14. Port Master Plan for 2020

14.1 Basic Requirements

(1) Design ship for container terminals

Taking into account ever-enlarging vessel sizes, an 8,000TEUs container vessel is adopted as the design ship for transshipment terminals. The dimensions of the design ship are 390m in length, 48m in width, and 16m in draft. To cater for this size of vessel, new transshipment terminals need to have an alongside depth of 18m.

(2) Navigational safety

The width of the approach channel should be equal to the length of the design ship to ensure safe and smooth vessel maneuvering. The minimum under-keel clearance is 10% of the design ship inside the harbor and 15% in the outer approach channel.

The navigable width at the present harbor entrance is 250m. With a growing number of calling vessels taken into consideration, the harbor entrance needs to be widened to enable the vessels to pass each other. When a ship makes a bow turning with tugboats assistance, the turning circle needs to have a diameter of double the length of the design ship. This is also the case with ships with thrusters.

(3) Calmness in the channels and basins

Breakwaters have to be provided to ensure smooth maneuvering in turning basins and safe mooring at quays. Quayside wave height (H $_{1/3}$) should be lower than 50cm during over 95 % of a year. The master plan is expected to propose a port geometry which can reduce surge.

(4) Interface with the hinterland

Port areas should be grouped according to the activities. A proper zoning plan has to be prepared to separate different port activities, thus avoiding congestion and ensuring efficient operation. Smooth interface of the port and the hinterland is indispensable to ensure the maximum efficiency of economic activities.

(5) Flexibility in the pace of development

Layout plans need to ensure flexibility in the pace of the development. Therefore, phased planning has to be envisaged in layout plans from the start.

(6) Environmental concerns

Impacts of the port development on the environment need to be minimized. Mangrove culture and coastal erosion are some of the main concerns

(7) Construction costs

Configuration of the main port facilities needs to be proposed so as to minimize the construction costs. The balance between dredging volume and reclamation volume is one of the key factors impacting on the overall costs.

14.2 Specific Requirements

14.2.1 Royal Navy

A future frigate with LOA of 125m, and draft of 5.5m is considered to be the design vessel. Royal Navy needs a quay of 300 m in length. The entrance should be available 24 hours a day and be provided with a minimum turning circle of 250m in diameter. The required water depth is -7m for a future frigate, or 1.5m below the draft of the ship.

14.2.2 Royal Yacht Squadron

The design vessel is 150m in length and needs a minimum alongside depth of 8.4m. A minimum berth frontage of approximately 400m is required to provide suitable alongside berths for the three major ships. For the boats, a berth frontage of approximately 90m with boat mooring pontoons along the length of the jetty is needed. The water depth of the basin should be consistent with the dimension of the major ships.

14.3 Development Sites

14.3.1 Characteristics of the Project Area

The topography of the coastal areas to the east and west of Port Salalah differs sharply. The coast to the east of the port is a flat beach open to the sea. The coast to the west of the port is a rocky cliff with small bays. Neither coast can provide a natural harbor. The western coast is out of the question as a development site for the port expansion. The land behind the coast is hilly and not suitable for development. In addition, the cliffs precipitously fall into the sea to the depth of 30m within one kilometer from the shoreline. On the other hand, the eastern coast provides a gentle slope with a gradient of 1 to 200. Development sites are therefore limited to the eastern coasts.

14.3.2 Constraints to the Port Expansion

The eastern coast has the following constraints as a development site:

- (1) Wadis
- (2) Fishery harbor
- (3) Mangrove communities
- (4) Coastal erosion
- (5) Wave

14.3.3 Evaluation of the Project Area

The Study Team evaluated the project area to identify prospective development sites. The project area was divided into one square kilometer grids and then each grid was evaluated taking into account the above mentioned constraints. Taken together, the study findings support a port expansion in the direction of east to northeast.

14.4 Alternative Layouts

14.4.1 Identification of the Prospective Development Sites

The Study Team identified five prospective development sites taking into account the evaluation of the project area, the layout of the existing facilities, and the topography of the area (See Figure 14.4.1). The five sites were then evaluated from various viewpoints (See Table 14.4.1). Though each site has advantages and disadvantages, Site A is slightly preferable to Site B and C from a viewpoint of natural conditions. Site D is clearly inferior to the other four because of environmental concerns.

14.4.2 Conceptual Layouts

Due to the topographical constraints mentioned in section 14.3.2, a large-scale reclamation directly extended from the present shoreline behind Site B was excluded in the alternative formulation. A large-scale development at Site D was also excluded for the reasons mentioned in section 14.4.1. Bearing these factors in mind, the Study Team prepared three conceptual layout plans and then compared them with the concept of the H.P.A. Layout Plan (See Table 14.4.2).

Based on the comparison among the four conceptual layouts (See Table 14.4.2), the Study Team proposes that Conceptual Layout 3 and H.P.A. layout be further examined. Conceptual Layout 1 is discarded because of a great imbalance between dredging volume and reclamation volume. Conceptual Layout 2 is not recommendable either because it can not respond to further expansion needs in future.

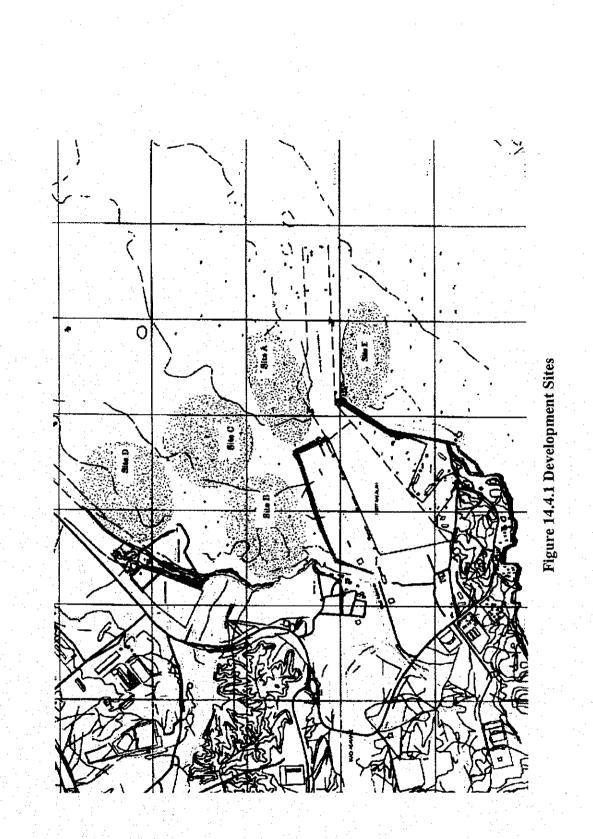


Table 14.4.1 Observation on the Prospective Development Sites

the the IS, breakwater need to be 2 Extension of the east Existing terminal road <u>5</u> volume dredging of the basin Change in the natural needs to be examined needs to be expanded No major issue is impact g Site E Ч Reclamation breakwater extension examined necessary surpasses expected Suitable period volume Effects Little sight Littoral drift needs to Ч S. surpasses reclamation volume Adjacent beach will experience the effects No surge is expected unless another closed Some measure needs to be taken to provide sufficient shelter from impact the south to southeast New access road dredging is required volume basin is created Site D of littoral drift Considerable be examined is expected Reasonable balance is Dredging required volume Large waves road connected to other site 2 required to provide sufficient shelter from the south to southeast Wadi Adawnib and Wadi Nar may cause Effects of the new breakwater need to be IS No surge is expected unless another closed New breakwater impact basin is created access Site C sedimentation is required examined attainable expected Suitable New waves Little No major erosion is New access road is volume Some measure needs Wadi Nar may cause surpasses reclamation of No surge is expected to be taken to provide the south to southeast Wadi Adawnib and S unless another closed sufficient shelter from dredging is required volume impact basin is created Site B sedimentation Dredging expected expected required volume waves Large Little the Reasonable balance is the Extension of the east IS. No major issue is in period of the basin 2 Existing terminal road breakwater need to be Change in the natural needs to be examined needs to be expanded impact G of Site A breakwater extension necessary attainable examined expected Suitable Effects Little sight from and between Alternative sites Mangrove community Initial investment Deep-draft quays Coastal erosion Maintenance reclamation Surge issue hinterland dredging Balance Factors Access

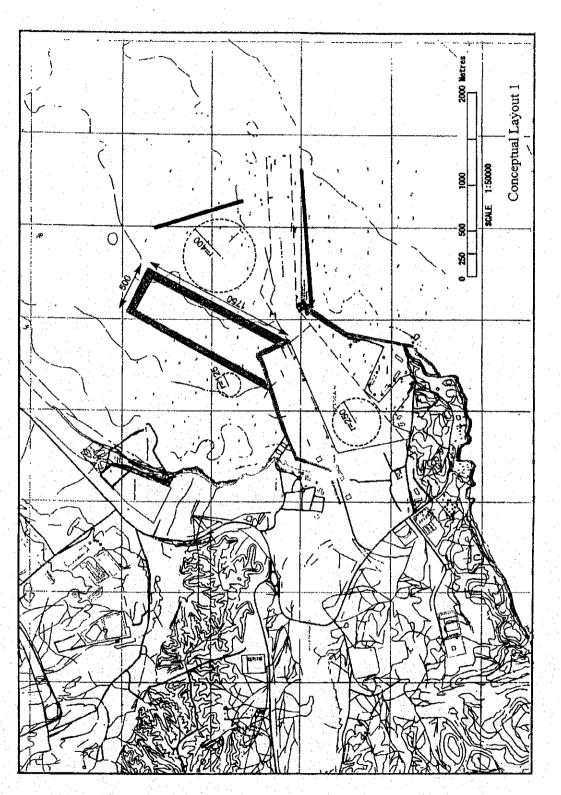


Figure 14.4.2 Conceptual Layout 1

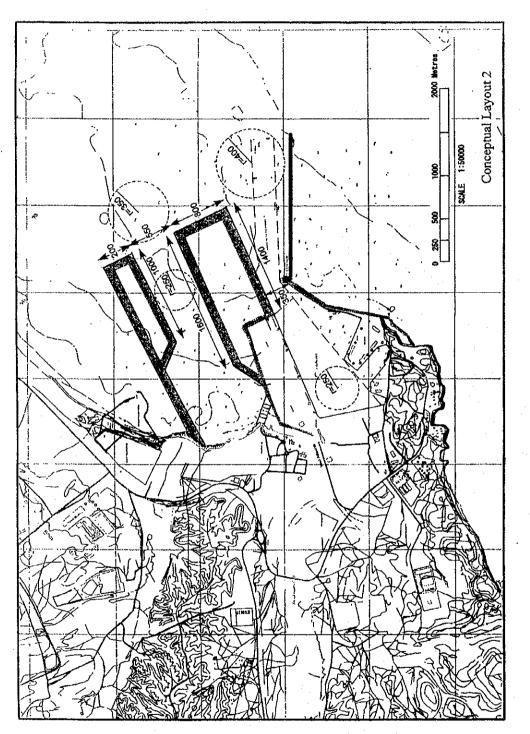


Figure 14.4.3 Conceptual Layout 2

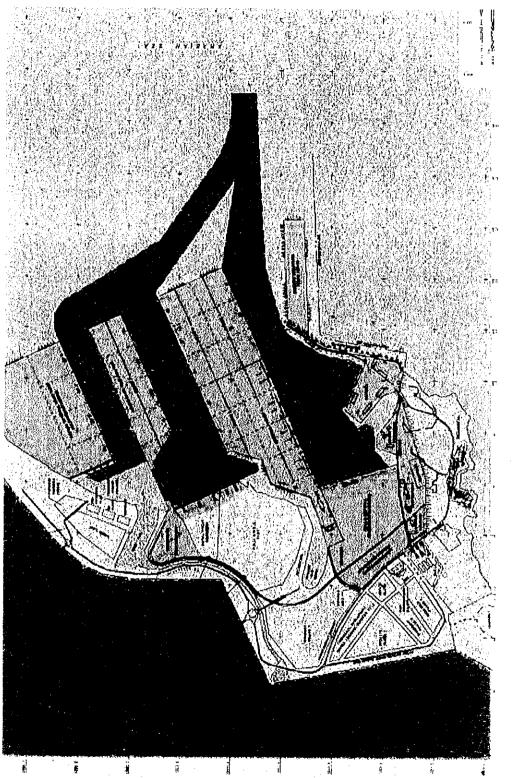


Figure 14.4.4 H.P.A. Layout

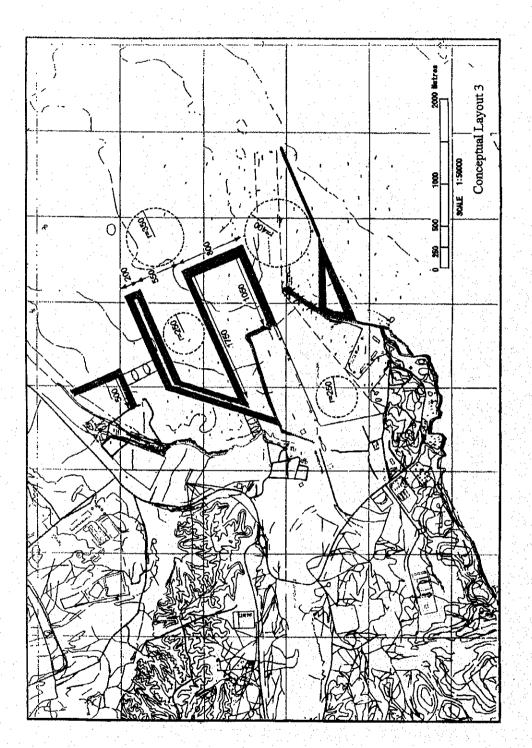


Figure 14.4.5 Conceptual Layout 3

Table 14.4.2 Comparison among the Conceptual Layouts

CO F	Conceptual Layout 1	Conceptual Layout 2	H.P.A. Layout Cpncept	Conceptual Layout 3
l hree		1W0	Four	Four
Congestion	at the har	No major issue is in sight	Additional approach	maneuvers
examined			criatifies tas a starp verio, posing difficulty for vessel	present marver exittance
			maneuvers	
Extension	of the east	Extension of the east	Extension of the east	Removal of the half of the
breakwate	breakwater is needed	breakwater and creation of	breakwater is needed	east breakwater and
		a offshore breakwater are		construction of a new east
		needed		breakwater is needed
Further ex	Further extension of the two	Rather difficult	Envisaged at Site D	Envisaged at Site E
piers				
Numerical	l simulation is	Numerical simulation is	Numerical simulation is	Numerical simulation is
required f	required for two basins	required for the existing	required for three basins	required for two basins
		basin		
Threat fro	Threat from Wadi Adawnib	Threat from both wadis is	Siltation from Wadi	No threat from wadis is
is significa	is significantly reduced	significantly reduced	Adawnib needs to be	expected
Wadi Nar	Wadi Nar poses no problem		carefully examined	
Reclamation		Dredging volume exceeds	Reclamation volume	Reclamation volume
greatly	exceeds dredging	reclamation volume	exceeds dredging volume	exceeds dredging volume
volume			unless the future expansion	
	-		at Site D is included	
Effects	Effects of the breakwater	Change in coastal currents	Effects of the breakwater	Effects of the breakwater
extension	i need to be	is expected due to the	extension and future	extension need to be
examined		creation of a offshore	development at Site D need	examined
		breakwater	to be examined	
Little imp	Little impact is expected	Change in coastal currents	on at Site	Little impact is expected
		may have an impact	D has an impact	

14-11

14.5 Capacity Requirements

14.5.1 Container Berths

(1) Transshipment

The estimated demand of transshipment container for the year 2020 differs sharply depending on the development scenario. the Study Team proposes 6.2 million TEUs for the high growth scenario and 5.1 million TEUs for the low growth scenario Consequently the additional capacity required for 2020 is in the range of 3.1 million to 4.2 million TEUs.

