5.6 Labor Market

The labor supply and demand situation is almost similar to that of national level, though the difficulty of Omani to find out the job opportunity is more severe compared to the North. According to the information from industry, more than 20 times of Omani had applied when they recruit their employee. Table 5.6.1 shows the population in Dhofar region by age group. The employment by industrial sector in 1997 is shown in Table 5.6.2. Although there is no data available about the unemployment rate of Omani, it is easily understandable that there are many potential labors in Dhofar region, when one compares these two tables.

The inflow of Omani labor from other regions is very rare, except for transfer to the offices in Dhofar region from outside within the same company.

Table 5.6.1 Omani Population in Dhofar Region by Age Group

(Unit: person)

Age Group	Population		
	Male	Female	Total
0 - 4	10,544	10,156	20,700
5 - 9	11,124	10,718	21,842
10 - 14	11,542	11,213	22,755
15 - 19	10,228	9,794	20,022
20 - 24	7,362	6,912	14,274
25 - 29	4,710	4,284	8,994
30 - 34	3,347	3,328	6,675
35 - 39	2,666	2,790	5,456
40 - 44	2,348	2,679	5,027
45 - 49	1,927	1,934	3,861
50 - 54	1,770	1,745	3,515
55 - 59	1,666	1,550	3,216
60 - 64	1,055	873	1,928
65 +	2,269	2,155	4,424
Total	72,558	70,131	142,689

Source: Statistical Year Book 1998

Table 5.6.2 Employment by Industrial Sector in Dhofar Region, 1997

(Unit: person)

Subsector	Omani	Non-Omani	Total
Food Products/ Beverages	89	312	401
Wearing Apparel; Dressed/ Dyed Fur	0	0	0
Wood/ Products of Wood/ Cork, Excl. Furniture	0	0	0
Paper/ Paper Products	5	18	23
Printed Materials/ Recorded Media	13	72	85
Refined Petro Products	3	19	22
Chemicals/ Chemical Products	0	9	9
Rubber/ Plastics Products	17	52	69
Other Non-Metallic Mineral Products	168	574	742
Basic Metals	9	19	28
Fabricated Metal Products	12	83	95
Machinery/ Equipment nec.	0	0	0
Office, Accounting/ Computing Machinery	0	0	0
Electrical Machinery/ Apparatus nec.	0	0	0
Medical, Precision/ Optical Instruments	0	0	0
Motor Vehicles, Trailers/ Semi Trailers	0	0	0
Other Transport Equipment	0	0	0
Furniture; Manufacturing nec.	12	49	61
Other Industries	7	33	40
Total	335	1,240	1,575

Source: Ministry of Commerce and Industry, "Yearly Industrial Statistical Book, 1997" (1999)

5.7 Existing Port Facilities

5.7.1 Salalah Port

(1) General

Salalah port is located on the southern coast of the Dhofar region in Oman and about 20km southwest of Salalah municipality. It is the second largest city in Oman. The distance from Muscat, the capital city of Oman, to Salalah municipality is about 1,050km by road and about 660 miles (about 1,200km) by sea. The port is situated about 100km east from the border of the Republic of Yemen and face the Arabian Sea.

The present port, which consists of conventional port and container terminal, is situated immediately to the north of the natural peninsula formed by a limestone ridge. A 1,400m long breakwater is extended to the northeast from the end of the peninsula and protects the port from the SW monsoon.

Until the beginning of the 1970's there was no port in the southern region of Oman and cargo to/from Dhofar was rowed ashore in small boats. During the monsoon season (form June to September), however, such small boats could not operate. The initial development of the port (Raysut Port) was executed from 1971 to 1974 and provided accommodations for small vessels with drafts up to 4m. As economic activities in the southern region began to increase, in 1976 an expansion program to enlarge the harbor to accommodate ships with drafts up to 10m was initiated. The expanded port, which was designed to handle annual cargo throughput of 1,000,000t, was opened in 1980. Under the Second Five Development Plan, in 1982 a container terminal was developed in the existing conventional terminal area, including one container crane, four luffing cranes and other yard facilities to improve container handling efficiency.

In May 1996 a Memorandum of Understanding was signed between the Ministry of Communication and Sea-Land Inc. and its Omani partners for the transformation of the Raysut port into a modern container terminal to attract transshipment, and the first stage of the new container terminal construction project was started. Salalah Port Services Company (SAOG), which is responsible for management and operation of Salala port (the former Raysut port), was established with a 30 year concession contract with the Omani Government holding a 20% share of SPS. Operation commenced on 1st November 1998 when the first vessel called the new container terminal.

In the conventional port, the old container terminal was converted into multi-purpose berth, the existing container crane was relocated to the new container terminal, and a new bulk terminal was constructed.

(2) Breakwater, Channel and Turning Basin

The length of the east breakwater is 1,400m, the depth of the approach channel is 16.5m, and the diameter and depth of the turning basin is 500m and 16.0m, respectively.

Vessels approaching to the port from the easterly or southerly direction should head to the tip of east breakwater.

(3) Berthing Facilities

The port consists of Conventional Port and Container Terminal at present.
In the Conventional Port, there are specialized berthing facilities to accommodate bulk carrier, conventional cargo vessel and oil tanker. There are five deep water berths, five berths for coastal vessel and launches, and one oil pier. The total length of berths is 2,116m. (The back yard for the new bulk terminal has not yet been prepared.) Ministry of Oil and Gas uses the oil pier.
The total area of the Container Terminal length is 54ha including a total berth length of 1,236m. The terminal is equiped with six post panamax and one panamax quay gantry cranes. The terminal is designed for container transshipment operation. In the middle of 2000, five quayside gantry cranes (post panamax (22wide)) and six RTGs (6over/5high) will be installed.

Table 5.7.1 Berths in Port Salalah

Berth Number	Usage	Dimension (m)		Handling Equipment and Facilities
		Length	Draft	
Conventional Terminal				
1,2&3	Multi-Purpose	546	10.0	Rail Mounted Quay Side Crane (15t) 2 Units Rail Mounted Quay Side Crane (6t) 2 Units Shed (3,000m^2)*2
4	General	200	8.0	
5,6&7	Launch(Dhow) and Government Use	345	4.0	Shed (3,000m^2)*2
8		115	4.0	
9	Launch(Dhow)	260	3.0	for Launch Repair
10	Oil Pier		12.0	Oil Boom(300-350m^3/hour) Oil Tanker up to 35,000DWT
New Berth	Bulk Terminal	650	16.0	Back yard is not completed
Container Terminal				
1,2,3&4	Container	1,236	16.0	Quayside Gantry Crane 1 Unit (Panamax, 35t, 22Boxes/hour) Quayside Gantry Crane 6 Units (Postpanamax, 65t, 18wide, 25boxes/hour) Container Yard

Source : Salalah Port Service(SPS)

(4) Container Yard and Storage Area

Container yard and storage facilities are as follows.

Table 5.7.2 Container Yard and Storage in Port Salalah

Area	Dimension and Equipment	
Storage (Conventional Terminal)	Total Area	200,000 m^2
	Transit shed	4Nos.*3,000 m^2
	Mobile Crane (150t)	1 Unit
	Mobile Crane (30t)	1 Unit
Container Yard (Container Terminal)	Total Terminal Area	54 Ha
	Yard Stacking Capacity	9,360 TEUs
	(Reefer Plugs(440V)	432 outlets)
	Empty Container Depot	1,560 TEUs
	RTG(6over/5high)	12 Units
	Reach Stacker(15tons)	2 Units
	Reach Stacker(45tons)	1 Units
	Tractor	47 Units
	Yard Chassis	70 Units
	Crane Maintenance Repair	
	Two Hour Container Repair Facility	
	Reefer Wash Facility	
	Hazardous Containment Bays	
	Fuel Station	
	Emergency Power Plant 2.8MW	
	Sewage Treatment Plant	
	Future Procurement Plan (May 2000)	
	Quayside Gantry Crane Post Panamax (22wide)	5Units
	RTG(6over/5high)	8 Units
	Tractor	10 Units
	Reach Stacker(45tons)	1 Units

Source : Salalah Port Service (SPS)

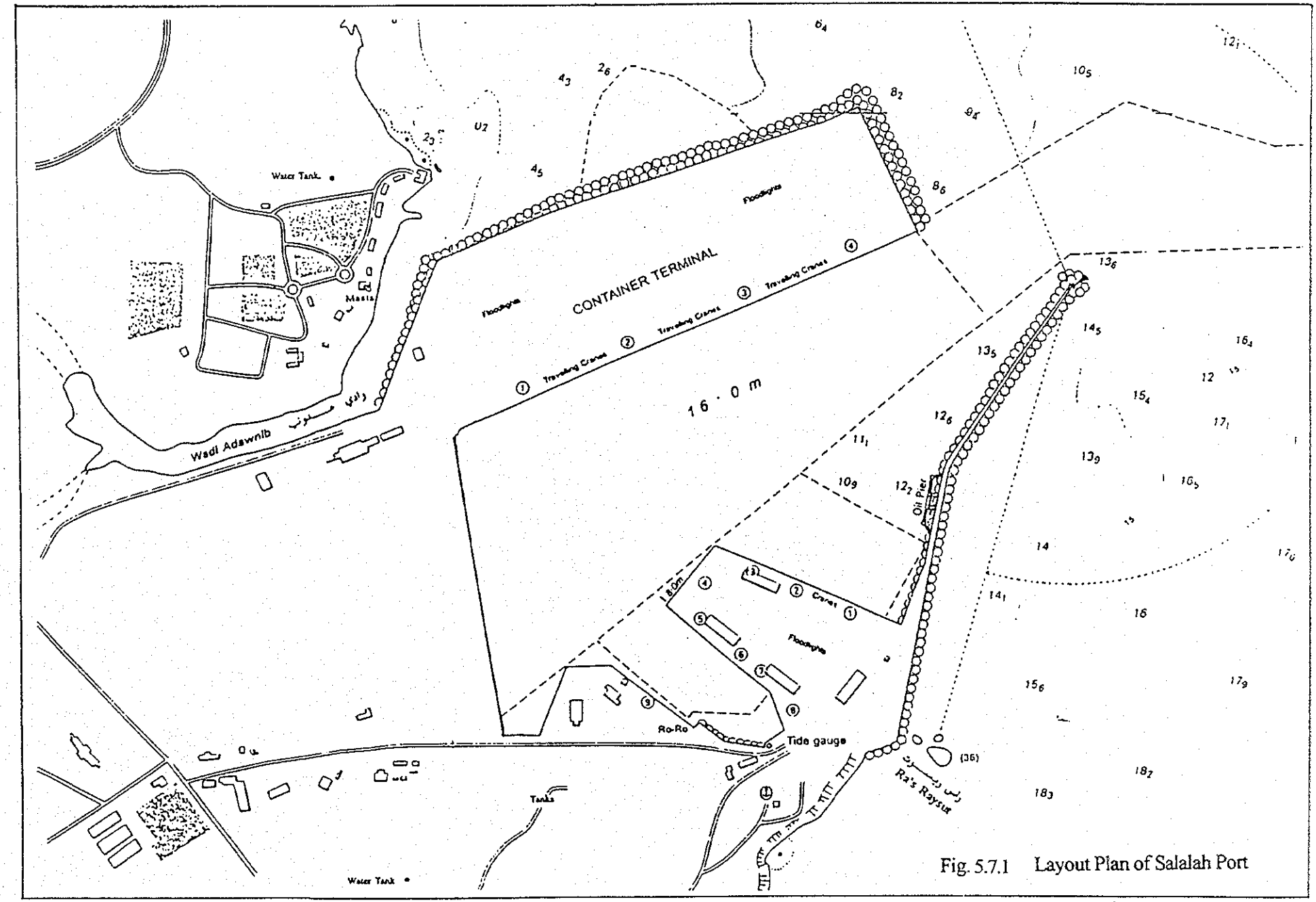


Fig. 5.7.1 Layout Plan of Salalah Port

5.7.2 Sultan Qaboos Port

(1) General

Sultan Qaboos Port is situated in the capital area of The Sultanate of Oman, which is one of most densely populated areas, and an important political and economic center. The development of Sultan Qaboos Port was prioritized to serve as a maritime gateway to the country at the beginning of 1970's. It was completed in 1974 with an annual handling capacity of 2,000,000tons.

The port is located in a natural harbor 250km south of the Hormuz Strait on the Indian Ocean coast which offers saving in sailing time for ships destined for the ports in the Upper Gulf area. By using Oman's first developed highway system, trucks can travel from the port to the United Arab Emirates in four hours, and vice versa.

During the early 1990s, the port underwent a major expansion program including dredging the harbor entrance to a depth of 13 m and land reclamation in Shutaifi Bay with the dredged and other materials. Berth 1 and Berth 2 were upgraded to receive vessels up to 260m LOA and draft of 12.5m. In addition three quayside gantry cranes were added and back-up equipment, and a 150,000m2 container storage area was constructed. In the second phase, construction of the break-bulk reefer storage and control tower are being envisaged. There are also plans to upgrade the information technology, restructure the entrance gate, and construct additional maintenance workshops and support facilities.

A Study carried out by the Ministry recommended that a new port be developed in Sohar area to supplement Sultan Qaboos Port in the next decade, since the development area for the port facilities is limited and the port is situated in the center of the capital.

(2) Berthing Facilities

There are specialized berthing facilities to accommodate all type of vessels, including container ship, bulk carrier and conventional cargo vessel. There are eight deep water berth, three coastal berth and one berth for launches. These berths, the total length is 2,441m are sheltered by a breakwater on one side and cliffs on the other.

