Development of the Port of Baku
Port Master Plan

Phase III - Final Report, Vol III

17 November 1997

Volume III

Port Master Plan

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Part A - Introduction

This Volume describes hereinafter the Port Master Planning in terms of port operations, organisation, conditions of Port equipment (cargo handling equipment and marine crafts), the workshops and equipment maintenance.

In the Phase 3 of this project the operational concept of the Container Terminal and the General Cargo Terminal has been revised according to the comments, discussions and inputs from Baku Port, the Azerbaijan authorities, Tacis management unit and monitors, EBRD and their related consultants. Special attention has also been paid to the parallel ongoing rehabilitation project of the ferry terminal, a close co-ordination between both project teams in terms of traffic forecast and operational interfaces between the ferry terminal and main cargo complex of Baku Port.

Part B describes the organisation structure and the legal status of the Port and gives recommendations for a commercial organisation structure, the separation of the maritime administration sector from the commercial port activities and for adoption of international conventions for terminal operations.

Part C covers the assessment of the current port operations and develops a concept for future port operations according to the forecasted traffic volume. Details in manning levels, required port area and equipment requirements are given for the handling of general cargo as well as of bulk cargo. Also the future container operations requires new operational elements for the port, these are an interchange gate with sufficient parking area, and a stacking area for container storage which needs to be newly constructed. Further the recommended change from yard crane operations towards horizontal movements and stacking of cargo by forklifts and tractor/trailer has significant impact to the new terminal layout. According to the expected growth of cargo volume a flexible terminal concepts has been developed, where existing structures are used as much as possible in order to keep initial investments low.

Part D - The results of the workshop and cargo handling equipment assessment are outlined in this section. Mayor conclusions are the recommended rehabilitation of the still useable equipment such as the Takraf Portal cranes, tractors, forklifts etc. A budget for required spare parts and materials, as well as a programme to carry out the work with own workers of the of the Port, assisted by technical assistance of a foreign expert for training, workshop management and supervision, has been elaborated. Further for upgrading the workshops, enabling them to carry out proper maintenance and repair work, required tools and equipment has also been allocated and budgeted.

Part E contains a survey of the port's marine crafts, describing the conditions and giving recommendations for rehabilitation.

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Part B - Organisational and Corporate Structure of the Port

1. Current Structure and Developments

During the former Soviet Union the International Sea Port of Baku was subordinated to the Soviet Ministry of Sea Transport. Since the independence of Azerbaijan, with the Resolution No. 407 of 28 November 1994, the government of Azerbaijan established the International Sea Port of Baku directly under the government's jurisdiction with the following arrangements:

- The Port is a legal body. It has an own management
- The name of the Port is shown on its stamps and seals
- The Port has its own account in the banks of Azerbaijan Republic and has the right to open additional accounts

The Resolution gives a statement on the following:

- Basic responsibilities of the Port
- Rights of the Port
- Property of the Port
- Port Management
- Calculation, accounts and control
- Reorganisation, liquidation of the Port

New Organisation Structure

The current organisation structure of the Port (Figure B-1) is still, except some changes, the structure used in former Soviet times. Due to the ongoing economical changes in Azerbaijan there is an urgent need for commercialisation in order to cope with the changing markets. In the course of the "Tacis -Management Assistance and Training Project" a new commercial organisation structure has been developed (Figure B-2).

The new organisation scheme and the necessary implementation steps are being currently discussed by the port management. Basically, the proposed organisation is business field oriented, targeting a decentralisation of personal accountability , and responsibility for cost and profit centres. The proposed structure is not only a re-arrangement of staff compared to the current order, it also requires changes in leadership and the management methods towards "MBO - Management by Objectives". The implementation is scheduled for 1 March 1997.

The organisation structure with of the individual business units reflects also the various possible degrees of commercialisation for them. This ranges from the current state-own commercial operation, up to rent out the facilities to private or partially private companies for operation. For the new Container Terminal at the General Cargo Complex the Port is planning to establish a separate corporate entity, considering also third party participation from Railways or commercial terminal operators (Figure B-4).

Maritime Administration

In addition to the commercial port operation, the Port also carries out Maritime Administrative functions. In the course of building up a new legal framework for Azerbaijan in the maritime sector, it is recommended to shift the national tasks and the ports authority into a "National Maritime Administration" and convert the cargo handling sections of the Port into a commercial port operation an cargo handling company. For the cargo handling and port operations, the Ports Authority would act only as landlord on behalf of the Azerbaijan Republic, leasing the infrastructure to commercial operators.

A model structure for a Maritime Administration of Azerbaijan has been elaborated, taking all national and international tasks and duties into account (see Figure B-3). The intended establishment of a Free Port would also been administrated by the Maritime Administration.

Conditions for Terminal Operations

Azerbaijan is currently in the process to adopt common international conventions for cargo handling and transport. In the view of the changes of transportation towards containerisation it is recommendable for the Port of Baku to adopt international regulations for cargo and container handling, such as the UN Convention for Transport Terminal Operators. (*in the Russian version ANNEX B-1)* The subjection to this regulation would increase security for the freight industry in the transport up to Azerbaijan and the Port will be an accepted partner for the international shipping lines and container operators in Azerbaijan.

2. Recommendation for Future Corporate Structure of Baku Port

The new organisational structure of the port will allow the restructuring of the current port administration to a structure commensurate with those of ports elsewhere in the world, whereby governmental and public service functions will be separated from the commercial functions. For the financial analysis the following future structure has been used:

- The Maritime Administration (MA) - This will be a governmental administrative body subordinated to the Ministry of Transport and will be responsible for all maritime related issues on the national sovereign level. This entity can also function as a controlling body for the of the maritime related corporate entities owned by the state of Azerbaijan.

- The Port Administration (PA) - This will be established as an administrative body reporting to the MA to handle all issues related to the safety and security of navigation in the port area. In addition the PA will act as the landlord on behalf of the government for the land and infrastructure occupied by the commercial port operating companies. The PA will collect the rent for the land and infrastructure leased to the port operators, further it will collect all channel and light dues, pilotage and other charges levied on ships to gain access to the port of Baku.

- The International Sea Port of Baku (ISPB) - This entity will be established as a corporation, whose shares will be wholly owned by Azerbaijan Republic. The ISPB will be the commercial port operations and stevedoring company, which will be responsible for all cargo handling and commercial activities in the port of Baku. This corporate entity will invest in and own all superstructure built on the land of the port such as quay walls, ferry ramps, rail and road infrastructure and access in the port, pavement, buildings and structures plus all cargo handling equipment to be used by the port such as cranes, forklifts and all other cargo handling equipment. This entity will be the borrower of the funds to redevelop and reconstruct the port infrastructure and also reconstruct and acquire the equipment. The ISPB will perform all ship to shore cargo handling operations and other port related activities, while the responsibility and franchise for operation of the container yard with the exception of ship to shore container operations will be given to a dedicated container handling company to be established.

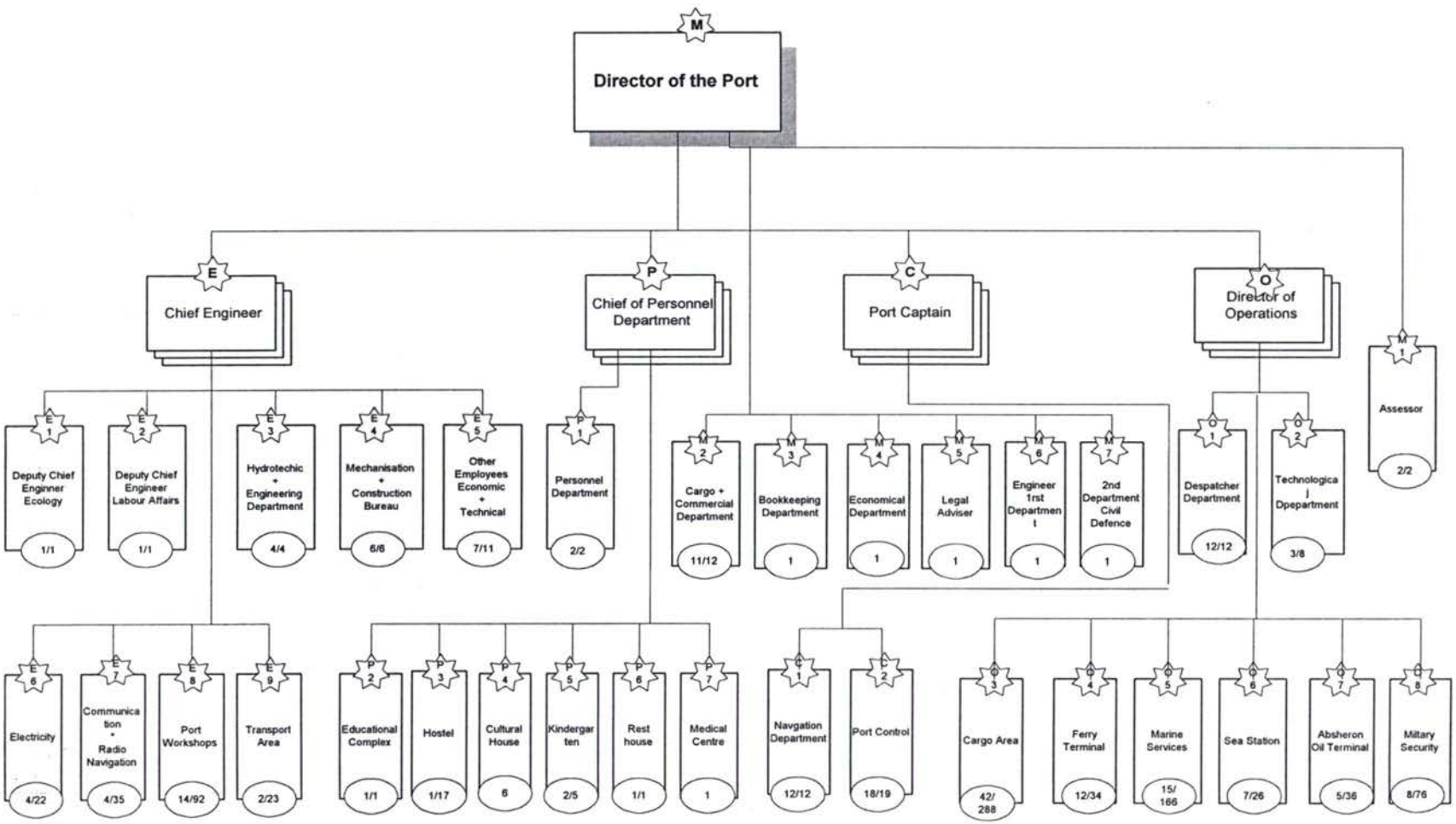
- The Container Yard of Baku (CY) - This will be established as a corporate entity, which initially will be a wholly or partially owned subsidiary of the ISPB. Consideration should also be given to inviting the Azerbaijan State Railways and a commercial container operator to participate in the ownership and operation of the CY, whereby ISPB, the railway and the container operator will each own one-third of the shares. The CY will enter a sublease for all the land and superstructure occupied and will lease all container handling equipment from the ISPB.

- The Ferry Terminal of Baku (FT) - This will be established as a corporate entity, which like the CY will initially will be a wholly owned subsidiary of the ISPB. As with the CY, consideration should also be given to inviting the Azerbaijan State Railways and the commercial ferry operator to participate in the ownership and operation of the FT, whereby ISPB, the railway and the ferry operator will each own one-third of the shares. The FT will enter a sublease for all the land and superstructure occupied and will lease all handling equipment from the ISPB. The FT will purchase container handling services for the ferry operations from the CY.

A model of the corporate structure and cash-flow for the Baku Port is shown in Figure B-4, which outlines the basic structure for the financial feasibility analysis of the study.