The Study Team proposes a throughput estimate in the year 2005 with the same sets of scenarios as above.

Table	14.5.1	Addi	itional	Conta	iner	Berths
- C	1.					
			-			
14 N. 18 N.			1			12

Year	2005	2020
Container throughput	2.5-3.0 million TEUs	5.1-6.2 million TEUs
Additional berths	2	6-8

(2) Import/Export Containers

The annual throughput of import/export container is estimated to be 0.3 million TEUs at the year 2020 and thus negligibly small compared to the throughput of transshipment container. Since free zone activities is expected to generate most of the import/export container, demand forecast should be reexamined after the free zone starts its operation.

14.5.2 Conventional Berths

The annual throughput of bulk cargo in 2020 is estimated to be 1.9 million tons excluding fuel. The main item is animal feed, cereals, and cement. Since the cargo volume is relatively small, the new bulk terminal should be used as a multi-user terminal rather than as a single user terminal. If a grabbing crane of 800 t/h capacity are installed in one of the new terminal, they can handle up to 1.7 million tons of dry bulk cargo. Therefore, the new bulk terminal has more than enough capacity towards the target year.

The annual throughput of general cargo in 2020 is estimated to be 0.3-0.4 million tons If the bulk cargo is handled at the new bulk terminal, the berth occupancy ratio goes down to 20 %. Therefore, general cargo can be catered for at berths 1-4 towards the target year.

14.5.3 Oil Terminal

The local demand of fuel is expected to experience a marked decline upon completion of a

LNG pipeline. Although the demand will gradually increase afterwards, it will not greatly surpass the current level.Since Salalah is located at the halfway between Singapore and Rotterdam, two of the world's busiest bunkering points, it has a potential to become a major bunkering port. Since bunker oil prices are high in Salalah at present, the prices should be sharply cut in order to materialize the potential demand.

14.5.4 Passenger Terminal

In the year 2020, cruise ships are expected to call at Port Salalah 44-64 vessels a year, or twice to three times as frequently as in 1999. One dedicated passenger terminal is needed toward the end of the planning period.

14.6 Master Plan for 2020

14.6.1 Planning Principles

This master plan is targeted to develop Port Salalah toward 2020 in line with the development needs of the region. Economic viability of the specific projects is dealt with in section 14.8. The master plan also allocates some areas for future expansion which is not required up to 2020 according to the demand forecast.

Facility	Dimensions
Additional berths	18m draft container quay: 1,050m
	16m draft container quay: 1,750m
	Passenger berth: 350m
	Government berth: 800m
	(Future expansion: 980m with 12m depth)
Additional terminal area	112ha
	(Additional 42ha for future expansion)
Handling equipment	Container: 15 gantries (18 rows), 9 gantries (22 rows),
이 가 없는 것 같은 것 같아.	48 RTGs, 96 yard tractors
	Conventional: 1 grab bucket crane
Container handling capacity	6 million TEUs/year
Breakwater	2,550 m
Dredging	17,393,000 m ³
11 - 17 일 · 가장은 문제가 가지 않는다. 같은 동안 같은 것이 같은 것이 나라 같은 것이다.	(Additional 331,000 m ² for future expansion)
Reclamation	15,062,000 m ³
	(Additional 7,271,000 m ² for future expansion)
Total cost	310 million R.O.

14.6.2 Layout Plan

Table 14.6.1 Master Plan for 2020

14.6.3 Container Terminals

The Study Team sets an 8,000 TEU vessel as the maximum design ship for the master plan (See section 8.1). The Study Team sets 350m as the standard quay length in the master plan. Currently 99% of container vessels are shorter than 300m and thus can safely berth at a 350m quay.

In setting the quay depth, the Study Team took into account the dimensions of the maximum design vessel and the distribution of the size of container vessels. The Study Team proposes that two berths have a depth of 18m and the remaining berths of the terminal have a depth of 16m.

The area for the proposed container terminals is 14 ha. Taking the quay length of 350m into account, the terminal area behind the quay needs to have a depth of 400m. Transfer crane (RTG) system is recommended in the expanded terminals. Since 99% of containers handled in Salalah is transshipment and thus land-side operation is minimal, two RTGs and eight yard tractors per gantry crane will be sufficient for the time being.

14.6.2 Conventional Terminal

Since the bulk cargo projected for 2020 is relatively small and diversified, the master plan proposes to equip the new bulk terminal with a grab bucket crane, which is excellent in versatility.

14.6.3 Oil Terminal

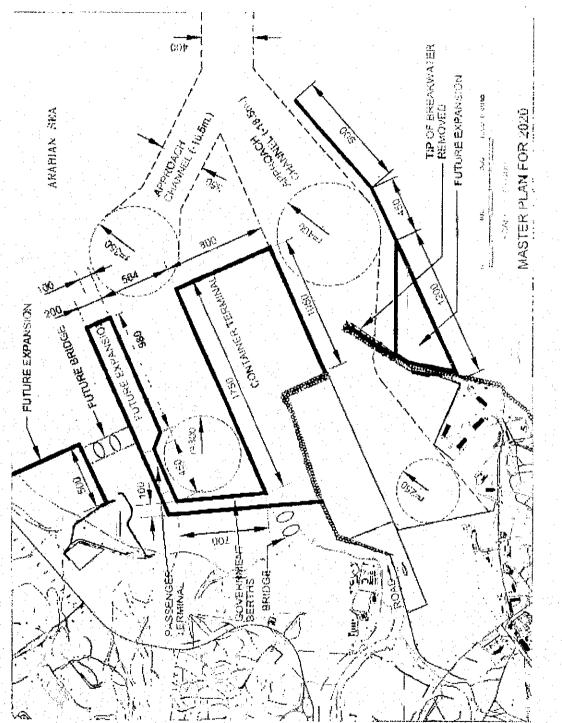
The timing and scale of further development of the oil terminal for bunkering need to be reviewed after bunkering service is started at the refurbished oil pier.

14.6.4 Passenger Terminal

The Study Team proposes that the terminal is 350m in length and 11m in depth which can cater for the longest cruise vessel, Queen Elizabeth 2.

14.6.5 Government Berths

The master plan allocates a quay of 700m to government use, 300m for the Royal Navy and 400m for the Royal Yacht Squadron. The depth alongside is 8.5m to cater for the largest design vessel. Another 100m berth frontage with a pontoon is allocated to the Royal Yacht Squadron for smaller boats. In order to avoid the mixture of different types of traffic, the government berths are linked with the hinterland by a bridge.





14.7 Preliminary Engineering Studies

14.7.1 General

The basic engineering concept will be compiled in accordance with the results of the survey to be conducted at the site.

14.7.2 Design Codes and Standard

The design of marine structures such as quay walls revetment, etc., for Salalah Port has been carried out on the basis of Technical Standard for Port and Harbor Facilities in Japan which are used as the basis for port design in Japan as well as in many developing countries world wide.

In the process of designing, technical information in the Sultanate of Oman was adopted with duly considered to reflect local conditions, particularly in the interpretation of structural properties of construction materials available on site and various kinds of environmental conditions, including seismic disturbances.

14.7.3 Comparison Study of Quay wall

Before finalizing the berth structure in the port development plan, it is necessary to select the prospective structural types of the berth for cost and technical comparison.

The soil condition of the proposed site is generally hard rock layer, and steel piles cannot easily be driven in this layer.

For comparison of quay wall type, the following three types was selected; namely,

- (1) Block wall type
- (2) Pile supported platform Type
- (3) Caisson type

As a result, block wall type is recommended based on the soil condition, construction cost, construction equipment, and adjacent terminal quay structures.

14.7.4 Breakwater

The rubble mound type, same as existing east breakwater, is recommended for proposed breakwater considering availability of construction materials, subsoil condition of proposed site, construction cost and construction time.

14.7.5 Dredging and Reclamation

When the present container terminal was constructed in 1997 and 1998, a cutter suction pump dredger dredged the channel area effectively.

The same dredging and reclamation method will be recommended for the proposed port facilities of Salalah Port.

14.7.6 Construction Cost

The cost estimates are primarily based on the unit prices and rates in Salalah derived from the construction material and equipment price survey conducted by the Study Team in Jan. 2000.

The construction cost for Salalah Container Terminal that was completed in 1998 was inferred.

14.7.7 Construction Period

The construction period is primarily based on the natural conditions, material quantity, dredging volume, ability of construction equipment, and existing container terminal construction period are the decisive factor in the overall construction time. These factors were taken into full consideration for the entire construction period.

14.8 Phased Planning

14.8.1 Concepts

The master plan encompasses the port expansion envisaged in 2020. The Study Team classified the port development projects into the following three phases taking into account the demand forecast and the risks entailed:

- Phase 1: Container terminal expansion and creation of the government berths (short term)
- Phase 2: Further expansion of the container terminal, installment of cargo handling equipment in the new bulk terminal, and creation of a passenger terminal (long term)
- Phase 3: Overall port development (future expansion)

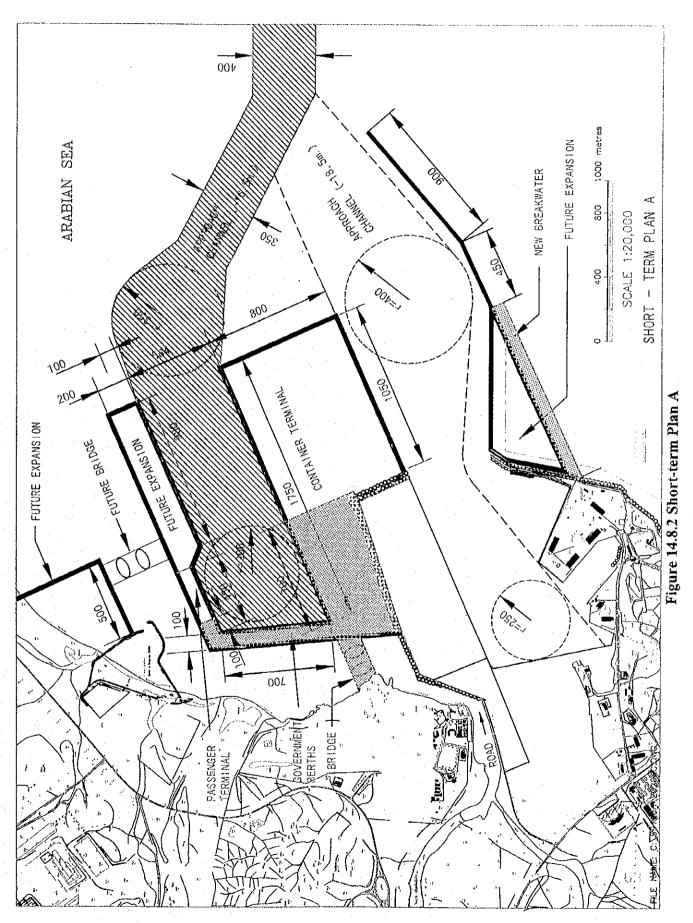
14.8.2 Short-term Plan

The capacity of the present container terminal is estimated to be 2 million TEUs. According to the demand forecast, the container throughput is expected to reach that capacity in 2002-2003 (See section 13.3). The demand forecast projects an increase of the throughput to 2.5-3 million TEUs in 2005. In order to meet this growth, construction works for at least two berths should start in 2001 (See Figure 14.8.1).

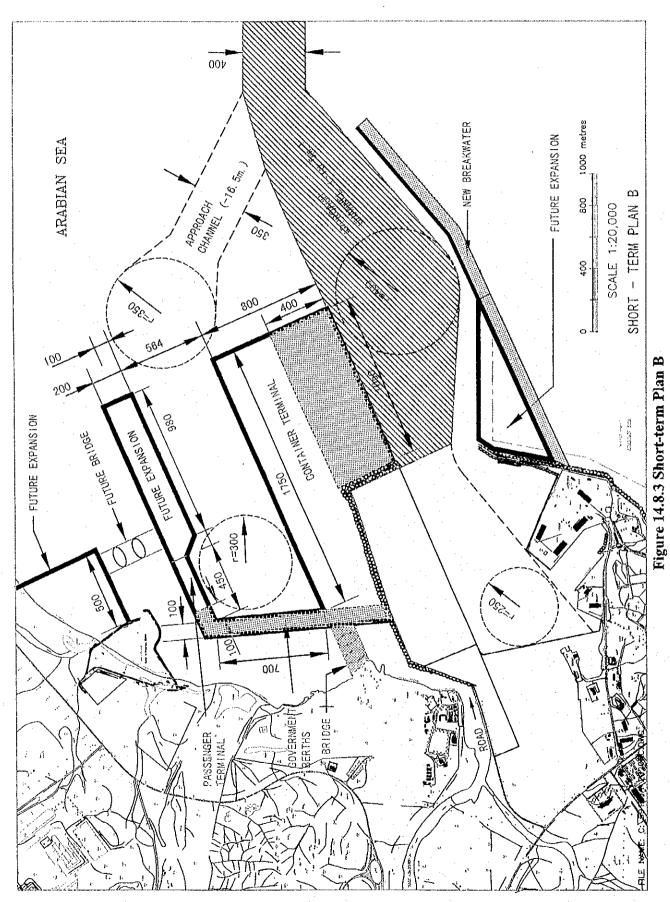
The Study Team prepared two alternatives for the short-term development within the scope of the master plan for 2020 (See Figure 14.8.2, 14.8.3). One is the northward expansion (Plan A) and the other is the eastward extension (Plan B).

Facility	Plan A	Plan B	
Additional berths	16m draft container quay:	18m draft container quay:	
	700m	1,050m	
	Government berth: 800m	Government berth: 800m	
Additional terminal area	28ha	42ha	
Handling equipment	Six gantry cranes (18 rows)	Nine gantry cranes (22 rows)	
	12 RTGs	18 RTGs	
	24 yard tractors	36 yard tractors	
Container handling capacity	3 million TEUs/year	3.5 million TEUs/year	
Breakwater	1,200m	2,550m	
Dredging	13,779,000 m ³	6,722,000 m ³	
Reclamation	3,060,000 m ³	7,003,000 m ³	
Total cost	118 million R.O.	164 million R.O.	

Table 14.8.1	Outline of the	Two Alternatives for	the Short-term Expansion
--------------	----------------	----------------------	--------------------------



14-19



14-20

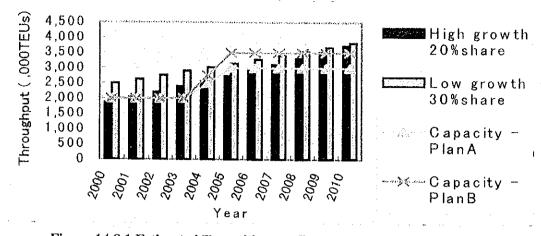


Figure 14.8.1 Estimated Transshipment Demand and Capacity Addition

The Study Team evaluated the two alternatives from various viewpoints. The conclusion is that Plan B is undoubtedly superior to Plan A from the viewpoints of flexible terminal operation, vessels waiting time, and wave disturbance.

14.8.3 Long-term Plan

Port Salalah should always have a spare capacity of not less than 300-400 thousand TEUs/year to capture the potential growth. For that reason, the relevant authorities should take appropriate actions when the spare capacity of the terminal comes close to the minimum spare capacity An expansion project needs to provide a capacity addition of at least 600-800 thousand TEU/year, or double the minimum spare capacity.

A passenger berth of 350m in length is included in the long-term plan. Congestion of the container terminal and the bulk terminal needs to be monitored to determine at what point the construction works of the passenger terminal should be started.

In order to make good use of the new bulk terminal, efficient handling equipment is indispensable. However, it will require users' investment in conveyers and silos as well. Since the existing conventional terminal has capacity large enough to deal with a sizable increase in demand, users are not likely to embark on a large investment in the foreseeable future. Efficient bulk cargo handling system needs to be provided when a large-scale private sector investment in the grain industry comes to the port.