Berth 1 and Berth 2 are in-line multi-purpose berths with three quayside container cranes; an underground grain conveyor is extended to Berth 2. Berth 3 is handling general cargo and bulk. Berth 4 and Berth 5 are container terminals with two quay gantry cranes and container marshalling yard. Berth 6 is a RORO and WOWO terminal although break bulk conventional cargo handling is done as well. Berth 7 and Berth 8 can handle general cargo with back-up sheds and Berth 8 is called by Bitumen bulk vessel. Launch also use Berth7 and Berth 8. (See Table 5.7.3)

Table 5.7.3 Berths in Sultan Qaboos Port

Berth Number	Usage	Dimension (m)		Handling Equipment and Facilities
		Length	Draft	
1 & 2	Multi-Purpose	458	13.0	3Nos. Quay Side Container Crane (41t, 36m outreach,27m height,14m Backreach) Grain Conveyor (250t/h)
3	General/Bulk	228	10.2	
4 & 5	Container/General	366	10.9	2Nos. Quay Gantry Crane (35t, 36m outreach, 22m height) Container yard
6	Multi-Purpose	183	9.6	RORO, WOWO, Break Bulk
7 & 8	General/Liquid	366	9.6	Launch and Bitumen, Transit Shed*2
9	General	122	4.0	Transit Shed
10	Government and Coast Guard	183	4.0	
11		223	9.0	
12		160	8.0	
13		500	2.2	

Source : Port Service Corporation(PSC)

(3) Container Yard and General Cargo Storage Area

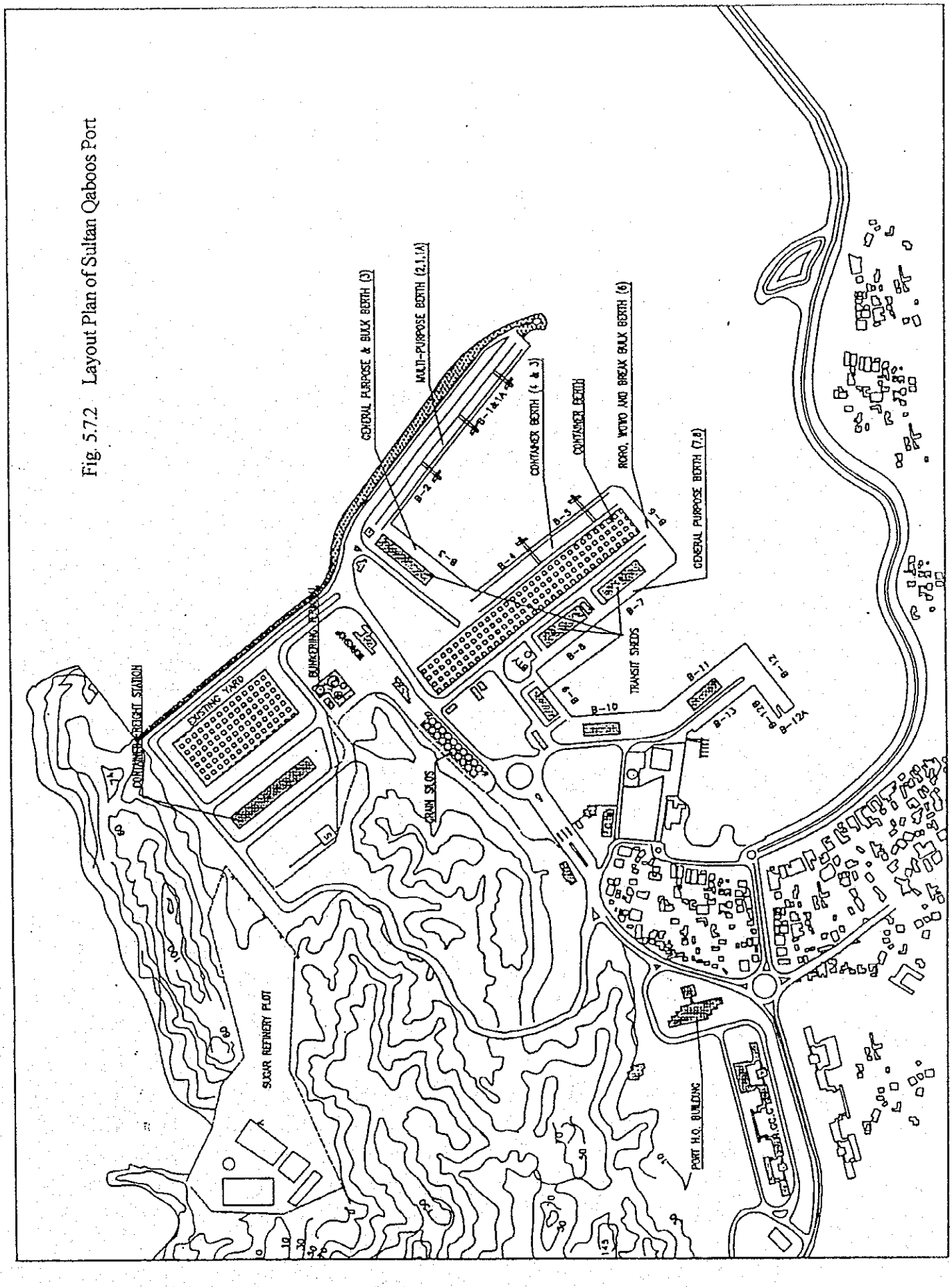
Container yard and storage in the port are as follows. The total number of container ground slots in port area is 2,340 and estimated annual container handling capacity is 300,000TEUs.

Table 5.7.4 Container Yard and Storage in Sultan Qaboos Port

Area	Equipment and Dimensions		
Container Yard	Berth 4&5	Container yard	38,600 m^2
		Number of ground slots	1236 slots
		(Number of reefer plug	192 outlets)
		RTG(40t, 6*4)	6 units
		Tractor	18 units
		Trailers	20 units
	Shutaity Bay	Total Area	150,000 m^2
		Number of ground slots	1104 slots
		(Number of reefer plug	222 outlets)
		RTG(40t, 6*4)	2 units
		CFS	6,000 m^2
		Open Storage	9,000 m^2 + 8,000 m^2
	Equipment	Tractor	18 units
		Trailers	20 units
		Heavy Folk lift (35ton)	6 units
		Heavy Folk lift (25ton)	2 units
		Empty Container Handler	5 units
		Reach Stackers	2 units
General Cargo Storage	Transit shed	(No7&8)3,354 m^2*2 + (No9)1,860 m^2 + (No3) 4,000 m^2	
	Open Storage		175,000 m^2
	Grain Silos		120,000 metric ton
	Bitumen Tank		2,000 metric ton
	Mobile Cranes (3 to 150 ton)		8 units
	Folk lift Trucks (3 to 10 ton)		39 units
	Mafi Trailerd		10 units

Source : Port Service Corporation(PSC)

Fig. 5.7.2 Layout Plan of Sultan Qaboos Port



(4) Access Road

Widening the existing port entrance to three lanes and the completion of a second access road will improve the traffic flow though Sultan Qaboos Port. The new access road links the CFS in Shutaufy Bay to the main highway at a few kilometers away from the Muscat city area. These developments will reduce traffic congestion in the port and around the neighboring area.

5.7.3 Al-Fahal Port

Al-Fahal port, located in Muscat City, is the only port handling petroleum in Oman. The layout plan of offshore facilities is shown Fig. 5.7.3. There is an oil refinery complex in the land area. The port has three main SBM (Single Buoy Mooring) berths and 2 inshore berths for coastal vessels. SMB1 and SMB2 are owned by PDO (Petroleum Development Oman) and SBM3 is owned by Shell Oman Marketing (SOM). PDO marine department operates and maintains these three buoys.

Table 5.7.5 Main Berthing Facilities in Al-Fahal Port

Name of Berth	Type of Berth	Maximum Draft (m)	Maximum Dead Weight (Tones)	Products Handled	Maximum Loading Rate (m^3/hour)
SBM1	SBM	21.0	350,000	Crude Oil Residue	9,500 3,500
SMB2	SMB	N/A	554,000	Crude Oil Fuel Oil	8,700 500
SMB3	SMB	14.0	100,000	Gas Oil Motor Gasoline Jet Fuel	530
Inshore Berth		4.5	Coastal vessel		

Source : Petroleum Development Oman (PDO)

Considering the environmental condition of Muscat, all facilities including oil refinery are expected to be relocated to the new port planned in the Sohar area.

5.7.4 Sohar Port

Sohar city is one of the regional centers in Al Batinah Region and located some 230km northwest from Muscat and about 90km to the UAE (United Arab Emirate) boundary. Al Batinah Region is the next densely populated area after Muscat in Oman. The town was also the capital of Oman before Islam and is famous for its production and export of copper since long time ago and Majees Jetty was used for copper import/export.

The Study on The Port Development for Northern Oman by JICA (Japan International Cooperation Agency) in 1990 recommended a new port at Sohar and MOC of Oman decided to develop new port, considering location, population, existing infrastructure distance from the neighboring market and construction cost. In June 1998 an agreement was signed between Japan Export & Import Bank and the Government of Oman, and construction project was commenced in July 1999.

The port will comprise a main harbor and a fishery harbor with a 3.6km north breakwater and a 2.4km south breakwater. Approach channel and turning basin will be dredged to16.5m and 16.0m, respectively at Phase 1, requiring a total dredging volume of 14,000,000 m^3. Construction of an 850m general cargo/container wharf, two liquid berths, two aluminum bulk berths and Government wharves is ongoing and is scheduled to be completed by the beginning of 2003. (See Fig. 5.7.4) MOC is also studying a mechanism to allow a private sector operate the new port. Other industrial development projects such as dry dock for ship repairing, steel plan and so on are planned in the port area. LNG pipe line from gas field is now being prepared and LNG will be supplied to power plan, polyolefin project, aluminum project and others.

5.7.5 Sur (Qalhat) Port

Sur city is one of the regional centers in Ash Sharqiyah Region and located about 340km southeast from Muscat, facing the eastern end of the Gulf of Oman. The city had historically an important role in trade and navigation in Indian Ocean and is famous for ship (Dhow) building. Qalhat port is now being developed under an LNG export project. The gas fields in Central Oman were discovered between 1989-1991 and have been developed by PDO which is responsible for upstream operation. Oman LNG L.L.C was established under the Royal Decree to handle the downstream operation of the LNG export project that includes liquefaction, transportation and sale. In November 1996, construction work on site started and first shipment will be expected in April 2000. The LNG export terminal is located at a semi-sheltered site close to the small village of Qalhat with an open unobstructed deep approach channel. The terminal area is sheltered from the influence of the SW monsoon by Al Hajar ash Sharqi Mountain, but is exposed to the NE monsoon.

Table 5.7.6 Berthing Facilities in Sur (Qalhat) Port

Name of Berth	Type of Berth	Maximum Draft (m)	Maximum Dead Weight (Tones)	Products Handled	LNG Storage
LNG Berth	Offshore Jetty	12.1	125,800	LNG	2*120,000m^3
MOF Jetty	Offshore Jetty	7.9	13,000	Minerals Offloading	

Source : Oman LNG L.L.C.