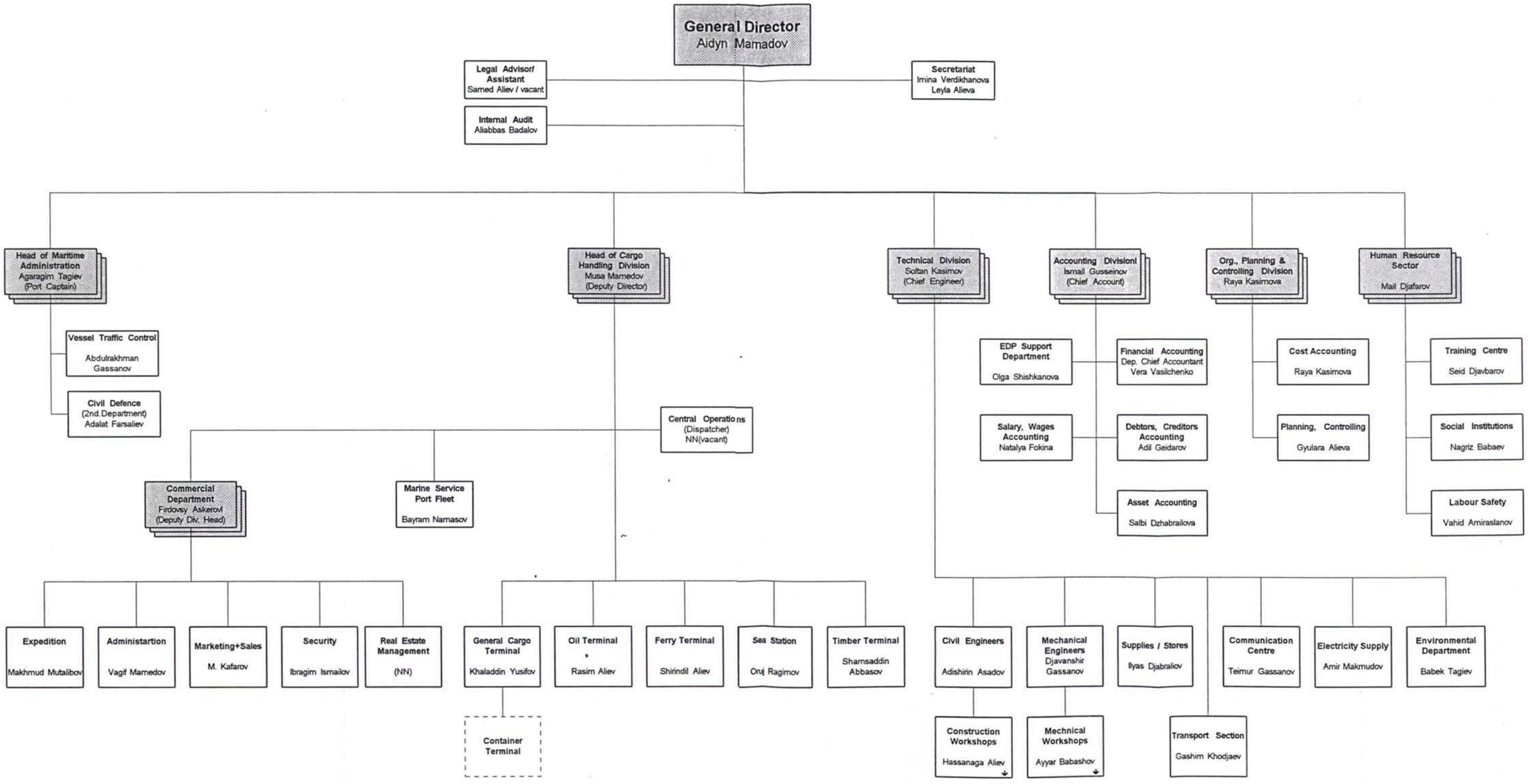
Port of Baku

Structure in April 1996



Baku International Sea Port

May 1997



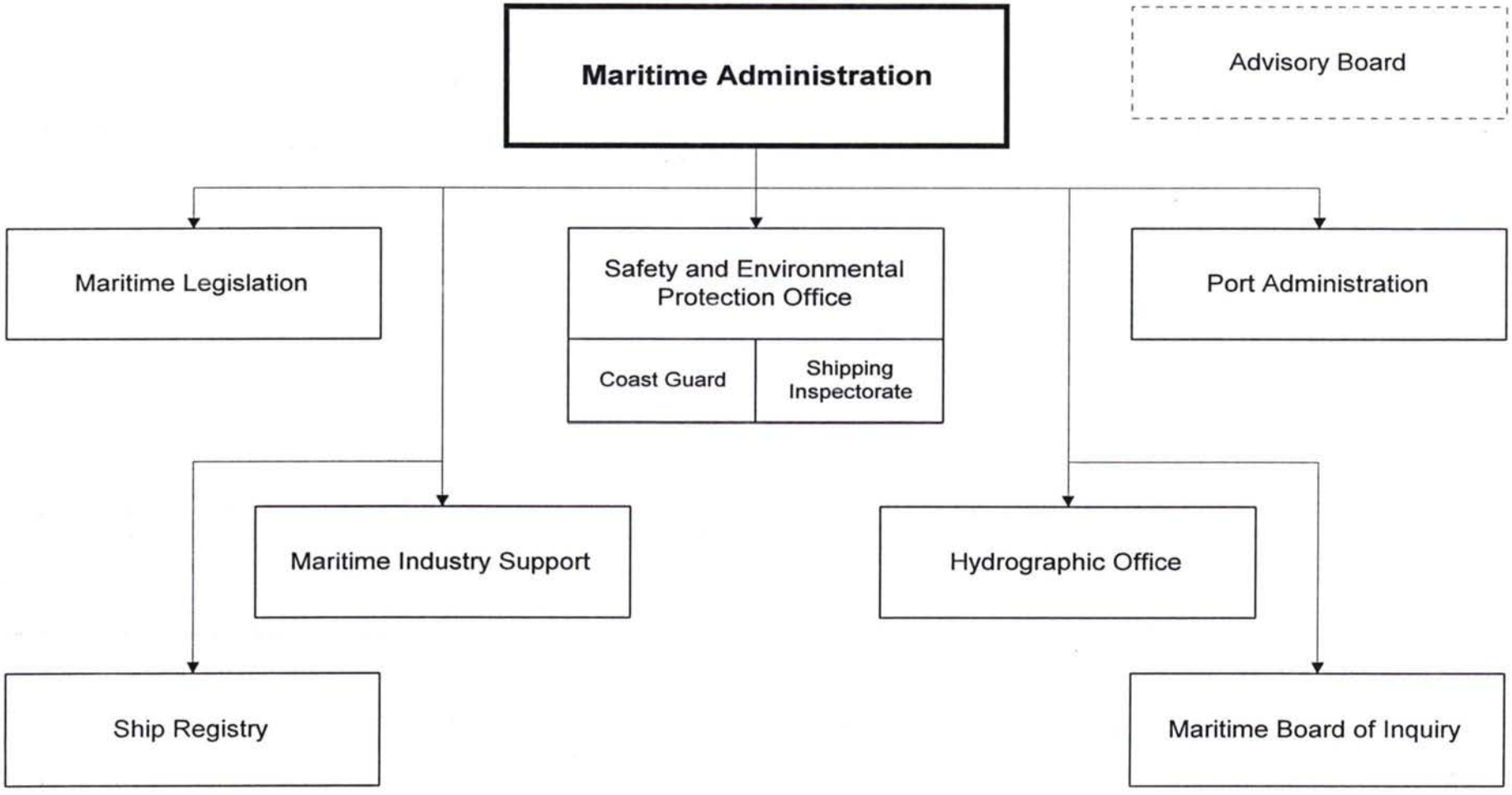

Maritime Administration
Advisory Board
Maritime Legislation
Safety and Environmental Protection Office
Coast Guard
Shipping Inspectorate
Port Administration
Maritime Industry Support
Hydrographic Office
Ship Registry
Maritime Board of Inquiry

Fig. B 3

Modell of Cashflow and Corporate Structures
Baku International Sea Port

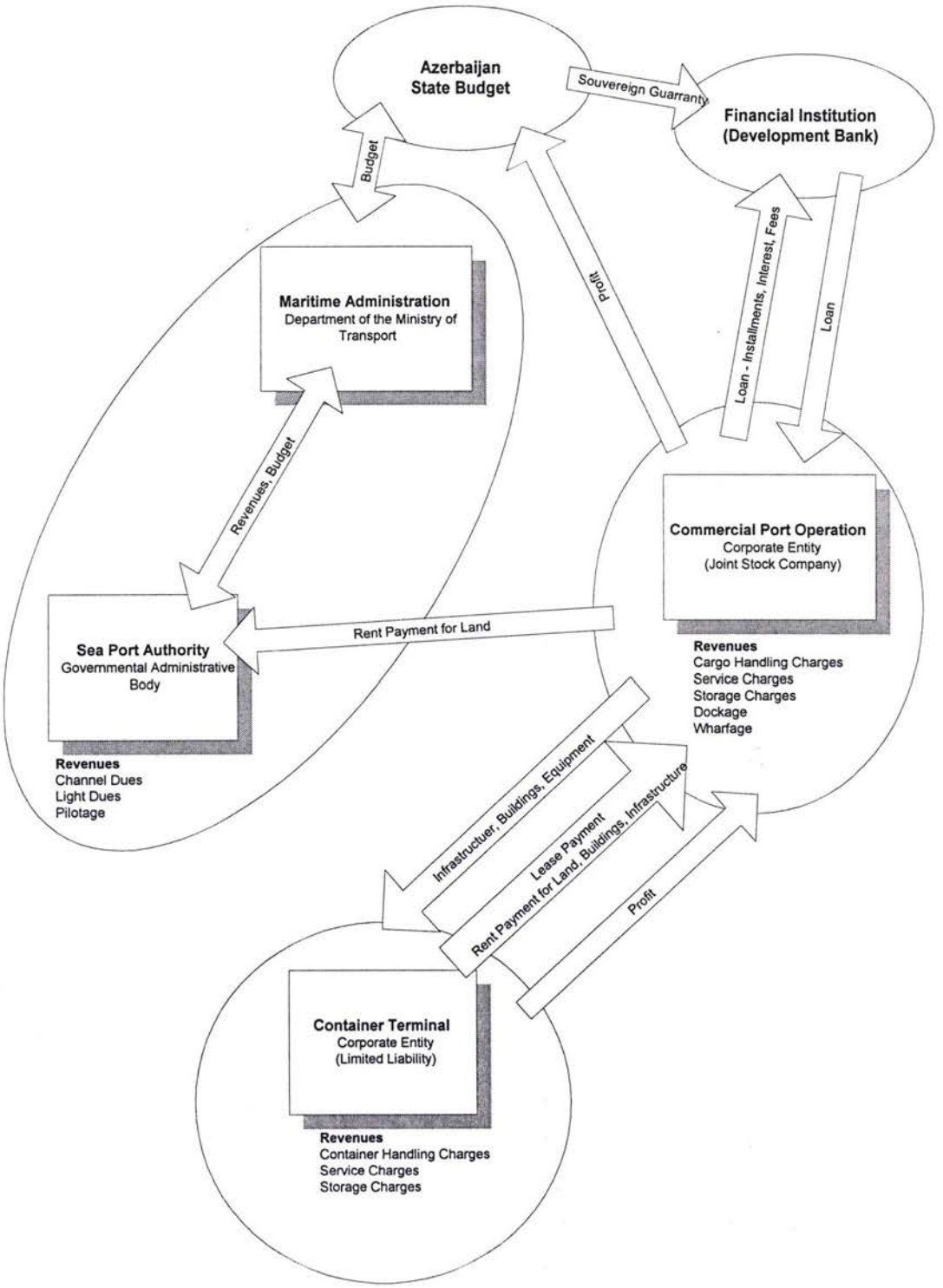


Fig. B 4

Part C - Future Port Operations

1. Introduction

As it can be seen from the evaluation of present cargo operations and from the evaluation of existing infra- and superstructure as well as from the operational procedures, the port needs major improvement in the a.m. fields in order to meet future requirements. Special attention has to be paid to the integration of the increasing container throughput which in particular means that a container terminal has to be integrated.

In the following a concept for future port operations will be introduced which in particular deals with

- technical requirements, i.a.
  - infrastructure (terminal access, link to the ferry terminal, railway access)
  - superstructure (buildings, surface, equipment)
- manpower requirements, i.a.
  - number of staff
  - qualifications
  - training
- definition of operation areas, i.a.
  - definition of space requirements interdepending with equipment selection
  - zoning of areas for general cargo, break bulk and containers
- operational procedures, i.a.
  - operational strategies
  - shift system.

The introduced concepts are elaborated

- in full accordance with the requirements which arise from the traffic forecast and

- on the base of Ideal operating conditions which means
  - the most efficient and economic equipment is chosen
  - the capacity is always sufficient to handle the projected cargo throughput
  - manpower and space requirements are calculated to guarantee smooth operation.

The initial phase of development and implementation has to be based on a concept which only allows minor investment risks. This means in particular that

- the existing equipment and assets have to be repaired where necessary and to be used as far as possible

- investment in expensive and highly specialised equipment is excluded for the initial phase due to high risk of such investments.

2. Basic Conditions

2.1 Operational Strategies / Policies

The operational strategies will have some major influence on the master plan as they may directly affect such important matters as the port's cargo handling capacity, the space which is available, the cargo handling technology to be chosen etc. In the following some major strategies are listed:

- The port will be open to all shipping lines for the dispatch of general cargo and container vessels as a common user terminal without any restrictions. All clients will be treated on equal basis.

- In general vessels will be dispatched in accordance to *"first come - first to be served"* unless special circumstances require a different routine. Vessel berthing and dispatch will be co-ordinated with the Port Authority. Specific routines have to be discussed with the Port Authority, but would include at least transmission of relevant information prior to the vessel's arrival.

- The terminal will provide its services seven days per week, 365 days per year. All following calculations are made on this basis.

- It is recommended to implement a 3-shift-system with 8 working hours each, as e.g.:

1st shift:	07.00 - 15.00 hrs
2nd shift:	15.00 - 23.00 hrs
3rd shift:	23.00 - 07.00 hrs

  Special arrangements can be made for weekends and public holidays.

- The operator intends to train his operational staff as multi qualified workers e.g. equipment operators will be able to also work as checkers, supervisors etc., which in turn increases the efficiency of operations and decreases the number of required staff especially in the initial phase of operation where it will be difficult to utilise the manpower to a reasonable extent. Therefore flexible working times are also recommended where the number of working shifts per month is fixed but the working times shall be flexible according to operational demands.

- It is assumed that the following additional services will be provided by third parties:
  - Towing and pilotage
  - Dredging of sea access, front of berth and link to access channel
  - Ship repair
  - Fire protection
  - Security outside of the terminal area
  - Maintenance of access roads

- The port will provide i.a.
  - Sufficient and safe berth for vessel dispatch
  - Reception, delivery and movements of the cargo as requested by clients
  - Sufficient cargo handling equipment for containerised and non-containerised cargo
  - Sufficient storage area
  - Reception and delivery of LCL-cargo
  - Intermediate storage of LCL-cargo
  - Sufficient land-side access to / from the terminal

- Documentation of container movements
- Supply of all required data to the Port Authority and the clients as far as possible and necessary
- Security on the Terminal
- Container Repair Services
- Reefer Services
- an EDP- & Communication System in order to cover basic operational requirements

- To fulfil the a.m. demands the operator will
  - purchase the necessary yard handling equipment according to corresponding cargo throughput
  - guarantee high availability of all assets
  - execute maintenance and repair of all facilities (quay area, buildings, equipment etc.) according to international standards
  - The operator will also provide facilities / office space to be used by governmental authorities in case of operation control / inspection according to the lease contract.

2.2 Traffic Projections

The future cargo handling in the Port and the functional requirements are based on the cargo volume and modal split as projected in the Traffic Forecast (Volume II). Table C-1 shows the forecasted cargo volume by year:

Table C-1 Projected Cargo Volume Port of Baku

Non- Containerised Cargo in 1000 t	2000			2005			2010			2015		
	pess.	most likely	optim.	pess.	most likely	optim.	pess.	most likely	optim.	pess.	most likely	optim.
Gen. Cargo	50	50	50	23	27	34	26	36	56	29	48	96
Break Bulk	310	310	310	351	415	522	397	555	880	449	743	1483
Dry Bulk	390	390	390	419	464	491	452	564	795	489	697	1223

Containers	2000			2005			2010			2015		
	pess.	most likely	optim.	pess.	most likely	optim.	pess.	most likely	optim.	pess.	most likely	optim.
Total Throughput												
TEU	28648	40476	40476	36430	58917	74188	41218	78845	125010	46634	105513	210679
Boxes	25783	36428	36428	29144	47134	59350	30914	59134	93758	34976	79135	158009
via Import/Export Yard												
TEU	24166	34166	34166	30170	49068	61786	34136	65664	104112	38622	87874	175434
Boxes	21749	30749	30749	24136	39254	49429	25602	49248	78084	28967	65906	131576
via Empty Container Yard												
TEU	4482	6310	6310	6260	9849	12402	7082	13181	20898	8012	17639	35245
Boxes	4034	5679	5679	5008	7879	9922	5312	9886	15674	6009	13229	26434
via Railway Transshipment Area												
TEU	19300	29000	29000	21836	38809	48868	24706	51934	82344	27952	69500	138754
Boxes	17370	26100	26100	17469	31047	39094	18530	38951	61758	20964	52125	104066
Quay Moves Main Complex												
TEU	4166	4166	4166	7542	8922	11234	8534	11938	18930	9656	15978	31898
Boxes	3749	3749	3749	6034	7138	8987	6401	8954	14198	7242	11984	23924
Transfer to/from Ferry Terminal												
TEU	6100	8000	8000	6902	10706	13482	7808	14326	22716	8834	19172	38276
Boxes	5490	7200	7200	5522	8565	10786	5856	10745	17037	6626	14379	28707

The illustration overleaf shows the different movements which have to be taken into consideration when the future design of the container terminal is made (example given for most likely scenario for the year 2000).

Model of Principle Movements at the Container Yard

Year 2000 - Most Likely Scenario

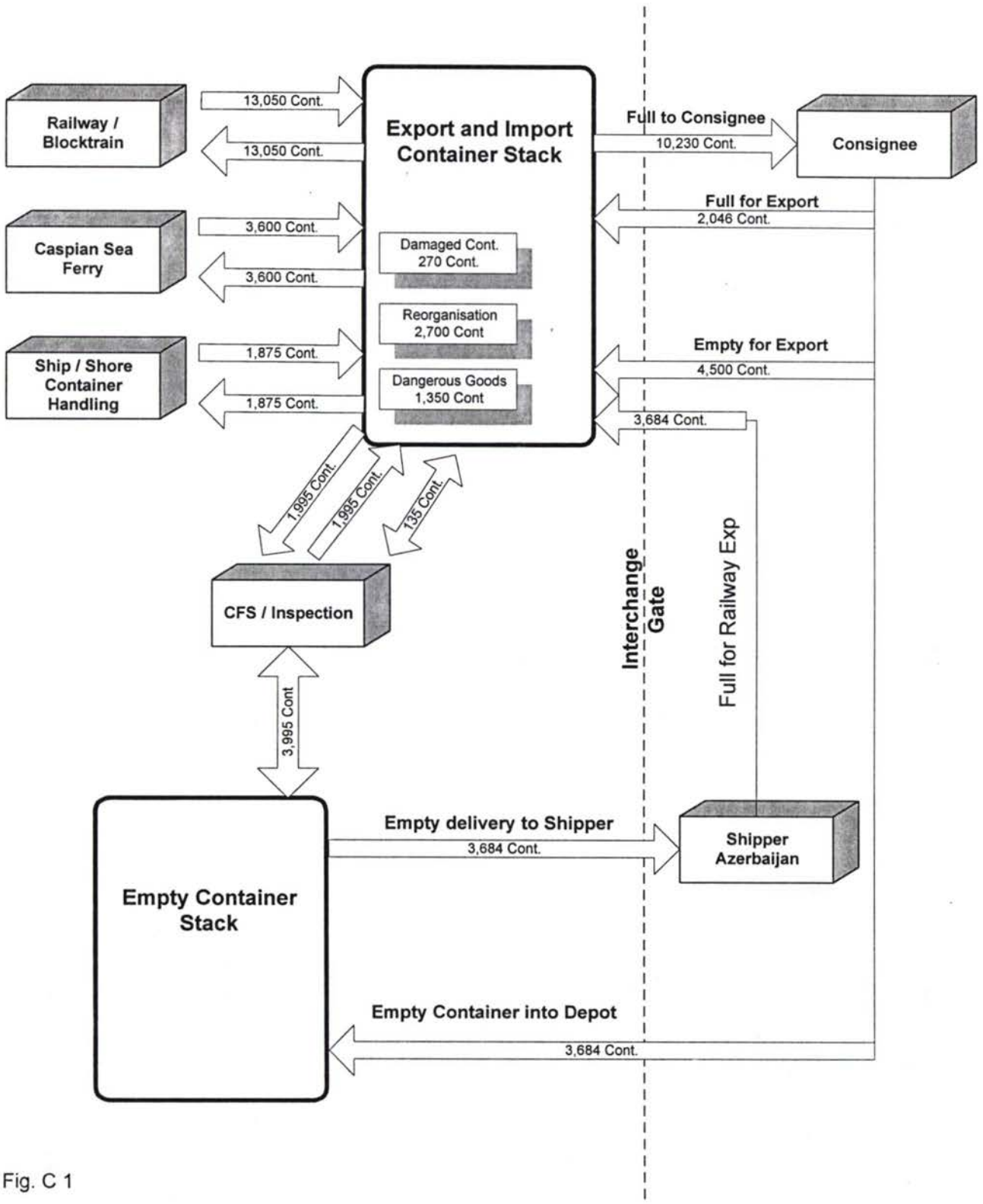


Fig. C 1

3. Port Master Planning

3.1 Required Facilities

The required facilities are defined on the base of the most likely scenario of the traffic forecast. Knowledge of the required facilities such as e.g. berths, cranes and storage facilities is a major need for the further planning steps.