14.8.4 Future Expansion

The Study Team allocated areas for future expansion in the master plan to respond to the projects which can not be proven viable at this time. Those projects include a ship repair yard, a bunker fuel terminal, and additional bulk handling terminals.

14.9 Wave Disturbance

14.9.1 Short-period Waves

The Study Team employed a numerical simulation model (Wave Diffraction Model by Takayama) to evaluate wave disturbance in the port basins caused by short-period waves. Wave height was evaluated in front of the main quays included in the master plan. Table 14.9.1 shows the estimated berth availability, or the proportion of the duration in which wave height is lower than 50 cm at the berth alongside. The Study Team prepared three alternative layouts and found that only master plan 3 provided a satisfactory level of berth availability for all the main quays. Those quays will be available during over 95 % of a year. The Study Team thus determined the configuration of the breakwater. Plan B can provide sufficient protection, while Plan A can not ensure safe berthing.

·····				(70)
	Existing layout	Master plan (3)	Short-term plan	Short-term plan
			Α	В
Bulk terminal	97.8	97.0	96.6	97.0
Existing container	92.5	96.0	71.9	96.9
terminal				n an
Eastward-extended	•	96.2	<u> </u>	96.2
container terminal	ingentaria (herita). Les			
Northern basin		98.1	96.5	-
container terminal				
Government	-	97.0	50.2	93.1
berths				

Table 14.9.2 Berth Availability (short-period waves)

(%)

14.9.2 Long-period Waves

A different numerical simulation model (The Boussinesq Equation Model) was employed to estimate the effects of long-period waves. Characteristics of the incoming long-period waves were determined taking into account the existing survey data. (See 8.2 and Table 14.9.3). The spectrum of incoming long-period waves was assumed as shown in Figure 14.9.2.

Table 14.9.3 Characteristics of Long-period Waves

Wave direction	Period	Spectrum density	Wave height (H_{10})
S-SE	12-300 seconds	100 cm ² second	11.7 cm

Wave height and wave period were evaluated besides the main quays included in the master plan. Harmful effects of long-period waves will be reduced in the port geometry proposed by the master plan (See Table 14.9.4). Long-period wave motions in front of the existing container terminal will become less serious since the master plan layout can reduce a wider range of energy than the existing one (See Figure 14.9.4). However, further study based on long-period wave observation data will be required to estimate the detailed nature of wave motions. The model testing currently carried out by MOTH will give another perspective on this issue.

		la de la composición de la composición Composición de la composición de la comp	(cm)
	Wave direction	Existing layout	Master plan
Existing container	S	11.7	10.6
terminal	SE	19.4	11.5
Bulk terminal	S	9.1	7.6
	SE	13.7	17.0
Eastward-extended	S	-	8.3
container terminal	SE		14.9
Northern basin	S		9.5
container terminal	SE		11.2
Government	S		10.4
berths	SE	-	15.1

Table 14.9.4 Wave Transformation Estimate (long-period waves)

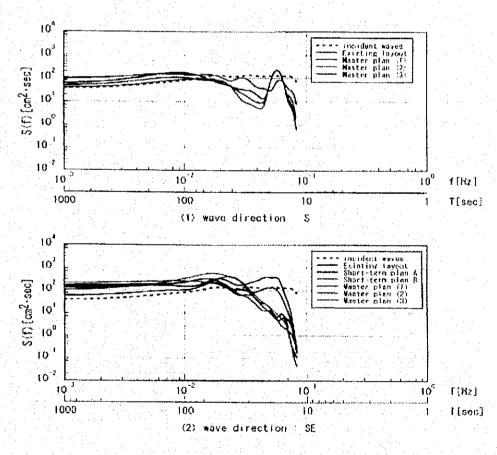


Figure 14.9.4 Energy Spectrum Comparison at the Existing Container Terminal

14-23

14.10 Capacity Evaluation

A numerical simulation model, "Witness", was employed to evaluate whether the port capacity would be sufficient to deal with the increasing cargo and vessel traffic throughout the planning period. Characteristics of the calling vessels, productivity of the terminal, navigation requirements were determined as shown in Table 14.10.1.

Table 14.10.1 Caning Vessel's Conditions (in 2020)					
Vessel type	Frequency of call	Productivity	Cargo volume	Maneuvering and idling time	
Container (mother)	22 calls / week	Max 6 gantries 40 TEUs/crane	3.1 million TEUs 2,800 TEUs / vessel	3 hours	
Container (feeder)	32 calls / week	Max 3 gantries 40 TEUs/crane	3.1 million TEUs 1,960 TEUs / vessel	2.25 hours	
Bulk cement carrier	l call/week	200 t/hour	500,000 t in total 10,000 t / vessel	2.25 hours	
Dry bulk carrier	65 calls / year	500 t /hour	1.3 million t/ year 20,000 t/ vessel	2.25 hours	
General cargo vessel	112 calls / year	Max 2 gangs 30 t/hour/gang	300,000 t / year 2,500 t / vessel	2.25 hours	

Table 14.10.1 Calling	Vessels	Conditions ((in 2020)
-----------------------	---------	--------------	-----------

1) These vessels are taken into account only for evaluating channel congestion

Berth occupancy ratio and average waiting time are shown in Table 14.10.2. This result indicates that the capacity provided by the master plan is sufficient to respond to the vessel traffic in 2020.

Table 14.10.2 Berth Occupancy Ratio				
Berth	Berth occupancy ratio			
Container berths	0.51			
Bulk berths	0.30			
General cargo berths	0.14			
Oil berths	0.15			

THOIC I TIXUID	TTHILMIS LINK
Vessel type	Average waiting time (minutes)
Container vessel (mother)	43
Container vessel (feeder)	55
Bulk cement carrier	197
Dry bulk carrier	106
Fuel tanker (local use)	29
Fuel tanker (bunkering)	88

Table	14.10.3	Waiting	Time

Table 14.10.3 also indicates that it might be possible to handle containers with fewer berths or lower productivity. This is due to a linear quay alignment which enables flexible crane deployment.

14.11 Economics of Port Development

14.11.1 Purpose and Methodology of the Economic Analysis

This section evaluates the economic cost and benefits so that the government of Oman can compare various projects to assign priority in view of the national economy.

The economic internal rate of return (EIRR) based on the cost-benefit analysis is used to appraise the feasibility of a project from the viewpoint of national economy.

There are 8 cases to be studied in the economic analysis. Major 2 categories stand for the assumption of the cargo demand; low growth with 30% share and high growth with 20% share. Each of these demand growth cases have 4 different cases for port development; Plan A (Short Term), Plan A (Short Term + Long Term), Plan B (Short Term) and Plan B (Short Term + Long Term).

14.11.2 Assumptions

The base year means the starting year of the economic analysis. Taking into consideration the construction schedule, the year 2001 is set as the base year for this study.

Considering the depreciation period of the main infrastructure of the port, and the construction period thereof being 4 years, the period of calculation as the project life in the economic analysis is assumed to be 34 years from the beginning of construction; from the year 2001 to the year 2034.

The exchange rate assumed for this analysis is U.S.\$1=0.385R.O.

In this study, the "without" case is defined as follows:

1)No investment is made for the infrastructure and port equipment for the expansion of the container port.

2)Transshipment container cargo volume will increase until it reaches the existing port capacity and then level off.

3)Investment for the Free Trade Zone adjacent to the port is not made, however, the investment for the expansion of the existing Industrial Estate is made as planned.

Since the project is to expand the container port to cater for the increasing transshipment container cargo, the most easily defined difference between "With" case and "Without" case is an increase in the revenue of the container port. In addition to this benefit, an increase in the industrial activities highly dependent on the container port was taken up as a measurable effect

of the project. In order to measure this effect, the average value added versus production value in the industrial statistics of Oman was employed.

14.11.3 Economic Pricing

Economic pricing is not made in this economic analysis, as the difference between the market prices and international price is negligibly small in Oman.

14.11.4 Costs and Benefits

(1) Benefits

In view of the financial position of the Oman Government, the payment from SPS based on the concession agreement is the source of revenue. It includes land rent, royalty, franchise fee, income tax from SPS, and 20% of dividend from SPS if it is available.

However, in view of the Oman National Economy, the benefits expected from the port development are those directly or indirectly accrued from port construction and operation, regardless of the fact that they are quantifiable or not. The major ones will be:

1. Port charges paid to SPS,

- 2. Savings for those who use Salalah port, in terms of costs, time, or other convenience,
- 3. Value added accrued from the economic activities which will be generated by construction work of the port,
- 4. Value added accrued from the economic activities which will be generated by industrial development taking advantage of the port development,
- 5. Increase in employment opportunities accrued from the above port construction, port operation and the industrial development, and
- 6. Foreign exchange saving and earning from these activities.

Among the above major 6 benefits, 1 (port charges) and 2 (savings of port users) are the benefits arisen directly from the port development project. On the other hand, 3 and 4 are the trickle-down effects of port development. In calculating EIRR, item 1, 2, and 4 of the above benefits were taken in to account.

Benefits 5 and 6 include both direct and indirect benefits from the port development, and may overlap the benefits 1-4.

(2) Costs

Table 14.11.1 summarizes the items included in the financial and economic analysis.

Table14.11.1 Project Evaluation

Port (including Ъ, Benefit (in the case secondary benefits) Omani investment) of (without | Development Benefit Benefit EIRR Cost Cost Cost Cost Cost ı, Port The following items are counted either as costs or benefits in the financial and economic evaluations secondary benefits) 5 Development Benefit Benefit EIRR Cost Cost Cost Cost Cost . the the (20% of 5 Government dividend) Benefit Benefit Benefit Benefit FIRR Benefit Cost FIRR of SPS Benefit Cost Cost Cost Cost Cost Cost of Cost of of of of Value Added by Port-Salary for Employees Transportation Costs related Industries Superstructure Superstructure Corporate Tax Franchise Fee Infrastructure Infrastructure Procurement Construction Royalty Fee Port Charge Rental Fee Operation Reduction Operation Dividend Items

14-27

14.11.5 Analysis

(1) EIRR

EIRRs of the proposed projects are shown in Table 14.11.2. EIRR is calculated in two cases; depending on whether the value added is included or not in the benefit. Regarding the construction costs of port infrastructure, the following will be the matters to be decided by the project owner (the Government, in this case):

- 1) Whether the construction costs of the Government berths and bridge should be included in the project costs or not, and
- 2) Whether all the breakwater construction costs should be shouldered by the short-term project or not.

Therefore, the EIRR calculation assumed three cases, depending on the costs included in the port infrastructure construction, namely,

- 1) All the port infrastructure construction costs.
- 2) The port infrastructure construction costs excluding that of the Government berths and bridge.
- 3) The port infrastructure construction costs excluding that of Government berth and bridge, with a part of breakwater construction costs, spread over to the long-term project.

(2) Conclusion

EIRR of the port development excluding the industrial development turned out to be rather low but fit in the range of 6 to 10%, which is considered to be reasonable for an infrastructure project. On the other hand, EIRR of the port development including Salalah industrial development as a whole will be very high. In addition, other benefits such as increased job opportunities and foreign currency earning, combined with multiplier effect on the general economy in the region would further improve EIRR.

Taking into account the above factors, the Study Team concludes that the proposed project is feasible in view of the national economy of Oman, on condition that an adequate set of policies will be taken for the development of industry and social infrastructure in the region.

			1 40	1 2016 14.11.2 E	FINA			
					EIRR	R		
B	Benefit	Govt FIRR	<u>ଟ</u> +	Port charge + Reduction of transportation costs	isportation costs	& + +	Port charge + Reduction of transportation costs + Port-related industrial VA	sportation costs strial VA
Costs of in constr	Costs of infrastructure construction		All costs included	W/O government berth & bridge	W/O government berth & bridge, a part of breakwater cost spread over to the long-term project	All costs included	W/O government berth & bridge	W/O government berth & bridge: a part of breakwater cost spread over to the long-term project
	High (w/ 20% share)	3.3	7.2	8.2		40.3	42.3	
	Low (w/ 30% share)	3.9	8.0	6		41.3	43.4	
Flan A Short	High (w/ 20% share)	5.3	9.4	10.1		48.5	53.0	
& long		4.8	9.1	9.9		50.9	56.0	
5	High (w/ 20% share)	3.2	6.1	6.7	8.8	34.0	35.4	40.0
	Low (w/ 30% share)	3.9	6.9	7.6	10.0	35.0	36.5	41.4
Flan B Short	High (w/ 20% share)	5.5	6.6	6.9	7.4	32.5	33.7	37.5
& long		3.8	6.3	6.7	8.9	33.4	34.6	38.6

Table 14.11.2 EIRR

14-12 Financial Analysis

(1) Methodology and assumptions

The analysis focuses on the viability of the project itself and the financial soundness of the project. The financial viability has been evaluated in terms of the Financial Internal Rate of Return (FIRR). Construction is assumed to start in 2001, and commercial operation is assumed to start in mid-2004.

(2) Analyze pattern

The master plan includes two development plans, each with two cases.

Development plan A (short, short + long)

Development plan B (short, short + long)

Two scenarios are used to forecast the cargo handling volume. (In the high growth scenario, Salalah has a 20% share at the total container throughput of the region. In the low growth scenario, Salalah has 30% share). Therefore we calculate FIRR for a total of 8 cases.

GSO is assumed to be the owner of the port facilities and the new terminal is leased to the new terminal management entity. The new terminal management entity will pay the following fees to GSO.

A yearly royalty fee: US\$64 thousand per berth to be increased 3% per year.

A yearly rental fee: US\$186 thousand per berth to be increased 3% per year.

A yearly franchise fee: 50% of the net profit after tax when exceeding the aggregate of 15% of the Issued Share Capital.

Costs shouldered and revenues obtained by the new terminal management entity are assumed to be as listed in Table 14.12.1.

Revenue	Cost
1. Port dues	1. Installation of handling equipment
2. Tug Charges	2. Royalty Fee
3. Pilotage Charges	3. Rental Fee
4. Berthing Charges	4. Franchise Fee
5. Cargo handling Charges	5. Daily maintenance cost
	6. Administration and operation cost

Table 14.12.1 Cost and Revenue Items

(3) Calculation of FIRR

The results of the FIRR calculation in all cases are shown in Table 14.12.2.

	Plan A (short term)	Plan A (short term + long term)	Plan B (short term)	Plan B (short term + long term)
High growth/ 20% share	22.2	16.7	15.3	14.1
Low growth/ 30% share	28.3	19.2	20.1	17.0

Table 14.12.2 Result of the FIRR

In all cases, FIRR exceeds the interest rate of funds (8%).

Judging from this analysis, this project is assessed to be financially viable.

15. Port Management System

15.1 Identification of Problem Areas

15.1.1 Nationwide Port Development Plan

In Oman, port development is planned and executed on an individual project basis. There is no nationwide port development plan explicitly defined. For example, the scheme of port development, especially the role of the private sector, is different in each port. In order to make the most efficient use of the national budget and to avoid duplication of investment, the government must prioritize projects from the viewpoint of national development. For this purpose, a nationwide port development plan also should be established by the government.

15.1.2 Container Terminal

Container throughput at Port Salalah has been increasing steadily, exceeding 600 thousand TEUs in 1999. But the handling volume is still less than the capacity of existing facilities. For efficient use of the existing 4 berths and the new equipment, the cargo volume needs to be increased.

SPS posted a net loss of R.O. 3,750,117 in 1999. Cargo throughput must also be increased from the financial point of view. To increase the cargo volume, it is necessary for SPS to attract other shipping lines and also establish a well coordinated feeder network from various areas.

This container terminal was developed and designed as a transshipment port and more than 99% of container throughput is transshipment. As a result, while container handling service is available 24 hours, delivering/receiving cargoes service time is from 8:00 to 16:00. When the volume of import and export cargo from/to its hinterland increases, the operation policy and system should be reviewed to accommodate these import/export cargoes.