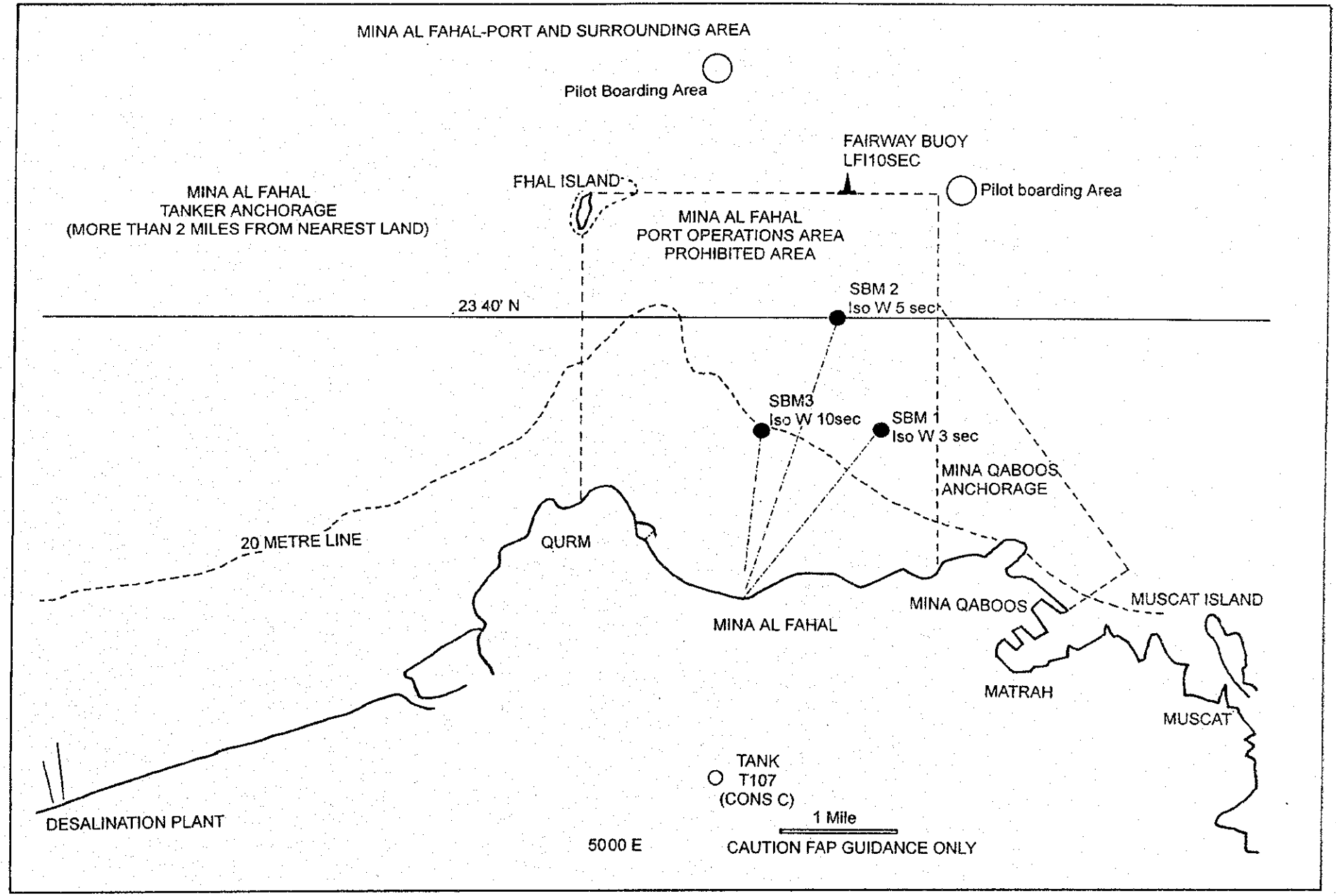


Fig. 5.7.3 Layout Plan of Al Fahal port

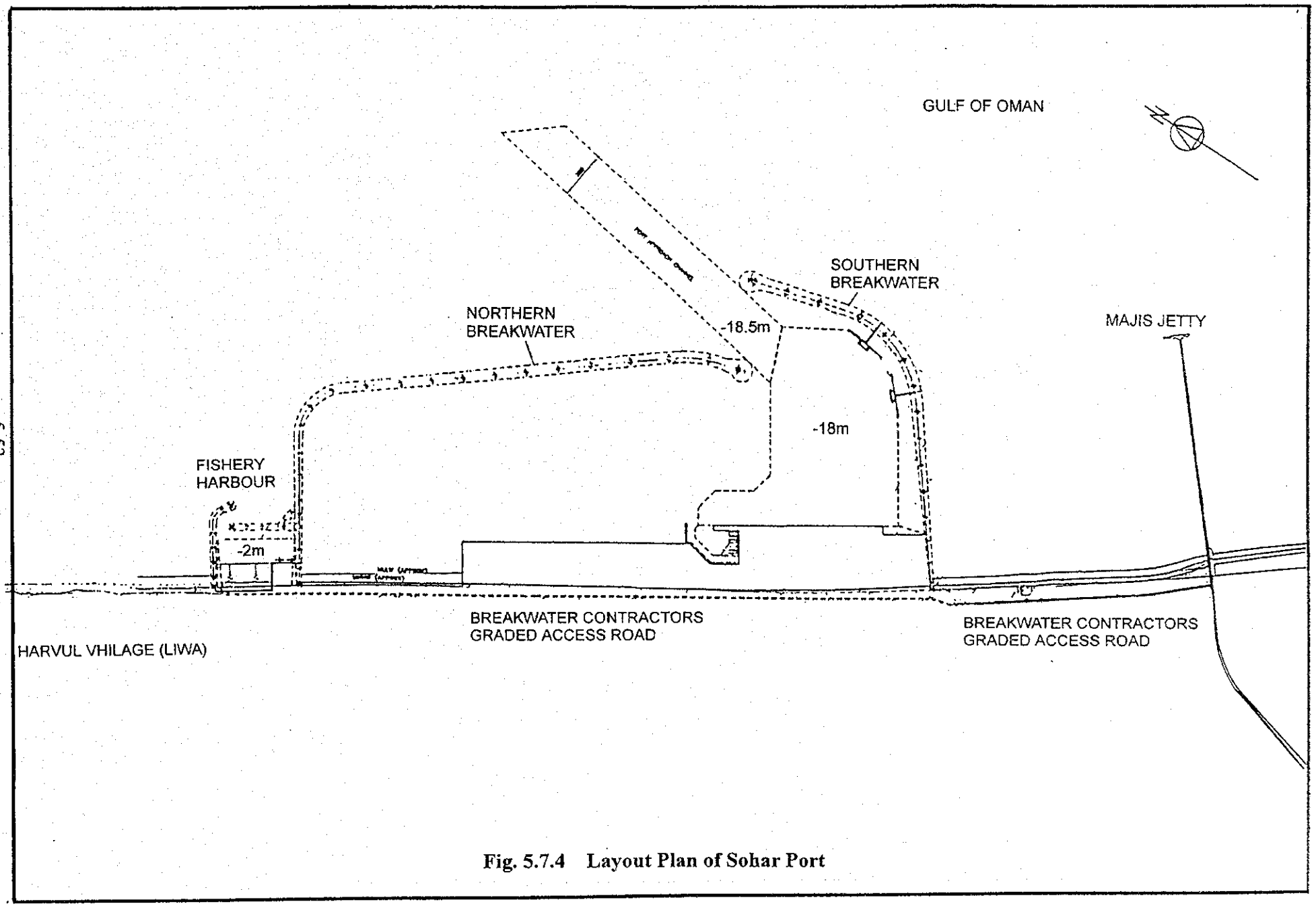


Fig. 5.7.4 Layout Plan of Sohar Port

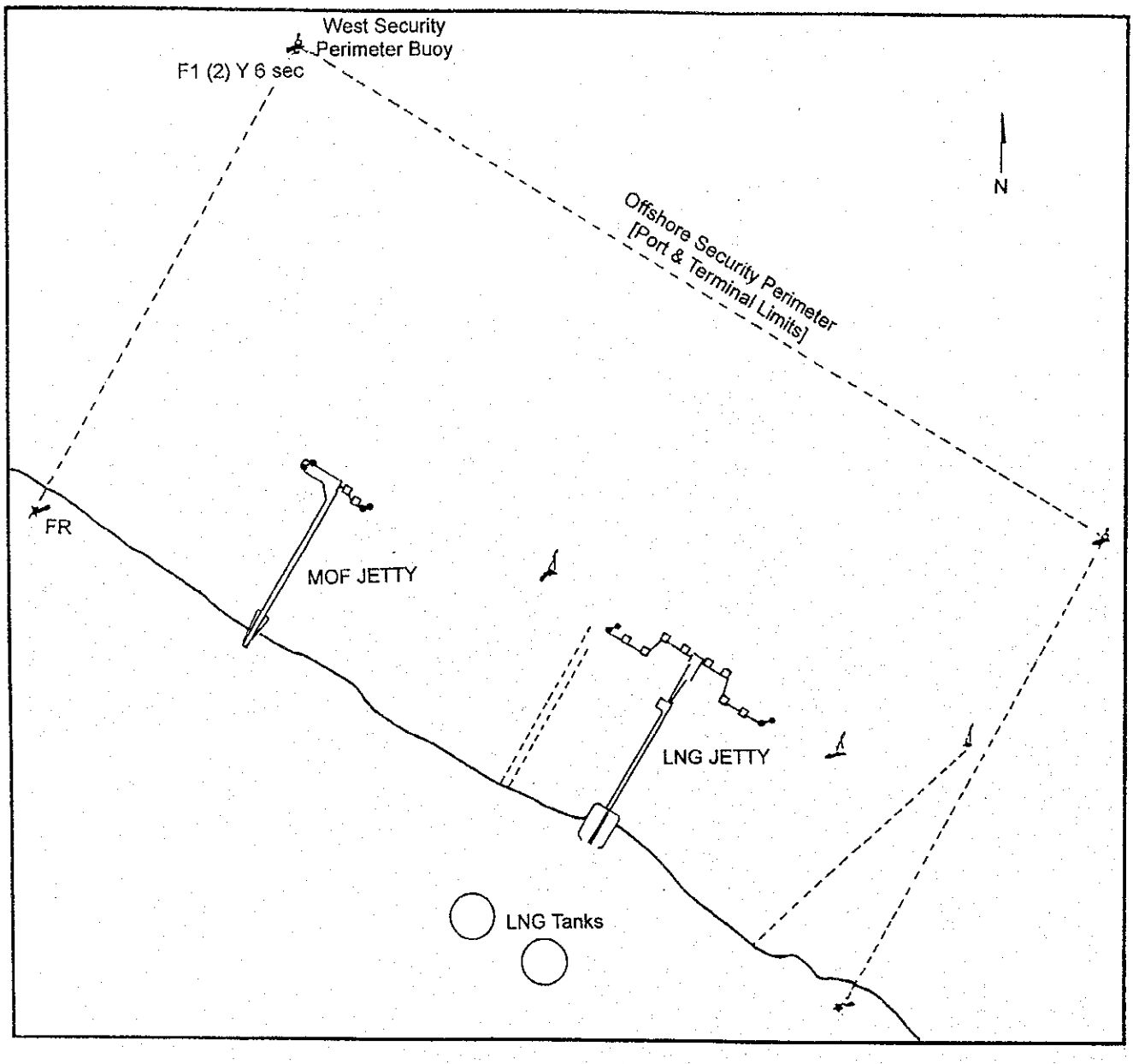


Fig. 5.7.5 Layout Plan of Sur (Qalhat) Port

5.8 Port Cargo Throughput

5.8.1 Salalah Port

(1) Cargo Throughput

In 1999, the container terminal in Salalah port handled 628,647TEUs, in which 1,927TEUs was loaded import container, 706TEUs was loaded export container, 516,522TEUs was loaded transshipment and the remainder was empty container. (See Fig. 5.8.1 and Table 5.8.3) The container volume handled at the old container terminal (although no detailed data exists) in the conventional port was less than 500TEUs for the past several years. After the new container terminal started service in November 1998, not only transshipment container volume but also import/export container volume rapidly increased. Service routes calling the container terminal can be divided into six origin/destination areas, namely East Bound Main route, West Bound Main route, East Africa/Indian ocean Island area, Red Sea area, Indian Subcontinent and Gulf area. The share of container handling volume by service route during December 1999 is shown in Figure 5.8.2.

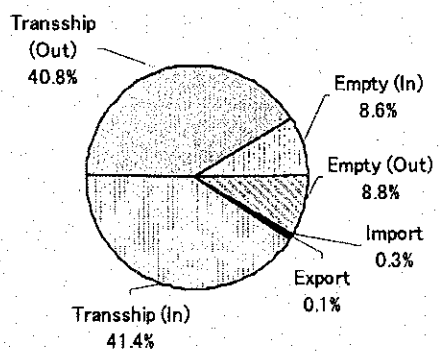


Fig. 5.8.1 Container Share by Handling Type in Salalah Port

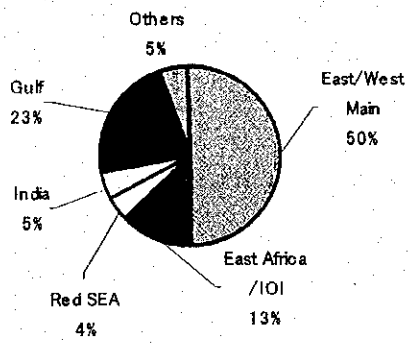
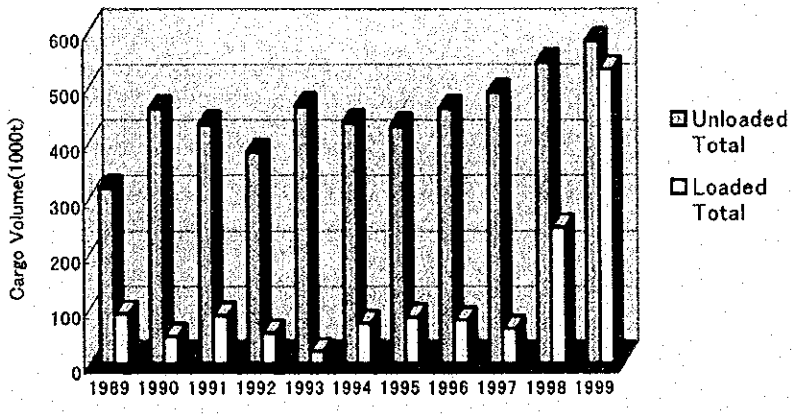


Fig. 5.8.2 Container Share by Service Route in Salalah Port

In 1999, the conventional port in Salalah handled about 1,113,000tons; 582,000tons of unloaded cargo and 531,000tons of loaded cargo. Until 1997 the annual unloaded volume was less than 500,000tons which included about 300,000tons of Fuel cargo and annual loaded volume was less than 100,000tons which included from 50,000tons to 80,000tons of cement cargo. (See Table 5.8.2 and Fig. 5.8.3)

Launch (Dhow Shipping) is an important transport means in the Gulf and Indian Ocean area as it supports local economies. During the 1980's less than 100 Launches called Raysut (Salalah) port, but more than 200 Launches have called recently. Export volume by Launch has increased, but on the other hand import volume has decreased for the past four years.

(See Table 5.8.4) The shares of origin/destination of the launch are 39.2% Nishtoon, 25.4% Bosaso(Somalia), 15.8% Sehoot, 4.6% Mukala(Yemen), 4.6% Saqtra.



Source : Salalah Port Service(SPS)

Fig. 5.8.3 Cargo Volume in Salalah Conventional Terminal

Cargo volume by cargo styles handled in 1999 excluding transshipment container is summarized in Table 5.8.4. The volume of dry or liquid bulk type cargo including fuel represents more than 75% of the total cargo.

Table 5.8.1 Export/Import Volume Handled in Salalah Port by Cargo Styles in 1999

Cargo Style	Unloading	Loading	Total	Share (Incl. Fuel)	Share (Excl. Fuel)
Container	19,300 t (1927TEUs)	7,100 t (706TEUs)	26,400 t (2,633TEUs)	2.3 %	3.6 %
Bulk	126,600 t	344,000 t	470,600 t	41.3 %	63.4 %
Bulk(Fuel)	398,200 t	0 t	398,200 t	34.9 %	-
General Cargo	50,800 t	132,600 t	183,400 t	16.1 %	24.7 %
Launch	6,800 t	54,500 t	61,300 t	5.4 %	8.3 %
Total	601,700 t	538,200 t	1,139,900 t	100.0 %	100 %

Source : Salalah Port Service(SPS)

Note : Container cargo volume is assumed as 10t per TEU by Consultant

Bulk(Fuel) in this Table is domestic cargo

A certain part of container cargo to/from Salalah area and Dhofar region is transported by road through Qaboos port, which is the same as before the new container terminal in Salalah began operations.

Table 5.8.2 Cargo Handling Volume in Salalah Port

(Unit 1,000 ton)

Year / Commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Unloaded											
1. Food Stuff	6.6	12.6	7.5	4.2	16.9	14.2	9.1	15.5	24.3	50.7	94.0
1.1 Rice	3.0	10.0	4.9	2.5	3.3	2.0	0.5	1.5	1.1	-	0.6
1.2 Suger	2.0	-	-	-	3.1	-	-	-	-	-	-
1.3 Frozen Food	1.1	2.2	2.3	1.2	1.1	1.5	1.0	0.7	1.5	0.7	0.1
1.4 Wheat	-	-	-	-	-	-	-	-	11.9	-	85.6
1.5 Others	0.5	0.4	0.3	0.5	9.4	10.7	7.6	13.4	9.8	50.0	7.7
2. Construction	22.7	64.5	47.9	22.2	12.3	20.5	37.2	32.4	34.5	41.4	18.6
2.1 Timber	0.8	-	-	-	-	-	-	-	-	-	-
2.2 Cement	-	-	-	-	-	-	-	-	-	-	-
2.3 Steel & Pipes	21.9	26.7	47.9	22.2	12.3	13.2	8.4	23.8	20.0	24.7	17.9
2.4 Others	-	37.8	-	-	-	7.3	28.8	8.6	14.5	16.7	0.7
3. Vehicles (No.)	224	251	57	560	375	223	1,226	315	349	497	1.6
4. Others	287.9	381.4	376.9	350.4	433.9	399.1	378.8	411.5	429.9	450.2	468.2
4.1 General Cargo	43.1	19.1	27.4	14.8	9.8	7.1	7.3	7.2	12.9	12.3	6.4
4.2 Iron Ore	-	-	-	-	58.8	14.9	-	22.8	58.5	33.8	14.3
4.3 Fuel	207.9	296.1	265.9	265.0	293.3	293.6	309.5	323.8	346.8	375.1	398.2
4.4 Cattle Feed	36.7	66.2	83.6	70.6	72.0	83.2	61.0	56.6	8.9	24.3	35.4
4.5 Live Stock	0.2	-	-	-	-	0.3	1.0	1.1	2.8	4.7	3.7
4.6 Palm Oil											10.2
Total	318.1	460.4	432.7	382.3	466.1	435.7	428.7	461.5	490.2	544.0	582.5
Loaded											
1. Cement	88.0	42.0	79.0	47.0	15.0	69.0	78.0	72.0	49.0	84.7	430.0
2. Flour	-	-	-	-	-	-	-	-	-		36.2
2. Others	2.0	10.0	9.0	9.0	8.0	5.0	7.0	7.0	14.0	162.3	64.9
Total	90.0	50.0	88.0	56.0	23.0	74.0	85.0	79.0	63.0	247.0	531.1

Source : Salalah Port Service (SPS)