3.1.1 Berths

Based on the figures from the Report on the Assessment of Current Port Operations (Volume III, Annex 1) the average berth capacity was assumed to be around 700,000 t p.a. resp. around 300,000 t p.a. containerised cargo which leads to the berthing requirements shown in the table below.

Table C-2 Berth Requirements (Based on Most Likely Scenario)

Commodity	Year							
	2000		2005		2010		2015	
	Volume (1,000 t)	No. of Berths	Volume (1,000 t)	No. of Berths	Volume (1,000 t)	No. of Berths	Volume (1,000 t)	No. of Berths
Gen. Cargo	50	0,07	27	0,04	36	0,05	48	0,07
Break Bulk	310	0,44	415	0,59	555	0,79	743	1,06
Bulk	390	0,56	464	0,66	564	0,81	697	1,00
Containers*	3749	0,13	7138	0,24	8954	0,30	11984	0,40
Total	-	1,20	-	1,53	-	1,95	-	2,53

* = figures given in number of containers to be moved via quay

The size and type of ships calling Baku for the above sea borne traffic will not change significantly, as their dimensions are given by the Volga-Don-Canal system. Ro/Ro traffic in maritime transport may develop in future on the Caspian Sea, which also will be considered in the port planning.

If it is considered that berths nos. 4 - 6 (total length 403 m) will count as 2 berths only (approx. 200 m each according to future vessel length of not more than 180 m) and also taking berth nos. 8 and 9 with a total length of approx. 270 m as two berths for smaller ships into consideration, the total number of 4 berths is more than sufficient for future demands.

Furthermore berth no. 7 with the Ro/Ro ramp is available, but without any quayside handling equipment in operational condition.

Ro/Ro traffic in the Caspian Sea, organised by private ship-owners, is most likely to appear during the next years. Ro/Ro vessels will also be limited in design according to the Volga-Don Canal system, i. e. Ro/Ro vessels will be rather small, about 3,000 to 4,000 tdw.

These types of Ro/Ro vessels cannot be equipped with a so called quarter ramp, but with a normal stern ramp only, because quarter ramps are too big in construction and are being used for Ro/Ro ships of 10,000 tdw onwards. The limitation to a stern ramp type Ro/Ro vessel traffic does not automatically include a special berth design in the ports of call. In many ports a pontoon-barge facility substitutes a special berth design. This barge will be placed behind the ship. The ship's ramp will be lowered to the barge. The barge is provided with another ramp from barge to shore which can be levelled by a hydraulic system. The advantage of such a facility is its flexibility in operations, a Ro/Ro vessel can be berthed at any berth available. As long as the Ferry Terminal with the existing link span can serve such traffic, an acquisition of a pontoon barge device is not necessary.

From the operational side berths nos. 4 - 6 and nos. 8 - 9 need rehabilitation in order to serve for future cargo handling activities. During reconstruction works berth no. 7 may be reactivated if necessary and possible under technical point of view.

3.1.2 Quayside Cranes

Based on the assumption that 1 quayside crane will move approx. 300,000 t p.a. on average (respectively approx. 50,000 containers), the number of required quay cranes can be seen from the table below.

Table C-3 Requirement of Quayside Cranes (Based on Most Likely Scenario)

Commodity	Year							
	2000		2005		2010		2015	
	Volume (1,000 t)	No. of Cranes	Volume (1,000 t)	No. of Cranes	Volume (1,000 t)	No. of Cranes	Volume (1,000 t)	No. of Cranes
Gen. Cargo	50	0,17	27	0,09	36	0,12	48	0,16
Break Bulk	310	1,03	415	1,38	555	1,85	743	2,48
Bulk	390	1,30	464	1,55	564	1,88	697	2,32
Containers*	3749	0,08	7138	0,14	8954	0,18	11984	0,24
Total	-	2,58	-	3,16	-	4,03	-	5,20

* = figures given in number of containers to be moved via quay

From operational point of view, taking the lifting capacity, outreach and age of the cranes into consideration, it is absolutely sufficient to keep the 9 TAKRAF cranes on site (1 x 40 t, 4 x 16/32 t, 4 x 10/20 t). Than there is sufficient reserve capacity to enable the port for simultaneous operations at all transport modes. The required cranes should be rehabilitated in order to meet international standards in terms of availability, reliability and maintenance condition.

The cranes can be fitted with attachments for the handling of special cargoes, e. g. magnetic plates for the handling of scrap, grabs for the handling of dry bulk cargoes, etc. All this attachment equipment is available in sufficient number.

As the lifting capacity of the existing cranes is very limited, in case of necessary transhipment of heavy lifts a mobile crane has to be hired occasionally.

It has clearly to be stated that the Port does not provide any adequate quayside container handling device. The 40 t TAKRAF crane limits container handling due to its limited lifting capacity and outreach and its missing special container handling devices like e.g. turnable automatic telescopic spreader etc. Attachment of such devices would further decrease the lifting capacity. Besides this, it is the only crane with a more or less tolerable container handling ability.

3.1.3 Storage Capacities

It is considered that only 50% of the total throughput of General Cargo and Bulk Cargo requires temporary storage in the port. The rest is assumed to be direct transhipment cargo which is directly transferred between ship and railway respectively vice versa. Break Bulk and containers are considered to be transhipped via the yard in any case.

Dwell times are assumed as follows:

- General cargo = 12 days
- CFS cargo = 5 days
- Bulk cargo = 15 days
- Break Bulk = 15 days
- Containers = 5 days full containers. / 10 days empty containers.

Based on the most likely scenario and the a.m. assumptions, the required storage capacities for the different commodities can be seen from the table below.

Table C-4 Requirement of Storage Capacities (Based on Most Likely Scenario)

Commodity	Year							
	2000		2005		2010		2015	
	Volume	Req. Cap. (t)	Volume	Req. Cap. (t)	Volume	Req. Cap. (t)	Volume	Req. Cap. (t)
Gen. Cargo	25000	833	13500	450	18000	600	24000	800
CFS Cargo	44320	616	66020	917	88360	1227	118240	1642
Bulk	145000	6042	232000	9667	282000	11750	348500	14521
Break Bulk	310000	12917	415000	17292	555000	23125	743000	30958
Cont. Full*	34166	475	49068	682	65664	912	87874	1220
Cont. Empty*	6310	175	9849	274	13181	366	17639	490

* = figures given in TEU

3.1.4 Storage Area Requirements

The required storage area mainly depends on the stacking density of the goods, on its stacking ability and on the cargo handling and stacking technology.

General Cargo , Bulk and Break Bulk are assumed to be handled in conventional manner with forklift trucks, cranes, grabs, clamps etc. In general there are not so many different choices.

It is another case with the container storage, where different kind of handling equipment causes major differences in terms of space requirements. Therefore, in the following, both commodity groups are investigated separately.

Non-Containerised Cargo

Based on the required storage capacity (see table C-4 above) the required space can be calculated if the land utilisation factors for the different kind of goods are known.

Land utilisation factors (net) are assumed to be as follows:

Covered storage

- General cargo = 1.5 t / sqm
- CFS container cargo = 1.5 t / sqm

Open storage

- Break Bulk = 1.75 t / sqm
- Bulk cargo = 3 t / sqm

Net storage area = 60% of gross area (factor 1.67 for manoeuvring purposes to be used) for covered storage areas
= 80% of gross area (factor 1.25 for manoeuvring purposes to be used) for open storage areas

The assumptions made above lead to the space requirements which are shown in table C-5 below.

Table C-5 Requirement of Storage Areas for Non-Containerised Cargo (Based on Most Likely Scenario)

Commodity	Year											
	2000			2005			2010			2015		
	Req. Cap. (t)	Area (sqm)		Req. Cap. (t)	Area (sqm)		Req. Cap. (t)	Area (sqm)		Req. Cap. (t)	Area (sqm)	
		net	gross		net	gross		net	gross		net	gross
Covered Storage												
Gen. Cargo	833	555	927	450	300	501	600	400	668	800	533	891
CFS Cargo	616	411	686	917	611	1021	1227	818	1366	1642	1095	1828
Open Storage												
Bulk	6042	2014	2518	9667	3222	4028	11750	3917	4896	14521	4840	6050
Break Bulk	12917	7381	9226	17292	9881	12351	23125	13214	16518	30958	17690	22113

Containerised Cargo

The space requirements for container storage are mainly depending on the handling technology. The existing systems are briefly introduced in the following.

In general there are the following different container yard handling systems:

- the *Tractor-trailer System*, in which containers are both handled and stored by "over-the-road" chassis or terminal trailers, which are moved around the terminal by heavy-duty tractor units;
- the *Straddle Carrier Direct System*, in which quay transfer, stacking and other duties are performed by straddle carriers;
- the *Straddle Carrier Relay System*, in which straddle carriers are responsible for in-yard stacking and unstacking, while quay transfer and other movements are performed by tractor-trailer sets or other equipment;
- the *Yard Gantry System,* where the container yard is equipped with rubber-tyred or rail-mounted gantry cranes for stacking / unstacking, with tractor/ trailer units for quay transfer and other movements;
- the *Front-end Loader System (Forklift Trucks or Reach Stackers)*, either entirely performed by heavy-duty lift-trucks or one sort or another "direct system" or with other equipment for quay transfer in a "Relay" system;
- *Combination Systems* , various "hybrid" combinations of straddle carriers, yard gantry cranes and other equipment with more than one type of stacking equipment in use at a time, each carrying out a function to which it is best suited.

The decision regarding the equipment technology to be chosen depends on different factors which are namely:

- the required storage capacity
- the area which is available
- economic aspects.

In the following the major advantages and disadvantages are introduced and reasons for exclusion of certain technologies are named.

The *Tractor-trailer System* is not further introduced because of its major disadvantages which are namely

- huge space requirements (huge manoeuvring area required)
- units are not stackable.

The *Forklift Truck* or *Reach Stacker* - System is used at terminals with relatively low throughput. The machines are able to stack 3 high respectively up to 5 or more high for empty container stacks. The main difference between forklift trucks and Reach Stackers is that the latter can reach also some containers in the second row without restows. This system requires high expenses for the yard pavement due to the high axle-load. Reliability of the equipment is high and the investment risk is low as this kind of equipment can easily be sold on the second hand market. The stacking density achieved is the worst compared with the other systems. But the forklift trucks are very flexible and can also be used for other cargo handling activities.

Straddle Carriers have a theoretical capacity of stacking containers three (newer developments even four) high, although in practice this capacity will not be attained as it would require a perfect flow of information to guarantee permanent access to containers. The main advantages of the straddle carrier system are: moderate to good space utilisation, high flexibility, relatively low expenses for storage area pavement due to the weight distribution over eight wheels and compensating suspension systems.

Yard Gantry Systems are based either on rubber-tyred or on rail-mounted gantries, the basic differences being, first, that rubber-tyred gantries can serve different areas of the terminal while rail-mounted gantries are limited to the location of their rails, and secondly, that rail-mounted gantries are able to serve a wider area under the portal than rubber-tyred ones. Transfer between quayside and storage area is usually executed by tractor-trailer units. The main advantages of these systems are : good area utilisation by high

stacking, high reliability, suitability for automation and comparable low maintenance requirements. Anyhow, this system is less flexible than a straddle carrier system and is often difficult to implement in ports where import containers constitute the major proportion of the traffic.

The following area utilisation factors per ha are reached:

- Forklift Trucks for full container stack 275 TEU / ha
- Rubber-Tyred Gantry 700 TEU / ha
- Rail-Mounted Gantry 1.000 TEU / ha
- Empty Container Handler 6 800 TEU / ha

The information given above together with the already calculated amount of necessary slots leads to the space requirements shown in the following table.

Table C-6 Requirement of Storage Areas for Containerised Cargo (Based on Most Likely Scenario)

Year	Req. Storage Capacity		Space Requirements (ha)				
			Full				Empty
	TEU Full	TEU Empty	FLT/RS	Straddle	RTG	RMG	Stacker / FLT
2000	475	175	1,73	1,19	0,68	0,48	0,22
2005	682	274	2,48	1,71	0,97	0,68	0,34
2010	912	366	3,32	2,28	1,30	0,91	0,46
2015	1220	490	4,44	3,05	1,74	1,22	0,61

As the location for the container yard has to be somewhere in the centre of the Main Complex, it is assumed that an area of approx. 350 x 60 m = 2.1 ha will be available as container operation area. This space is further reduced by a necessary railway handling area of approx. 350 x 25 m (0.88 ha) so that only the remaining approx. 1.22 ha may serve as container yard. The yard for empty containers is not included and has to be located somewhere else.

From the table above it can be clearly seen that the only solution for equipment choice in later development steps is the Rail-mounted Yard Gantry. The space requirements in the shadowed fields exceed the available space partially by far.

3.1.5 Required Yard Equipment

Non-Containerised Cargo

It is considered that the existing cargo handling equipment after necessary rehabilitation works is sufficient for a certain time period. Transhipment of bulk and break bulk will mainly take place by means of ship/shore cranes. For the transfer of general cargo between quay and shed and for loading/discharging ships, trucks and railway wagons a sufficient number of smaller fork-lift trucks, trailers and tractors is available after rehabilitation.

Containerised Cargo

As already stated in the previous paragraph, the only choice for the stacking system is the Rail-Mounted Gantry (RMG) due to the limited space. But, the investment risk for such equipment is very high because of its high price, necessary crane rail foundations, extensive transport and erection and tailor made design. Therefor, for the initial phase, equipment with a much lower investment risk such as Forklift trucks and Reach Stackers has to be chosen. After the initial operation phase, when it is clear that the projected volume will be handled, the system has to be changed than to RMG's.

The yard equipment requirements are shown in the table below.

Table C-7 Requirement of Container Yard Equipment (Based on Most Likely Scenario)

Year	Full Container Yard		Empty Cont. Yard		Railway handl.	Equipment Requirements								
	Cont.	moves	Cont.	moves	moves	FLT	RS	ECH	RMG Yard	RMG Railw.	TTU	Pick-up	car	Mini-bus
initial	-	-	-	-	-	1	2	1	-	-	5	1	1	-
2000	30749	92247	5679	12494	26100	1	2	2	1	1	7	2	1	1
2005	39254	117762	7879	17334	31047	1	2	2	2	1	9	2	1	1
2010	49248	147744	9886	21749	38951	1	2	2	2	1	11	2	1	1
2015	65906	197718	13229	29104	52125	1	2	2	2	2	13	2	1	1

FLT = Forklift Truck
RS = Reach Stacker
ECH = Empty Container Handler
RTG = Rubber-Tyred Gantry
RMG = Rail-Mounted Gantry
TTU = Tractor / Trailer unit (1 Tractor + 2 Trailers)

It is assumed that all transfer containers to/from the Ferry Terminal will be moved on shipping line's trailers. Equipment to load or unload trailers at the Ferry Terminal is not included in the table above.

3.2 Zoning of Areas

Non-containerised cargo

The main complex was originally designed to handle general cargo, bulk and break bulk. As it is assumed this kinds of cargo have to be handled also in the future, the existing facilities will be used further on, which means in particular:

- the berths nos. 4 - 6 will mainly serve as berths for the transhipment of general cargo, bulk and break bulk, but also for containers when needed
- the stone-built warehouses / sheds nos. 1-3 will be used for temporary storage of general cargo, but most of the space may be rented out for other purposes as the required sheltered area is much smaller than the existing one
- the metal sheds nos. 4 and 5 will serve as container freight station, further on they may accommodate a transformer station, toilets and social rooms like changing rooms etc.
- general cargo vessels with transhipment of goods via the warehouses have to be berthed alongside berths nos. 8 - 9
- open storage area will be available in the backreach of the quayside cranes at berths nos. 4 - 6.