15.1.3 Conventional Terminal

A major problem in the conventional port is its profitability. In 1997, under the management and operation of MOTH, expenditure of the port was R.O. 1,386,527, 90 % of which was labor cost. Revenues from the port amounted to R.O. 658,606, covering only 48% of the expenditure. After SPS took over the management, its first measure to improve the conventional terminal was to reduce the excessive number of operation and engineering employees and to raise marine charges. However, other problems remain. The cargo handling efficiency is not satisfactory to port users. Some facilities have become deteriorated and require immediate rehabilitation, while some cargo handling equipment is becoming superannuated.

15.1.4 Vocational Training

The Ministry of Social Affairs, Labour & Vocational Training has stipulated a fixed Omanisation ratio in six areas of the private sector. In transport, storage and communications, the ratio should be 60%. In 1995, National Vocational Qualifications (NVQ) and General National Vocational Qualification (GNVQ) were introduced to promote Omanisation.

SPS believes that the current training system by the government doesn't meet the SPS's required standard and it didn't adopt the NVQ training system in 1999. SPS has proposed the establishment of a new training school in Salalah and is discussing the matter with relevant organizations. The organizations concerned basically admit the need for the training school, but the financing scheme remains to be fixed.

15.2 Urgent Measures

(1) Nationwide port development plan

In order to make the nationwide port development plan, an efficient system of collecting data and statistics of each port is necessary. The present statistic collecting system of MOTH is time-consuming and its items are not enough. Therefore it should be improved for MOTH to get sufficient data smoothly.

To conduct the process of establishment of the nationwide port development plan smoothly, an efficient coordination system, such as national port development meeting, which involves various port related organizations should be introduced.

(2) Establishment of Port Committee of Salalah

Port Salalah is a public asset and fair and transparent management is vital. Therefore it is necessary to establish "Port Committee" including MOTH, SPS, port users, local government, and persons of knowledge and experience. Main functions should be approval of port development plan, supervision of port activities, and coordination among port management body, port users, and local government.

GSO has a plan to establish a similar committee called the "Port Planning and Regulator Committee" ("PPRC") This committee will consist of representatives of GSO and SPS, representatives of existing users of the port, and persons experienced in planning, licensing and regulation of ports.

This PPRC has not yet been formally approved. Once it is established, we recommend that its functions be expanded to include those envisaged in the "Port Committee" described above. For this purpose, PPRC should include local government members as the representatives of the region Moreover SPS is expected to coordinate port development and FTZ development including investment timing of both projects. For this purpose PPRC should involve PEIE, which is responsible for FTZ development at present.

(3) Neutrality of Port Management and Operation

SPS is known to be under the influence of Maersk-Sealand. When other shipping companies consider using Port Salalah, they are likely to point out this issue and worry whether they will receive the same treatment as Maersk-Sealand.

To foster an image of neutrality which means that any shipping companies will be treated equally in any services, the following measures deserve consideration.

1)To advertise its neutral management policy to the shipping world through port sales activities

2)To change the composition of shareholders (to achieve more diversity)3)To establish a neutral committee, for example PPRC, to guide and supervise SPS

(4) Improvement of the facilities and equipment of the conventional port

The rehabilitation work of the berths of the conventional terminal has already started but most of the improvement work of the handling equipment has not started. Greater efficiency of the conventional terminal is strongly required by port users, and therefore all improvement work should be started as soon as possible.

(5) Enhancement of user-friendliness

A "Port Users Meeting" to exchange opinions between the port management body and port users is currently held each month. However users claim that they don't receive a clear reply from SPS to their requests. It is necessary to enhance the function of this Meeting and it would be a good idea for a government representative to attend the meeting in order to coordinate between SPS and the port users from a neutral position.

To promote activities of the industries and new investment in the hinterland and to be competitive with conventional terminals of other ports, especially Port Sultan Qaboos, Port Salalah should provide higher productivity than Port Sultan Qaboos and attractive port charges, which are less than Port Sultan Qaboos.

15.3 Port Management Scheme

15.3.1 Container Terminal Utilization

There are three types of terminal utilization, which are "Open use (Public use)", "Prioritized use" and "Exclusive use". Both the port of Singapore and the port of Hong Kong, which are the largest container hub ports in the world and have high ratios of transshipment, basically adopt "Open (Public) use" system. Under this system plural shipping companies can use the berth, resulting in high productivity and competitive terminal charges.

15.3.2 Container Terminal Development Scheme

Concerning the new container terminal development, basic idea is as follows.

- As private investment increases, the financial burden of the public sector is reduced. But the private sector is often unwilling to make a large investment because of the substantial risk involved.
- The sole management body is assumed to be SPS.
- From the viewpoint of efficient use of port facilities and equipment, a single operator system (by SPS) is optimum. But a third company operation should also be considered if it is necessary to attract a new shipping company.
- To achieve high productivity and a large cargo throughput, which are essential for a transshipment port, "Open use" system is usually appropriate. But a large shipping company may request to use a terminal exclusively to maximize efficiency. In this case "Prioritized use" system should be introduced to attract shipping companies.

Based on the above, six cases are considered as follows. Basic berth allocation is "Open use" system, but "Prioritized use" system will be considered if requested by shipping companies, while "Exclusive Use" system is adopted only in Case-4.

(Case-1)GSO provides all facilities (infrastructure and superstructure). Terminal management and operation is conducted by SPS.

- (Case-2)GSO provides infrastructure while SPS provides superstructure. Terminal management and operation is conducted by SPS.
- (Case-3)GSO provides infrastructure while a third company provides superstructure. Terminal management is conducted by SPS while the terminal operator is the third company.
- (Case-4)GSO provides infrastructure while a third company provides superstructure. Terminal management is conducted by SPS while the terminal operator is the third company. "Exclusive use" system is adopted when strongly requested by shipping companies.
- (Case-5)SPS provides superstructure and a part of infrastructure(for example berths). Terminal management and operation is conducted by SPS.

(Case-6)A third company provides superstructure and a part of infrastructure(for example berths). Terminal management is conducted by SPS while the terminal operator is the third company.

An evaluation of above cases is made as follows.

- In case1, GSO must bear all investment costs by itself which involves a substantial risk.
 Private participation is limited to operation.
- ▶ In case 5 and 6, the private sector must make a large investment which involves a substantial risk. Furthermore the private sector would own the land although a port is a public asset.
- From the viewpoint of efficient use of port facilities and equipment, the single operator system by SPS is considered preferable. If, despite SPS's efforts to foster an image of neutrality, a third company operation is the only way to attract a new shipping company, then a third company operation should be introduced.
- For efficient utilization of berths, "Open use" system should be adopted as a basic scheme. But "Prioritized use" system also should be adopted if it will attract shipping companies.
 Considering above mentioned points, case 2 is considered to be preferable. But to satisfy
 - the needs and requests of shipping companies, case 3 and 4 are also possible.

15.3.3 Port Development and Management

The sole management body of Salalah Port including container and conventional terminals is assumed to be SPS.

Conventional terminals cater for the needs of the region. Therefore, to support regional development, GSO should develop necessary infrastructure and set reasonable concession conditions which will allow SPS to offer low port charges. SPS should operate and maintain the conventional terminal based on the concession with the government.

Port development and management scheme of container terminal and conventional terminal is shown in Table 15.3.1.

Table 15.3.1 Port Development and Management Scheme

. •	
5	
Ċ.	
1.1	
1.1	
Ξ.,	
1.1	
'	
· .	
1	
111	
11	
1	

		Construction	Maintenance	Management	Operation
		Procurement			- -
E-intian Containon Tominal	Infrastructure	GSO	SUS	SUDO .	טרט
	Superstructure	SAS	010	C.IC	ere
Additional Container Terminal	Infrastructure	GSO	enerard nearly	STIC	c pic/ous
Automatical Contrating Actimitat	Superstructure	SPS(3 rd Party)	oro() rauy)	CIC .	(Uner c)ere
Existing Conventional Terminal	Infrastructure	GSO*	CDC	CDC	D CD D
EADSILIE CONVENTIONAL LEADING	Superstructure	GSO,SPS*	010	C IC	050
Additional Conventional Terminal	Infrastructure	GSO	202	cnc	SUD C
ruuuuviiai Coirveiluviiai Jeannaiai	Superstructure	SPS	010	oro	oro
V	3 _				

Note: * Including rehabilitation work

15.4 Port Marketing Strategy

15.4.1 Port Sales

As a new comer to the transshipment business world, port sales are essential for Port Salalah to promote its name. SPS must play the main role in conducting port sales activities. But the Omani Government also should support and join these activities because the development of Port Salalah benefits not only SPS but also the Dhofar region and the government.

The following measures are recommended to promote port sales activities.

1)Improvement of web site of Port Salalah

2)Improvement and efficient usage of sales promotion materials (printed brochure and video)3)Regular dispatch of Port Salalah Sales Missions (This mission is desirable to be formed by SPS and the government.)

4)Set up of port sales offices abroad in addition to the office in Dubai

15.4.2 Marketing Strategy

(1)Port Tariffs

Compared with Dubai Ports, the tariff level of Port Salalah is about 4% is higher. But Salalah is much closer to the main East-West shipping route than Dubai and, therefore, the present tariff level of Port Salalah is sufficiently competitive with Dubai Ports.

Compared with Singapore Port, charges of loading and discharging of laden 20 feet container are about 7 % higher at Port Salalah. But Port Salalah offers more than 50 % discount in average for over 200 thousand movements per year. It is said that the volume discount of Singapore Port is only about 10 % for over 400 thousand movements per year. Therefore it can be said that Port Salalah can compete with Singapore Port at the tariff levels for large class shipping companies. But Port Salalah aims at being a common user port and to achieve this target it must attract various shipping companies including middle and small class shipping companies. From this view point, standard tariffs should be reduced while volume discount rate should be increased from the present level.

(2)Network of Shipping Lines

Port Salalah must have not only trunk lines but also sufficient feeder service network to achieve success as a world class transshipment hub port. Main prospective market areas of hinterland development are Yemen, East Africa countries, and Indian Sub-Continent besides the United States, Europe, South-East Asia and Far East countries. From this viewpoint to increase trunk lines and to expand feeder network, especially from/to East Africa and Indian Sub-Continent, is

very important.

(3)User Friendly Management

PSA communicates with its customers through the advisory council which it has set up with shipping companies calling PSA. Shipping companies set a high value on PSA's attitude. It is recommended that SPS forms a similar council with shipping companies calling Salalah.

(4)Introducing Modernized Facilities

Salalah port must take advantage of its new port status. Salalah boosts the most modern facilities and operating systems, and these are good tools of port sales. SPS has already installed super post panamax quay cranes with 22 rows which are world largest class cranes at present. SPS also should develop large depth quays, for example 18 meter quays.

(5)Increase of Base Cargo

To have not only transshipment cargo but also base cargo from/to hinterland is very important and will raise the status of Port Salalah. SPS should make efforts to develop its hinterland and to increase base cargo.

16. Engineering Design

16.1 Design structure

16.1.1 Design Criteria

The design criteria necessary for designing the port facilities is tabulated in Table 16.1.1.

Table 10.1.1 Design Chief la	and the second
	M.H.H.W +1.68m
Tidal levels	M.S.L +1.30m
	M.L.L.W +0.60m
Seismic disturbance	0.1W (W: Weight of structure)
Wave height for design of breakwater	7.0m
Vessel of design(max)	Container vessel 90,000DWT
Water depth of berth(max)	L.A.T-18m
Surcharge load of berth	Load condition 5.0t/m ²
Berthing velocity of ship	0.15m/sec
Design lifetime	50 years

Table 16.1.1 Design Criteria

16.1.2 Structural Design

Typical example of breakwater, quaywall, and revetment are shown in the following figures.

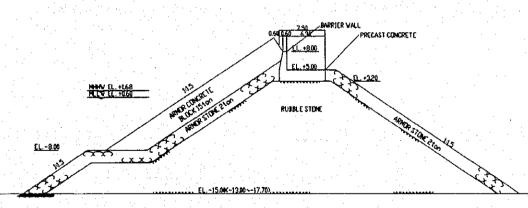
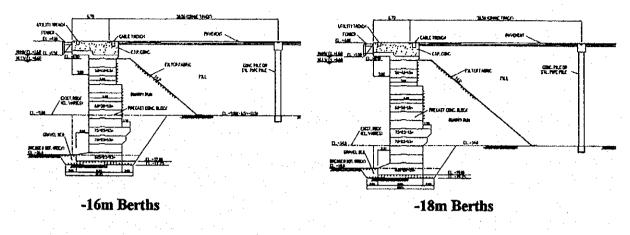
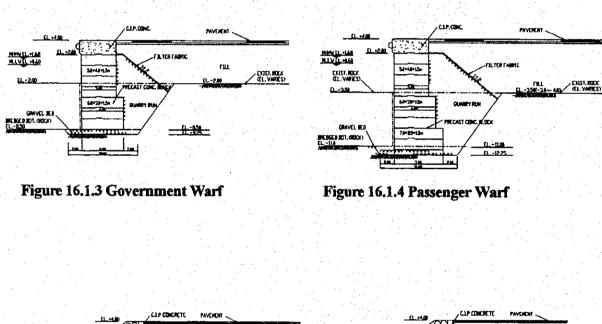


Figure 16.1.1 Breakwater







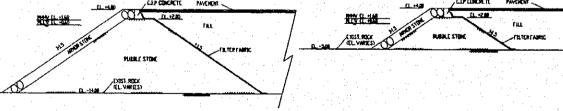


Figure 16.1.5 Revetment

16.2 Implementation Plan

16.2.1 JICA PLAN A

The implementation plan of JICA PLAN A is shown in Figure 16.2.1.

16.2.2 JICA PLAN B

The implementation plan of JICA PLAN B is shown in Figure 16.2.2.

16.3 Cost Estimation

16.3.1 Basic Condition for Cost Estimate

- (1) The construction cost has been estimated based on the result of material survey cost on Jan.2000 at Salalah.
- (2) Exchange rate of currency is fixed as follows: US Dollar 1.0=OR 0.385
- (3) Physical contingency is estimated at 10%.
- (4) Engineering services fee is estimated at 5%.
- (5) Indirect cost is estimated at 15%: contractors overhead and profit.
- (6) Price escalation is not included for construction, equipment and engineering cost.
- (7) The direct cost of construction is classified into the foreign and local currency components. The percentage distribution of the major items of construction materials, equipment and labor between the foreign and local currency components is shown in Table 16.3.1.