Table 5.8.3 Container Handling Volume at Salalah Container Terminal in 1999

INBOUND										
	Import(Loaded)		Transship(Loaded)		Empty		Total			
	20Feet	40Feet	20Feet	40Feet	20Feet	40Feet	20Feet	40Feet	Box	TEUs
Jan	96	21	1,651	884	39	73	1,786	978	3,476	3,742
Feb	22	8	1,833	984	260	404	2,115	1,396	4,208	4,907
Mar	43	21	2,205	1,046	49	158	2,297	1,225	4,551	4,747
Apr	58	37	2,783	2,251	262	325	3,103	2,613	6,148	8,329
May	24	31	7,069	8,605	1,429	2,146	8,522	10,782	17,020	30,086
Jun	60	27	9,334	9,997	1,734	2,675	11,128	12,699	22,196	36,526
Jul	134	61	10,071	11,113	2,100	2,522	12,305	13,696	24,476	39,697
Aug	74	55	10,172	10,754	1,813	2,183	12,059	12,992	24,044	38,043
Sep	67	95	9,047	10,897	1,765	3,217	10,879	14,209	21,691	39,297
Oct	60	81	9,902	12,209	1,858	2,251	11,820	14,541	23,580	40,902
Nov	104	44	8,143	9,769	1,871	1,952	10,118	11,765	20,132	33,648
Dec	109	57	9,635	10,623	1,726	1,711	11,470	12,391	22,831	36,252
Total	851	538	81,845	89,132	14,906	19,617	97,602	109,287	194,353	316,176
OUTBOUND										
	Export(Loaded)		Transship(Loaded)		Empty		Total			
	20Feet	40Feet	20Feet	40Feet	20Feet	40Feet	20Feet	40Feet	Box	TEUs
Jan	34	4	1,709	884	31	44	1,774	932	3,514	3,638
Feb	13	12	1,610	853	288	461	1,911	1,326	3,809	4,563
Mar	11	6	2,455	1,191	152	181	2,618	1,378	5,225	5,374
Apr	2	7	2,310	1,858	200	175	2,512	2,040	5,022	6,592
May	8	18	6,925	7,943	837	1,633	7,770	9,594	15,532	26,958
Jun	38	27	8,720	9,868	2,055	2,800	10,813	12,695	21,588	36,203
Jul	16	5	9,548	10,530	2,220	2,770	11,784	13,305	23,552	38,394
Aug	24	20	10,094	11,008	2,057	2,340	12,175	13,368	24,326	38,911
Sep	20	17	9,363	10,719	1,988	3,405	11,371	14,141	22,722	39,653
Oct	80	27	10,190	12,342	1,682	1,992	11,952	14,361	23,824	40,674
Nov	31	30	8,541	10,187	1,608	1,861	10,180	12,078	20,329	34,336
Dec	25	29	9,198	10,492	2,466	2,222	11,689	12,743	23,353	37,175
Total	302	202	80,663	87,875	15,584	19,884	96,549	107,961	192,796	312,471
Grand Total	1,153	740	162,508	177,007	30,490	39,501	194,151	217,248	387,149	628,647

Source : Salalah Port Service(SPS)

Table 5.8.4 Cargo Handling Volume by Launch/Ship at Salalah Conventional Terminal

Year	Unload/Load	By Launch (1,000t)	By Ship (1,000t)	Total (1,000t)	Share of Launch(%)
1996	Unload	14.4	447.1	461.5	3.1
	Load	15.4	63.6	79.0	19.5
1997	Unload	10.4	479.9	490.3	2.1
	Load	15.0	40.1	55.1	27.2
1998	Unload	15.2	528.8	544.0	2.8
	Load	26.2	220.8	247.0	10.6
1999	Unload	6.8	575.7	582.5	1.2
	Load	54.5	476.6	531.1	10.2

Source : Salalah Port Service(SPS)

(2) Major Shipper of Salalah Port

1) SHELL (Ministry of Oil and Gas)

All fuels are handled in the Oil Pier owned by SPS. The storage facilities in the port area are owned by the Ministry of Oil and Gas and have been operated by SHELL for the past 27 years. Average shares of Jet (A1), Gasoline, Gas Oil and Light Fuel are about 10%, 20%, 60%, 10%, respectively. The major user of Gas Oil is electric power stations in Dhofar Region. After some natural gas electric power stations go into operation, the demand for Gas Oil will decrease around half of the present volume.

2) Raysut Cement Company

The Raysut Cement Company started commercial operation in 1984 with 250,000ton per year capacity. In 1998, a new production line added which increased the total annual production capacity to 750,000tons. In 1999 total production was 650,000tond and over 430,000tons were exported. About 80% of export volume was shipped by bulk to Yemen (Aden, Makala), Mauritius, Reunion and other countries, and the balance was shipped by bagged cargo. Domestic limestone is used as main raw material and about 10,000t of iron ore and Pozzolana was imported from India and Greece for Oil well cement.

3) Dhofar Cattle Feed Company

Total volume of products in 1999 was about 60,000tons and 70% of product was sold in the Dhofar region and the balance was sold in Yemen, desert and the northern part of Oman. Raw materials such as barley, maize and Soybean came from Australia, Canada, EU and others by bulk. Fifty percent of wheat bran came from Tanzania in bag and the rest came from Salalah Mill Company. Fishmeal came from Argentina, Peru and Scandinavia and

other additives were imported by bag. Methonine and other chemical additives were imported from EU and Japan by container.

4) Salalah Mill Company

The Salalah Mill Company which uses conventional port only at present, started commercial production in Jan. 1998. The annual production capacity is 100,000tons at present. In 1999 about 100,000tons of raw material (wheat) was imported by bulk from Australia and Argentine and total product was about 80,000t. About 50% of production was exported. All cargo shipped in bag, and about 45% of export volume were shipped by Dhow and the balance was by conventional. The export market covers Yemen, Somalia, Ethiopia, Djibouti and Tanzania.

5) Oman Drilling Mud Products Company

The company imports barium, sulfate and bentonite. Total volume is 20,000tons per year. Export volume has fluctuated between 3,000tons and 10,000tons depending on the crude oil price.

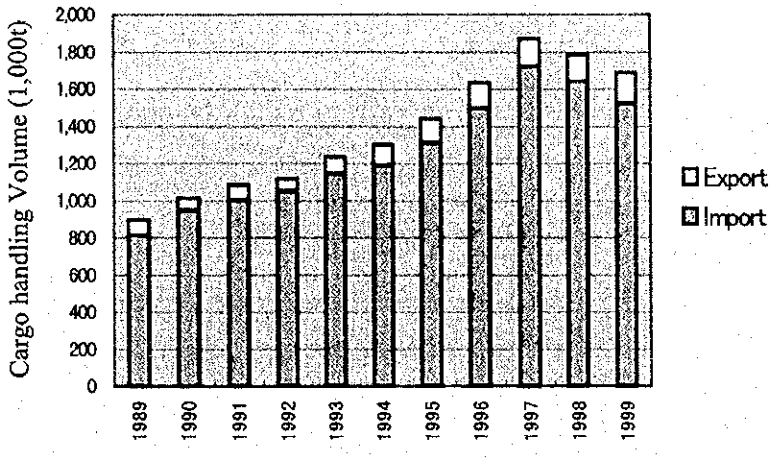
6) Dhofar Vegetable Oil Company

Commercial operations at the factory started in Jan 1999. Palm oil was imported from Malaysia and corn and sunflower oil from the USA in liquid bulk, and plastic materials were imported by container. About 70% of products are exported by break bulk or container.

5.8.2 Sultan Qaboos Port

(1) Cargo Throughput

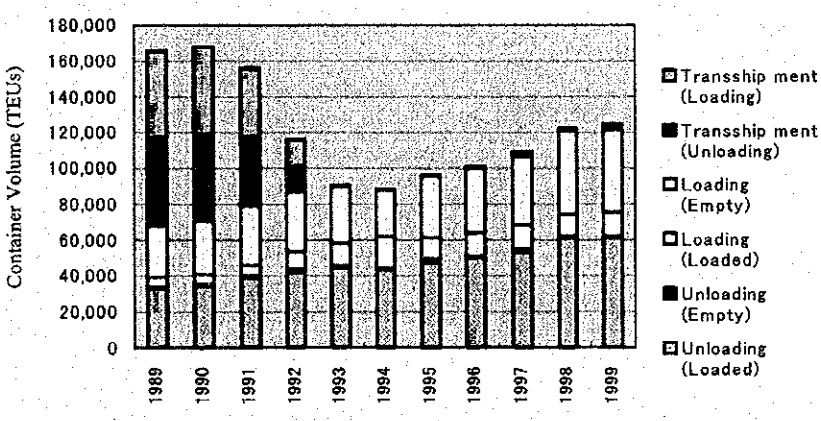
Until 1997 total cargo volume handled in Sultan Qaboos Port increased steadily year by year, the volume in 1990 was over 1,000,000ton and in 1997 over 1,700,000ton, and the average annual growth rate was more than 8%. In 1998 and 1999, however, the volume decreased about 5% per year. The major factor was the decreased handling volume of steel materials. (See Table 5.8.6)



Source : Port Service Corporation(PSC)

Fig. 5.8.4 Total Cargo Handling Volume in Sultan Qaboos Port

Container handling volume in Sultan Qaboos Port is shown in Fig. 5.8.5. In 1990 transshipment container volume was about 100,000TEUs and import/export volume was about 70,000TEUs. Since 1993 the volume of transshipment container has been very small (less than 500TEUs in 1993 and about 3,000TEUs in 1999), because only feeder service routes called the port in these days. (See Table 5.8.7)



Source : Port Service Corporation(PSC)

Fig. 5.8.5 Container Handling Volume in Sultan Qaboos Port

Import/Export loaded container volume in 1994 was about 61,000TEUs and in 1999 about 74,000 TEUs, yielding an average annual growth rate of about 4%. The growth rate is almost the same as constant price GDP growth rate during same period.

(1) Cargo Type

Cargo volume by cargo type in 1999 is shown in Table 5.8.5. The share of container cargo to total volume of the cargo handled in Sultan Qaboos is around 50% and the share for general cargo is about 80%. This indicates that, in general, containerizable cargoes have already been containerized. Major dry bulk cargoes were grains for Oman Flour Mill Company and cement clinker. Liquid bulk cargoes were vegetable oil and bitumen.

Table 5.8.5 Cargo Volume by Cargo Type in Sultan Qaboos in 1999

(Unit ton)

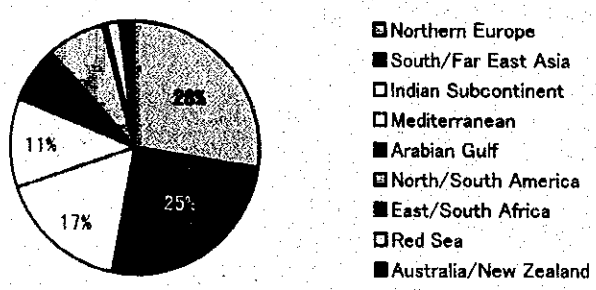
Cargo Type	Import	Export
Bulk Cargo (Dry)	421,874	0
Bulk Cargo (Liquid)	68,087	0
General Cargo	151,946	17,859
Container	*654,232	*118,847
RO-RO & Vehicles	67,925	0
Livestock	25,298	0
Total	1,389,362	136,706

Source : Port Service Corporation (PSC)

Note : * these figures are extracted by the Study Team based on statistical data

(2) Origin and Destination of Container Cargo

The origin and destination of import container cargo in 1998 is shown in Fig. 5.8.6. The major trade partners are northern Europe, South/Fareast Asia and Indian subcontinent. (See Table 5.8.8)



Source : Port Service Corporation(PSC)

Fig. 5.8.6 Origin and Destination of Import Container Cargo in 1998

Table 5.8.6 Cargo Handling Volume in Sultan Qaboos Port

(Unit 1,000 ton)

Commodities \ Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Unloaded											
1. Food Stuff	357.5	438.9	415.5	410.9	450.9	523.8	536.6	480.1	669.1	644.4	652.7
1.1 Rice	42.9	62.4	55.4	47.1	65.0	51.0	72.9	80.7	87.4	90.2	99.1
1.2 Wheat & Flour	134.6	171.8	129.3	151.5	135.4	204.3	163.6	138.5	315.6	286.9	229.1
1.3 Maize	8.4	21.8	21.9	12.0	34.2	34.9	34.3	4.5	30.2	28.9	52.8
1.4 Barley	27.3	28.8	36.8	38.7	35.1	38.3	68.7	67.0	43.7	48.3	36.1
1.5 Sugar	10.5	22.7	14.4	13.8	15.5	18.2	10.1	16.9	15.2	8.7	6.7
1.6 Frozen Food	47.1	38.7	43.5	34.8	36.0	39.1	45.7	46.3	46.3	50.7	67.2
1.7 Others	86.7	92.7	114.2	113.0	129.7	138.0	141.3	126.2	130.7	130.7	161.7
2. Construction	116.7	134.8	151.3	159.4	191.1	141.0	111.8	153.1	312.1	287.8	140.3
2.1 Timber	31.6	44.3	51.5	38.3	37.5	28.9	30.7	23.3	22.1	31.5	31.8
2.2 Cement-bagged	13.1	7.0	-	-	2.5	0.2	-	-	16.8	4.6	0.1
2.3 Steel	56.0	70.2	86.7	105.6	129.3	92.2	56.7	106.4	237.8	211.2	74.3
2.4 Others	16.0	13.3	13.1	15.5	21.8	19.7	24.2	23.45	35.4	40.5	34.1
3. Vehicles (No.)	19,122	26,254	34,353	48,354	48,810	41,598	33,024	39,711	46,291	50,399	-
4. Others	312.4	330.4	381.4	402.9	427.3	462.4	601.8	864.4	741.1	706.4	730.2
4.1 Livestock	18.0	19.5	23.2	24.2	26.7	32.4	30.7	39.6	27.6	23.3	25.3
4.2 General Cargo	287.7	305.4	350.0	369.6	390.1	419.6	558.5	811.6	698.8	662.3	684.7
4.3 Spareparts	6.7	5.5	8.2	9.1	10.5	10.4	12.6	13.2	14.7	20.8	20.2
Total	814.4	945.9	1,003.4	1,051.1	1,145.8	1,192.4	1,309.1	1,497.6	1,722.3	1,638.6	1,523.2
Loaded											
1. Dates	0.4	0.8	0.9	7.7	5.3	4.3	4.2	4.2	3.0	7.6	4.1
2. Others	80.1	66.3	77.5	57.1	81.7	103.5	124.8	130.4	142.8	135.8	161.5
Total	80.5	67.1	78.4	64.8	87.0	107.8	129.0	134.6	145.8	143.4	165.6

Source : Port Service Corporation (PSC)

Table 5.8.7 Container Handling Volume in Sultan Qaboos Port

(Unit TEUs)