After discharging from the ship, the cranes will put the cargo either directly to a railway wagon (direct delivery) or to the adjacent transit storage area (indirect delivery). Direct delivery to trucks is not likely.
Export Cargoes will follow the same pattern, vice versa. It is assumed that 50% will take the direct delivery route. This assumption is realistic as in the past the share of direct deliveries was up to 80%. Due to some expected operational obstacles, e. g. availability of railway wagons etc., this ratio may drop, but not below 50%.

For the mentioned direct delivery to and from railway wagons it is vital to have at least one railway track under the cranes along the berths.

The open storage area for bulk, break bulk cargoes and general cargoes is available adjacent to the west side berths of the general cargo complex. Due to some limitations, e. g. railway tracks, container area etc., it cannot be wider than approx. 35m, but over the entire length of the berths.

Some special general cargoes, e. g fruits and other food stuff may require covered transit storage in a transit shed, the transport from ships to shed and vice versa will in this case be carried out by a terminal tractor-trailer. The cargoes in the open storage area will either be handled by the harbour cranes within their reach or by forklift trucks with adequate capacity, i. e. 5t. The system of a 2nd line cranes / yard cranes should be abandoned.

As the remaining available storage area of approx. 14,000 sqm for break bulk and bulk cargo will only be sufficient until around the year 2003, the handling of these goods has then to be transferred to the timber terminal which should then be rehabilitated in order to accommodate the named cargoes.

Containerised cargo

Container yards are normally located as close as possible to the quay where the ship operation takes place in order to keep the transfer distance between quay and yard as short as possible which influences the operation speed respectively the number of required transfer equipment. As, according to the traffic projections, quayside transhipment of containers will only play a minor role and due to the fact that the main complex has to provide the storage facilities for containers to be transhipped via the ferry terminal, the direct access to the quayside is not that important, it is planned to implement a container yard parallel to berths nos. 4 - 6 between the metal sheds and the open storage area for general cargo, bulk and break bulk.

The container yard will be divided into:

- container yard for full containers
- container yard for empty containers.

The yard for full containers will be located parallel to berths nos. 4 - 6, but in the centre of the terminal area. The yard will be limited by the dispatcher's building to the north-east, by the railway transhipment area at railway tracks nos. 5 and 6, by berth no. 7 and by the open storage areas for general cargo, bulk and break bulk to the north-west (see Fig 3 figure section).

Railway tracks nos. 5 and 6 will serve for loading / unloading containers from / to railway wagons. In the initial phase the transhipment will be executed by Reach Stackers. In the final stage the Reach Stackers will be replaced by 1 respectively two rail-mounted gantry cranes. A zone of at least 15m width adjacent to the railway tracks has to be kept free for manoeuvring of the Reach Stackers

The yard for full containers will consist of 3 blocks (15 TEU long x 4 TEU wide + 6 TEU long x 4 TEU wide + 41 TEU long x 2 TEU wide) in the initial phase, which means a capacity of 166 ground slots = 250 operational slots in total. All these blocks are located on the area where concrete plates are already laid (see Fig. 1 figure section).

After demolition of the ramp between the transformer substation close to berth no. 7 and the house where the border police is located, another block of 15 TEU long x 4 TEU wide will be added and the block of 2 rows depth will be extended to a total length of 63 TEU (see Fig 2 figure section). After that extension a total number of 210 ground slots = 315 operational slots will be available.

According to the traffic projections and the calculated storage requirements (see table C-4) this will not be sufficient to meet the demands of the year 2000. Therefor it has to be evaluated, if after demolition of the ramp already the transtainer stacks have to be built. But, anyhow, this question will be answered by the development of container traffic in the Port of Baku.

After changing to a transtainer stacking system it is planned to have a stack of 9 containers wide and 4 high. The total length of the block will be 55 TEU which leads to a capacity of 495 ground slots = 1,485 operational slots. The Consultants know very well that this requires an accurate yard planning and container allocation system, but without such a high density storage system the space available is by far not sufficient to meet the future demands.

The transtainer will span over a block of 9 containers wide and 1 truck lane on each side. Traffic separation can be seen from Fig4 (figure section).

The yard for empty containers will be located at the place where the burnt-out metal shed was situated. Therefor, the ramp has to be dismantled completely in this area in order to reach the height level of the surrounding quay area. This area will give room for approx. 55 ground slots = 207 operational slots. This will be sufficient only until the year 2001. It is then recommended either to dismantle the warehouse no. 3 or to extend the yard to the open storage area adjacent to berths nos. 4 - 6 after transfer of the break bulk business to the Timber Terminal.

Gate Area

In total 3 container lanes will be sufficient. They will be reversible order to use them as in- and outgate. For this purpose on each island there should be 2 gate cabins with sufficient space for two persons including edp-equipment.

Additionally one lane should serve for general cargo. This lane should be widened to 6m width and should not be sheltered in order to allow passing of oversized trucks (e.g. for project cargo with over width or over height).

In total 10 parking lots are sufficient for arriving trucks during the document pre-check. This pre-check has to take place before passing the gate in order to avoid long queues at the gate.

The gate office should accommodate border police (estimated 5 people), customs (5 people), gate dispatchers (5 people) , forwarders (5 people) and shipping lines/agents (3 lines/agents with 4 people each).

The location and design of the gate area can be seen in Fig.4 (figure section).

3.3 Specification of Yard Equipment

Forklift Trucks (including Empty Container Handlers) / Reach Stackers

Heavy duty Forklift Trucks or Reach Stackers with automatic telescopic spreader for at least 20' and 40' positions with 40 tons lifting capacity under spreader and capable for not less than 3 high storage.

Empty container handlers (which are also forklift trucks) should have a lifting capacity of 15 tons under spreader and should be capable for at least 5 high storage.

Railmounted Gantry Crane(s) for Import/Export Yard

should have at least 40 tons lifting capacity under spreader (spreader specification same as above) and 1 over 5 high and 9 wide plus truck 2 lanes and cantilever of approx. 10 m on one side which leads to the following dimensions

clearance between legs	approx. 31.4 m
rail gauge	approx. 32.9 m
width portal	approx. 34.4 m
overall width	approx. 44.4 m
lifting capacity	40 tons under spreader
lifting height	1 over 5 = approx. 18.5 m

Rail-mounted Gantry Crane(s) for Railway Operations

should have at least 40 tons lifting capacity under spreader (spreader specification same as above) and 1 over 2 high and 1 wide pre-stack plus 2 truck lanes plus 2 railway tracks which leads to the following dimensions

clearance between legs	approx. 19.1 m
rail gauge	approx. 20.6 m
overall width	approx. 22.1 m
lifting capacity	40 tons under spreader
lifting height	1 over 2 = approx. 12 m

Tractor / Trailer - Sets

Tractors should have sufficient power to pull a full loaded trailer also over a Ro/Ro-ramp of such vessels. Trailers should have guide frames (not only guide posts) on three sides to increase the productivity during loading the trailer which is important especially as long as containers are lowered on them by ship's gear. Containers with length over 40' as e.g. Maersk 45'-containers should be taken into consideration.

Small Forklift Trucks

Lifting capacity 2,5 tons with *"free lift mast"* which allows operating in containers. Some special attachments (e.g. bale clamps, paper clamps etc.) should be purchased to guarantee flexibility.

3.4 Requirements for Other Facilities

The requirements for other facilities are various, those include:

- Access Roads
- Gates and Parking areas
- Interchange Container Control Facility
- Adequate office space for operations and technical staff, Customs, Border Police /Immigration, Water Police, Forwarders, Shipping Lines and/or their Agents
- Customs Clearance Area
- Yard Planning Office
- Ship Planning Office
- Dangerous Goods Area
- Reefer Plugs
- Workshops

- Sufficient rail tracks for "direct delivery" by rail and for container traffic by rail, e. g. block trains
- Sufficient illumination

Some existing facilities, e.g. offices, can be rehabilitated, some others have to be renewed (reconstructed, e.g. the gates); interchange and adequate parking areas must be newly constructed in connection with a new office building.

Dangerous cargoes in containers are also taken into account. Either they may be stacked at the end of the container stacking rows or better not far from the in-gate or out-gate facility. In any case, some container ground slots must be fitted with a special drainage system for the storage of containers with dangerous goods according to environmental protection standards and laws. At least 10 reefer plugs for refrigerated containers must be available in the port.

3.5 Other Operational Requirements

Important operational requirements are as follows:

- Sophisticated container handling systems require skilled and trained staff in order to reach a maximum productivity. Therefore, training concepts for further courses must be realised

- Customs procedures should be simplified in order to avoid bottlenecks and high dwell-times because of customs clearance. Customs staff should participate in special training courses. The check of the standard cargo papers should be done prior to the containers arrival or departure from the Container Yard. During in-gate and out-gate control the Customs should only briefly look at the already checked documents. At the gate only a brief physical control of the containers, i.e. container number, size, dangerous goods label, etc. will take place. Customs check of containers should take place in the Container Yard, if required, in order to avoid queuing at the gates.

- There is an ongoing TACIS Project for trade facilitation and customs procedures with the target for a harmonised customs documentation system based on UN alignment. This system is required to ensure that:

  - Exporters, importers, forwarders and international transport companies have the correct documentation to facilitate trade between them

  - Customs have the correct documentation available to enable them to process and clear goods for export, import or transit in an efficient manner, etc.

- The port's own in-gate procedures, i.e. container interchange, must also be done in an efficient manner. Besides the normal cargo papers and a "truck order" from consignees or forwarders the "interchange paper" is the most important as it "interchanges" also the responsibilities for box and cargoes from forwarders, shippers and consignees to the port and vice versa. The interchange document states also the slot position in the yard and is basic information for the invoicing.

- The documentation flow must be smooth and well-organised.At the beginning for container yard operations a so called "T-Card system" with stack boards in the control room will be sufficient for yard planning and monitoring of container movements in the Container Yard, however, it requires a very high discipline of the staff assigned. With the increase of container traffic a EDP system should

replace the T-Card System in order to avoid unnecessary waste of time for the tracing of containers. However, even a T-Card System is capable to operate up to 100,000 containers per year in ports.

For the initial operation phase the port should implement as soon as possible an EDP-system which covers the basic requirements. e.g. support of:

- receipt and delivery of containers (gate in / gate out control)
- yard administration
- ship / shore operations.

When operation commences with the RMG's for yard operations, a high sophisticated container terminal control system (e.g. CMC, NAVIS) is a substantial requirement in order to:

- increase the terminal's productivity
- shorten information lines by direct data transfer
- increase the degree of data precision and quality
- enable the operator to communicate with client's or the Port Authority's EDP-system
- to be continuously supplied with container status data
- decrease paper works.

Envisaged year of implementation of the basic system is at the initial phase of container operation, for the high sophisticated system not later than in the year 2000.

- Modern container terminal control systems offer e.g. the following modules:
  - Yard Planning
  - Ship Planning
  - Railway Operations
  - Manpower Planning
  - Equipment Planning
  - Real-Time Equipment Control
  - Yard Operations, Monitoring & Scheduling
  - Quayside Operations
  - Holds & Releases (Custom's Interface)
  - Invoicing
  - Interface to other Computer Networks / EDI (Electronic Data Interchange).

This list is not complete and should only serve as an example for what is planned to implement in the 2nd phase of terminal development.

Container operations require also a proper work planning of the port's staff and a good collaboration with other institutions (e.g. customs), shipping agents and forwarders.

An adequate internal communications system, e.g. "walkie-talkies" is a vital operations requirement in all port areas, but specially in container operations. The RMG operators and crane operators must always be in connection with their respective foreman and dispatcher by VHF in order to keep the system in operation efficiently.

4. Manpower Requirements

4.1 Organisational Matters

It is planned to have a separation of operations staff between

- container operations and
- all other cargo operations

as a new enterprise for container operations will be founded.

Therefore, the staff requirements are elaborated separately in the following. The staff requirements only include the persons needed on the operations level up to foremen, dispatchers and planners, but not including the management level. Also staff of the technical department, for administration, secretary works, telephonists etc. are not included.

4.2 Manpower Allocation

Non-Containerised Cargo

For the calculation of required manpower the following assumptions are made:

performance per shift (8 hours) and gang

- 100 - 200 t general cargo
- 400 - 500 t dry bulk
- 400 - 500 t break bulk

The majority of non-containerised cargo will be dry bulk and break bulk. Therefore the following calculations are based on an average performance of 420 tons per shift and gang. 5 shifts have to be worked per week by each person on regularly basis.

One gang usually consists of 3 - 7 people, depending on the kind of cargo to be handled. The gangs namely consist of:

- 1 crane driver
- 1 crane supervisor / foreman
- 4 stevedores
- 1 tally

As most of the cargo is bulk and break bulk (which requires less staff than general cargo) it is assumed, if the gangs are calculated with 7 labours each, peak situations and times for absence due to vacation, illness etc. are already covered.

Table C-8 Number of Required Gangs for Non-Containerised Cargo (Based on Most Likely Scenario)

Year	Cargo Volume (t)		No. of Required Shifts / Week	No. of Required Gangs	No. of Required Labourers
	Per Year	Per Week			
2000	750000	14423	34	7	48
2005	906000	17423	41	8	58
2010	1155000	22212	53	11	74
2015	1488000	28615	68	14	95

The table above only shows the number of required staff for ship operations. Furthermore some other persons are needed in order to guarantee smooth cargo operations. These persons are namely:

- 5 persons working in the warehouses
- 1 mechanic and 1 electrician per shift for immediate assistance in case of equipment breakdown which means in total 4 mechanics plus 4 electricians for the initial phase
- 2 ship & yard planners
- 2 data collectors
- 2 operators
- 2 gate dispatchers
- 1 edp-/communication specialist
- 1 driver/messenger.

The number of labourers above indicates the requirement of the year 2000. The number of persons will not rise proportionally with the cargo throughput. It is assumed that the requirements will rise only by 20-25% until the year 2015.

Containerised Cargo

For handling containers the following tasks have to be executed:

- ship/shore container handling
- yard operations
- railway container handling
- transfer of containers to/from Ferry Terminal

The low number of containers to be handled via quay does not allow the implementation of gangs which exclusively work on this task. It is therefore recommended that ship/shore container handling will be executed by the same people which are executing the yard operations. 1 gang consists of 13 people which are namely:

- 1 crane driver
- 1 crane supervisor
- 1 hatch foreman
- 4 stevedores
- 2 lashers
- 1 tally/checker

- 3 tractor drivers

The yard operations gang consists of 4 people which are namely:

- 1 crane driver
- 1 crane supervisor
- 1 tally / data collector
- 1 spare

The gang for railway operations will also consist of 4 people as above.

The following calculations are based on the assumptions that

- 5 shifts are worked per week and person
- 1 shift means 6.5 hours productive working time
- 18 moves per hour per crane on average are assumed to be realistic

Table C-9 Number of Required Gangs for Containerised Cargo (Based on Most Likely Scenario)

Year	Ship/Shore Operations			Yard Operations			Railway Operations			Total no. of staff
	moves p.a.	shifts/ week	no. of gangs	moves p.a.	shifts/ week	no. of gangs	moves p.a.	shifts/ week	no. of gangs	
2000	3749	0.62	0.12	92247	15.16	3.03	26100	4.29	0.86	17
2005	7138	1.17	0.23	117762	19.36	3.87	31047	5.10	1.02	23
2010	8954	1.47	0.29	147774	24.29	4.86	38951	6.40	1.28	28
2015	11984	1.97	0.39	197718	32.50	6.50	52125	8.57	1.71	38

The table above only shows the number of required staff for operations in the yard respectively at the quay area. Furthermore some other persons are needed which are namely:

- 2 mechanics and 2 electricians per shift for immediate assistance in case of equipment breakdown which means in total 8 mechanics plus 8 electricians for the year 2000
- 4 ship & yard planners
- 2 data collectors
- 4 operators
- 6 gate dispatchers
- 2 edp-/communication specialists
- 1 driver/messenger.

Same as for non-containerised cargo it is assumed that the number of staff for the a.m. tasks will only rise by 20-25% until the year 2015.

5. Cost Estimations

5.1 Equipment Investment Costs

In the following the equipment investment costs are described. These investment costs do not include costs for rehabilitation of the existing quay cranes, tractors, trailers, forklift trucks etc.