No	Item	Foreign	Local
1	Breakwater	30%	70%
2	Dredging	· 90 · ·	10
3	Wharf	30	70
4	Bridge	70	30
5	Building	10	90
6	Mechanical	90	10
7	Electrical	90	10
8	Water Supply & Drainage	90	10
9	Cargo Handing Equipment	100	0

Table 16.3.1 Distribution of Construction Cost

ļ		Description	Quantity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	202
	No.		Guaracy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	1	Bronovstan, Wad			ļ			ļ											1			[1
	0	Preparatory Work Breakwater	l		—	ļ	ļ						ļ		· · · ·								
hort			1,200m																		[t	1
erm		Dredging	13,778,975m ³		-															T	[[1
T		Wharf	700m -16m 2Berth															1		<u> </u>	<u> </u>		1
T			850m -8.5m						· · .				T		1			<u> </u>		· · · ·	<u> </u>	<u> </u>	+
			350m												<u> </u>			<u>+</u>	<u> </u>	<u> </u>	<u> </u>		+
		Building				· •					· · .		1					<u>+</u>	<u> </u>		<u> </u>		
	8	Erectrical						F	·				1		 	·		┨─────	 	·	·	·	
	9	Mechanical								· · ·									<u> </u>		 	 	+
			Container Crane 18lines	· ·	[<u> </u>					<u>+</u>				· · · · ·		 	ļ	· · · · · ·		<u> </u>
	10	Cargo Handling Equipment																					1
. 1	11	Miscellaneous Work		<u> </u>		<u> </u>	<u> </u>	<u> </u>					l		 			ļ					_
										· · · ·	·	· · · ·	l		ļ	· · · · · · · · · · · ·	· · ·	ļ	ļ		· .		
	12	Engineering Services						·						· .	_								
		Lighteering Oelvices				-							ļ		· · · · ·				L				
				<u> </u>				 															
		Duran average 14(1)		_				· .							· ·	· · ·		· ·					
	·	Preparatory Work											· ·								·		-
		Breakwater	1,350m		·		11 11				1								1				
ong	2	Dredging	3,614,150m ³																1			· · · ·	
erm		Wharf	1,050m -18m 3Berth		·		1											†		· · · · ·		· · · ·	<u>t</u>
	4	Building							-	in the stars			1					· · · ·					\vdash
-1		Erectrical			2		· .			N									·····				
	6	Mechanical										-	<u> </u>					†	····				
·			Container Crane 22lines	1										·				·····		- <u> </u>			
1.1	.7	Cargo Handling Equipment	9Nos ,etc 54Nos.													· · · · ·							L .
	8	Miscellaneous Work			ļ			<u> </u>					┨╴╴━┤							· · ·			
					1								 										┢
5 A 1	9	Engineering Services			-		· · · · · · · · · · · · · · · · · · ·											<u> </u>				· · · · · · · · · · · · · · · · · · ·	
1					· · · · ·											· · ·							↓
1.11					-			···· ·												· ·			ļ
	1	Preparatory Work															1.				· · · ·		Ļ.
- s	2	Wharf	1,050m -16m 3Berth	-							· · · · · · · · · · · · · · · · · · ·								· · · ·		· · ·		I
		Building											· · · · ·								· ·		
I -2	4	Erectrical						····															<u> </u>
		Mechanical						ļ							· ·					· .			
		meenameat	Container Crane 18lines	· · · · ·							_ : · ·							· · · ·					
	6	Corres Handling Equipment		1.12															an tha a	1. A. A.			ſ
		Cargo Handling Equipment	SINOS , EC 34INOS.																				
· ·		Miscellaneous Work		ļ												_							
					- 20 A.			1 - 12 - 14 1		· · · ·													<u>.</u>
1.1	8	Bulk Terminal crane	800t/h											1. A. A. A.									<u> </u>
	Ľ.				1.5.5							· .		-	14.1								
	9	Engineering Services		1 N							1.2.1	· · ·											<u> </u>
1				N 16 1										·									
		Preparatory Work		· · .										·									
	2	Dredging	96,850 m ³					1 ¹				1.14									· · ·		
_	3	Passenger Berth	350m -11.0m	1																			<u> </u>
L-3	4	Building etc		T	 	1		<u> </u>							· · · · · · · · · · · · · · · · · · ·								
	5	Gunge Way	2Nos			 							<u> </u>										.
	6	Miscellaneous Work		1	<u> </u>				· · ·										· .	· .			
					t					<u> </u>								i		-			ļ
	7	Engineering Services	 		<u> </u>																· .		L
	<u> </u>		<u> </u>		L	E C C	1 1 1 I	1 - 1 - 1 - 1	1 .	1.1.1.1.1.1		· ·	L		1		L	L					1

Figure 16.2.1. Construction Schedule of JICA PLAN A

	Description	0	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	202
1	No. Description	Quantity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	1 Preparatory Work							_	 	· · ·	· · · · · · · · · · · · · · · · · · ·						ļ		ļ		ļ	\downarrow
hort	2 Breakwater	2,550m				1	ļ	ļ	ļ								ļ	· ·	 		 	<u> </u>
erm	3 Dredging	7,003,146m ³) i i i i i i i i i i i i i i i i i i i	- · · ·					: 		· · ·									ļ	
	4 Wharf	1,050m -18m 3Berth	· · · ·			· ·			·		· · · ·					 		l			L	
I	5 Government Berth	850m8.5m				<u></u>						1.0.0		1 ·				Í				
	6 Bridge	350m	1							·								I				
· . [7 Building																	· .				
Ļ	8 Erectrical		· ·	ļ				1.1.1.			· · · · ·	· · ·	· · ·				L	· ·		l		
	9 Mechanical		· · · · · · ·	ļ			ļ	ļ		·		ļ	ļ	ļ		· .	ļ		<u> </u>		L	_
		Container Crane 22lines		· ·	-			· · ·														
Ļ	10 Cargo Handling Equipment	9Nos ,etc 54Nos.	· · ·	ļ	ļ	ļ		· · · ·		ļ	ļ	 		ļ			ļ		ļ			.l
. -	11 Miscellaneous Work			<u> </u>			ļ	ļ	ļ	 		ļ							· · · · · · · · · · · · · · · · · · ·	· · · · · · · · ·		_
	10 5			 								 		· · ·			 		ļ		ļ	<u> </u>
╞	12 Engineering Services					<u> </u>		<u> </u>	┢			<u> </u>	· · · · · · · · ·	· · · · · · · ·		· · ·	<u> </u>					╂
											<u> </u>	<u> </u>				· · · · · · · · · · · · · · · · · · ·			<u> </u>		<u> </u>	╆━━
 	1 Preparatory Work		- ·				· · ·			<u> </u>			 			· · · · · ·			<u> </u>		<u> </u>	╂
·		10,801,725m ³	<u>}.</u>	+							<u> </u>					· · · · · ·						+
ong erm	2 Dredging 3 Wharf	700m -16m 2Berth							· · · · ·		· · · · ·						<u> </u>					
enn	4 Building					 	+				 									· ·	<u> </u>	+
∐ –1İ				+		· · ·											<u> </u>					+
<u>u – il</u>	5 Erectrical			-				+]	<u> · · · ·</u>								_		 	_
· • •	6 Mechanical	Container Crane 18lines		+				_──										<u> </u>	 			+
	7 Cargo Handling Equipment																					
-	8 Miscellaneous Work									<u> </u>			ł		<u> </u>				+ · • · • · · · ·	·	 	+
.	Umiscenarieous Hork								-													+
	9 Engineering Services		-								· · ·								 			
				1					1	1				1 1 2		 	1	· · .	1			1
			1 1 1	1	1								1.	· .								1
Ī	1 Preparatory Work			1				1.11			1						1		1		· ·	1
	2 Wharf	1,050m -16m 3Berth	· ·								. *						1					1
	3 Building							1. L						·		. :		1. A.				
II2	4 Erectrical																·		1		1	
	5 Mechanical		: -1		1.		:	1									1					
		Container Crane 18lines								· .				·							·	
	6 Cargo Handling Equipment	9Nos ,etc 54Nos.								1. 5										<u> </u>	<u> </u>	
	7 Miscellaneous Work				- 14 A	1 ¹⁰ 1	· · · ·		_ · · ·			<u> </u>						ļ	<u> </u>	· · · ·	<u> </u>	<u> </u>
										1,1		ļ	· .			· · · ·					· .	\bot
	8 Bulk Terminal crane	800t/h		·			<u> </u>		1 1 1					<u> </u>	<u> </u>	<u> </u>	· · · ·	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		· · · ·	·	
					<u></u>	· · · ·				-			[1			<u> </u>	· · · ·	.		<u> </u>	+
	9 Engineering Services			-		·		_	-									<u> </u>	<u> </u>		╂────	
÷			· · · · · ·										<u> </u>		· ·		<u></u>	l	<u></u>		<u></u>	_
	1 Preparatory Work	00.050 3		+				-			+				-		F	1			+	+
	2 Dredging	96,850 m ³				1				<u> </u>	-							<u></u>		ļ		+
π ~	3 Passenger Berth	350m -11.0m			+	-						+							- · ·	· ·	<u> </u>	-
II3					1						· · ·		ļ			1 · · · ·			<u> </u>	·	_	
	5 Gunge Way	2Nos		-									ļ	ļ		and the			_	<u>. </u>	1	
	6 Miscellaneous Work								<u> </u>			- <u></u>	_	 	┨	·	_		- · · · · ·	Į	<u> 1979</u>	<u> </u>
			-				_					_	ļ	- · ·		<u> </u>			ļ	ļ	1 1	<u> </u>
	7 Engineering Services		1									1					T	1	1			

Figure 16.2.2. Construction Schedule of JICA PLAN B

16.3.2 JICA PLAN A

Summary of the construction cost for JICA PLAN A is shown in Table 16.3.2.

(1) Short Term

The cost estimation of short term for JICA PLAN A is shown in Table 16.3.3.

(2) Long Term

The cost estimation of long term for JICA PLAN A is shown in Table 16.3.4.

(3) Future Term

The cost estimation of future term for JICA PLAN A is shown in Table 16.3.5.

16.3.3 JICA Plan B

Summary of the construction cost for JICA PLAN B is shown in Table 16.3.6.

(1) Short Term

The cost estimation of short term for JICA PLAN B is shown in Table 16.3.7.

(2) Long Term

The cost estimation of long term for JICA PLAN B is shown in Table 16.3.8

(3) Future Term

The cost estimation of future term for JICA PLAN B is shown in Table 16.3.9.

Table 16.3.2 Summary of the Construction Cost (PLAN A)

)	(Unit:1,0000.R)
Princinal Items	Facilities and	Dimension and	Short Term	Long Term	Short + Long	Future
	Handling Equipment	Ouantity				
Container	18m draft berth	1,050m		21,831	21,831	
Terminal	16m draft berth	1,750m	13,727	19,716	33,443	
	Cargo handling	24 gantry cranes	14,667	49,503	64,170	
	equipment	48 RTGs	5,056	15,167	20,223	
		96yard tractors	308	923	1,231	1
Government herth		800m	7,128		7,128	1
Bridge		350m, 400m	5,288	1	5,288	6,045
Passenger berth		350m		3,017	3,017	
9	Equipment	2 gangways	1	407	407	-
12m Draft berth etc]	26,898
Rreakwater		2,550m	20,918	30,837	51,755	l
Dredging		17,725,000m ³	41,201	11,095	52,296	14,846
Reclamation		$22,455,000m^3$				
Conventional	Cargo handling	1 bulk crane	I	2,444	2,444	••••••
Terminal	equipment					
Building etc			10,098	31,833	41,931	
TOTAL			118,391	186,773	305,164	47,789

				41-11	4		Construction Cost	
No.	XIOM	Work Item			Animny	Foreign	Local	Total
1-1	Civil Work							
1-1-1		Breakwater Demoltion	Existing	Ē	410		1,087	1.087
I -1-2		New Breakwater	-13.0m to-17.7m	Ē	1,200	4,501	-	15,003
I -1-3	Dredging	[Harbour Area(])	-16.0m	Ē	10,028,350	21,060	2,0	23,066
I -1-4		Harbour Area2	-8.5m	۳ ۳	197,000	414		453
1-1-5		Approach Channel	-16.5m	°E	3,553,625	7,463	711	8.174
1-1-8	Reclamation	Container Terminal B	+4.0m	<u>ہ</u>	2.425.725	1	1	1
1-1-7		Government Berthe	+4.0m	°E	634,148	-	1	1
1-1-8	Container Terminal B		-16m , 2Berths	٤	700	1,711	3,991	5,702
1-1-9		Sea wall	-8.5m to-16.0m	٤	50	102		341
1-1-10		Revetment	+4.0m	٤	450	117	1,049	1,166
1-1-1		Pavement		2 2 E	335,000	T	3,350	3.350
1-1-12	Government Bertha	Quev weil	-8.5m	٤	850	849	1,981	2,830
1-1-1		Revetment	+4,0m	ε	1.420	138	1.240	1,378
1-1-14		Pavement		ž	127,500	1	1,275	1.275
7-1-15	Bridge			2	350	2,848		4.068
1-1-28	Sub Total					39,203	28,690	67,893
1-1-17	Physical Continuancy	10%of Sub total				3,920	2.869	6,789
T -1-18	Indiract Coat	15%of Sub total				5,880	4,304	10,184
1-1-10	Frainsarine Sawina	5%of Sub total				1,960	1,435	3,395
1-1-20	Total					50,963	37,298	88,261
I -2	Building Electric, and Water	r Supply						
I -2-1	Building			L.S.	-	123	-	1.243
I ~2~2	Electrical			L.S.	-	2.703		3,003
I -2-3	Mechanical			L.S.	-	949		1.055
- 2-4	Miscellaneous			LS.	Ŧ	1,727		2,467
I -2-5	Sub Total					5,502	2	7,768
I26	lontingency	10%of Sub total				550		111
I -2-7		15%of Sub total				825		1,165
I -2-8	ervice	5%of Sub total				275		388
I -2-9						7,152	2,946	10,098
I -3	Equipment							400.04
I -3-1	Container Crane	18lines	3No. X 2Berths	Son I	0	400.01		100.01
- I3 2	RTG			Nos Nos	12	4,596		060.4
1 -3-3	Yard Tracter			S Nos	24	280		280
I -3-4						18,210		18,210
I -35	X	5%of Sub total				911		116
1-3-6		5%of Sub total				6118		118
-1-37	Total					20.032		20,032
								110.001
7	Grand Total			+		18,14/	++Z'0+	118,331
							l	

Table 16.3.3 Breakdown of Project Cost(JICA PLAN-A)

Table 16.3.4 Breakdown of Project Cost(JICA PLAN-A)

9,008 3,164 20,001 13,788 3 2,449 3,673 833 ŝ 24 487 25,002 66.536 6,653 9,900 86,496 3,729 31,633 82.222 68,444 186.773 3.32 23.7 otal Unit: 1,000 OR 7.538 754 1.131 377 9.800 2,255 4,109 1,095 382 333 45,054 16,805 294 2,255 4,300 5,986 4,505 8,758 2,253 3.360 900 318 2,220 740 68,370 429 6 6,725 58,570 267 Cost Construction Local 1 7,116 3.083 2,566 369 8,108 2,846 5,181 16,949 1,695 2,542 847 20,001 25,002 13,788 839 370 2,222 62,222 3,111 21,482 2,148 3,222 1,074 27,926 3,111 118,403 4,507 2,882 25011 250 469 4 22,033 203 ¥ 68,444 Foreign 1,467,900 2,148,250 99,850 99,850 9,152,902 1,551,248 1,5551,248 1,556 1,556 1,050 1,050 1,050 1,050 1,050 1,050 33250 33250 1,350 36 2 Quantity Unit LS. LS. LS. LS. Nos Nos Nos Nos εΓεΓεΓε "E"E E E E E ε Ε EE ε**`**ε +4.0m +4.0m -18.0, 3Berthe -16.0m to-18.0m +4.0m Remarka -16m , 3Berthe +4.0m 3No. × 3Berthe 3No. × 3Berthe -11.0m -11.0m 2,000m -18.0m -18.5m 800t/h +4,0m +4.0m Container Terminal A Container Terminal C Passenger Berths Quay wall Passenger Berths Approach Channel Passenger Berth Bulk Terminal 10%of Sub total 15%of Sub total 5%of Sub total Harbour Area B 10%of Sub total 15%of Sub total 5%of Sub total New Breakwater 5%of Sub total 5%of Sub total Harbour Area Revetment Pavement Quey wall Quey wall Revetment Revetment Pavement Pavament Sea wall TERM DEVELOPMENT 2020) Building, Electric, and Water Supply 1 Sknes 22lines Work Item Cargo Handling Equipment Miscollaneous Passenger Tarminal Sub Total Physical Contingency Bulk Grane Sub Total Physical Contingency Engineering Service Total Container Terminal O Physical Contingency Container Terminal A Engineering Service Engineering Service Passenger Berths Container Crane Container Grane RTG Miscellansous() Indirect Cost Indirect Cost Yard Tracter Reclamation Grand Total Reclamation Civil Work Breakwater Gunge Way Mechanical Oredeine Sub Total Electrical Building Total Total I-1-12 (LONG I -1-14 I -1-15 1-1-13 -1-18 6-1-1 I -1-20 1-18 -1-22 E-2-10 1-2-2 1-2-2 **+**-0-∎ п-1-4 1-1-5 <u>II - 1 - 9</u> I-1-11 I-1-21 8-C- I 1-0-10 1-1-2 1-1-8 6-1-1--1-10 Ì 1 1-2-5 1-2-5 I-2-8 II -- 2-- 9 <u>n -3-1</u> ŝ <u>9</u> 1 -2-2 1 -2-3 Ī 1