	Unloading (Loaded)	Unloading (Empty)	Loading (Loaded)	Loading (Empty)	Transshipment (Unloading)	Transshipment (Loading)	Total
1989	33,001	938	5,349	28,511	49,415	48,118	165,332
1990	34,271	1,153	5,148	29,737	48,718	48,846	167,873
1991	39,121	905	5,761	33,346	38,381	38,090	155,604
1992	42,198	1,350	9,774	33,530	13,898	15,041	115,791
1993	44,808	829	12,397	31,902	185	231	90,352
1994	43,480	836	17,456	26,106	109	161	88,148
1995	47,797	1,306	12,149	34,353	162	183	95,950
1996	50,152	978	12,670	36,206	437	410	100,853
1997	53,274	1,455	13,876	37,948	1,386	1,248	109,187
1998	61,103	1,088	12,006	46,475	644	949	122,265
1999	61,204	844	13,135	46,284	1,664	1,672	124,803

Source : Port Service Corporation (PSC)

Table 5.8.8 Origin and Destination of Container Cargo in Sultan Qaboos Port

Unit (TEUs)

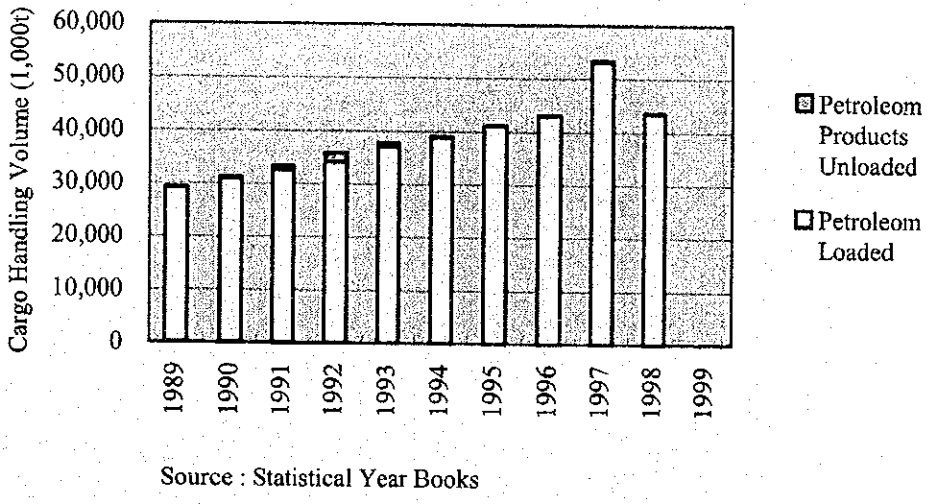
Year	1996			1997			1998		
Origin/Destination	Import	Export	Total	Import	Export	Total	Import	Export	Total
Northern Europe	17,742	1,120	18,862	14,719	1,288	16,007	16,625	1,179	17,804
South/Far East Asia	12,617	6,129	18,746	12,812	4,621	17,433	15,395	2,075	17,470
Indian Subcontinent	8,739	1,936	10,675	9,315	2,842	12,157	10,048	2,821	12,869
Mediterranean	690	404	1,094	5,481	694	6,175	6,887	739	7,626
Arabian Gulf	5,277	2,133	7,410	5,150	2,440	7,590	4,394	2,886	7,280
North/South America	3,615	246	3,861	3,588	713	4,301	4,526	550	5,076
East/South Africa	292	233	525	229	569	798	319	1,225	1,544
Red Sea	103	413	516	969	368	1,337	978	487	1,465
Australia/New Zealand	1,511	80	1,591	1,116	71	1,187	1,212	44	1,256

Source : Port Service Corporation (PSC)

5.8.3 Al-Fahal Port

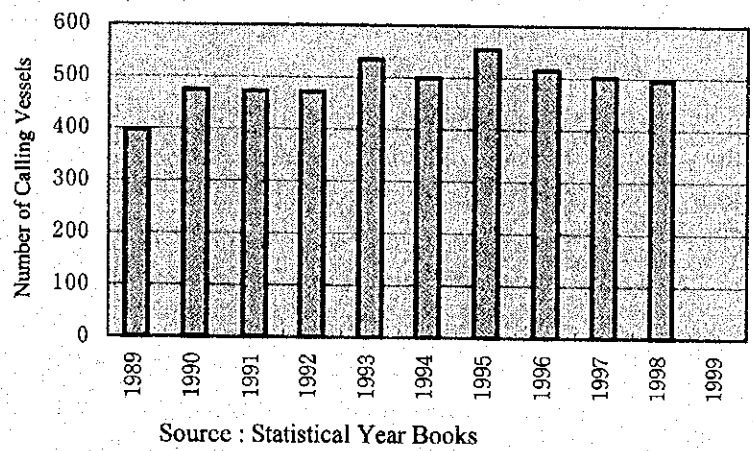
Petroleum cargo volume handled in Al-Fahal port is shown in Fig. 5.8.7. Until 1997, loaded volume has steadily increased, reaching 53millon tons in 1997. In 1998, however, loaded volume decreased 20%. In 1992 unloaded petroleum volume was more than 1,700ton, but the volume has fallen to 200tons per year recently.

The handling volume at Al-Fahal port does not depend on the economic activity of Oman, but was decided based on national economic policy because petroleum exports represent more than 70% of Government revenue.



Source : Statistical Year Books

Fig. 5.8.7 Cargo Handling Volume in Al-Fahal Port



Source : Statistical Year Books

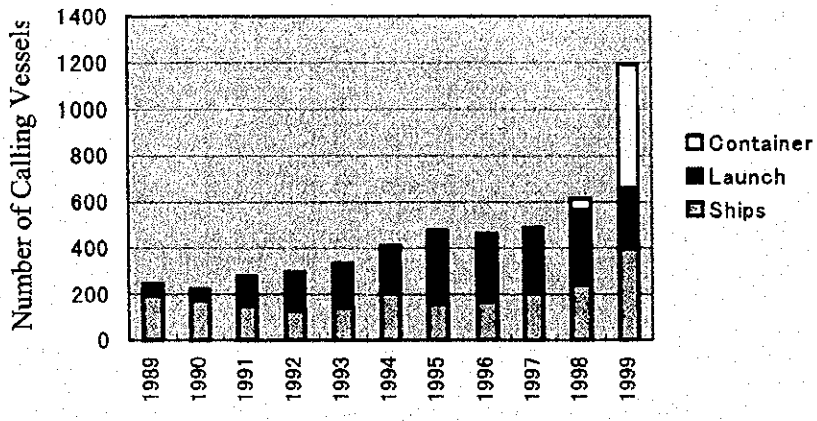
Fig. 5.8.8 Number of Calling Vessel in Al-Fahal Port

5.9 Calling Vessels

5.9.1 Salalah Port

The number of calling vessels for the past 11 years(1989-1999) is shown in Fig.5.9.1. In 1999, 1,194 vessels called Salalah port, that is, 536 container vessels, 398 general and bulk vessels, and 260 launches.

Total number of calling ships in Salalah has steadily been increasing. In Nov 1998 the new container terminal started operation and in 1999 the number of calling ships had almost doubled. The trend in the number of calling ships (general and bulk cargo vessels) coincided with the cargo volume handled in the conventional port.



Note : Ships and Launch called to the conventional port

Number of Ships include container vessels which called to the conventional port

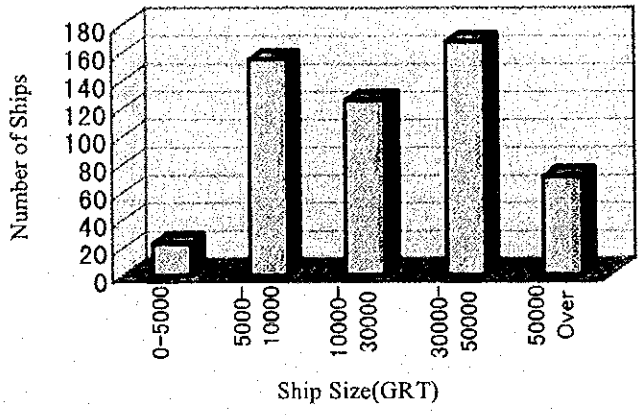
Source: Salalah port Service (SPS)

Fig. 5.9.1 Number of Calling Vessels in Salalah Port

Number of calling container vessels by size in 1999 is shown Fig. 5.9.8. The largest size container vessel in the world, more than 90,000GRT and about 350m in length, called once a week and some more than 10,000GRT feeder vessels also called. The share of small size vessels less than 5000GRT was about 4% and large size vessel over 50,000GRT was about 13%.

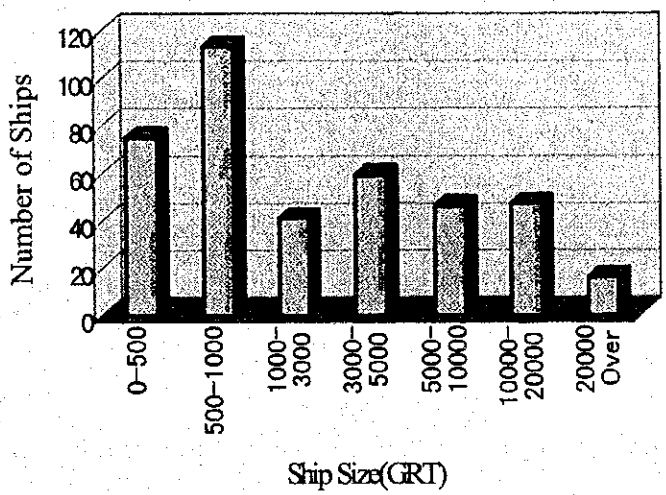
Number of calling vessels to conventional port in 1999 is shown Fig. 5.9.3. The largest size vessel was about 28,000GRT and 320m in length, but the arrival draft was less than 9m. Various sizes of vessel called the conventional port.

The size of launch was less than 100GRT, in general, but sufficient data is not available.



Source : Salalah Port Service

Fig. 5.9.2 Number of Calling Container Vessels in Salalah Port by Size in 1999

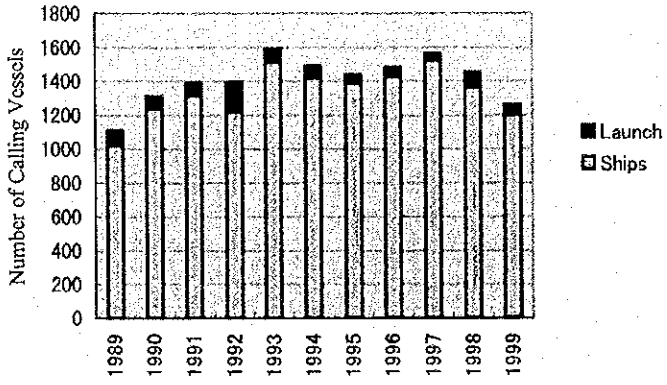


Source : Salalah Port Service

Fig. 5.9.3 Number of Calling Vessels in Conventional Port by Size in 1999

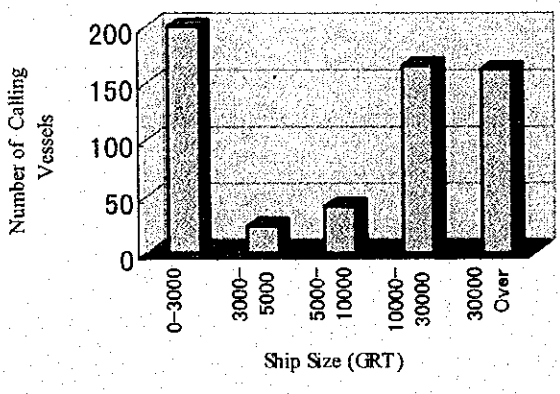
5.9.2 Sultan Qaboos Port

In 1997, 1,521 ships called Sultan Qaboos port , which was largest number in the past 11 years but the number of calling vessels decreased more than 10% in the last 2 years. (See Fig. 5.9.4) In 1999, a total of 1,201 vessels called; 588 was container vessels (about 49%), 21 cruise ships and the balance were general cargo, bulk cargo and others. For non-container vessel, maximum size of vessel was 58,684GRT for wheat bulk, about 30% were more than 30,000GRT and those were for wheat bulk, vehicle and live sheep. The size of general cargo vessel was concentrated between 10,000-30,000GRT while most vessels less than 3,000GRT were trawlers and bitumen. (See Fig.5.9.5) The maximum size of container vessel was 41,786GRT in 1999. The vessel size between 10,000-30,000GRT was 40% and less than 3,000GRT, the regional feeder vessel, was about 24%.



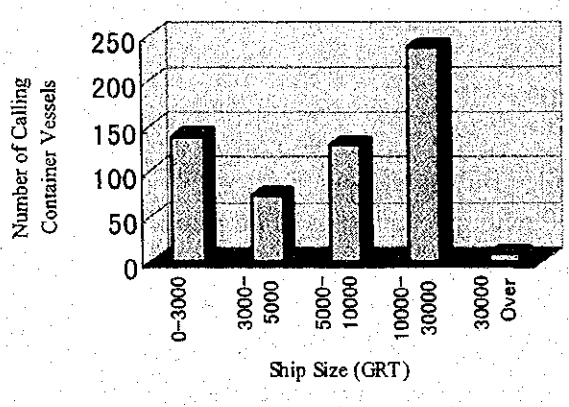
Suroce : Port Service Corporation (PSC)

Fig 5.9.4 Number of Calling Vessels in Sultan Qaboos Port



Suroce : Port Service Corporation (PSC)

Fig 5.9.5 Number of Calling Vessels except Container by Size



Suroce : Port Service Corporation (PSC)

Fig 5.9.6 Number of Calling Container Vessels by Size

5.9.3 Cruise Vessel Calling

Total number of cruise vessel and passenger in Salalah port was 23 vessels and about 7,600 persons, and in Sultan Qaboos port was 22 vessels and about 4,800 embarking persons and about 5,000 disembarking persons. (See Table 5.9.1 and Table 5.9.2) The difference between number of embarking and disembarking passengers by vessel at Sultan Qaboos port was more than 500. (Such figure are not recorded in Salalah port.) It is understood that these passengers use the connecting flight at Seeb international airport in Muscat.

At Salalah port from the middle of April and at Sultan Qaboos from the beginning of April to the end of October, there were no cruise vessel calls. Even during Kareef Season, which is the peak tourism season in the Dhofar Region, no cruise vessels called at Salalah port due to the monsoon and congestion of the city with GCC people. Since all tourists accommodate in cruise vessel, calm sea condition is required for visiting area. The age of cruise tourist is, in general, more than 45 years old and moderate warm weather condition of visiting port is preferable.