The prices for the new equipment as proposed are as follows:

Table C-10 Equipment Prices 1997 per Unit

Item	Expected Life Span	Prices in US $		
		ex works, fully erected	Transport / Insurance	CIF Baku
Forklift Truck 41 t with spreader	10 years	300,000	20,000	320,000
Reach Stacker 41 t	10 years	370,000	30,000	400,000
Empty Container Stacker ,15 t, 5 high	10 years	200,000	20,000	220,000
Rail-mounted Gantry Crane 1 over 5, 9 wide, 33 m span, 41 t under spreader, with 10m cantilever on one side	15 - 20 years	2,000,000	300,000	2,300,000
Rail-mounted Gantry Crane 1 over 2, 20m span, 41 t under spreader	15 - 20 years	1,300,000	200,000	1,500,000
Small Forklift Trucks	10 Years	25,000	3,000	28,000
Tractor / Trailer Units	10 years	90,000	30,000	120,000
Miscellaneous gear	10 years	lumpsum		150,000
Pickup	5 years	lumpsum		25,000
Minibus	5 years	lumpsum		40,000
Car	5 years	lumpsum		20,000
Tank-trailer	10 years	lumpsum		40,000

The prices above do not include import tax, customs fees and other local costs to be added.

The split-up of equipment purchase can be seen in the table overleaf.

Table C-11 Proposed Equipment Allocation Schedule

Year	Allocated Equipment
Initial	1 Forklift Truck 1 Reach Stackers 1 Empty Container Stacker 5 Tractor / Trailer Units 1 Pickup 1 Car 10 small Forklift Trucks
2000	1 Rail-mounted Gantry Crane for Railway Operations 1 Rail-mounted Yard Gantry Crane 1 Reach Stackers 1 Empty Container Stacker 2 Tractor / Trailer Units 1 Minibus 1 Pickup 1 Tank-trailer
2005	1 Rail-mounted Yard Gantry Crane 2 Tractor / Trailer Units 6 small Forklift Trucks
2010	2 Tractor / Trailer Units
2015	1 Rail-mounted Gantry Crane for Railway Operations 2 Tractor / Trailer Units 6 small Forklift Trucks

5.2 Equipment Operation Costs

Operation costs for the equipment consist of costs for energy (electricity/fuel and maintenance. Maintenance costs include spare parts, labours and materials (e.g. grease, lubrication etc.). The costs shown in the table below are based on normal equipment utilisation over the year.

Table C-12 Equipment Operating Costs per Unit

Unit	Maintenance	Energy/fuel consumption	Working hours per year
Railmounted gantry crane	4% of purchase price per year	100 kwh/hour	3500
Railmounted gantry for railway operations	4% of purchase price per year	60 kwh/hour	3500
Tractor/trailer units	30% of purchase price per year	12 ltr/hour	3000
Reach stackers/heavy forklift trucks	20% of purchase price per year	18 ltr/hour	2500
Empty container handler	20% of purchase price per year	13 ltr/hour	2500
Small forlift truck	20% of purchase price per year	10 ltr/hour	1800
Cars	15% of purchase price per year	USD 3000/yr	
Tanktrailer	5% of purchase price per year	Min.	
Quay cranes	4% of purchase price/repl. value per year	140 kwh/hour	1800

6. Dry Bulk Cargo Area

6.1. Preface

This chapter is an addendum to the Phase III Report, Vol. III; all statements and calculations remain valid. The only exemption is the recalculation of the area and volume of the dry bulk area.

6.2. Introduction

This chapter is concerned with dry bulk cargoes in the traditional way only. This means commodities in lose form, like grain, sand, salt, scarp and other similar goods.

The performance of the equipment depends normally on the following factors:

- nature of the material
- type and capacity of the grab
- speed of the crane
- outreach of the crane
- skill of the operator
- ships characteristics (hatch dimensions, ship's beam)
- distance from ship's rail to hopper

The performance of the terminal depends additionally to the above mentioned factors on:

- layout of the cargo area
- berth capacity
- availability of storage area
- type and availability of additional equipment, like:
    - hoppers
    - rail wagons
    - trucks

6.3. Current Methods

Presently, the bulk cargo is directly transhipped into rail-way wagons. Due to the fact that wagons are insufficient distributed and the volume of cargo is increasing, there is a raising need for storage on the terminal area.

6.3.1 Crane equipment

The following list shows which cranes are available on the general cargo terminal:

asset registration number	manufacturer	capacity	year of construction	outreach
32	Takraf/Albatros	10/20 to	1990	32/16-8m
21	Takraf/Sokol	16/20/32 to	1977	32/25/16-8m
20	Takraf/Albatros	10/20 to	1976	32/16-8m
22	Takraf/Sokol	16/20/32 to	1978	32/25/16-8m
24	Takraf/Sokol	16/20/32 to	1982	32/25/16-8m
30	Takraf/Sokol	16/20/32 to	1987	32/25/16-8m
29	Takraf/Condor	16/32/40 to	1986	32/16-8/8-25m
25	Takraf/Albatros	10/20 to	1984	32/16-8m
21	Takraf/Albatros	10/20 to	1988	32/16-8m

6.3.2 Crane attachments

In the Port of Baku the number of crane attachments is no restriction, there are more grabs available than necessary.

	Grab	polyp grab	magnet
amount	27	7	3 sets
capacity	9.7to/3.35m^3 6to/3 m^3	6.5to	4.4to

6.3.3 Hopper equipment

The amount of hoppers on the general cargo terminal is sufficient. The idea of the port to convert a condemned crane into a big size hopper for railway loading operation has to be judged as good, it will speed up the operation.

6.3.4 Bulk cargo contracts 1997

Turnover of Bulk Cargo in 1997 till October

Commodity	Jan - Oct 1997 in tons
Grain	10639.30
Salt	53347.80
Metal + Scrap	8599
Barytes	12670.10
Chemical Cargo	621

6.4. Area designation

Scrap

Owing to the very rough, uneven character of this commodity it is very difficult to give exact stowage figures. Scrap is divided into three classes

- HMS 1 heavy
- HMS 2 light
- HMS 3 shredded

In the Port of Baku only the classes HMS 1 and HMS 2 are present.

The annual throughput of 50,000 tons of scrap results in a monthly handling rate of ca. 4170 tons. Keeping in mind that a considerable part is transhipped directly into railway-wagons, the consultants recommend that an area of 30m x 50m is more than sufficient.

The scrap area capacity calculates as follows:

$$\underline{\textbf{1,500 ml x 8 to/ m}^2} \qquad \textbf{= 12,000 tons}$$

It is very important that the location of the scrap area is at the south end of the terminal. This ensures that the terminal traffic (cars and trucks) is not entering or crossing this area. Because of the specific conditions on a scrap terminal, sharp metal pieces on the ground, it is not advisable to drive with pneumatic tyres in this area.

The cranes have the option to use either magnets or polyp-grabs. Normally the results of the polyp-grabs are much (+ 50%) higher than of the magnets. Therefore the magnets are normally only used for small quantities which the polyp-grab can not reach, or for cleaning the area or hatch.

For the amount of cargo on the scrap area, separation walls are not needed for the near future. In case of huge increase of scrap, it is advisable to use a metal construction instead of concrete walls.

Grain

The annual throughput of 50,000 tons of grain results in a monthly handling rate of ca. 4,170 tons. It is very important that the grain is always directly transhipped. There are various reasons that grain is not stored onto open areas:

- grain will be spoiled by rain
- grain will generate hygienic problems caused by rats, vermins, etc

In case that the amount of grain handled in the Port of Baku will increase, so that no direct transhipment is possible anymore, it is absolutely necessary to build up storage facilities (sheds, silos) to protect the grain from any adverse impact.

Salt

The annual throughput of 210,000 tons of salt results in a monthly handling rate of ca. 17,500 tons. Considering the high amount of cargo and the possible non-availability of railway-wagons, it is obvious that a temporary storage on the terminal will be necessary.

Salt stockpile dimensioning
stowage factor = 1.0m^3/to
Angle of repose = 30 degrees
max. base diameter = 30m
max. height of pile = 9,5m
volume = 6,000 m^3 or 6,000tons

The storage area for salt should be located north of the scrap area and separated by a separation wall. This will be necessary to avoid a contamination of the salt by small pieces of scrap. It is recommended that the area should be 60m wide and 30m deep, this will allow to store two piles of salt within this area, with a total volume of 12,000 tons. If there is a need to store more salt on this area, it is possible to extend the capacity of one third to a total storage capacity of 16,000 tons with the construction of two boxes (4m high). These 16,000 tons, which equals nearly the throughput of one month, should cover all contingencies.

Building material

The area for building materials should be 60m x 30m and separated into three equal compartments of 20m x 30m. This will allow the port to store building materials with different qualities in the same area.

Sand stockpile dimensioning
stowage factor = 0,55 m^3 /to
Angle of repose = 40 degrees
max. base diameter = 20m
max. height of pile = 10m
volume = 2,775 m^3 or 5,045 tons

In our case we have to add one third of the maximum stockpile capacity by the use of boxes. In this case we have a total capacity of 6,725 tons of each box.

Miscellaneous

An area of 30m x 30m is dedicated as area for various goods. This area can be used in case of any new commodities arriving in the port, or if the amount of already handled cargoes will increase dramatically.

The area north of the dry bulk area is planned to be used as break bulk area. Because break bulk needs no special requirements on the terminal, it can be used together with container operation. If the area is big enough there is no direct interference between these two commodities. In case of a growing demand for a bigger container area in the future, it might be necessary to shift the break bulk activities to the timber terminal.

Area distribution

	I	II	III	IV
scrap dimension area volume	30m x 50m 1,500m^2 12,000 tons			
salt dimension area volume without separation with separation		30m x 60m 1,800 m^2 12,000tons 16,000 tons		
building materials dimension area volume per box			three boxes (30m x 20m) three times (600 m^2) 6,725 tons	
miscellanies dimension area				30m x 30m 900 m^2

6.5 Summary

The port has to install separation walls at the bulk terminal area as soon as possible. This will increase the land utilisation while the storage height is to be much more sufficient. For these separation walls no big investment is needed.

To build a separation wall (4m height), a simple and cheap concrete construction, local craftsmanship and local cement is necessary. An alternative is a separation wall made out of old ships hatch cover, cut in adequate pieces and welded together.

The dry bulk area needs to be rearranged urgently, to guaranty that the cargo is not spoiled or contaminated and the operation runs as smoothly as possible. With the proposed area arrangements, the cargo handling operation as well as the temporary storage on the terminal should fulfil all necessary requirements.

The present area and equipment is not perfect for dry bulk handling operation, but for the amount of cargo which is handled in the port it is not necessary to install other systems like conveyor belts. If the volume of cargo will increase more than the storage area is able to receive it is always possible to use more area in the hinterland by the use of a shovel loader.

Dry Bulk Cargo Area

Part D: Cargo Handling Equipment Engineering

1. Introduction

This task comprises the assessment of the port's handling equipment and of the respective maintenance and repair facilities, workshops, tools and machinery. Budgets for rehabilitation works and recommendations on the required equipment were established. The latter are outlined hereinafter.

The following equipment and workshops were inspected:

- 18 ship-to-shore cranes (SSC)
- 33 forklifts (FLT)
- 4 terminal tractors
- 4 bobcats
- 2 belt conveyers
- approximately 100 trailers
- forklift/tractor workshop
- ship-to-shore crane workshop
- machine workshop
- electrical workshop
- car and vehicle workshop
- store complex

A list of the existing cargo handling equipment was elaborated, and recommendations were given on how to improve the available handling facilities so that they will meet future operational requirements.

2. Port Handling Equipment

In order to meet the future demand for handling equipment in the Port of Baku, the existing equipment was inspected. The number of still useable equipment was identified and compared with the number of equipment necessary for the operation of the general cargo complex in the near future. Particular emphasis was put on the technical applications of the equipment needed for container handling.

2.1 Available Equipment

D-1: Ship-to-Shore Cranes

Cranes ...	**Capacity up to**						**Total**
	6 t	**10 t**	**15 t**	**20 t**	**32 t**	**40 t**	
... available in the port	6	2	1	4	4	1	18

Forklifts

Forklifts ...	Capacity up to					Total
	2.5 t	4 t	6 t	12 t	18 t	
... available in the port	18	10	3	2	0	33

Terminal Trucks and Trailers

Trucks: 4 units with a capacity of 40 t, fifth wheel and gooseneck
Trailers: approximately 100 pcs of 20' roll-trailers with a capacity of 25 t

Container Handling Equipment

Apart from the shore cranes, which are partly used for container handling, specific container handling equipment for yard operation (such as reach-stackers or rubber-tyred gantry cranes, etc.) is not available.

2.2 Analysis and Recommendations

Ship-to-Shore Cranes

During the assessment of the shore equipment, all operational cranes were tested under working conditions by an experienced crane operator (some cranes could not be tested due to the lack of power supply and various other reasons).

The Consultant's port operation and engineering expert inspected the cranes, identifying and recording weak points and faults. During the inspection, it was noticed that most of the cranes' technical failures were of similar nature. An evaluation sheet was established to estimate the repair cost for each crane, considering the size of each crane and the extent of damages on it. The latter was split into three categories, namely "low", "middle" and "high" (damage).

However, the stated price indications are based on manufacturer's spare part prices (ex factory) only and do not include labour costs. The repair works might be executed by the port technicians as their skills appear to be sufficient. The poor condition of the cranes clearly reflects the lack of maintenance and spare parts as well as of appropriate tools and machinery in the crane workshops.

It is strongly recommended to engage an experienced crane engineer for the supervision of works at the start of the rehabilitation programme in order to ensure that detailed surveys and respective repair works are carried out properly.

However, a certain number of cranes are not recommended to be included in the proposed repair programmes, as:

- they are very old,
- a rehabilitation would be uneconomical,
- spare parts might not be available,
- damages on structural and mechanical parts are too heavy,
- operational demands do not require such a crane.

Recommendation:

Out of eighteen (18) cranes available in the port, nine (9) shall be scrapped and nine (9) be repaired.

As mentioned before, each crane shall be thoroughly inspected by an experienced crane engineer in order to have exact spare part requirements specified. This task will require a minimum of three days for each crane.

In order to ensure that rehabilitation works are carried out in a professional manner, it is recommended to engage an experienced crane engineer.

The following summary states the number of cranes currently available in the port, the number of cranes that will be available after rehabilitation and the number of cranes actually required for operation:

D-2: Summary of Crane Requirements

Number of cranes ...	Capacity up to						Total
	6 t	10 t	15 t	20 t	32 t	40 t	
... existing in the port	6	2	1	4	4	1	18
... available after rehabilitation	0	0	1	4	3	1	9

All TAKRAF cranes are in fairly good condition, thus a rehabilitation is feasible.

As a result from the above, there is no need to purchase any new cranes at this stage.

The list in table D-3 in the table section of this report gives an overview of the actions recommended for each single crane, based on inspection results and repair cost estimates.

Forklifts

During the assessment of the 33 forklifts available in the port, the equipment was tested as to its operational functions as far as engines were running. As the operational demand for forklifts is quite low for the time being, many forklifts could not be started because of empty batteries. Other forklifts were partly disassembled or cannibalised, among them even forklifts with only 200 working hours built in 1994.

The summary below states the number of forklifts found in the port, the number of FLTs that will be available after the repair programme, as well as quantities actually required together with the number of FLTs to be purchased.

Summary of Forklift Requirements

Number of forklifts...	Capacity up to					Total
	2.5 t	4 t	6 t	12 t	18 t	
... existing in the port	18	10	3	2	0	**33**
... available after the repair programme	5	5	0	1	0	**11**

Recommendation:

Out of the 33 FLTs found in the port, only 11 may be used for further operation. This relation might be misleading: Many of the FLTs were disassembled and cannibalised in former times, while others, like the Diesel WARNA 1.5-t FLTs, are technically outdated even with only a few years of age. Thus the number of operational forklift trucks is very low.

Considering the age and the anticipated low number of working hours of the 1.5-t Diesel WARNA trucks, it is recommended to repair these trucks and use them for transportation within the workshops only. The following trucks should be considered for this purpose:

- item no 23/asset no is not available
- asset no 61
- asset no 66
- asset no 67
- asset no 9

One of the two 10-t HYSTER forklifts (asset N° 3+4) should be repaired.

The forklift evaluation sheet in table D-4 (table section) outlines the measures to be taken for each unit. The recommended actions result from the technical inspection of the equipment which is recorded in the Equipment Assessment File.
Based on these findings, a lump sum for spare parts was established for each unit. A summary of the rehabilitation cost calculation is attached. This lump sum does not include labour costs and is calculated on spare part prices ex factory, VAT excluded, from European manufacturers.

According to the number of new FLTs to be purchased, a cost summary was elaborated for standard equipment of the required type.