	5
	Z
	4
	Z
	2
	Ĕ
	4
•	2
	Ũ
	<u>, t</u>
Ì	÷
2	2
	A
	5
	F
	.≧
	2
	Ň.
	3
	E
	æ
	49
	сų,
	Q
	-
	Ť
	8
	H

(FUTURE	(FUTURE DEVELOPMENT)						Unit : 1,000 OR	000 OR
			-	1,-1,			Construction Cost	
°N No	Work	Work Item	Nomera		Annuanh	Foreign	Looel	Total
				Ţ				
	Civil Work			h	2+3 FC0	104		540
1	Orading	Ł		Ē	110,462			
1-1-4			+4.0m	ε	1,883,/22	1		
9-1-1			+4.0m	٦°	1,396,875			
日-1-6		Future Expansion C	+4.0m	۳°	3,804,550		-	1
田-1-10	Future Expansion A	1	-12m	٤	086	1,497	3.494	4,991
<u>11-1-11</u>		Sea well	-11.0m to-12.0m		142	217	506	723
Π-1-19		Revetment	+4.0m	ε	200	101	626	969
<u> </u>		Revetment	+4.0m	Ε	1,080	239	2,150	
田-1-14		Pavement		E	205,500	-	2.055	
TT-1-15	Future Expansion B	Revetment	+4.0m	E	1,160	140	1,267	1,407
Щ-1-16 -		Pavement		ε	257,000		2.570	
<u>n-1-17</u>	Future Expansion C	Sea wall	-10.0m	E	006	1,038	2,422	3,460
田-1-18		Pavement		٣Ę	240,000		2,400	
日-1-19	Bridge			ε	400	3,255	1,395	
Ш-1-20	Dredzina			Ē	4,730,453	9,934	946	
田-121	Sub Total					16,883	19,678	3(
Ⅲ −1−22	Physical Contineency	10% of Sub total				1.688	1,988	
Ш-1-23		15%of Sub total				2,532	2,982	5.514
<u>m-1-24</u>	envice	5%of Sub total				844	994	1,838
日-1-25						21,947	25,842	47.789
II -2	Building, Electric, and Water	r Supply						
Ш-2-1	Building					1	1	
Ш-2-2	Electrical					1	1	1
四-2-3	Mechanical					1	1	
Ш-2-4	Miscelianeous			-		-	1	-
直-2-5	Sub Total					ŀ	1	1
Ш-2-6	Physical Contingency	10%of Sub total				1	1	1
п-2-7		15%of Sub total				1	1	I
五-2-8	ervice	5%of Sub total				1	1	I
<u>n -2-9</u>						1	I	1
日 -3	Cargo Handling Equipment							
<u>1</u> -3-1	Sub Total					I	1	1
垣- 3-2	Physical Contingency	5%of Sub total			-	1	1	1
四—3-3	Engineering Service	5%of Sub total				1	1	1
五34	Total					I	1	1
7-日	Grand Total					21.947	25,842	41,789]

\sim	
8	
F	
<i>.</i>	
<	
1	
(PLAN B)	
\sim	
-	
Ost	
-8	
$\mathbf{\circ}$	
u	
_ <u>_</u>	
Ŧ	
2	
- 5	
st.	
Ż	
_ ē	
U	
ده ا	
, É	
-	
of the	
5	
_ <u>C</u>	
1	
- 8	
3	
- 55	
	•
6	
9	
-	ľ
<u> </u>	
- 2	
R	
E	

Drincinal Itame						
	Facilities and	Dimension and	Short Term	Long Term	Short + Long	Future
	Handling Equipment	Quantity				
	18m draft berth	1,050m	28,260		28,260	1
<u> </u>	16m draft berth	1,750m		31,928	31,928	-
<u> </u>	Cargo handling	24 gantry cranes	27,502	36,668	64,170]
Ψ	equipment	48 RTGs	7,584	12,639	20,223	
<u></u>		96yard tractors	461	769	1,230	-
Government berth		800m	7,505		7,505	
		350m, 400m	5,288		5,288	6,045
Passenger berth		350m	1	3,017	3,017	
<u>+</u>	Equipment	2 gangways	1	407	407	
12m Draft berth etc						26,898
		2,550m	51,755	1 111	51,755	ļ
		17,725,000 m³	20,941	31,355	52,296	14,481
- 4 - 4 - 4		$22,332,000 \mathrm{m}^3$				
	Cargo handling	1 bulk crane	1	2,444	2,444	1
			15,148	26,787	41,935	
			164,444	146,014	310,458	47,424

Model Model Model Model Enclosion				-	- - - - - - - - - - - - - - - - - 			Construction Cost	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	No.	WOR.	rk Rem	S M JANU D L		- Annenn	Foreign	Local	Totat
Order Evelopments Effection m 410 410 Dedicity Harboux Arreg/ Harboux Arreg/ Dedicity Exitedina 150m m 2.000 5.010 Dedicity Harboux Arreg/ Harboux Arreg/ Dedicity Exitedina 1.61 1.61 1.61 Dedicity Harboux Arreg/ Arregen Orbanici 2.60m m 2.600 5.014 Arregen Orbanici 2.60m m 2.000 5.014 Arregen Orbanici Oxtelation m 2.000 5.014 Arregen Orbanici Arrefit m 2.000 5.014 Arrefit Arrefit m 1.010 1.010 1.010 Arrefit Arrefit m 1.0100 2.000 5.010 Arrefit Arrefit m 1.0100 1.010 1.010									
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	T	Civil Work				477			1 00.1
	I -1-1	Breekwater	Breakwater Uemoltion	Existing	E	Dit.	1010		90'I
Dracting Herent Acad - 1.610m m - 1.41700 - 5.018 Automation Automation - 4.00m m - 2.402 - 5.044 Automation - 4.00m m - 2.402 - 5.044 Automation - 4.00m m - 6.000 - 5.044 Automation - 4.00m m - 6.0000 - 5.044 Automation - 4.00m m - 6.0000 - 6.04 Automation - 4.00m m - 6.0000 - 6.06 Automation - 4.00m m - 6.0000 - 6.06 Automation - 4.00m m - 1.600 - 2.646 Reventent - 4.00m m - 1.600 - 2.646 Reventent - 4.00m m - 1.600 - 2.646 Automation - 4.00m m - 1.600 - 2.646 Automation - 4.00m m - 1.600 - 2.646 - 2.640 - 2.640 - 2.640 - 2.640 - 2.646	I12		New Breakwater	-13.0m to-20.0m	E	2,550	11.018	77	30,124
Harbour Harbour 6.5m m² 2.402,000 5.99 Modemation Approval 16.0mm 2.000 5.14 Modemation Constraint 4.00 m² 2.402,000 5.44 Modemation Constraint 4.00 m² 5.000 5.14 Modemation Constraint 1.40 m² 5.000 5.14 Modemation Constraint 1.40 m² 5.000 5.14 Modemation Constraint 1.40 m² 5.000 5.14 Modemation Constraint 4.00 m² 5.000 5.14 Modemation Modemation 1.00 2.84 9.96 2.84 Modemation Modemation 1.00 2.84	1-1-3	Dredging	Harbour Area()	-18.0m	,е	1,467,900	3,083		3,3/6
6 1	1-1-4		Harbour Area(2)	-8.5m	°E	2,847,000	5,979		6,548
	1-1-5		Approach Channel	-18.5m	Ê	2,402,000	5,044	480	5.525
	1-1-6		Approach Channel	-9.0m	Ê	5.000	11	•	1
	1-1-7	Peolemetion	Container Terminal A	+4.0m	Ê	6.377.798	,	,	1
	1-1-8		Government Bartha	++ Om	Ê	625.348	•	1	1
0 1	0-1-1-1	Container Terminal A		-18m . 3Berthe	ε	1.050	2,882	6,725	9,608
Note Revenent 40m m 40m 551 Revenent Prevenent 40m m 1000 66 Revenent Prevenent 40m m 1000 66 Revenent Revenent 40m m 1000 66 Revenent Revenent 40m m 1000 66 Revenent Revenent 40m m 1000 66 Revenent 40m m 1000 29 66 Bridge Revenent 40m m 1000 29 Bridge Revenent 40m m 281,46 3392 Bridge Revenent 1000 1000 29 266 Revenence 1000 1000 1000 1000 Bridge Revenence 1000 1000 1000 1000 Bridge Revenence 1000 1000 1000 1000 Revenence 1000 1	1-1-10		San wall	-16.0m to-18.0m	٤ ٤	50	114		381
Revenuent Home	1 1 2		Revetment	+4 0m		400	251	2	2.506
Nommerit Develution mm mm 400000 - 1 Covenment Hold m 11/20 - 29 1 Covenment Eventment 4400 m 11/20 - 1 Eventment Hold m 12/2.600 - 29 1 Eventment Hom 14/20 m 12/2.600 - 29 1 Eventment Hom 14/20 m 14/20 - 28 1 Explore Montlongency 1566/53.8b total m 33.83 - 33.83 1 Explore Stof Sub total Montlongency 1 1.99 - 1 Total Meter Store Ls 1 1.45 - 1 Total Ls Ls Ls 1 1.45 - - 1.45 1 Total Ls Ls Ls Ls 1 1.45 -<			Bavatmant	+4 0m	8	1001	495		₩ ₩
Interface Comment: Bertha Comment: Bertha <thcomment: bertha<="" th=""> Comment: Bertha<!--</td--><td>71-1-1</td><td></td><td></td><td></td><td></td><td>430.000</td><td></td><td></td><td>4.300</td></thcomment:>	71-1-1					430.000			4.300
Nome Concentent Bertra Current, Newment, Revention, Bertra Current, Revention, Revention, Bertra Current, Revention, R	21-1-1					900,000	010	1 201	0206
Benefinitie Revenant 440m m 1,27,500 291 Diedefinit Formitter 440m m 127,500 2.94 Diedefinit Formitter 100m m 2.81,240 3.332 Diedefinit from Long fermit 100m 2.91 5.93 2.94 Diedefinit from Long 100m m 2.81,240 3.332 Diedefinit from Long 100m m 2.81,240 3.332 Diedefinit from Long 100m 1 2.81,240 3.332 Diedefinit from Long 1 1 2.81,240 3.332 Diedefinit flored 1 1 2.81,240 1.92 Diedefinit flored 1	I -1-14	Government Berthe	Guey wall	LUC'R-	E	007			
Image: constraint of the	I -1-15		Revetment	+4.0m	E	1,420	82		770'1
1 m $12/50$ 2.846 10 $12/50$ $12/50$ 2.846 10 $12/50$ $12/50$ 2.846 10 10 10 $12/50$ 2.846 10 10 10 10 2.846 3332 10 10 10 10 10 3332 3332 10 10 10 10 10 10 3332 10	1-1-18		Revetment	+4.0m	Е Т	901	87		
3 Biologe m 350 2846 0 Derivation m 2812.46 2813 0 Sub Total 15565 Sub total 50332 50332 0 Biol Total 15565 Sub total 505 Sub total 50332 1 Frequencia Contingency 15565 Sub total 505 Sub total 50333 1 Frequencia Contingency 506 Sub total 1 1.697 1 Total 1 1 1.695 1.695 1 Total L L 1 1.695 1 Total L L 1 1.695 1 L L L 1 1.695 1 L L L 1 1.695 1 L L L 1 1.425 Building Electricia L L 1 1.425 Miscellancous 1565 Sub total L L 1 1.425	I -1-17		Pavement		ε	127.500			1,2/5
Discipling from Long Term m^3 $281,246$ $233,233}{333,23}$ 0 Bub Tecking 1566 Sub total 1 3,332 0 Infineering 5567 Sub total 5 3,332 0 Infineering 5567 Sub total 5 3,332 0 Infineering 5567 Sub total 5 5 0 Infineering 5 5 5 5 1 10567 5 5 5 5 1 10567 5 5 1 4,112 1 10567 5 5 1 4,112 1 10561 1 1 1 4 1 1 1 1 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	I -1-18	Bridge			E	350	2,848	1,2	4,068
0 Sub Total 10 10 10 3332 1 Physical Continency 15561 Sub total 10 3332 2 Engineer Continency 15561 Sub total 10 10 3 Ford 5615 10 10 10 4 Total 561 10 10 10 1 Total 561 10 10 10 1 Total 10 10 10 10 1 Total 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10 1 10 10 10 10 10	I -1-19	Dredging			m ³	281,246	291		847
Image: Contingency(Nordiam Contingency)(Nordiam Contingency)<	<u>1-1-20</u>	Sub Total			· ·		33,932		87,498
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1-1-21	Physical Contingency	10% of Sub total				3,393	5,357	8,750
a Enviromenting Service 5%of Sub total 10691 i Total 1 1 i Total 1 1 i Total 1 1 i 1 <td< td=""><td>1-1-22</td><td>Indirect Cost</td><td>15%of Sub total</td><td></td><td></td><td></td><td>5,090</td><td></td><td>13,125</td></td<>	1-1-22	Indirect Cost	15%of Sub total				5,090		13,125