Table 5.9.1 Cruise Vessel Called at Salalah Port in 1999

No.	Name	Size of Vessel		No. of Passenger	Arival Date	Departure Date	Last Port	Next Port
		LOA(m)	DRT					
1	Island Princess	168	20,186	280	13/01/99	13/01/99	Port Said	Munbai
2	Renaissance 8	90	4,200	112	05/02/99	05/02/99	Munbai	Dprbouti
3	Minerva	135	12,331	111	13/03/99	N.A.	Muscat	N.A.
4	Beirlin	139	9,750	341	14/03/99	14/03/99	Muscat	N.A.
5	Colombos	N.A.	N.A.	234	14/03/99	14/03/99	N.A.	N.A.
6	Renaissance 7	90	4,200	112	18/03/99	18/03/99	N.A.	N.A.
7	Saga Rose	190	24,523	508	25/03/99	25/03/99	N.A.	N.A.
8	Europa	200	37,012	527	27/03/99	27/03/99	Muscat	N.A.
9	Arkona	164	18,591	344	28/03/99	28/03/99	Muscat	N.A.
10	Deutsch Land	175	22,494	432	01/04/99	01/04/99	Mumbai	Aden
11	Vistamar	120	7,478	262	02/04/99	02/04/99	Mumbai	Mukala
12	Song of Flower	124	8,282	93	02/04/99	02/04/99	Muscat	Aden
13	Crystal Symphony	238	51,044	589	05/04/99	05/04/99	Muscat	Hurghada
14	Sea Goddess 11	105	4,260	30	05/04/99	05/04/99	Muscat	Jeddah
15	Silver Cloud	156	16,927	239	12/04/99	12/04/99	Dubai	Safaga
16	Star Flyer	111	2,298	59	20/04/99	20/04/99	Goa	Aqaba
17	Star Flyer	111	2,298	73	27/10/99	27/10/99	Aden	Goa
18	Lilie Marlin	76	704	14	27/10/99	27/10/99	Maknala	Mascat
19	Deusch Land	175	22,494	N.A.	28/10/99	28/10/99	Hodeidah	Mascat
20	Song of Flower	124	8,282	129	04/11/99	04/11/99	Safaga	Mascat
21	Silver Wind	155	12,331	250	20/11/99	20/11/99	Djibouti	Tba
22	Minerva	135	12,331	N.A.	27/11/99	27/11/99	Safaga	Fujira
23	Regina Maris	103	3,999	N.A.	28/12/99	28/12/99	Aden	Muscat

Source : Salalah Port Servise (SPS)

Table 5.9.2 Cruise Vessel Called at Sultan Qaboos Port in 1999

No.	Name	Size of Vessel		No. of Passenger	Arival Date	Departure Date	Last Port	Next Port
		LOA(m)	DRT					
1	Monet	68	1,425	19/19	15/02/99	16/02/99	Dubai	Fujairah
2	Monet	68	1,425	10/10	01/03/99	03/03/99	Khassab	Fujairah
3	Minerva	135	12,331	111/285	09/03/99	11/03/99	Porbundar	Salalah
4	Berlin	140	9,570	288/379	09/03/99	12/03/99	Fujairah	Salalah
5	Sea Godess 11	105	4,260	36/37	11/03/99	11/03/99	Verval	KSA
6	Sea Godess 11	105	4,260	101/42	19/03/99	19/03/99	M.Saqr	Sur
7	Song of Flower	124	8,282	0/77	21/03/99	21/03/99	Munbai	Doha
8	Europa	200	37,012	527/526	25/03/99	25/03/99	Dubai	Salalah
9	SS Rotterdam	240	59,652	806/806	25/03/99	25/03/99	Doha	Djibouti
10	Arkona	164	18,591	301/288	26/03/99	27/03/99	Munbai	Salalah
11	Song of Flower	124	8,282	93/93	31/03/99	31/03/99	Bahrain	Salalah
12	Sea Godess 11	105	4,260	32/95	02/04/99	02/04/99	Sur	Sur
13	Crystal symphony	238	51,044	0/3	03/04/99	03/04/99	Dubai	Salalah
14	Deutsch Land	175	22,494	346/346	30/10/99	30/10/99	Salalah	Fujarah
15	Lily Marleen	76	704	14/14	01/11/99	01/11/99	Salalah	Khasab
16	Song of Flower	124	8,282	120/120	06/11/99	06/11/99	Salalah	Abudhabi
17	Song of Flower	124	8,282	130/130	15/11/99	15/11/99	Doha	Munbai
18	Legend od Seas	264	69,130	1542/1542	16/11/99	16/11/99	Salalah	Dubai
19	Minerva	135	12,331	297/229	01/12/99	08/12/99	Fujairah	Munbai
20	Lily Marleen	75	704	26/26	23/12/99	25/12/99	Fujairah	Fujairah
21	Regina Maris	103	3,999	47/47	31/12/99	01/01/00	Salalah	K. Fakkan

Source : Port Service Corporation (PSC)

Note : Number of Passenger indicates number of Embarkation /Disembarkation.

5.10 Cargo Handling System

5.10.1 Equipment

Cargo handling equipment is provided corresponding to the main cargo of Port Salalah, container, fuel, cement, iron ore, and cattle feed. An overview of the operational equipment is shown in Table 5.10.1. Cargo handling equipment is yet to be installed on the newly created general cargo/bulk cargo terminal.

Table 5.10.1 Cargo Handling Equipment in Port Salalah

Terminal	Equipment	Number	Capacity	Year of Procurement
SPS container terminal	Gantry crane	2	Super super post panamax	2000
		6	Super post panamax	1998
		1		
	Rubber tired gantry	15		1998-2000
	Yard tractor	60		1998-2000
General cargo terminal	Rail mounted crane	4	6-15 tons	1982
	Mobile crane	10	12-150 tons	1973-1985
	Fork lift	23	3-35tons	1981-1985
Oil terminal				1982
New general cargo/bulk cargo terminal	-	-	-	-

Source: SPS

5.10.2 SPS Container Terminal

(1) Equipment

The container terminal has nine gantry cranes, of which eight are new super post panamax type and one is a small crane transferred from the conventional terminal after rehabilitation. SPS plans to procure three more cranes toward the beginning of 2001, which increases the number of gantries to 12.

Two most recently introduced gantries are designed for 22 rows of containers with an under-spreader clearance of 35m. The other six super post panamax cranes can deal with up to 18 rows of containers and can lift two twenty feet containers at one time.

(2) Operation

Cargo handling operation is carried out in three shifts, basically 24 hours around the clock.

Since 99 % of cargo throughput is transshipment, quay-side operation is given priority in designing terminal lay-out. Two gantry cranes are applied to a feeder ship with a length of less

than 150m. Three gantry cranes are applied to a larger vessel and six super post panamax are employed when catering for a Maersk's S-class vessel (See Figure 5.10.1). When six gantry cranes are applied, gang is made up as follows:

Ship side: 7 workers × 6 cranes = 42 workers
Yard side: 6 workers × 6 cranes = 36 workers
Lashing: 18 workers × (1 or 2) groups = 18 workers or 36 workers
Relief: 12 workers ×(1 or 2) groups = 12 workers or 24 workers
Total: 108 workers or 138 workers

RTG operation is currently carried out by 1 over 4, although RTGs are capable of 1 over 5 operation. Loading to vessels is generally carried out after complete discharge from the vessels. Average dwelling time is 4 days, widely differing depending on the vessel. Empty containers are stored in the back rows in the terminal.

Since 99% of cargo is for transshipment, storage and gate operation is not given high priority. For that reason, the gate has only three lanes.

5.10.3 General Cargo Terminal

(1) Facilities

General cargo and bulk cargo has been handled at berth no. 1, 2, and 3 with the quayside depth of 10.5 m. Their main cargo is cement and flour with a total throughput of roughly 800 thousand tons in 1999. These berths and berths no. 4 through 8 constitute a general cargo wharf equipped with sheds and mobile cranes. Berths no.4 through 7 have the quayside depth of 4 m, and they are now allocated to dhow vessels.

560 m of quays for general cargo/bulk cargo was constructed in 1999 at the west end of the basin, which had been a sand beach used by small fishery boats. The new terminal is yet to be equipped with handling equipment and completed with pavement. When completed, this terminal will provide a significant increase of capacity for conventional cargo and will serve as a catalyst for industrial development in the Hinterland. Users are expected to provide necessary handling equipment.

However, the creation of this terminal might be one of the reasons which caused excessive ship motions (surge) at the container terminal during last summer monsoon. Because its vertical quay walls is not so capable of dissipating waves inside the harbor as the beach once was. Rather, it might be contributing to amplifying harbor resonance. This issue needs further field surveys and careful analysis before coming up with viable solutions.

(3) Operation

Five gangs carry out cargo handling operation in three shifts. Each gang is made up of a gang leader and ten stevedoring workers. When necessary, all five gangs are employed to cater for one vessel.
Basic shift is as follows: 0800-1600, 1600-2400, 2400-0800.

In most cases, cargo is handled directly between trucks and vessels in a palletized shape or by bulk. Less than 10% of conventional cargo uses sheds with dwelling time varying from one night to a few weeks.

5.11 Productivity of Facilities

5.11.1 Container Terminal

Gross productivity of the container terminal has been steadily improving since its commission, increasing from 19 moves/crane/hour at the start to the current level of 25 to 27 moves/crane/hour (See Figure 5.11.1). When catering for a Maersk's S-class vessel, terminal operator's overall target is at least 150 TEUs/hour, which is comparable to world's renowned transshipment hubs.

The Study Team summed up the performance of the terminal in Table. 5.11.1 based on the data recorded in November-December, 1999. Gross productivity of quay cranes was about 20 moves/hour and net productivity was about 30 moves/hour. Conversion ratio from boxes to TEUs was found to be 1.64 during the period. Overall productivity records converted to TEU/hour show that the operators' target are met.

Operators allocate as many quay cranes as possible to minimize ship costs. Number of quay cranes allocated to a vessel differs depending on the vessel size. Three to six cranes (3.8 cranes on average) are allocated to a mother vessel, while one to four cranes (2.4 cranes on average) are applied to a feeder vessel. Productivity per crane was found to be basically constant regardless of the number of cranes applied, indicating well-coordinated employment of quay cranes.

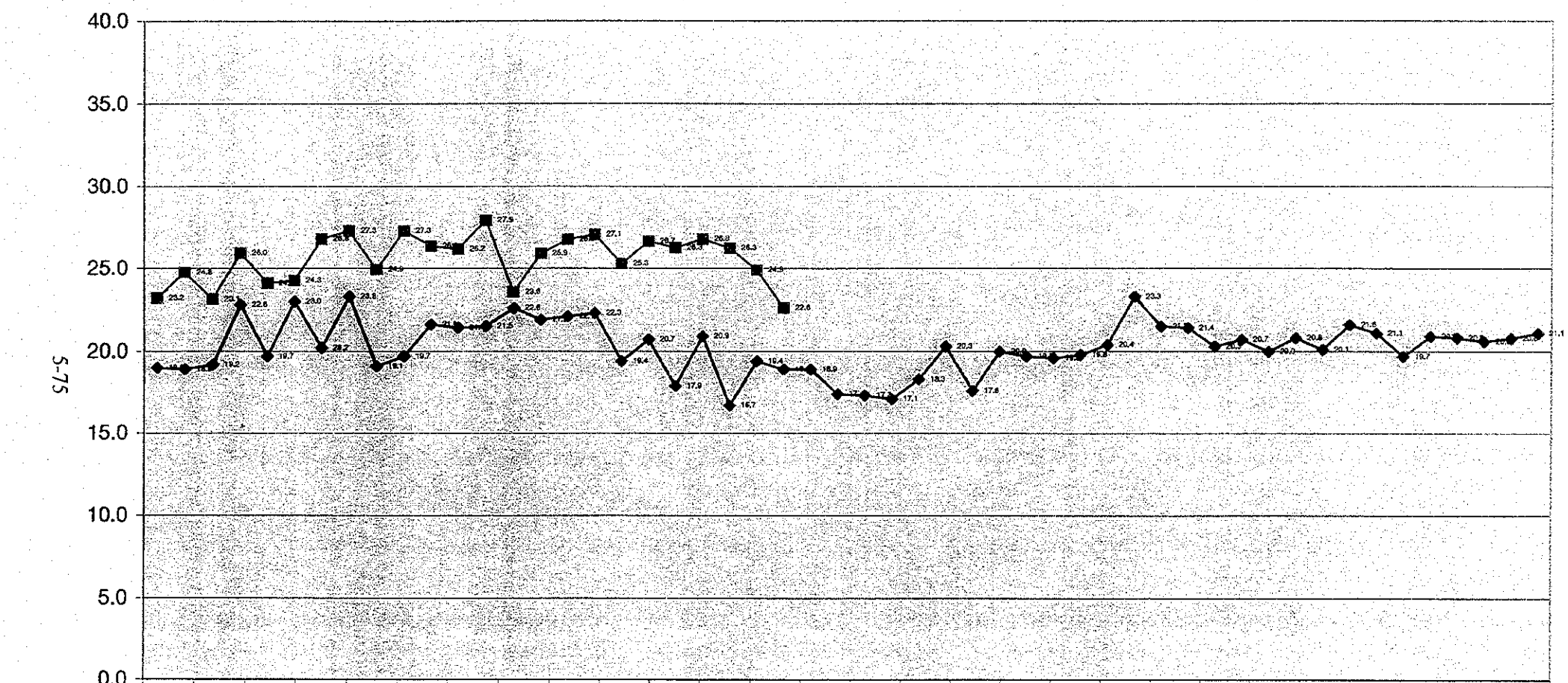
Table 5.11.1 Productivity of SPS Container Terminal (Nov. – Dec. 1999)

	Mother vessels	Feeder vessels
Gross productivity of quay cranes (moves/hour)	21.3	20.3
Net productivity of quay cranes (moves/hour)	30.5	28.8
Overall gross productivity for a vessel (moves/hour)	82.0	46.9
Overall net productivity for a vessel (moves/hour)	133.1	63.8
Average number of quay cranes allocated (crane/vessel)	3.8	2.4
Work time ratio	0.7	0.7

Source: SPS, JICA Study Team

SPS has four tugs, out of which two are new. Three pilots are assisting the navigation between the pilot station near the tip of the breakwater and the quays. Pilots will be able to board vessels outside the harbor when a new pilot boat is put into operation. A radar with a coverage distance

SALALAH PORT SERVICES
(S.A.O.G) CONTAINER TERMINAL
1999-2000 COMPARISON REPORT



	wk1	wk3	wk5	wk7	wk8	wk10	wk12	wk14	wk16	wk18	wk20	wk21	wk23	wk25	wk27	wk29	wk31	wk33	wk34	wk36	wk38	wk40	wk42	wk44	wk46	wk47	wk49	wk51
GMPH99	19.0	19.2	19.7	20.2	23.3	19.7	21.4	22.6	22.1	19.4	17.9	20.9	19.4	18.9	17.3	18.3	17.6	19.7	19.6	20.4	21.5	20.3	20.0	20.1	21.1	19.7	20.8	20.8
GMPH	23.2	23.1	24.1	26.8	27.3	27.3	26.2	23.6	26.8	25.3	26.3	26.8	24.9															

Figure 5.11.1 Crane Productivity

of 16 n.m. is currently aiding navigation. Navigational aids include buoys, signals, and radar reflectors on the breakwater. Container quays are equipped with guiding lights for berthing vessels. On average a mother vessel takes 1.5 hours to berth and deberth, while a feeder vessel takes an hour.

