar base with a paint finish, cloth finish, plywood board finishing

4.3.7 Utilities

(1) Electric system

Power supply to the Project facilities will be branched from the trunk line running along the boundary of the outside road, brought into the transformer and the main receiving terminal at the Project facility, and redistribution to branch terminals in the various facilities.

The main power lines leading to each facility will be buried. Within each building, PCV conduit pipes will be used for distributing electricity.

Voltages of electricity are as follows:

Three phase: 440V 55Hz

Single phase: 220V 50Hz

Lighting equipment and other electrical devices will be selected taking account of maintenance, availability of consumables, possible extension in the future and other relevant factors. From a maintenance stand

point, materials and products have been chosen, wherever possible, that confirm to local specifications and can be readily procured in Bangladesh.

The electrical facilities have been classified into 2 systems: a lighting/outlet system and a power system.

1) Lighting/outlet system

For the training building and faculty quarters, fluorescent lights are used for the most part, but incandescent lights are also used where necessary. For security, mercury lamps are used on the premises. The required luminosity for the main facilities are as follows:

Class room & model room:	300 lux
Workshop & rope work room:	200 lux
Lavatory & store room:	100 lux
Road on the premises:	10 lux

2) Power facility

Power must be supplied to machine tools, welding and other machines in the workshop, motors in the model room, winches of the cargo handling training gear installed on the roof, refrigerators in the food storage, winches of the davit and others. In addition, motors may be used in the rope workshop, power must be supplied in those rooms.

The maximum power load is estimated at 120 KVA.

(2) Water supply, drainage and sewage systems

1) Water supply system

Water from a well on the premises is used for various purposes including drinking. The following figure shows the existing water supply system. The water main is installed within Chittagong city, but, project site lies away from the water supply main, water supply pipes of the existing buildings has not connected with the city water.

Water is to be gravity supplied to lavatories and washrooms of the training building, the training galley, and the faculty quarters using the same system.

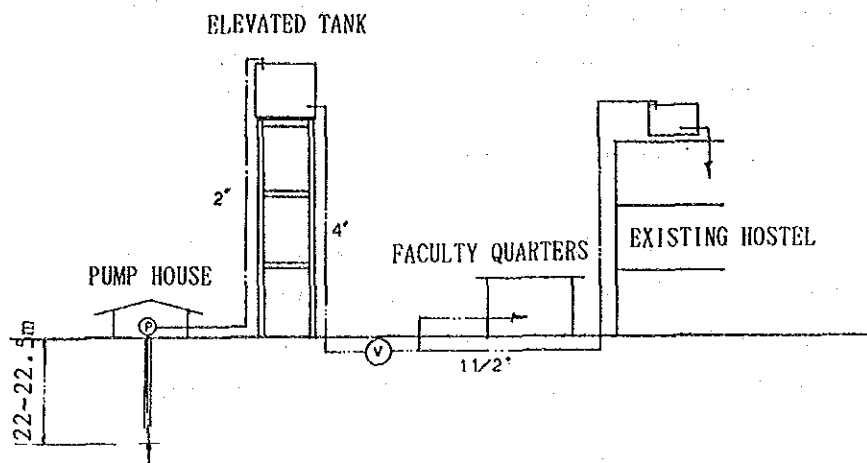


Fig. 4-19 EXISTING WATER SUPPLY SYSTEM

## 2) Sewer Facilities

Just behind the planned training building and the existing Seamen's Hostel, a drain runs from the north to the south. The drain leads to the drainage channel that runs between the compound and the main road. The drainage channel runs through the culvert under road and reaches the river.

At present, rain water and sewage from the existing buildings are discharged through this drainage channels. Water overflowed from two ponds on the premises also is discharged into the drainage channel.

Since no public sewage is provided on the premises, a septic tank will be installed to treat sewage water from the Seamen's Hostel.

Waste water containing machine oil will be discharged after treatment.

## (3) Gas Facilities



City gas pipes are installed along the main road on the premises. City gas is currently used in the staff quarters. It will be used in the training galley and the faculty quarters.

(4) Lightning rod

A lightning rod will be installed on the training building.

(5) Telephone, intercom and public address facilities

The installation of telephones and switchboards are to be the responsibility of the Bangladesh side.

For internal communications, the intercom facilities will be provided between the Principal's office, instructors' office and the administration office.

The public address equipment will be installed between the existing building and classrooms in the training building.

(6) Emergency system

To prevent a disaster, emergency exit lamps, emergency route lamps, and manual fire alarms are installed where necessary.

(7) Emergency power generating equipment

In case spare power source was needed in emergency, engine generators for training will be used.

(8) Fire fighting system

Fire hydrants and hose reels are installed where necessary.

(9) Air conditioning/ventilation system

1) Air conditioner