Indiffing Total 44.112 Building Electric, and Water Supply LS 1 44.112 Building Electric, and Water Supply LS 1 1.423 Building Electric, and Water Supply LS 1 1.423 Building LS LS 1 1.423 Building LS LS 1 1.423 Merchanical LS LS 1 1.423 Miscellaneous 15% Sub total LS 1 1.239 Physical Contrigenory 10% Sub total LS 1 1.239 Indirect Coart 15% Sub total LS 1 1.239 Engineering Service 5% Sub total No. XBentha No. XBentha 1.07.729 Indirect Coart 21mee No. No. XBentha No. XBentha 1.07.729 Engineering Service 5% Sub total No. XBentha No. No. 1.07.729 1.07.729 Cost Sub Total No. XBentha No. No.	I -1-23	Engineering Service	5%of Sub total				1,697		4,375
	I -1-24	Total					44,112	69,637	113,749
Building Electric, and Water Building Electric, Building ElectricatLet LSLS1165 LSBuilding ElectricatElectricatLS1 1.65 1 1.62 Building ElectricatMechanicatLS1 1.62 1.423 Building ElectricatMechanicatLS1 1.62 1.423 MechanicatMechanicatLSLS 1.62 1.62 1.62 National Indirect Cost15% Sub totalLS 1.62 1.62 8.253 Pysiciation15% Sub totalLS 1.64 1.626 8.253 Pysiciation15% Sub totalLLS $1.10, 228$ LogMattineSait Sub totalL 1.616 1.023 Container CostStof Sub totalNosNos 3.64 $9.25, 002$ Mattiner EuuipmentContainer CraneStof Sub totalNos 3.64 $9.25, 002$ Container CraneStof Sub totalNos $9.05, 64$ $9.05, 64$ PiotalContainer CraneStof Sub totalNos 3.64 $9.05, 64$ PiotalFroteiStof Sub totalNos $9.05, 64$ $9.05, 64$ PiotalFroteiStof Sub totalNos									
	-								
Building L.S. 1 135 Relational L.S. 1 1.423 Mechanicus L.S. 1 1.423 Nub Total L.S. 1 1.423 Nub Total L.S. 1 1.423 Sub Total L.S. 1 1.423 Sub Total L.S. 1 1.423 Physical Contingency 10% Sub total 1 0.256 Engineet Coat 5% Sub total 1 0.729 Carge Station 1 0.6 0.729 Total Engineet Coat No. XBertha No. 0.729 Carge Engineet Cranc 0.00 X3Bertha No. 0.729 Vard Trace Sub total No. 0.03 0.729 Vard Trace Sub total No. 0.05 0.0729 Vard Trace Sub total No. 0.05 0.0729 Vard Trace Sub total No. 0.05 0.0720	- -	Building Electric, and Wate	er Supply						
Electrical L.S. 1 $\frac{4.034}{1.5}$ Mechanical L.S. 1 1 $\frac{4.034}{1.53}$ Mechanical L.S. 1 1 $\frac{4.034}{1.53}$ Mechanical L.S. 1 2.531 $\frac{8.253}{1.533}$ Sib Total 15% Sub total L.S. 1 2.543 Indirect Coat 15% Sub total L.S. 1 2.543 Indirect Coat 15% Sub total L.S. 10.729 10.729 Indirect Coat 15% Sub total L.S. 10.729 10.729 Interest Coat 5% Sub total No. 10.729 10.729 Interest Coat 5% Sub total No. 10.729 10.729 Verd Total No. No. 10.729 10.729 Verd Expension No. No. 10.729 10.729 Verd No. No. No. 10.729 10.729 Verd No. No. No. 10.729 10.729	<u>1-2-1</u>	Building			L.S.		180		008.1 1.002
Mechanical L.S. 1 1.423 Misol Total L.S. 1 1.423 Misol Total Novel Sub total L.S. 1 2.591 Physical Total Novel Sub total 10% Sub total 8.253 8.253 Physical Total 15% Sub total 10% Sub total 1.238 8.253 Total 15% Sub total 10 1.238 8.253 Total 5% Sub total 10 1.238 8.253 Total Sworts 5% Sof Sub total 1.0,729 10,729 Total Nove State Nove State 10,729 10,729 Cargo Handling Equipment 22/ines 3No.×3Berthe Nos 55,002 RTG Nove Nos Nos 36 419 Verd Trace Swortsub Nos 36 419 Nor Nos Nos 36 1.616 Nor Nos Nos 36 32,315 Sub Total Swortsub Nos <	<u>I -2-2</u>	Electrical			si -		4.034		4004 1000
Miscellaneous LS. 1 2.591 Sub Total 106 Sub total 1 2.533 Physical Contingency 15/06 Sub total 6.253 Physical Contingency 15/06 Sub total 6.253 Priversion 5%6 Sub total 1 1.238 Priversion 5%6 Sub total 1 1.238 Total 5%6 Sub total 1 1.229 Total 1 1 1.239 Total 1 1 1.239 Total 1 1 1.0,729 Total 1 1 1.0,729 Total 1 1 1.0,729 Cargo Handling Equipment 1 10,729 Sub Total 1 1 10,729 Sub Total 1 1	I23	Mechanical			L.S.	-	1.423		1,582
Sub Total Engineering Santiagenoy 10% of Sub total 6.253 Physical Contingenoy 10% of Sub total 6.253 Indirect Coat 15% of Sub total 8.253 Indirect Coat 15% of Sub total 8.253 Indirect Coat 15% of Sub total 10% of Sub total Total 8.60 Sub total 10% of Sub total Total 8.60 Sub total 10.729 Cargo Handling Equipment 5% of Sub total 10.729 Cargo Handling Equipment 8.60 Sub total 10.729 Container Orane 2.21ines 3No. x 3Berthe Noe Container Orane 2.21ines 3No. x 3Berthe Noe RTG Noe Noe 9 25,002 Rtd Total Noe 16 10,729 Sub Total 2.21ines 3No. x 3Berthe Noe 25,002 Rtd Total 10.6 10,729 10,739 Sub Total 2.21ines 3No. x 3Berthe Noe 36 Sub Total 10.6 1	I2-4	Miscellaneous			LS.	Ť	2.591		3,701
Physical Contingency IOK Sub total IOK Sub total 825 Indirect Coat 15Xof Sub total 15Xof Sub total 825 Engineering Service 5%of Sub total 1 1238 Engineering Service 5%of Sub total 1 1238 Total 1 1 1 1 Cargo Handling Equipment 1 1 1 1 1 Cargo Handling Equipment 1 1 1 1 1 1 1 Cargo Handling Equipment 1 1 1 1	12-5	Sub Total					8,253	e,	11,652
Indiract Coart15% 6 Sub total11.238Engineering Sarvice5% 6 Sub total1011,238Total5% 6 Sub total10,72310,723Total101010,72310,723Total10101010,723Total10101010,723Cargo Handling Equipment11010,723Cargo Handling Equipment101010Cargo Handling Equipment2210010Cargo Handling Equipment2210010Cargo Handling Container Orane2210010RTG2210010010RTG221001010Notal10101010Notal10101010Dyreioal Contingenory5% 05 Sub total1010Dyreioal Contingenory5% 05 Sub total1010Dyreioal Contingenory5% 05 Sub total1010Total10101010Total10101010Cand Total10101010Chand Total10101010Card Total10101010Card Total10101010Card Total10101010Card Total10101010Card Total10101010Card Total10<	I -2-6	Physical Contingency	10%of Sub total				825		1.165
Engineering Service 5%of Sub total 413 Total 10,729 413 Total 10,729 10,729 Zerge Handling Equipment 10,729 10,729 Carge Handling Equipment 10,000 10,000 Container Grane 22lines 3No.×3Berthe 9 25,002 RTG 22lines 3No.×3Berthe Nos 36 419 Nos Vard Tracter Nos 36 9 25,002 Nos Sub Total Nos 36 419 33.315 Nosioal Contingency S%of Sub total Nos 36 32.315 Dhysioal Contingency S%of Sub total 1616 32.315 Total Total Nos 1616 32.315 Renoting Service S%of Sub total Nos 36 32.315 Total Total Nos Nos 36 32.315 Sub Total Stored Nos Nos 36 32.315 Contal Stor	I -2-7	Indirect Cost	15%of Sub total				1,238	510	1,748
Total Total 10,723 Forato No. No. <td< td=""><td><u>I -2-8</u></td><td>Engineering Service</td><td>5%of Sub total</td><td></td><td></td><td></td><td>413</td><td></td><td>583</td></td<>	<u>I -2-8</u>	Engineering Service	5%of Sub total				413		583
Cargo Handling Equipment Cargo Handling Equipment Container Crane 22 (no.2) 25,002 25,002 25,002 25,002 25,002 25,002 25,002 21000	I29	Total					10,729	4,419	15,148
Carryon Handling Equipment Carryon Handling Equipment Solution Solution <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
Carryo Carryo Handling Equipment 22002 Container 22lines 3No.×3Bertha Nos 9 25,002 RTG Nos Nos 16 6,834 6,834 RTG Nos Nos 36 419 32,315 Yard Traoter Nos 36 32,315 32,315 Sub Total Nos 5% Sub total No 32,315 32,315 Physical Contingency 5% Sub total No 32,315 32,315 32,315 Total Total No 5% Sub total No 32,315 32,315 Total Total No Sib total No 32,315 32,315 Total Total Sold Sub total No 35,547 35,547 35,547 35,547 Grand Total No No 90,388 90,388 35,547 35,547 35,547 35,547 35,547 35,547 35,547 35,547 35,547									-
Container Crane 22lines 3No. × 3Bertha Nos 9 25,002 RTG No Nos 16 6,894 RTG Nos 36 419 Yard Tracter Nos 36 419 Sub Total Mos 36 32,315 Physiolal Contingency 5% of Sub total 1 1616 Total Total 35,547 35,547 Grand Total Internet of total 1 55,547	[3 -	Cargo Handling Equipment							
RTG Nos 18 6.894 Yard Tracter Nos 36 419 Yard Tracter Nos 36 419 Sub Total S%6 Sub total No 36 32,315 Physical Contingency 5%6 Sub total No 36 32,315 Physical Contingency 5%6 Sub total No 30 316 Total 5%6 Sub total No 36 35,547 Total Total No 35,547 35,547 Referencing Service S%6 Sub total No 35,547 35,547 Total Total No No 36,358 35,547	I -3-1	Container Crane	22lines	3No. × 3Berths	Nos	6	25.002		25.002
3-3 Yard Tracter 419 3-4 Sub Total 419 3-5 Physical Contingency 5% of Sub total 3-6 Engineering Service 5% of Sub total 3-6 Engineering Service 5% of Sub total 3-6 Engineering Service 5% of Sub total 1 fotal 1 fotal 3.5,547 6 Engineering Service 3.5,547 7 1 1 6 Engineering Total 30,368 6 Find Total 90,368	I32	RTG			Nos	. 18	6,894		6.894
3-4 Sub Total 32,315 3-5 Physical Contingency 5% of Sub total 1.616 3-6 Engineering Service 5% of Sub total 1.616 3-6 Engineering Service 5% of Sub total 1.616 3-6 Engineering Service 5% of Sub total 3.5,547 3-7 Total 3.5,547 3.5,547 1 Otal 1.616 3.5,547 1 Otal 3.5,547 3.5,547 1 Otal 3.5,547 3.5,547	I33	Yard Treater	-		Nos	36	419		4
3-5 Physical Contingency 5%of Sub total 1.616 3-6 Engineering Service 5%of Sub total 1.616 3-6 Engineering Service 5%of Sub total 35,547 Total Total 90,388 90,388	1-3-4	Sub Total					32,315		32,315
3-6 Engineering Service 5%of Sub total 1.616 Total Total 35.547 foral 6 90.388 Grand Total 90.388	I -3-5	Physical Contingency	5%of Sub total				1.616		1,616
Total 35,547 Cand Total 90,388	I -3-6	Enzineering Service	5%of Sub total		:		1.616		1,616
Grand Total		Total .					35,547 {	1	35,547
Grand Total									
Grand Total									
	4	Grand Total					90,388	74.056	164,444