Productivity of the terminal was hampered to some extent during last summer monsoon due to excessive motions of moored vessels caused by long period waves. A comprehensive study is needed to precisely assess the causes and then come up with appropriate countermeasures.

Quayside productivity of container cargo handling in Mina Qaboos was examined in the previous JICA study. In 1989, productivity in Mina Qaboos was found to be 20.2 boxes/hour/crane for unloading and 16.8 boxes/hour/crane for unloading. After comparing the productivity with that of Dubai, which was 30-40 boxes/hour/crane, the report recommended that productivity should be increased to at least 25 boxes/hour/crane. Productivity in Mina Qaboos in 1999 was 20-30 boxes/hour/vessel and 18-25 TEUs/hour/crane, which indicates no improvement from 10 years ago.

5.11.2 General Cargo Terminal

Wheat, cement, and fuel are the main cargo items in the conventional terminal. The Study Team calculated productivity of the terminal based on the data provided by SPS (Table 5.11.2).

Table 5.11.2 Productivity of the Conventional Terminal in Port Salalah (1999)

Cargo item	Average ship size (GWT)	Average mooring time (hours)	Average cargo tonnage (t)	Gross productivity (t/hour)
Wheat bulk	21620	124	9730	78
Flour	2520	97	1220	13
Edible oil	5500	21	1310	64
Cement	3340	58	3930	110
Pipes	17200	53	1480	29
Fuel	5050	33	7150	224
Cattle feed	3100	215	3480	16
General cargo	7890	146	6600	62
Live stock	1100	258	690	4

Source: SPS, JICA Study Team

The Study Team obtained productivity records of cargo handling in Mina Qaboos from PSC. Its productivity is 190 t/hour for bulk grain, 12 t/hour for bagged cargo, 55 t/hour for pipes, and 26-30 t/hour for general cargo. Productivity of the conventional terminal in Port Salalah, in general, does not show a marked improvement from that of Mina Qaboos.

5.12 Existing Development Plans

5.12.1 The H.P.A. Layout Plan

After preparing a master plan for the container terminal consisting of four berths, Han Padron Associates made a conceptual layout plan for future expansion of Port Salalah (See Figure 5.12.1). The layout plan envisages an extensive port expansion including 12 additional container berths, a bulk/general cargo terminal, four multipurpose berths, a passenger terminal, breakwater extension, and relocation of fishing facilities as well as royal yacht squadron.

The layout plan allocates lands behind the port among various prospective industries including dry docks, distribution, light industries, heavy industries, and FTZ. The plan packs various activities into the current port area with limited space.

Some of the projects proposed in the layout plan has already been materialized and some others are in the pipeline. In 1999, the Government completed the civil works for a new bulk/general cargo terminal, 560m in length and with 16m depth alongside. The new bulk/general cargo will constitute an integral part of industrial development in the Hinterland catering for its export/import cargo. Cargo handling equipment for the terminal is to be provided by the private sector.

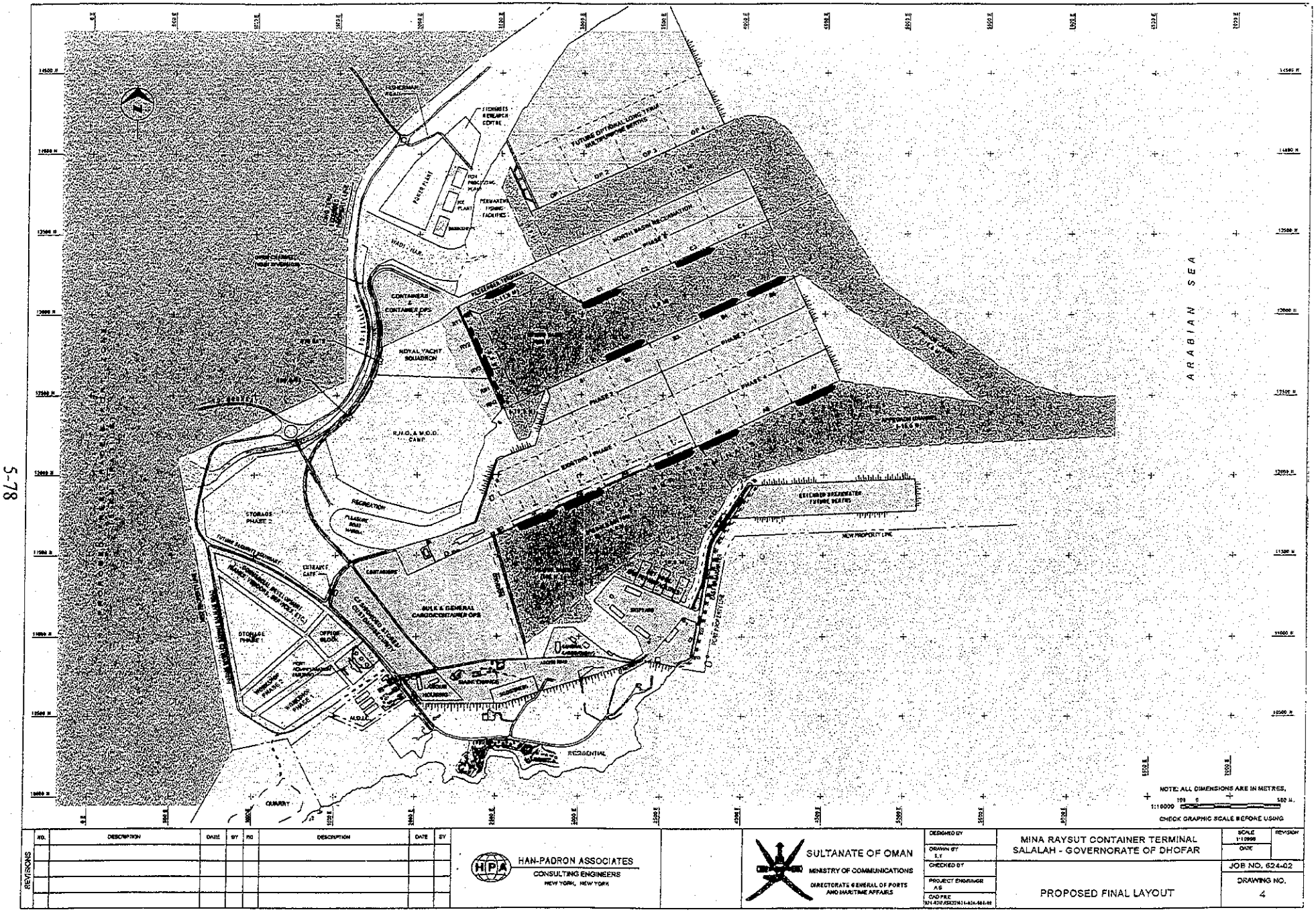
A fishery harbor was constructed in line with the layout plan, which made room for the new bulk/general cargo terminal. Once it gets operational, the existing general cargo terminal can be converted to other use.

5.12.2 Development Plan of MOTH

Container terminal expansion with two additional berths is now under consideration in the Ministry of Transport and Housing (MOTH). The following two alternatives are currently considered: eastward extension and northward expansion (See Figure 5.12.2, 5.12.3). Both alternatives are within the grand picture of the H.P.A. layout plan. Bearing in mind that the cargo throughput of the existing container terminal reached half the capacity within a year from the start of operation, thorough examination of terminal expansion is justifiable.

MOTH indicated that it would submit a budget request for the sixth five-year plan including additional two container quays, breakwater extension, and a power station, which amount to 20 million R.O. Some other projects will be undertaken in 2000 responding to urgent needs: reinforcement of the east breakwater, and an additional power supply for the container terminal.

Structure of the general cargo wharf, berth 1 to 3, is deteriorated and needs substantial structural reinforcement. However, neither MOTH nor SPS is ready to undertake the responsibility until a



REVISIONS

NO.	DESCRIPTION	DATE	BY	NO	DESCRIPTION	DATE	BY

HAN-PADRON ASSOCIATES
CONSULTING ENGINEERS
NEW YORK, NEW YORK

SULTANATE OF OMAN
MINISTRY OF COMMUNICATIONS
DIRECTORATE GENERAL OF PORTS AND MARITIME AFFAIRS

DESIGNED BY	
DRAWN BY	S.Y
CHECKED BY	
PROJECT ENGINEER	A.S
CAD FILE	

MINA RAYSUT CONTAINER TERMINAL
SALALAH - GOVERNORATE OF DHOFAR

PROPOSED FINAL LAYOUT

SCALE	1:10000
DATE	
REVISION	
JOB NO.	624-02
DRAWING NO.	4

Figure 5.12.1 H.P.A. Layout Plan

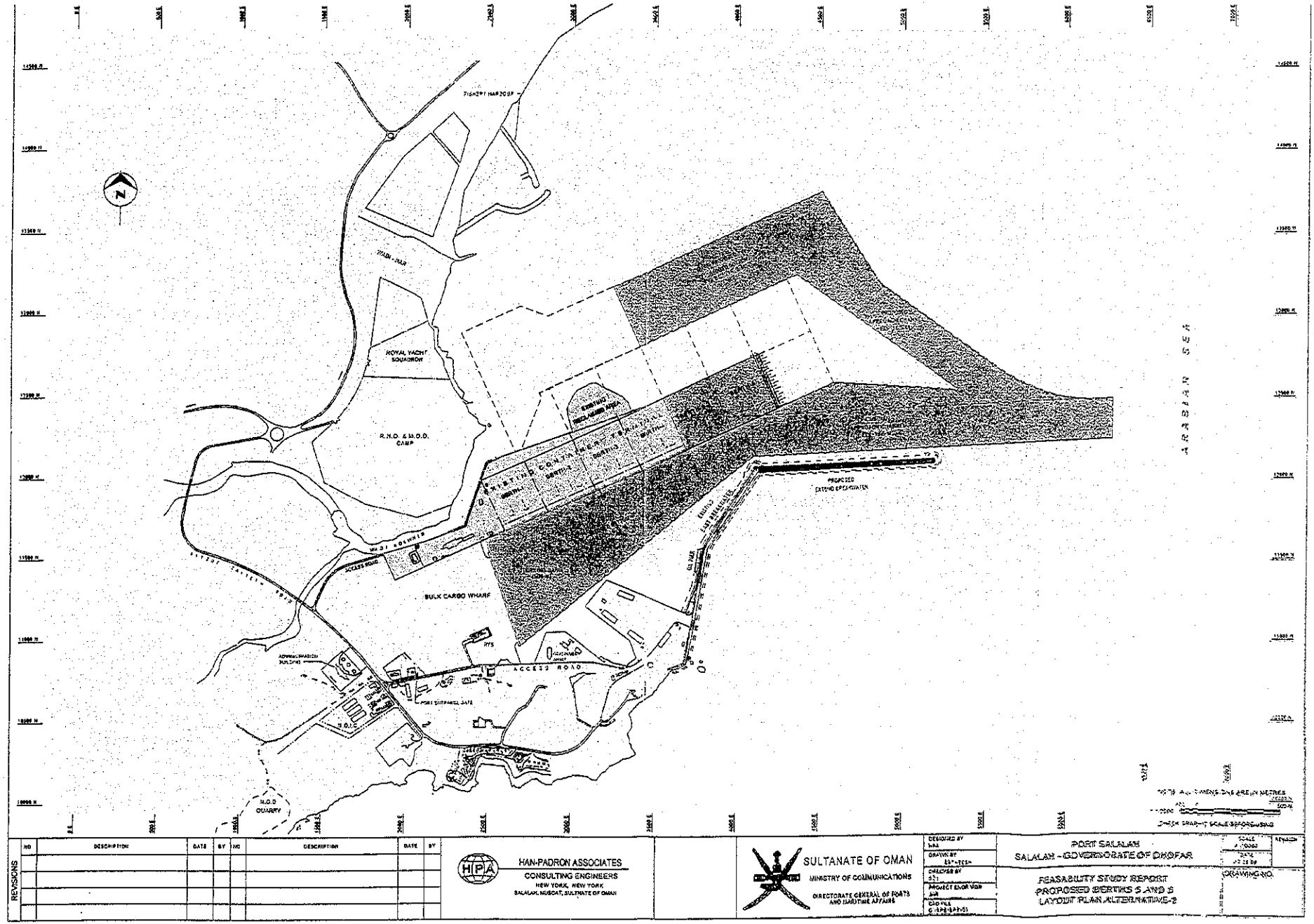


Figure 5.12.2 Eastward Extension

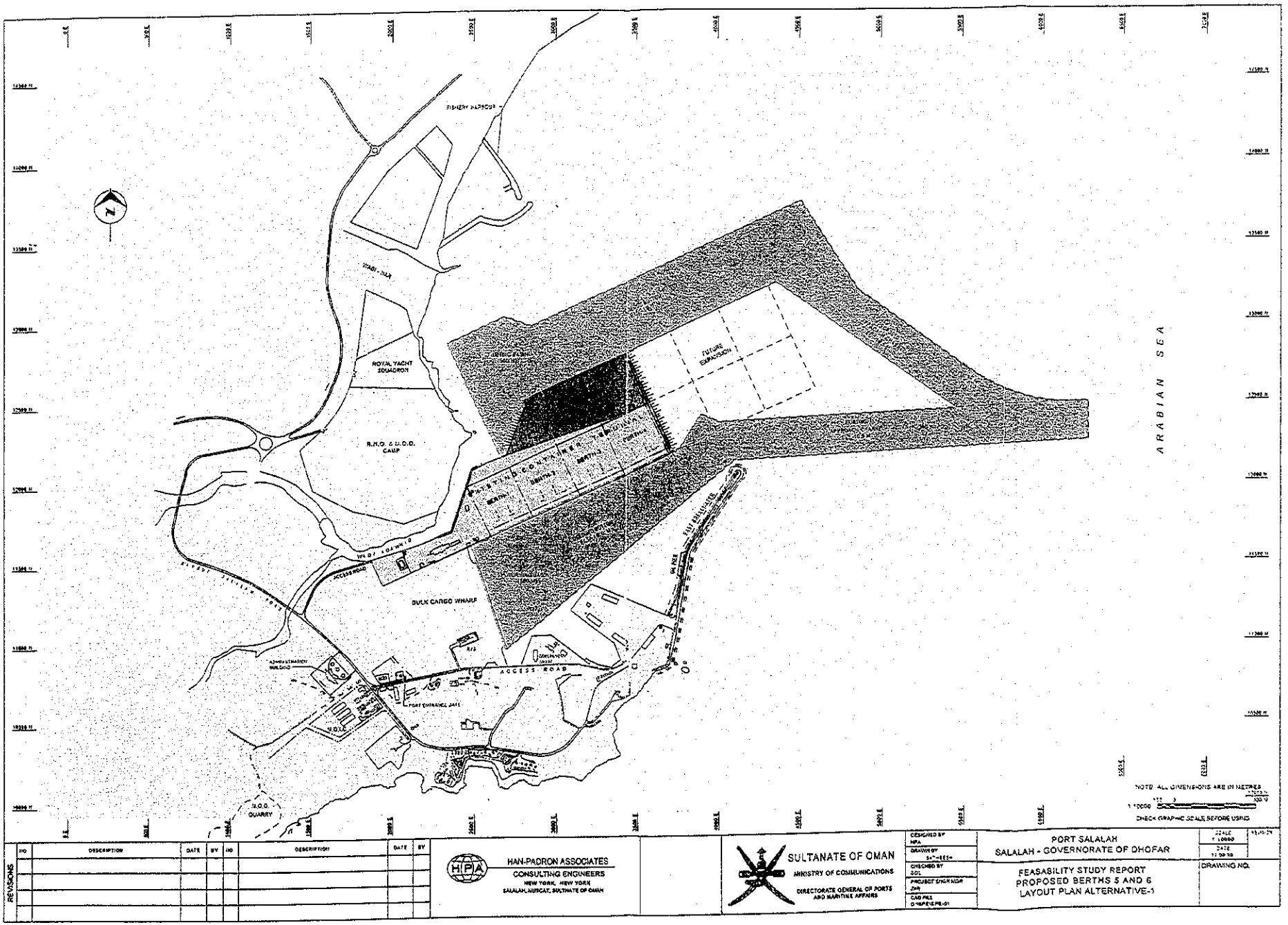


Figure 5.12.3 Northward Expansion

concession agreement for the conventional port is finalized.