Terminal Tractors and Trailers

Tractors
The number of terminal tractors existing in the port is very limited (four SISU tractors and two agricultural tractors). Two of the terminal tractors are operational, two are half-disassembled and stored in an old workshop (hangar). One of the agricultural tractors (item no 79/asset no is not available) is brand new with only five working hours, but not in use. The other one is in operation and requires some minor repairs only.

The data sheet overleaf gives an overview of the recommended actions to be taken for each unit.

Recommendation:
With regard to the future needs of terminal tractors, although the already 13 years old, the following two tractors, which are currently in operation, should be rehabilitated:

- asset no TRT1/item no 33
- asset no TRT4/item no 31

Considering their low level of working hours (3,800 and 4,000 hours) and that only minor repair works are required, a rehabilitation of these tractors is recommended.

The two in operational terminal tractors

- asset no TRT2/item no 26
- asset no TRT3/item no 32

are partly cannibalised but have a low level of working hours (approx 2,600 hours). For this reason, one of them should be rehabilitated with parts taken from the other unit. As the chassis of item no 32 is in better condition, it is recommended to rehabilitate this tractor. The costs for spare parts needed in addition to the parts taken from the other tractor are indicated in the evaluation sheet overleaf.

The two agricultural tractors should be kept operational by means of regular maintenance and by replacing some minor components.

Trailers
Due to the large number of terminal trailers available in the port, they were not inspected in detail. Basically, there are two types of trailers available:

- - 100 units of 20' roll-trailers with a capacity of 25 t
- - 5 units of agricultural 20' trailers with a capacity of 10 t, equipped with a tow bar

Recommendation:
Some 15% of the roll-trailers should be scrapped due to bended chassis resulting from overloads. The remaining roll-trailers, though in operation, should be rehabilitated. In general, only small repair works are required, e.g.:

- replacement of broken pine wood panels
- maintenance of the pendular axles
- derusting and repainting of the chassis

For these repairs, a lump sum of US$ 1,000.00 has been allocated to each trailer.
The five agricultural trailers are new but not in use. They are partly disassembled (illumination, etc.). The disassembled parts like tyres and rims should be mounted and the rest of the missing parts be replaced to render the trailers operational.

If the terminal surface will remain unchanged (i.e. with potholes, steps, etc.), the roll-trailers can only be operated at low speed and will be prone to further damages of axles and tyres as compared to other terminal trailer systems with pneumatic tyres.

3. Workshops and Stores

3.1 Workshop Analysis and Recommendations

The Port operates currently six different workshops for maintenance and repair work, these are:

- Forklift and Tractor Workshop
- Crane Workshop
- Machine Workshop
- Electric Workshop
- Car Workshop
- Wood Workers Workshop

Five of these workshops were visited during the equipment assessment. The wood workers workshop was not inspected as the works carried out in this workshop are not related to the core business of the port.

Being essential to the field of spare parts supply, the store complex with its different buildings was inspected as well. A brief summary of the findings is attached hereinafter.

Forklift/Tractor Workshop

This workshop is under the supervision of the transport department and employs four mechanics and one workshop head. Previously-employed electricians have left the workshop for jobs outside the port. It is the task of this workshop to supply cargo handling equipment to the transport section, including the maintenance and repair of forklifts, tractors and trailers. Due to the lack of proper tools and machinery, many basic repairs and maintenance works cannot be executed. Ring spanners or proper screwdrivers are not available for the mechanics. Thus most of the maintenance and repair works executed are inadequate or improvisations.

The workshop is located in two buildings of approximately 200 sqm each and comprises several garages and sheds where idle equipment or components are stored.

The low performance of the workshop is caused by various reasons such as:

- low salary
- low motivation of the staff
- lack of tools and machinery
- lack of spare parts
- lack of management support

Similar reasons apply to the other workshops and the store complex.

Recommendation:
To enable the workshop personnel to execute maintenance on a sufficient level, appropriate tools and machinery should be provided such as:

- mechanic tool sets
- auto electrician tool sets
- small overhead crane, 2.5 t
- air compressor
- tyre-removing machine
- high pressure cleaning device
- set of basic special tools
- battery charger of different types
- set of basic electrical hand tools

A list of recommended tools to be procured as well a list of existing workshop machinery is attached *as tables D-6 "Equipment List" and D-7 "Cost Break down for Additional Workshop Equipment" in the table section of this report.*

Crane Workshop

This workshop is also controlled by the transport department and located in a complex of approximately 200 sqm, consisting of three small workshops and one office. The workshop employs six electro-mechanics and one workshop manager in charge of the maintenance and repair of shore cranes.

The workshop is poorly equipped with tools and machinery. There is only one outdated pedestal drilling machine and very few old and insufficient hand tools available for the staff. Spare parts are not available. A large number of electric motors, which should be repaired, are inadequately stored in an open storage area in front of the workshop. The spare parts situation causes tremendous idle times, e.g. up to one year for the supply of crane bearings.

Preservation equipment and paint to protect crane structures from corrosion are not available.

Recommendation:
As an immediate measure, the spare part situation should be improved. Tools and machinery to be provided to the workshops are:

- mechanical tool sets
- electrical tool sets and measuring devices
- set of electrical hand tools
- sandblasting equipment
- spray painting equipment
- work benches
- pedestal drilling and grinding machine
- set of mechanical and electrical measuring devices
- mobile air compressor units

Machine/Crane Workshop

This workshop consists of two areas of approximately 250 sqm each, namely the machine workshop and the mechanical crane workshop. There are two turners working in the machine workshop, while the mechanical workshop employs six locksmiths = (mechanics) and one tool man. The workshop is headed by

a workshop manager. The machine shop mainly produces spare parts such as shafts and various other parts from the turnery which are required by the port, in particular mechanical parts for the cranes. In the crane workshop, only mechanical repairs on the shore cranes are carried out.

The available machinery in the turnery is rather old-fashioned but still operational. In table D-6 the existing machinery is *listed* A similar situation applies to the crane workshop where, however, one hydraulic press needs to be replaced. The existing hand tools are in very poor condition, and many basic tools are not available at all. Electrical hand tools are generally not available, thus repair works on the cranes are difficult and time consuming.

Recommendation:
Spare part availability for the machinery should be improved. Tools and machinery to be provided to the mechanics and turners are e.g.:

- mechanical tool sets
- set of basic electrical hand tools
- set of bearing pullers
- set of special tools
- hydraulic press
- sets of drills and turning tools

However, for the turnery it has to be further elaborated to which extent the spare parts should be manufactured. When comparing the required quality of spare parts with the costs of production involved, a rehabilitation and refurbishment of the machinery may seem to be uneconomical. It might be cheaper for the port to purchase genuine spare parts instead of producing them in a modernised machine workshop. This matter *should* be investigated in more detail.

Electric Workshop

This workshop is located in a shed/building which covers an area of approximately 300 sqm and which employs eight electricians and the workshop manager. The main task of this unit is to repair all general electric installations in the port and, in particular, the electrical components on the shore cranes, i.e. electric motors, contactors, relays, etc. The existing machinery is very old and partly out of order and use. In table D-6 the available equipment is listed. As to the hand tools, they are in the same bad condition as described for the other workshops.

Recommendation:
Spare parts availability in this workshop has to be improved. Sufficient tools and machinery should be provided to execute repair works on an acceptable level, e.g.:

- electrical tool boxes
- set of measuring devices for electrical components
- electrical test boards
- pedestal grinding machine
- electrical motor rewinding machine and consumables

Car/Vehicle Workshop

This workshop is located in a small garage with a size of approximately 50 sqm. Only one mechanic is working in this location. The task of this workshop is the repair of port-owned cars and small vehicles. The equipment and tools in this workshop are outdated and beyond any recognised standards. Thus the quality of work is very questionable.

Recommendation:
This workshop should either be closed or completely refurbished or directly linked to the forklift/tractor workshop. The continuation of works within this workshop in the present way is not recommended.

3.2 Stores Complex Analysis and Recommendations

The central stores complex consists of several small sub-stores and one office, covering an area of approximately 1,260 sqm. Two persons work in the stores. Their main task is the store-keeping of all the items used in the port. This includes the handling of all kind of materials, spare parts, uniforms, components, etc. (approximately 7,000 different items). The reordering of spare parts is done in the supply department, which also stipulates spare part requirements. Since 1993, a Personal Computer is used with a self-made- store-keeping software, but the programme does not meet the requirements of a modern store software, e.g. there is no interlink to other EDP systems, the ordering of spare parts is done in another department, analysis functions are not available, cost-related issues are only rudimentarily applied.

The distribution of the different items in the various storage rooms seems to be rather unorganised, a location plan for the individual items does not exist. The shelving system is inadequate and generally in poor condition, i.e. they consist of old wooden shelves. Some of the items are just stored on the floor. Due to the lack of a proper shelving system, a large part of the store is empty. Many sensitive spare parts are inadequately stored, i.e. bearings and pistons are not protected against dust and corrosion.

The fact that sub-stores are located at various places in the port causes time-consuming work procedures.

Recommendation:
In the whole stores complex, both the shelving and spare parts handling systems as well as lighting have to be completely refurbished. In order to avoid damages to the goods stored and to improve the tidiness in the store, a suitable shelving system should be provided together with a bin card system. The latter should be replaced, at a later stage, by a modern system meeting the latest requirements and providing data interlinks to other departments - especially to the accounting department - and to the port's future EDP systems. Moreover, it is strongly recommended to remove all obsolete spares still on stock for equipment that does no longer exist.

4. Summary

Recommendations and measures to be taken for port equipment and workshops are summarised hereinafter.

4.1 Equipment

Cranes

Out of the 18 cranes existing in the port, 9 should be repaired to meet the future operational requirements. To establish the detailed spare part requirements, each crane has to be reassessed in detail upon approval of the budget.

Forklifts

Out of the total number of forklifts, eleven forklifts are still useable for further cargo operation. In addition, five forklifts may be transferred to the workshops for use of internal transportation. The remaining lift trucks should be scrapped or used as spare part carriers. As there is a high demand for forklifts, eight additional units should be purchased.

Terminal Trucks and Terminal Trailers

Out of the four existing terminal trucks (two of which are in operational), three units should be rehabilitated, while the fourth one should be used as spare parts carrier. In addition, two agricultural trucks are available, one of them is almost new. If regular maintenance is carried out in future, both units could be kept operational.

4.2 Workshops/Stores

Workshops

In general, similar conditions were found in all port workshops, these are:

- poor equipment with basic hand tools
- old and partly insufficient machinery
- lack of spare parts
- no special tools available

In order to improve the workshop situation, the following measures should be taken:

- acquisition of basic tools,
- acquisition of the necessary machinery,
- improvement of the supply of spare parts,
- incentives to improve the workers' motivation.

These measures are of vital importance to ensure a professional execution of the rehabilitation programme and to carry out future maintenance within an improved environment.

Stores Complex

The entire stores complex is poorly organised, and goods are inadequately stored. In order to improve the situation within the various facilities, a suitable shelving system should be purchased.

The existing EDP-system in the stores should be replaced by a modern system which meets the latest technical requirements and provides data interfaces to other departments.

To facilitate spare parts procurement, this department should be subordinate to the technical department.

5. Recommendations

5.1 Equipment Rehabilitation and Technical Assistance to the Maintenance and Repair Workshops

The equipment survey has identified among in the port available cargo handling equipment the ones which are suitable for rehabilitation and therefore a preliminary budget for necessary spare parts has been allocated. In the following a rehabilitation programme is described for those items which are on one side worth to repair and on the other side required for the future operation at Baku Port, according to the operational requirements.

The objectives of this rehabilitation programme are:
- Provision of fully operational crane, forklifts, truck, etc. to the port
- Training of the technical staff of the port's workshops in modern maintenance and repair work standards
- Establishment an efficient workshop organisation
- Establishment of a spare parts and store management
- Quality assurance of the repair work during the programme

The allocated equipment for rehabilitation is shown in the tables overleaf. The programme consists of three main sections:

Project Preparation

- Specification of all necessary spare parts, material, tools, workshop equipment etc. and drawing up a plan for procurement of those items
- Renovation and preparation of workshops and stores, implementation of a maintenance and stores management EDP system
- Carry out training of workshop and stores personnel in basic skills and techniques, as well as special courses in electronic control systems and hydraulic systems
- Selection of four work groups among the port staff for establishing two repair teams for the cranes and two repair teams for tractors, trailers and forklifts.
- Rehabilitation Programme Cranes
    - The two work groups for the cranes will carry out a repair programme for the allocated cranes, each group will carry out a general repair of dedicated cranes one after the other. A period of approximately three month will be necessary for each crane.

- Rehabilitation Programme Trucks and Forklifts
    - One work group will start with the rehabilitation of the Terminal trucks and heavy forklifts, and the second work group will carry out the rehabilitation of the small forklifts. An approximate period of two month per truck or forklift will be necessary.

This programme is planned as a combination of technical assistance, training, supply of spare parts, necessary equipment and materials, and supervision and quality control of the maintenance and repair work. According to the project planning shown in Figure D-1 (figure section), A long-term expert should be assigned for two years. In the first year this expert should work in an executive position as the Workshop and Stores Manager, subordinated to the technical director of the Port of the port. A local counterpart should be selected as an assistant in this first phase. After the project preparation phase and start up of the rehabilitation programmes, the counter part should take over the workshop management, and the expert will function as counterpart. Additional to the long-term expert, necessary short term training for special skills such as electronic control- and hydraulic system should be carried out.

5.2 Rehabilitation Costs

Spare parts

The following tables show the allocated equipment of the Port being worth to be repaired within the programme. A detailed breakdown of spare part costs for the portal cranes is given in the tables D14a-l (table section):

Table D-7 Portal Shore Cranes

No	Item No	Asset No	Type	Recommendation	Current Value	Rehabilitation Costs US$	Replacement Costs US$
9	43	21	16/32t	repair	10%	29.000,-	1,6 mill
10	45	22	16/32t	repair	15%	42.500,-	1,6 mill
11	46	24	16/32t	repair	35%	25.000,-	1,6 mill
12	47	30	16/32t	repair	55%	23.500,-	1,6 mill
14	48	29	40t	repair	50%	20.500,-	2,0 mill
15	41	32	10/20t	good	70%	11.500,-	1,4 mill
16	44	20	10/20t	repair	5%	58.500,-	1,4 mill
17	56	25	10/20t	repair	40%	57.500,-	1,4 mill
18	57	21	10/20t	repair	60%	19.500,-	1,4 mill

Assumptions:

- the current value was calculated on a 10 year depreciation period for the economic lifetime of the cranes
- replacement costs are based on standard equipment of European manufacturers and FOB prices (the technical details have a considerable impact on the price)

Table D-8 Forklift Trucks

No	Item No	Asset No	Type	Recommendation	Current Value	Rehabilitation Costs US$	Replacement Costs US$
3	19	63	3,5t	repair	80%	2.500,-	35.000,-
6	10	61	1,5t	repair	50%	1.500,-	25.000,-
7	12	60	3t	repair	60%	2.000,-	35.000,-
8	13	66	1,5t	repair	80%	1.500,-	25.000,-
10	15	44	3t	good	1%	500,-	35.000,-
13	18	69	3t	repair	30%	1.500,-	35.000,-
14	22	67	1,5t	repair	70%	1.500,-	25.000,-
15	23	66	1,5t	repair	70%	1.500,-	25.000,-
17	1	4	10t	repair	1%	20.000,-	120.000,-
19	6	55	1,5t	repair	40%	2.000,-	25.000,-
20	7	58	1,5t	repair	50%	3.000,-	25.000,-
21	8	51	1,5t	repair	40%	3.000,-	25.000,-
22	9	57	1,5t	repair	50%	3.000,-	25.000,-
23	20	59	1,5t	repair	50%	3.000,-	25.000,-
26	-	9	1,5t	repair	1%	1.500,-	25.000,-
28	80	9	1,5t	repair	1%	1.500,-	25.000,-

Assumptions:
- the current value was calculated on a 10 year depreciation period for the economic lifetime.
- replacement costs are based on standard equipment of European manufacturers and FOB prices.

Table D-9 Tractors

No	Item No	Asset No	Type	Recommendation	Current Value	Rehabilitation Costs US$	Replacement Costs US$
1	31	TRT4	Sisu	repair	1%	5.000,-	115.000,-
2	3	TRT1	Sisu	repair	1%	8.000,-	115.000,-
3	32	TRT3	Sisu	repair	1%	15.000,-	115.000,-
5	72	-	Russ.	Repair	20%	2.000,-	40.000,-
6	79	-	MF	good	90%	500,-	40.000,-

Assumptions:
- the current value was calculated on a 10 year depreciation period for the economic lifetime.
- replacement costs are based on standard equipment of European manufacturers and FOB prices.