Table 16.3.7. Breakdown of Project Cost(JICA PLAN-B)

Model heart	-				1 Init	Orrentity		CONSTRUCTION COST	
Cold Work, bedraft Herew. Area 10.0 - <t< th=""><th>No.</th><th>Wor</th><th>k Itam</th><th>Komarka</th><th>5</th><th>Annan</th><th>Foreign</th><th>Local</th><th>Totai</th></t<>	No.	Wor	k Itam	Komarka	5	Annan	Foreign	Local	Totai
Order Mater Matera Ana 110 m 333.00 15.66 17.10 Relationistic Matera Ana 10.00 </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>									
Dedicat Freeman 11.000 2.833.05 2.833 3.93 <td> </td> <td>vil Work</td> <td></td> <td></td> <td></td> <td>7 378 350</td> <td>15.495</td> <td>1.476</td> <td>16.970</td>		vil Work				7 378 350	15.495	1.476	16.970
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		edging	Harbour Area	19.01		OR AGO	2031	19	222
Reduction Accession - 100m m 2.463.265 - 400m - 100m - 200m - 2	-1-2		Harbour Area B	m0.11-		3 805 97E	A OTS	R50	7 574
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			Approach Channel	-16.5m	E ^P	0.1274,070			
Perturnin Container Terninal C Adom m 3289-38 m 3299 Container Terninal C 2399 3391 Container Terninal C Container Terninal C Container Terninal C Container Terninal C 2391 3391 Container Terninal C Container Terninal C Container Terninal C Container Terninal C 2391 3391 Container Terninal C Container Terninal C Container Terninal C Container Terninal C 2391 3391 Dendigen Container Terninal C Container Terninal C 2391 3391 3391 Dendigen Container Terninal C Container Terninal C 2391 3391 3391 Dendigen Container Terninal C Container Terninal C 2301 3391 3391 Dendigen Container Terninal C Container Terninal C 2301 3391 3391 Dendigen Container Terninal C Container Terninal C 2301 2301 3391 3391 <td></td> <td>olamation</td> <td></td> <td>H-0m</td> <td>E</td> <td>2,403,320</td> <td></td> <td></td> <td></td>		olamation		H-0m	E	2,403,320			
Description Description Implication 155.07 (1000 1111 3.981 (1000 1111 3.981 (1000 1111 3.981 (1000 1111 3.981 (1000 1111 3.981 (1000 3.981 (1000 <t< td=""><td></td><td></td><td></td><td>+4.0m</td><td>È</td><td>5,599,248</td><td></td><td>±</td><td></td></t<>				+4.0m	È	5,599,248		±	
Container Terminal (6) Container (6) <thcontainer (6)<="" th=""> Conta</thcontainer>	Γ	olamation		+4.0m	°£	185,875			-
Image: Container Terminal Container Control Contrelation Contrelation Control Contro Control Control Control Cont	ľ	utainer Terminal B	÷		m	700	1.711	3,991	5,702
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Τ		See well	-8.5m to-16.0m	8	50	102	239	341
Container Terminal O Currenting (C Currenting (C Currenting (C Currenting (C Condition Terminal (C Currenting (C Condition Terminal (C Currenting (C Condition Terminal (C Condition Terminal (C Condition Terminal (C Condition Terminal (C Condition (C <thc< th=""> Condition (C <thc< th=""> <t< td=""><td></td><td></td><td>Devenant</td><td></td><td>re</td><td>335,000</td><td>1</td><td>3,350</td><td>3,35</td></t<></thc<></thc<>			Devenant		re	335,000	1	3,350	3,35
Norman Norma Norma Norma <td>T</td> <td></td> <td></td> <td>-1Am (Rathe</td> <td></td> <td>1.050</td> <td>2.566</td> <td>5.986</td> <td>8.55</td>	T			-1Am (Rathe		1.050	2.566	5.986	8.55
Perment Production		Intainer Lerminal U				W.F	250	2 255	2.50
Image: Paremett From the formett F			Hevetment	m0.4+		204 011			4100
It Passinger Bertha Outy well $-11.0m$ m 350 453 1.025 It Revenuest Automatic $-40m$ m 350 423 1.025 3.050 5.00 3.050 5.00 3.050 5.00 3.050 5.00 3.050 5.00 3.050 5.00 3.050 5.00 3.050 5.00 3.050 5.00 5.00 5.00 5.00			Pavement		Έ	410,300		2074	
Image: control of the sector of th	Γ	ssenger Bertha	Quay wall	-11.0m	ε	350	469	1,095	1,564
m m 33.2460	Γ		Revetment	+4.0m	E	350	42	382	424
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$					۲u E	33,250		333	333
Protection 271:62 23:349 55 1 Privated Contingency 10:45 Sub total 10:45 Sub total 2.04 3.514 1 Privated Contingency 15:56 Sub total 15:56 Sub total 3.518 3.118 3.519 1 Englancing Service 55:61 Sub total 15:96 Sub total 3.518 3.118 3.519 1 Englancing Service 55:61 Sub total 15 3.510 3.999 9.9 1 Englancing Service 5.510 3.015 3.125 3.50 1 Lis 1 1 3.125 3.50 3.00 1 Histolina Lis 1 4.46 7.40 4.46 Miscolinational Lis 1 4.46 7.40 4.46 7.40 Miscolinational Service Service 1.460 4.46 7.40 Miscolinational Service 1.460 1.460 4.46 7.40 Miscolinational Miscolinational 1.460 3	Ţ				۴	-281.246	-591	-56	-647
Nome State	T						27,162	23.838	51.000
1 Intraction (1000 calmenty) (1000 callot) (1000 calmenty) <	Ι						2718	2.384	5.100
0 Indirect Cost. 1300 1132 0 Total 1000 1132 1132 1 Total 1000 1000 1132 1 Total 1000 1000 1132 1 Total 1 1 100 1132 1 1 1 1 1 100 11420 1 1 1 1 1 100 11420 11420 1		veloal Contingency	I UNOT SUD TOUR		+		INTO N	3 578	7 850
Engineering Service Shof Sub total Image State State <th< td=""><td>Π</td><td>lireot Cost</td><td>15%of Sub total</td><td></td><td>╋</td><td></td><td></td><td>01000</td><td>0.000</td></th<>	Π	lireot Cost	15%of Sub total		╋			01000	0.000
Total Total So.210 So.210 <td></td> <td>gineering Service</td> <td>5%of Sub total</td> <td></td> <td></td> <td></td> <td>0001</td> <td>1701-1</td> <td>20 40 20 40</td>		gineering Service	5%of Sub total				0001	1701-1	20 40 20 40
Building Building Electric, and Water Supply Building Building Electric, and water Supply Suply Supply Supply		tal contraction of the second s					010'00	066'05	00'00
Building Electric, and Water Supply. Deliver Les L.S. I 0.08 2.800 Building Heidenge Electric, and Water Supply. L.S. 1 6.757 750 Building Heidenges Electric, and Water Supply. L.S. 1 6.757 266 Miscellamoout() Pasemetr Florthe L.S. 1 4.318 1.860 Miscellamoout() Pasemetr Florthe L.S. 1 4.46 740 Presenter Tarminal 1 2.000m ⁴ L.S. 1 4.46 740 Privacial Continency 15565 Sub total L.S. 1 1.2,000 6.415 Privacial Continency 5665 Sub total L.S. 1 1.4200 6.415 Privacial Continency 5665 Sub total L.S. 1 1.4200 6.415 Privacial Continency 15565 Sub total L.S. 1 2.000m ⁴ 2.100 Privacial Contractore 5665 Sub total L.S. 1 2.1200 6.415 Privacial Contractore 16166 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
Building. Electrical L.S. 1 3.06 2.600 Building. Electrical L.S. 1 2.37 750 Miscellaneous Miscellaneous L.S. 1 4.45 - Miscellaneous Electrical L.S. 1 - 4.45 - Sub Total L.S. L.S. 1 - - 4.45 - Soft Sub total L.S. L.S. 1 - - 4.45 - Total Total L.S. No. L.S. No. - 4.45 - - Total Total L.S. No. - - 4.45 - - Total Electrical Total <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
Elevidini LS 1 0.57 750 Mechanicat LS 1 3.12 2.372 255 Mestellamoustry Pasenger Tarminat LS 1 4.6 740 Missellamoustry Pasenger Tarminat LS 1 4.6 740 Missellamoustry Pasenger Tarminat LS 1 - 4.6 - Pasenger Tarminat Entities 2.000m² LS 1 - 4.6 - Pisuit Tarminat Entities 2.000m² LS 1 - 4.6 - Pisuit Tarminat Entities 2.000m² LS 1 - 4.6 - Pisuit Crease Bist Creas Bist Creas Bist Creas - 1.420 6.105 3.235 Compare Locat 1 (1) Bist Creas Bist Creas - 1.6 2.100 3.21 Contro 1 (1) Bist Creas Bist Creas Bist Creas 3.335 - -		ilding, Electric, and Wate			9	•	BUE	0.800	3 108
Electrical L.S. 1 2.372 2.65 Miscellareoue① Electrical L.S. 1 4.16 1.660 Miscellareoue① Pasenger Berthe L.S. 1 4.16 7.40 Personian Bisolitaneoue① Pasenger Berthe 2,000m² L.S. 1 - 4.65 - 740 Personian Bisolitaneoue① 15%0 Sub total L.S. L.S. 1 - - 4.65 - 740 Physical Contingenov 10%of Sub total L.S. L.S. 1 1,200 6415 -	T	ikling			ń a		A 757	750	7.507
Miscellancourd) Les 1 4.56 1.650 Miscellancourd) Passenger Bertha L.S. 1 1 4.55 1.46 - 740 Passenger Tarminal Ubbio Dathineourd) 10% Sub total L.S. 1 1 4.500 6415 - 740 - 740 - 740 - - 1 - 4.5 - - 1 - 4.5 - - 1 - 4.65 -		otrical) ()))		9379	245	2.637
Miscellaneoue(1) Pasemeter Berths LS 1 - 46 - 740 Passinger Tarminal Passinger Tarminal 2,000m* L.S. 1 - 46 - 740 Sub Total 16% Sub total 2,000m* L.S. 1 - 46 - 740 Sub Total 16% Sub total 2,000m* L.S. 1 - 46 - - 740 Displated to continemoty 16% Sub total 2,000m* L.S. 1 - 46 -	T	ohanioal			- - -		4 318	1 8501	6168
Miscellaneous(2) Paseenger Dentie 2,000m² L.S. L.S. T. T.A. Sub Total Sub Total 2,000m² L.S. 1 - T.420 6,405 1 Physical Contingency 10% Sub total 2,000m² L.S. 1 1,420 6,405 1 Physical Contingency 15% Sub total 2,130 961 2,130 961 Indirect Cont 15% Sub total 5 1 1,420 6,405 1 Osrego Handling Equipment 5 5 1 1 1,420 6,405 1 Osrego Handling Equipment 5 5 1 1 1 2 2 2 Osrego Handling Equipment 10 6 6 5 3		scellaneous(1)			ri 0 		145	2221	445
Pareentger Tarminal Pareentger Tarminal 14,200 6,405 1 Sub Total Bub Total 1,420 6,415 6,415 Bub Total 1,420 6,415 6,415 6,415 Date Cent 1,420 6,415 6,415 6,415 Indirect Cent 1,450 5%5 Sub total 2,130 961 Iotal 5%5 Sub total No. x 5Berths No 1,420 6,327 Ourge Handling Eculoment Bulk Creas 18/166 1,420 6,327 32 Ourge Handling Eculoment Bulk Creas Bulk Creas Nos 16 15 33.335 - Ourge Verse Bulk Creas Bulk Creas Nos Nos 2 30 14,400 - - Ourge Verse Bulk Creas Bulk Creas Nos Nos 2 30 14,400 - - - - - - - - - - - - - - - -		soellaneous(2)	- 1		, i			1075	
Sub Total Sub Total 14,200 0,400 0,400 0,400 0,400 0,400 0,400 0,400 0,410		ssenger Tarminal		2,000m ⁵	L.S.			104/	
Physical Contingenory 10%of Sub total 1420 641 Indirect Cort 15%of Sub total 5%of Sub total 9 7,130 961 Engineering Service 5%of Sub total 5%of Sub total 6%1 320 320 Corrego Handling Equipment 5%of Sub total Mox x5Bertine 16 33.33 321 321 Corrego Handling Equipment 8%of Sub total Mox x5Bertine Nos 16 33.33 5 5 Corrego Handling Equipment 108 Nox x5Bertine Nos 30 11,450 6,01 3,323 5 Corrego Nos Nos Nos Nos 2,100 6,11 2,300 5 Ounge Way Ounge Way Pasenger Berth Nos Nos 2,400 5 5 2,400 5 5 Bulk Leminal Bulk Terminal 800k/h Nos 2,400 5 5 5 5 5 5 5 5 5 5		b Total					14,200	6,405	CU0,UZ
Indiract Coart 15% of Sub total 1 2.130 961 Engineering Service 5% of Sub total 5% of Sub total 220 320 Total 5% of Sub total 6 1 1 230 320 Total 5% of Sub total 6 6 6 6 3335 - 20 Operatine 18 8 8 8 8 8 3335 - 6 33355 - - 8 2 3 3335 - - 8 2 3		veloat Contingency	10%of Sub total		-	-	1.420	641	2.06
Image: Engineering Service 5%of Sub totel 10 320 320 Total Total 16,460 6,327 2 Argo Handling Equipment 18,1460 6,327 2 Argo Handling Equipment 18,11490 - - Ourtainer Crene 18,114 - - - Ontainer Crene 18,114 - - - - Ontainer Crene 18,114 - - - - - Outainer Crene 10,05 Nos Nos Nos - <td< td=""><td>Г</td><td>lirent Cont</td><td>15%of Sub total</td><td></td><td></td><td></td><td>2,130</td><td>961</td><td>3,091</td></td<>	Г	lirent Cont	15%of Sub total				2,130	961	3,091
Total Total 18,460 6,327 5,323 5,327 5,323 5,323 5,323 5,323 5,323 5,323 5,323 5,323 5,3333 5,333 5,333 <	Г	rineerine Service	5%of Sub total				710	320	1.030
Carrgo Handling Equipment I No. x5Berthe Nos 15 33.335 - - Container Crene 10 1490 - 0 1,490 - - RTG No. x5Berthe Nos Nos 30 11,490 - - - RTG Nov Nos Nos 0 13,490 - </td <td>Γ</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>18,460</td> <td>8,327 {</td> <td>26,787</td>	Γ						18,460	8,327 {	26,787
Owrkeiner Crene Ontainer Crene 18/1nes No.x 5Berths Nos 15 33.335 - - RTG Container Crene RU No. x 5Berths Nos 15 33.335 - - RTG Aved Tractor Bulk Terminet Nos 0 0 14.490 - - 0 0 - 0 0 - - 0 - - 0 0 1 - 0<									
Container Crene 16/inee 33.335 - - - RTG No. x 5Barths Nos 30 11,490 -	T	reo Handling Equipment							
RTG Nos 30 11,490 - Yard Tracter Nos 00 699 - 0 Qunge Way Pasemper Berth Nos 2 370 - - Qunge Way Bulk Terminal 600t/h Nos 2 2222 - - Bulk Crane Bulk Terminal 600t/h Nos 1 2,122 - - Bulk Crane Bulk Terminal 600t/h Nos 1 2,116 - - Sub Total 5%of Sub total 5%of Sub total - 2,406 - - Total 5%of Sub total - - 2,406 - - - - Total 5%of Sub total - - 2,406 -	Γ	ntainer Grane	18lines	3No. × 5Berthe	Nos	15	33,335	1	33,33
Yard Tracter Yard Tracter Nos Nos 80 699 - 4 Gunge Way Pasesnger Barth 600t/h Nos 2 370 - 44 Bulk Crane Bulk Terminal 600t/h Nos 1 2,222 - 44 Sub Total Entitency 5% of Sub total - 1 2,106 - 44 Entiteering Service 5% of Sub total - 2,406 - 55 - 55 Total - - - 52,927 - - 55 Grand Total - - 52,927 - 55 - 55 Grand Total - - 52,927 - 55 - 55	ľ	0			Nos	30	11,490		11,49
3-4 Gunge Way Passenger Berth Nos Nos 2 370 - 3-5 Bulk Crane Bulk Terminal 800t/h Nos 1 2,222 - 4 3-6 Sub Total Bulk Crane Bulk Crane 800t/h Nos 1 2,222 - 4 3-6 Sub Total Bulk Crane Bulk Crane 2,406 - 4 3-7 Physical Contingenov 5% of Sub total - 2,406 - 5 3-8 Engineering Service 5% of Sub total - 2,406 - 5 7 Total Total - - 52,927 - 5 6 Cotal - - 52,927 - 5 7 total - - - 52,927 - 5 6 - - 52,927 - 5 5 7 total - - - 53,317 14		rd Traoter			Nos	60	669	: :	669
Bulk Crane Bulk Terminat 600t/h Nos 1 2,222 4 3-6 Sub Total Bulk Terminat 600t/h Nos 1 2,222 4 3-6 Sub Total Bulk Crane Bulk Crane 2,406 - 44 3-7 Physical Contingency 5% of Sub total - 2,406 - 5 3-8 Engineering Service 5% of Sub total - 2,406 - 5 3-8 Engineering Service 5% of Sub total - - 5 5 1 Otal Total - - - 5 5 5 5 5 1 Otal - - - - - 5	Γ	man Wav	Passenger Berth		Nos	2	370	-	370
3-6 Sub Total - 48,116 - 44 3-7 Physical Contingency 5% of Sub total 2,406 - 4 3-8 Engineering Service 5% of Sub total 2,406 - 5 3-8 Total 2,406 - 5,406 - 5 1 Total 7 total 5% of Sub total 1 5 5 5 5 1 Total 106.697 39,317 14 14		lk Crane	Bulk Terminet	800t/h	Nos	-	2,222		2,222
3-7 Physical Contingency 5% of Sub total - 2,406 - 5 3-8 Engineering Service 5% of Sub total - 2,406 - 5 1 Total 5% of Sub total - 5 - 5 (1 otal 5% of Sub total - 5 - 5 (1 otal 5% of Sub total - 5 - 5	Ī	b Total					48,116		48,116
3-8 Engineering Service 5% of Sub total - 2,406 - 5 Total 52,927 - 55 5 5 5 India Total 52,927 - 55 5 India 106,697 39,317 14		veicel Contingenoy	5%of Sub total				2,406		2.406
Total 52,927 - 64 and Total 52,927 -	ŀ	rineering Service	5%of Sub total				2,406	,	2,408
Grand Total 39,317							52,927	1	52,927
Grand Total 39,317									
Grand Total 39,317 39,317									
		and Total					108 807	39.3171	148 011

Table 16.3.8. Breakdown of Project Cost(JICA PLAN-B)

(FUTURE	(FUTURE DEVELOPMENT)						Unit : 1,000 OR	00 OR
Ň	Work	Work Item	Remarke	Chit	Quantity	Foreign	Local Local	Total
				Ļ				
E	Oivil Work							
1-1-1	Dredzing	Harbour Area A	-12.0m	Ē	234,617	493	47	540
B		Future Expansion A	+4.0m	۴	1,683,722	-	1	•
11-1-5		τ.	+4.0m	Ē	1,396,875		-	
目-1-6		Future Expansion C	+4.0m	Ē	3,804,550		-	
1-1-10	Future Expansion A	Quey well	-12m	E	086	1,497	3,494	4,991
四-1-11		Sea wall	-11.0m to-12.0m		142	217	506	723
田-1-12		Ravetment	+4.0m	E	200	70	626	969
<u>n</u> -1-13		Revetment	+4.0m	E	1,080	~ ~	2.150	2.389
1-1-14		Pavement		Ê	205,500			2,055
田-1-15	Future Expansion B	Revetment	+4.0m	E	1,160	140		1,407
日-1-16		Pavement		ľε	257,000			2,570
四-1-17	Future Expansion C	Sea wall	-10.0m	E	006	1,038		3,460
四-1-18		Pavement		Ē	240,000	ī	2,400	2,400
日-1-19	Bride			8	004	3,255	+-	4,650
日-1-20	Dredzine			Ē	4,808,149	9,677	922	10,599
田-1-2 1	Sub Total					16,626	19,854	36.480
II-1-22	Physical Contineency	10%of Sub total				1,663	1,985	3.648
<u>m-1-23</u>	Indirect Cost	15%of Sub total		Ļ		2,494		5.472
田-1-24	Engineering Service	5%of Sub total				831		1,824
<u>m-t-25</u>	Total					21,614	25,810	47,424
田-2	Building, Electric, and Water	er Supply						
田-2-1	Building					1	1	1
<u>11-2-2</u>	Electrical					I	1	1
<u>m-2-3</u>	Mechanical					I	1	1
П-2-4	Miscellaneous			Ц		1	1	1
Ш-2-5	Sub Total					J	1	t
Щ-2-В	Physical Contingency	10%of Sub total				1	I	1
П-2-7	Indirect Cost	15%of Sub total				1		1
П-2-8	Engineering Service	5%of Sub total				1	-	ł
П-2-9	[Total					I	-	1
日-3	Cargo Handling Equipment			Ľ				
B -3-1	Sub Total					1	•	1
<u>m</u> -3-2	Physical Contingancy	5%of Sub total				1	-	1
II -3-3	Engineering Service	5%of Sub total		Ц		1		1
II -3-4	Total					1	1	-
TE	Grand Total					21,614	25.810	47.424

Table 16.3.9. Breakdown of Project Cost(JICA PLAN-B)