A broader area is allocated for the port use in a layout plan included in the concession agreement, which is to be signed by the GSO and SPS shortly (See Figure 5.12.4). This layout plan specifies the concession area and a free zone in the first stage.

5.12.2 Development Plan of SPS

Based on a demand forecast, SPS is preparing a new business plan which encompasses short to long term investment and marketing strategy. Procurement of five super post-panamax gantry cranes was included. SPS is contemplating to convert the sheds in the conventional port into CFS in 2000 The Study Team has not learned the contents of the new business plan to date. However, it will most likely to be aggressive one taking into account the rapid growth of cargo throughput experienced in Port Salalah since the opening of the SPS terminal.

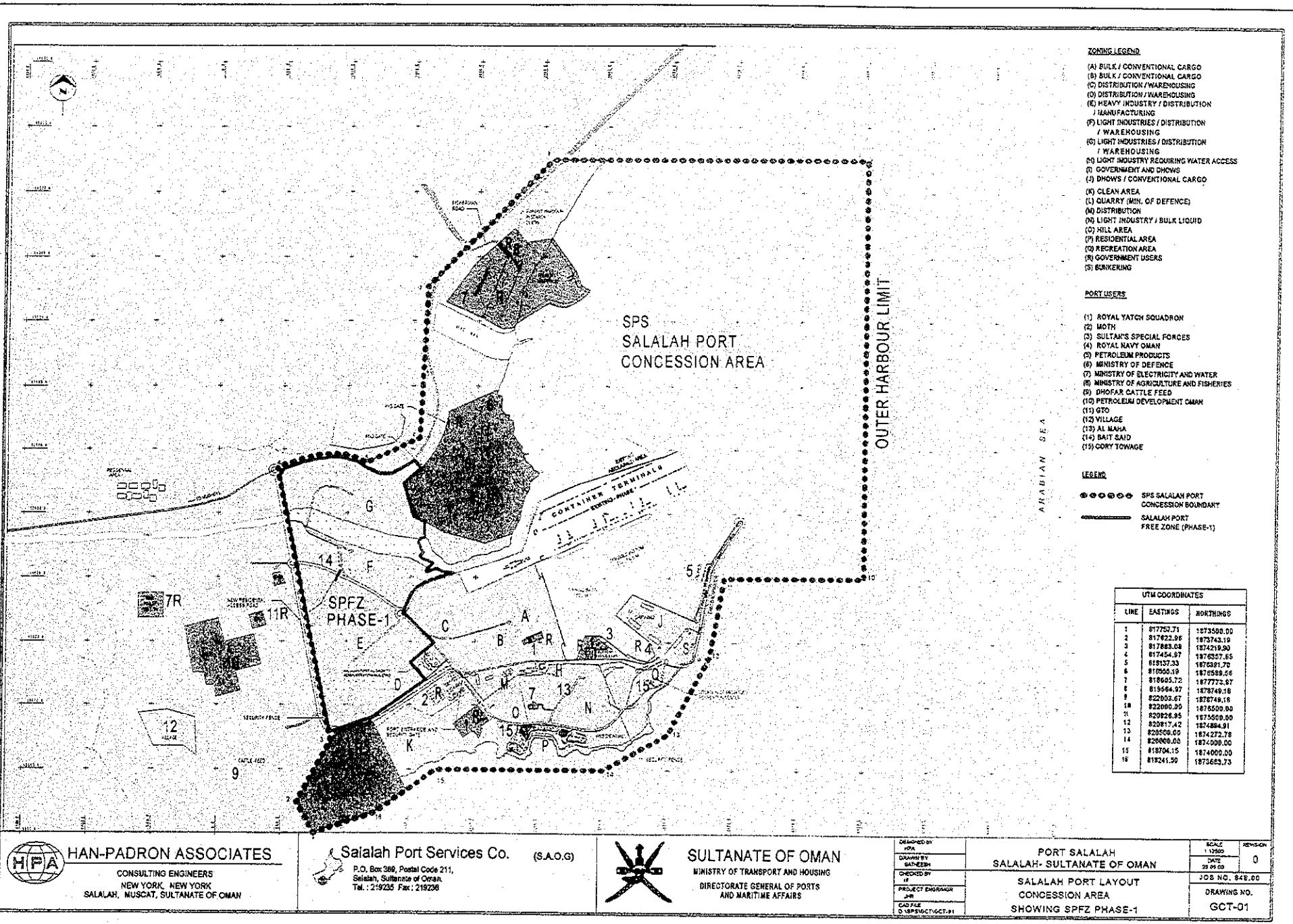


Figure 5.12.4 Concession Area

5. 13 Maintenance Program

Maintenance program of the conventional port have already been implemented step by step based on previous study reports, namely the Danport Study from 1992 to 1996, the Han Padron Study from 1996 to 1999 and the Posford Duvivier Study from 1997 to 1998.

JICA study team performed site observation in December 1999 and in January 2000 to confirm the conditions of the existing port facilities in both conventional port and the container terminal. Followings are the outline of the existing facilities of Port Salalah.

Construction of the conventional port was commenced in 1971 to accommodate vessels of up to 4 meters draft and was expanded in 1976 to cater for larger vessels. Expansion was undertaken also in 1982 and 1988 to develop a container berth and four quay side cranes and an administration building was constructed.

The conventional port has 10 berths, of which Berth 1 to 3 form a 520m long quay with 10m depth and Berth 4 is a 200m long quay with 8m depth. Berth 5 to 8 form a 460m a quay with 4m depth and Berth 9 is a 260m long quay with 3m depth. Berth 10 is an oil terminal comprising four dolphins with 12m depth, which is suitable for tankers up to 35,000 dwt.

In 1999 a new terminal was constructed adjacent to the container terminal. It comprises a 650m quay with the depth of 16m and will be used for multipurpose, especially for bulk cargo handling.

Construction of the container terminal was commenced in 1997 to accommodate the post-Panamax vessels and any anticipated vessels for the next generation. In 1998 two berths with the length of 305m each were completed and equipped with a total of 6 quay cranes and associated rubber tired gantries. In1999 additional two berths started operation.

Total length of the container quays are 1,236m with 16m depth and the turning circle is 500m in diameter. The approach channel had been dredged to 16.5m. The container terminal facilities include an administration building, a maintenance shop, container repair facilities, reefer wash facilities, a sewage treatment plant, an emergency power plant of 2.8MW, and a fuel station.

Han Padron Associates performed a detailed above-water and underwater condition survey of various waterfront facilities during mid 1996. The survey identified deficiencies and recommended remedial actions with cost estimates for the following structures: East Breakwater, Oil Berth, Berths 1-3 and 8, Dolphins at SSF berth, Royal Craft Jetty, and Ramp.

The findings of the site surveys carried out by the Study Team are summerized in Table 5.13.1.

Table 5.13.1 Present conditions of the Existing Port Facilities

No.	Facility	JICA Observation	Recommended Action
1.	East Breakwater	. Generally fair condition	
		. Partly surfacing repairs	Immediate
		. Additional dolosse	Immediate
2.	Oil Terminal	. Generally poor condition	
		. Repair concrete face	Immediate
		. Repair Ladders and Fenders	Priority
		. Adding new reinforcement	Priority
		. Repair truss walkways	Ongoing
		. Underwater concrete check	Immediate
		. Repair ancillary elements	Priority
3.	Berth 1, 2, 3	. Generally poor condition	
		. Repair concrete face	Immediate
		. Repair fenders	Immediate
		. Adding new reinforcement	Priority
		. Repair services trench	Priority
4.	Berth 4	. Generally fair condition	
		. Preventive maintenance	Routine
5.	Berth 5, 6, 7, 8	. Partly poor condition	
		. Spot repair concrete face	Priority
		. Repair fenders	Priority
6.	Berth 9	. Partly poor condition	
		. Spot repair concrete face	Priority
		. Repair fenders	Priority
7.	Royal Craft Jetty	. Generally fair condition	
		. Preventive maintenance	Routine
8.	Open Storage	. Generally fair condition	
		. Preventive maintenance	Routine
9.	Transit Sheds	. Generally fair condition	
		. Preventive maintenance	Routine

Ongoing repair and maintenance projects are shown in Table 5.13.2.

Table 5. 13. 2 Ongoing Repair and Maintenance Projects

No.	Facility	Works	Period	
1.	East Breakwater	Surfacing Repair Additional Dolosse	Feb－May	2000
2.	Oil Terminal	Surfacing Repair Ladders and Fenders Truss Walkways Ancillary Elements	Jan－Dec	2000
3.	Berth 1, 2, 3	Surfacing Repair Ladders and Fenders Services Trench Ladders and Fenders	Feb－Dec	2000

Berth 4 had been repaired in 1995 designed by DANPORT and contracted by WIMPEY.
Major items of works included the followings.

- Concrete demolition of deteriorated parts.
- Reconstruction of concrete structures using precast concrete elements and insitu concrete.
- High strength concrete patch repairs.
- Replacement of built in parts such as ladders, hard wood fender, fender chains.
- Protective coating to concrete structures, steel items and timber.
- Rehabilitation of quay wall structure covering.
- Removal of existing installation in conductor trench.
- Temporary removal and reinstalement of existing water line chambers.

The condition of the port facilities in the conventional port is generally clean and reasonable, with some exceptions mostly caused by severe monsoon. A regular maintenance program is indispensable for sustained utilization of the conventional port. Berth 1, 2, and 3 are heavily used due to 10m depth and wide space of stock yard for multipurpose cargo. All cargo handling equipment in the berths is between 15 and 25 years old and some equipment shows the effects of aging.

5. 14 Design Criteria

Design criteria of Salalah Port shall be decided based on the natural conditions, vessel size, load conditions and construction materials The design criteria for the new container terminal was compiled by the Han-Padron Associates as follows:

(1) General Data

The plant grid coordinate system used on all drawings is related to the UTM coordinate.
Elevations refer to the 1996 New Survey Chart Datum(C D).
North arrows shown refer to GRID North unless otherwise indicated.
Topography and information of land features is based upon Nortech Survey 1996.
Bathymetric and Sub－Bottom Profiling data is based upon Fugro Survey 1996.
Meteorological, Boring and Dredging data is based upon previous study data.

(2) Environmental Data

Wind:	With ships in berth	31 m／sec	
	Without ships in berth	50 m／sec	
Seismic:	Oman code level B	(UBC Zone 1)	
Waves:	Design wave height	East face of container yard	4. 0 m
		Inside dredged harbor basin	0. 4 m
Precipitation:	Mean monthly precipitation	100 mm	
	Maximum monthly precipitation	275 mm	
	Maximum 24 hours precipitation	180 mm	

(3) Vessel Design Data

Container terminal :	Typical container carrier	LOA: 276 m
		Beam: 37 m
		Displacement Tonnage: 110,000 t
	Post Panamax plus	LOA: 318 m
		Beam: 43 m
		Displacement Tonnage: 20,000 t
	Feeder Vessels	LOA: 143 m
		Beam: 23 m
		Displacement Tonnage: 9,600 t
Government Wharf		LOA: 137 m
		Displacement Tonnage: 7,000 t

(4) Design Live Load

Container Terminal : Uniform Live Load 5 T／sq. m (Inboard Crane Rail)
3T／sq. m (Outboard Crane Rail)
HS20－44 PER AASH TO (15 percent Impact)

Uniform Surcharge Behind Quay Wall 5 T／sq. m

(5) Allowable Pile Loads And Soil Bearing Capacity

Landside Crane Rail Support Piles	400 T (Compression)
	50 T (Tension)
Boat Launch Pier Support Piles	50 T (Compression)
	10 T (Tension)
Hydraulic Fill Bearing Pressure For Footing	27 T／sq. m

(6) Design Codes

Design and construction shall be in accordance with the latest edition of the followings.

ACI－318 Building code requirements for structural concrete.

AISC Manual of steel construction.

AASHTO Standard specifications for highway bridges.

Uniform building code

Military Handbook 1025／1, Piers and Wharfs.

AWS Structural welding code.

AITC Timber construction manual.

ANSI C2 National Electric Safety code.

NFPA 70 National Electric Code.

ASME American society of mechanical engineers.

NFPA National fire protection association.

API American petroleum institute.

AWWA American waterworks association.

BSI British standard institution (British Standard)

(7) Material Properties

Concrete	. Cast－In－Place Concrete	Fc ＝27. 6 MP a
	. Precast Concrete	Fc ＝27. 6 Mpa
	. Grout	34. 5 Mpa Nonshrink

Reinforcing Steel : ASTM A－615 Grade 60, 414 MP a, Epoxy Coated

Concrete Cover : 75 mm unless otherwise noted

Chamfer All Concrete Edges : 25 mm

Structural Steel	. Pipe Piles	ASTM A252 Grade 3 FY ＝310 MP a
	. MISC Steel	ASTM A36 (FY ＝ 248 MP a)
	. All Steel shapes and plates－Hot dip galvanized after fablication	
	. Stainless Steel	ASTM Type 316
Timber	: Douglas Fir	f b＝ 8. 3 MP a
		f s＝ 0. 6 MP a
		f c＝ 0. 8 MP a