Table D-10 Summary of spare part cost for the equipment

Portal cranes	US$ 287.500,-
Forklift trucks	US$ 49.500,-
Tractors	US$ 30.500,-
Costs spare parts	US$ 367.500,-
Shipping/Insurance	US$ 36.750,-
Total Costs	**US$ 404.250,-**

Materials and workshop equipment

The materials and workshop equipment necessary for this programme includes a maintenance and stores management EDP system and tool-sets and hand-tools for about 20 craftsmen (mechanics and electricians) of the workshops. The costs are budgeted as follows:

Table D-11

Maintenance and Store EDP System	US$ 65.000,-
Shelving system for stores	US$ 100.000,-
Tools, Workshop Equipment for 20 Craftsmen	US$ 25.000,-
Equipment - Tractor Workshop *	US$ 32.000,-
Equipment - Crane Workshop *	US$ 30.000,-
Equipment - Electrical Workshop *	US$ 34.000,-
Equipment - Crane Machine Workshop *	US$ 21.000,-
Shipping/Insurance (10%)	US$ 30.000,-
Total Materials / Equipment	**US$ 337.000,-**

* Detailed Breakdown of Costs see Tables D-13a-d (Table Section)

Table D-12 , Costs for technical assistance and training

Workshop Manager / Training Experts - 2 years	**US$ 600.000,-**

Part E: Existing Port Marine Craft

1. Present Situation

The existing port marine craft, e.g. tug boats, pilot boats, floating crane etc., are shown in table E-1:

Table E-1: Existing marine crafts in the Port of Baku.

No	Name	Type	Year Built
1	"SALATIN ASKEROVA"	Excursion Boat	1975
2	"KAPITAN QASIMOV"	Excursion Boat	1975
3	"GARTAL"	Fire fighting Boat	1980
4	"BELEDCHI"	Pilot Boat	1968
5	"NHS 73"	Oilskimmer/Garbage Collector	1984
6	"NMS 16"	Oilskimmer/Garbage Collector	1978
7	"NMS"	Oilskimmer/Garbage Collector	1989
8	"ELKHAN KAZIMOV"	Harbour Tug	1959
9	"GUNASHLI"	Harbour Tug	1972
10	"ARAZ"	Crew Boat	1975
11	"ULDUZ"	Supply Boat	1976
12	"KUR"	Dirty Oil Collecting Vessel	1988
13	"SHAFAG"	Dirty Oil Collecting Vessel	1988
14	"SPK PAHLAVAN"	Floating Crane	1979
15	"SABIR BABAYEV"	Harbour Tug	1987
16	"NMS 26"	Oilskimmer/Garbage Collector	1974
17	"LIMANSI"	Harbour Tug	1974
18	"CHASARLI"	Harbour Tug	1974
19	"N.SCHIRiNOV"	Harbour Tug	1974
20	"ACHMEDLY"	Bunker Boat	1938

For more detail, please see Vol.III, Annex 3.: "Condition Survey Report"

2. Condition of Marine Craft

Table E-2 shows the condition of the marine craft as it was during a survey carried out by the Consultants in October, 1996.

Table E-2: Condition of the Marine Crafts

No	Name	Condition
1 2	"SALATIN ASKEROVA" "KAPITAN QASIMOV"	The vessels are in working condition but require dry docking for the hull etc. and possible underwater repairs. Engines are outdated and not economical
3	"GARTAL"	The boat is obsolete; it cannot cope with the requirements
4	"BELEDCHI"	Boat is outdated and needs to be replaced
5 6 7	"NMS 73" "NMS 16" "NMS 21"	Boats need dry-docking, sandblasting and painting. Boats have unusual design and therefore efficiency is limited. No-s "73" and "21" are in working condition.
8	"ELKHAN KAZIMOV"	Condition is very poor; the design is totally outdated, the machinery is obsolete.
9	"GUNASHLI"	In working condition but should be repaired and painted safety equipment to be renewed.
10	"ARAZ"	In working condition. Life saving equipment needs to be replaced.
11	"ULDUZ"	In working condition. Needs dry docking.
12 13	"KUR" "SHAFAG"	In good condition ("SHAFAG" was not in Port)
14	"SPK PAHLAVAN"	Said to be in working condition. Needs maintenance and painting.
15	"SABIR BABAYEV"	In working condition. Needs maintenance and dry docking as soon as possible.
16	"NMS 26"	Not in working condition, must be repaired.
17 18 19	"LIMANCHI" "CHASARLI" "N.SHIRINOV"	In working condition but in poor state. Need maintenance and painting.
20	"AKHMEDLY"	Said to be in working condition .

For more details see Vol. III, Annex 3: "Condition Survey Report"

3. Summary and Recommendations

As stated before (2), some marine craft are not in working condition and must have a general rehabilitation or must be replaced. However, all vessels need dry docking for sandblasting, some steelworks and painting. Most engines are outdated and not economical. The fire fighting boat is obsolete. The capacity of the fire pump is too small and the arrangement of the two nozzles attached to a derrick does not allow a quick change of the throwing direction. In case of fire on one of the ferries or a tanker this boat would be completely useless. It is therefore recommended to take this boat out of service as soon as a modern replacement is available.

- The pilot boat is outdated and needs, to be replaced.
- The oil skimming equipment should be overhauled as soon as possible and then put back to work.
- The condition of the tug boat "ELKHAN KAZIMOV" is in a very poor condition and the machinery is obsolete.
- It is recommended to stop all ongoing repair works on that boat immediately and use the funds for urgent repairs on other vessels of the port.
- Three sister ships, two built in 1961 in Baku and one, "N.SHIRINOV", built in 1971 in Astrakhan, could not be inspected as they were not presented with the argument that they are identical to "ELKHAN KAZIMOV". As the design of these three other tugs is identical to the one inspected and described, also these three units should be taken out of service as soon as possible.
- The floating crane's structure is in an advanced state of corrosion as can be soon from the photographs (Annex 4). The same applies for the hull. Due to the limited capacity of the crane (25 t), its operational versatility is very limited.
- Because of the very bad condition of the crane immediate repairs would be required. If the condition deteriorates further, it will not be justifiable to spend any money on it. For these reasons the rehabilitation of this crane can not be recommended.

For more details see Annex 3 "Condition Survey Report".

Vol. III

Tables and Figures

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D-3: Ship-to-Shore Cranes (SSC)

No	Item No	Asset Registration No	Manufacturer	Capacity	Year of Construction	In Operation	Recommended Actions		
1	40	10	Kirowetz/Leningrad	10 t	1960	yes	x		
2	53	8	Abus	10 t	1958	yes	x		
3	49	16	Ganz	6 t	1972	yes[1]		x	
4	50	18	Ganz	6 t	1975	yes		x	
5	51	28	Ganz	6 t	1986	yes		x	
6	52	12	Ganz	6 t	1960	yes	x		
7	54	11	Ganz	6 t	1960	yes	x		
8	55	13	Ganz	6 t	1960	yes	x		
9	43	21	Takraf/Sokol	16/32 t	1977	yes		x	
10	45	22	Takraf/Sokol	16/32 t	1978	yes		x	
11	46	24	Takraf/Sokol	16/32 t	1982	yes		x	
12	47	30	Takraf/Sokol	16/32 t	1987	yes		x	
13	42	6	Abus	15 t	1958	no	x		
14	48	29	Takraf/Kondor	40 t	1986	yes	x		
15	41	32	Takraf/Albatros	10/20 t	1990	yes			x
16	44	20	Takraf/Albatros	10/20 t	1976	no		x	

[1] crane is not used at present

17	56	25	Takraf/Albatros	10/20 t	1984	yes[2]		x	
18	57	21	Takraf/Albatros	10/20 t	1988	yes		x	

[2] crane is not connected to power supply at present

D-4: Forklifts

No	Item No	Asset No	Manufacturer	Capacity	Year of Construction	In Operation	Recommended Actions		
1	24	27	Russia Lvov 4014	5 t	1987	no	X		
2	25	28	Russia Lvov 4014	5 t	1987	no	X		
3	19	63	DW 1792	3.5 t	1994	yes		X	
4	50	39	DW 1792	3.0 t	1984	no	X		
5	4	64	DW 1792	3.0 t	1994				
6	10	61	DW 1661	1.5 t	1991	no		X[1]	
7	12	60	DW 1788	3.0 t	1992	yes		X	
8	13	66	DW 1661	1.5 t	1994 (only 161 h)	no		X[1]	
9	14	38	DW 1792	3.0 t	1985 (only 94 h)	no	X[2]		
10	15	44	DW 1792	3.0 t	1985	yes			
11	16	37	DW 1792	3.0 t	1985		X[2]		
12	17	32	DW 1792	3.0 t	1985	no	X		
13	18	69	DW 1792	3.0 t	1989 (only 74 h)	no		X	
14	22	67	DW 1661	1.5 t	1993 (only 233 h)	no		X	
15	23	66	DW 1661	1.5	1993 (only 214 h)	no		X	
16									
17	1	4	Toyota FD 100	10 t	1985	yes		X	

No	Item No	Asset No	Manufacturer	Capacity	Year of Construction	In Operation	Recommended Actions		
18	2	3	Toyota FD 100	10 t	1982	no	X		

No	Item No	Asset No	Manufacturer	Capacity	Year of Construction	In Operation	Recommended Actions		
19	6	55	Toyota FD 15	1.5 t	1990	yes		X	
20	7	58	Toyota FD 15	1.5 t	1991	yes		X	
21	8	51	Toyota FD 15	1.5 t	1990	yes		X	
22	9	57	Toyota FD 15	1.5 t	1991	yes		X	
23	20	59	Toyota FD 15	1.5 t	1991	no		X	
24	21	54	Toyota FD 15	1.5 t	1991	no	X		
25	38	50	Toyota FD 15	1.5 t	1990	no	X		
26	-	9	Toyota FD 15	1.5 t	1983	yes			
27	11	58	Toyota FD 15	1.5 t	1990	no	X		not inspected as not found
28	80	9	Toyota	1.5 t	1986	yes		X	
29	5	52	Still	2.5 t	n. a. .1975	no	X		
30	39	53	Still	4 t	? 1990	no	X		
31	-	48	Toyota	1.5 t	. 1989	no	X		
32	-	42	Toyota	1.5 t	. 1989	no	X		
33	-	56	Toyota	1.5 t	1991	no	X		

Three forklifts are exclusively used within the workshop and are thus not mentioned in the balance sheet, namely two TOYOTAs and one TCM.

[1] *Forklifts might be used for internal transportation in one of the workshops*
[2] *To be used as spare part depot*

D-5: Tractors -

No	Item No	Asset Registration No	Description	Manufacturer	Year of Construction	In Operation	Recommended Actions		
1	31	TRT 4	4 x 4 Terminal Tractor	SISU	1983	yes		X	
2	3	TRT 1	4 x 4 Terminal Tractor	SISU	1993	yes		X	
3	32*	TRT 3	4 x 4 Terminal Tractor	SISU	1983	no		X	
4	26	TRT 2	4 x 3 Terminal Tractor	SISU	1983	no	X		
5	72		Agricultural Tractor	Russia	1988	yes		X	
6	79		Agricultural Tractor	Massey Ferguson	. 1995	yes			X

* To be repaired with parts taken from item. No 26.

Table D-6a : Equipment List ELECTRIC WORKSHOP

No	Asset No	Description	Country of origin/ Manufacturer	Year of Construction	In operation		Recommended Actions		
					yes	no	to be scrapped	to be repaired	OK/to be maintained
1	-	Surface plate	-	n.a.	x			x	
2	4948	Drilling machine	Germany	n.a. (- 30 years)	x			x	
3	2	Overhead crane, 1 t	Russia	n.a. (- 1970)	x			x	
4	-	Test board	self-made	n.a. (- 20 - 25 years)	x		x		
5	-	Mechanical plate-cutting machine	-	n.a. (- 30 years)	x			x	
6	5045	Scraper	Russia	1974	x			x	
7	5188	Scraper	Russia	1974	x			x	
8	-	Drilling machine, small	Russia	n.a. (- 50 years)					
9	-	Grinder	Russia	n.a.	x		x		
10	-	Oven	self-made	n.a. (- 20 years)		x	x		

Table D-6b Equipment List FORKLIFT/TRACTOR WORKSHOP

No	Asset No	Description	Country of origin/ Manufacturer	Year of Construction	In operation		Recommended Actions		
					yes	no	to be scrapped	to be repaired	OK/to be maintained
1	n.a.	Compressor without tank	Russia	n.a. (- 1976)	x			x	
2	n.a.	Welding machine	Russia	n.a. (- 1976)	x			x	
3	n.a.	Pedestrian drilling machine	Russia	1978	x			x	
4	n.a.	Grinding machine	Russia	n.a. (- 1974)	x			x	
5	n.a.	Drilling machine, big	Russia	n.a. (- 1976)	x			x	

Table D-6c Equipment List MACHINE/CRANE WORKSHOP

No	Asset No	Description	Country of origin/ Manufacturer	Year of Construction	In operation		Recommended Actions		
					yes	no	to be scrapped	to be repaired	OK/to be maintained
1	n.a.	Compressor without tank	Russia	n.a. (- 1976)	x			x	
1	5114	Lathe machine, 1,000 mm	Russia	1978	x			x	
2	4929	Scraper, 2,500 x 500	USA	(- 1944)	x			x	
3	5186	Scraper, 500 x 500 mm	Russia	1980	x			x	
4	5068	Scraper, 1,000 x 500 mm	Russia	1976	x			x	
5	5078	Scraper, 300 x 800 mm	Russia	1976	x			x	
6	9918	Pedestrian grinder	Russia	1967	x			x	
7	3	Overhead crane, 1 t	Russia	- 1970	x			x	
8	4908	Lathe machine, 2,000 mm	Georgia	1962	x			x	
9	5046	Lathe machine, 1,000 mm	Armenia	1974	x			x	
10	4910	Lathe machine, 1,000 mm	MONARCH	1943	x			x	
11	4909	Lathe machine, 2,000 mm	Georgia	1961	x			x	
12	4933	Lathe machine, 1,500 mm	Russia	1972	x			x	

Tables D-13a-d Cost breakdown for additional workshop equipment

Table D-13a Electrical Workshop

Item	Description	Qty.	Costs US$
1	Electricians Tool boxes	8	8,000
2	Sets of measuring devices for electrical components	1	10,000
3	Electrical test board	1	5,000
4	Pedestal grinding Machine	1	1,000
5	Electrical motor rewinding machine	1	10,000
Total Costs additional Equipment US$			**34,000**

Table D-13b Forklift/Tractor Workshop

Item	Description	Qty.	Costs US$
1	Mechanic tool boxes	4	4,000
2	Auto electrician tool sets	2	2,000
3	Small Overhead Crane	1	2,000
4	Air Compressor	1	2,000
5	Tyre removing machine	1	10,000
6	High pressure cleaning device	1	3,000
7	Set of basic special tools	1	5,000
8	Battery charger of different types	2	1,000
9	Set of basic electrical hand tools	1	3,000
Total Costs additional Equipment US$			**32,000**

Table D-13c Machine/Crane Workshop

Item	Description	Qty.	Costs US$
1	Mechanic's tool boxes	6	6,000
2	Set of basic electrical hand tool	1	3,000
3	Set of bearing pullers	1	2,000
4	Set of special tools	1	5,000
5	Hydraulic press	1	5,000
Total Costs additional Equipment US$			**21,000**

Table D-13d Crane Workshop

Item	Description	Qty.	Costs US$
1	Mechanic's tool boxes	2	2,000
2	Set of basic electrical hand tool	1	4,000
3	Set of basic electrical hand tools	1	3,000
4	Sandblasting equipment	1	2,000
5	Basic spraypainting equipment	1	1,000
6	Work benches	8	5,000
7	Pedestal drilling and grinding machine	1	3,000

8	Set of mechanical and electrical measuring devices	1	10,000
Total Costs additional Equipment US$			**30,000**

Tables D-14a

Crane Repair Cost Estimates Item No: 44 - Takraf 10/20 t, 1976,Asset No: 20

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting		4,000	
2	Contactors check/replace	5,000		
3	E-motor overhauling/per motor		1,000	
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake		1,000	
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie			5,000
11	Boogie replacement			30,000
12	Limit switches + emergency switches without differential switch			
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres			
17	Cable drum repair			
18	Cable drum replacement			
19	Cable installation junction boxes etc.		5,000	
20	Repair of structural damages			
21	General maintenance: 1 year with a set of standard spare parts		2,500	
	SUM	10,000	13,500	35,000
Total estimated cost			**58,500**	

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14b**Crane Repair Cost Estimates Item No: 57 - Takraf 10/20 t, 1988,Asset No: 21**

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting	3,000		
2	Contactors check/replace			
3	E-motor overhauling/per motor			1,500
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake	500		
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie			5,000
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch			
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.			
20	Repair of structural damages			
21	General maintenance: 1 year with a set of standard spare parts	1,500		
	SUM	13,000	0	6,500
Total estimated costs		**19,500**		

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14c

Crane Repair Cost EstimatesItem No.: 56 - Takraf 10/20 t, 1984, Asset No.: 25

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting	3,000		
2	Contactors check/replace			
3	E-motor overhauling/per motor			1,500
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake			1,500
9	Cabin overhauling			9,000
10	Boogie overhauling/per boogie			
11	Boogie replacement			30,000
12	Limit switches + emergency switches without differential switch	3,000		
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.	2,000		
20	Repair of structural damages			
21	GENERAL Maintenance 1 year with a set of standard spare parts		2,500	
	SUM	13,000	2,500	42,000
Total estimated costs			**57,500**	

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14dCrane Repair Cost Estimates Item No: 51 - Ganz, 6 t, 1986, Asset No: 28

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting		4,000	
2	Contactors check/replace	5,000		
3	E-motor overhauling/per motor			1,500
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake			1,500
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie		2,000	
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch			
13	Illumination overhauling		2,000	
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.			
20	Repair of structural damages			
21	General maintenance: 1 year with a set of standard spare parts		2,500	
	SUM	12,000	10,500	3,000
Total estimated costs		**25,500**		

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14eCrane Repair Cost Estimates Item No: 50 - Ganz, 6 t, 1975, Asset No: 18

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting			5,000
2	Contactors check/replace	5,000		
3	E-motor overhauling/per motor			1,500
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake			1,500
9	Cabin overhauling		6,000	
10	Boogie overhauling/per boogie		5,000	
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch		6,000	
13	Illumination overhauling		2,000	
14	Switchboard overhauling		2,000	
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.	2,000		
20	Repair of structural damages	1,000		
21	General maintenance: 1 year with a set of standard spare parts		2,500	
	SUM	11,000	23,500	8,000
Total estimated costs			**42,500**	

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14fCrane Repair Cost Estimates Item No: 49 - Ganz, 6 t, 1972, Asset No: 16

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting			5,000
2	Contactors check/replace		10,000	
3	E-motor overhauling/per motor			1,500
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement		3,000	
6	Pivot bearing	2,500		
7	Brake replacement/per brake			
8	Brakes overhauling/per brake			1,500
9	Cabin overhauling			9,000
10	Boogie overhauling/per boogie			5,000
11	Boogie replacement			30,000
12	Limit switches + emergency switches without differential switch	3,000		
13	Illumination overhauling		2,000	
14	Switchboard overhauling		2,000	
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.	2,000		
20	Repair of structural damages		5,000	
21	General maintenance: 1 year with a set of standard spare parts			4,000
	SUM	10,500	22,000	56,000
	Total estimated costs		**88,500**	

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc..

Table D-14gCrane Repair Cost Estimates Item No: 48 - Takraf, 40 t, 1986, Asset No: 29

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting	3,000		
2	Contactors check/replace			
3	E-motor overhauling/per motor			
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake		1,000	
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie			
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch	3,000		
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave		4,000	
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.			
20	Repair of structural damages			
21	General maintenance: 1 year with a set of standard spare parts	1,500		
	SUM	15,500	5,000	0
Total estimated cost			**20,500**	

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14hCrane Repair Cost Estimates Item No: 47 - Takraf 16/32 t, 1987, Asset No: 30

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting	3,000		
2	Contactors check/replace			
3	E-motor overhauling/per motor			
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake		1,000	
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie			
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch	3,000		
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.	2,000		
20	Repair of structural damages		5,000	
21	General maintenance: 1 year with a set of standard spare parts	1,500		
	SUM	17,500	6,000	0
Total estimated cost			**23,500**	

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14iCrane Repair Cost Estimates Item No: 46 - Takraf 16/32 t, 1976, Asset No: 27

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting	3,000		
2	Contactors check/replace	5,000		
3	E-motor overhauling/per motor			
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake			1,500
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie			
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch	3,000		
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.	2,000		
20	Repair of structural damages			
21	General maintenance: 1 year with a set of standard spare parts		2,500	
	SUM	21,000	2,500	1,500
Total estimated cost			**25,000**	

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14jCrane Repair Cost EstimatesItem No: 45 - Takraf 16/32 t, 1978, Asset No: 22

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting		4,000	
2	Contactors check/replace	5,000		
3	E-motor overhauling/per motor			1,500
4	E-motor replacement - drive motor - hoist motor - turning motor		7,000	
5	Boom bearing replacement			
6	Pivot bearing			
7	Brake replacement/per brake		3,000	
8	Brakes overhauling/per brake			1,500
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie			
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch	3,000		
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair	500		
18	Cable drum replacement			
19	Cable installation junction boxes etc.	2,000		
20	Repair of structural damages		5,000	
21	General maintenance: 1 year with a set of standard spare parts		2,500	
	SUM	18,000	21,500	3,000
Total estimated cost		**42,500**		

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Table D-14kCrane Repair Cost EstimatesItem No: 41 - Takraf 10/20 t, 1990, Asset No: 32

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting	3,000		
2	Contactors check/replace			
3	E-motor overhauling/per motor			
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement	1,000		
6	Pivot bearing			
7	Brake replacement/per brake			
8	Brakes overhauling/per brake	500		
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie			
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch			
13	Illumination overhauling			
14	Switchboard overhauling			
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair			
18	Cable drum replacement			
19	Cable installation junction boxes etc.			
20	Repair of structural damages			
21	General maintenance: 1 year with a set of standard spare parts	1,500		
	SUM	11,500	0	0
Total estimated cost		**11,500**		

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

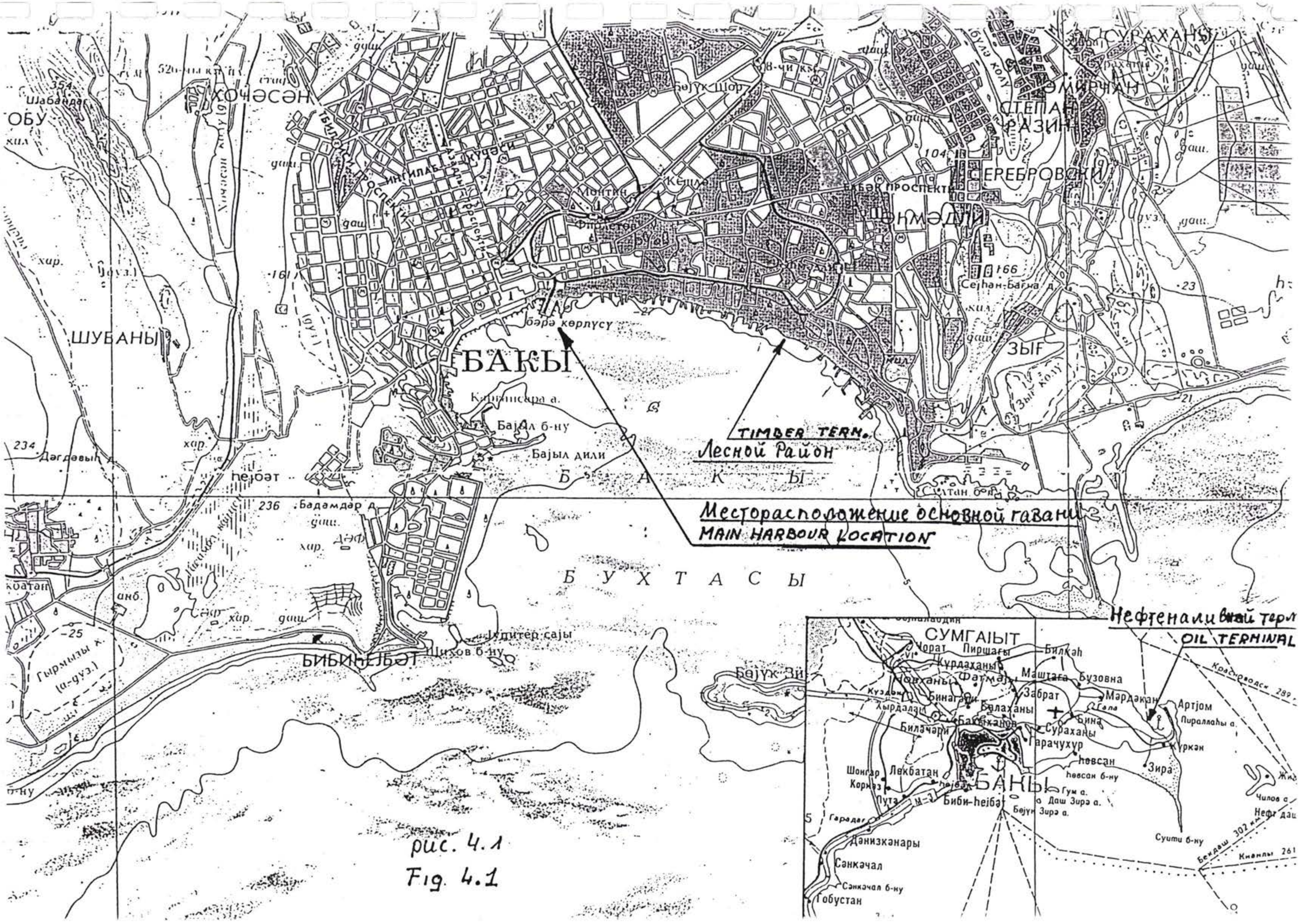
Table D14ICrane Repair Cost EstimatesItem No: 43 - Takraf 16/32 t, 1977, Asset No: 21

No	Type of Repair	Cost in USD		
		Low	Middle	High
1	Painting	3,000		
2	Contactors check/replace	5,000		
3	E-motor overhauling/per motor			
4	E-motor replacement - drive motor - hoist motor - turning motor			
5	Boom bearing replacement			
6	Pivot bearing		3,500	
7	Brake replacement/per brake			
8	Brakes overhauling/per brake		1,000	
9	Cabin overhauling	3,000		
10	Boogie overhauling/per boogie		2,000	
11	Boogie replacement			
12	Limit switches + emergency switches without differential switch			
13	Illumination overhauling	1,000		
14	Switchboard overhauling	1,000		
15	Replacement of sheaves/per sheave			
16	Power supply cable approx. 40 metres	2,500		
17	Cable drum repair		2,500	
18	Cable drum replacement			
19	Cable installation junction boxes etc.	2,000		
20	Repair of structural damages			
21	General maintenance: 1 year with a set of standard spare parts		2,500	
	SUM	17,500	11,500	0
Total estimated cost		**29,000**		

Note: Check if tools and machinery for repair work are available, i.e. pullers, sandblasting unit, etc.

Figure Section

List of Figures



TIMBER TERM.
Лесной Район
Месторасположение основной гавани
MAIN HARBOUR LOCATION
Нефтеналивной терм
OIL TERMINAL
БАКЫ
Б А К Ы
Б У Х Т А С Ы
ХОЧӘСӘН
ШУБАНЫ
БИБИҺЕЈБӘТ
СТЕПАН РАЗИН
СЕРЕБРОВСКИ
ӘМИРҸАН
СУРАХАНЫ
ЗЫҒ
БАБӘК ПРОСПЕКТИ
ИНГИЛАБ КҮЧӘСИ
ТБИЛИСИ ПРОСПЕКТИ
Бајыл дили
Бајыл б-ну
Һејбәт
Бадамдар д.
Дәгдәвин д.
Шабандаг
Шихов б-ну
Јупитер сајы
Бөјүк Зирә
Гырмызы к. (а-дүз.)
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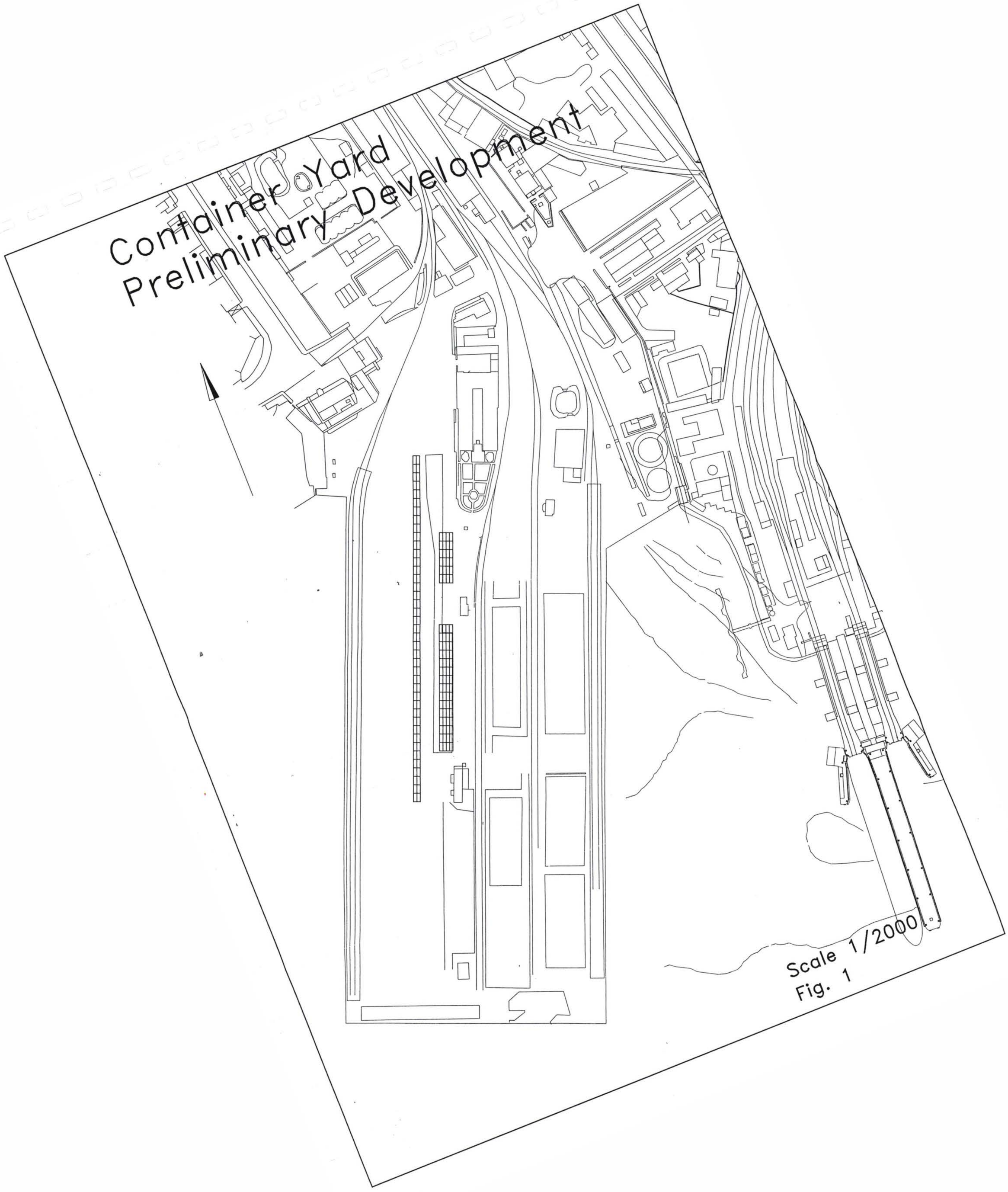
СУМГАЈЫТ
Новханы
Фатмаjы
Маштага
Бузовна
Бинагади
Забрат
Мәрдакан
Артјом
Пираллаһы а.
Балаханы
Бина
Сураханы
Гарачухур
Күркән
Һөвсан
Һөвсан б-ну
Зира
Хырдалан
Билачары
Шонгар
Лөкбатан
Корказ
Пута
Биби-Һејбат
Бөјүк Зирә а.
Даш Зирә а.
Гум а.
Дәнизкәнары
Санкачал
Санкачал б-ну
Гобустан
Гарадаг
Суити б-ну
Чилов а.
Нефт Даш.
Бекдаш 302 км
Красноводск 289

рис. 4.1

Fig. 4.1

Container Yard
Preliminary Development



Scale 1/2000

Fig. 1

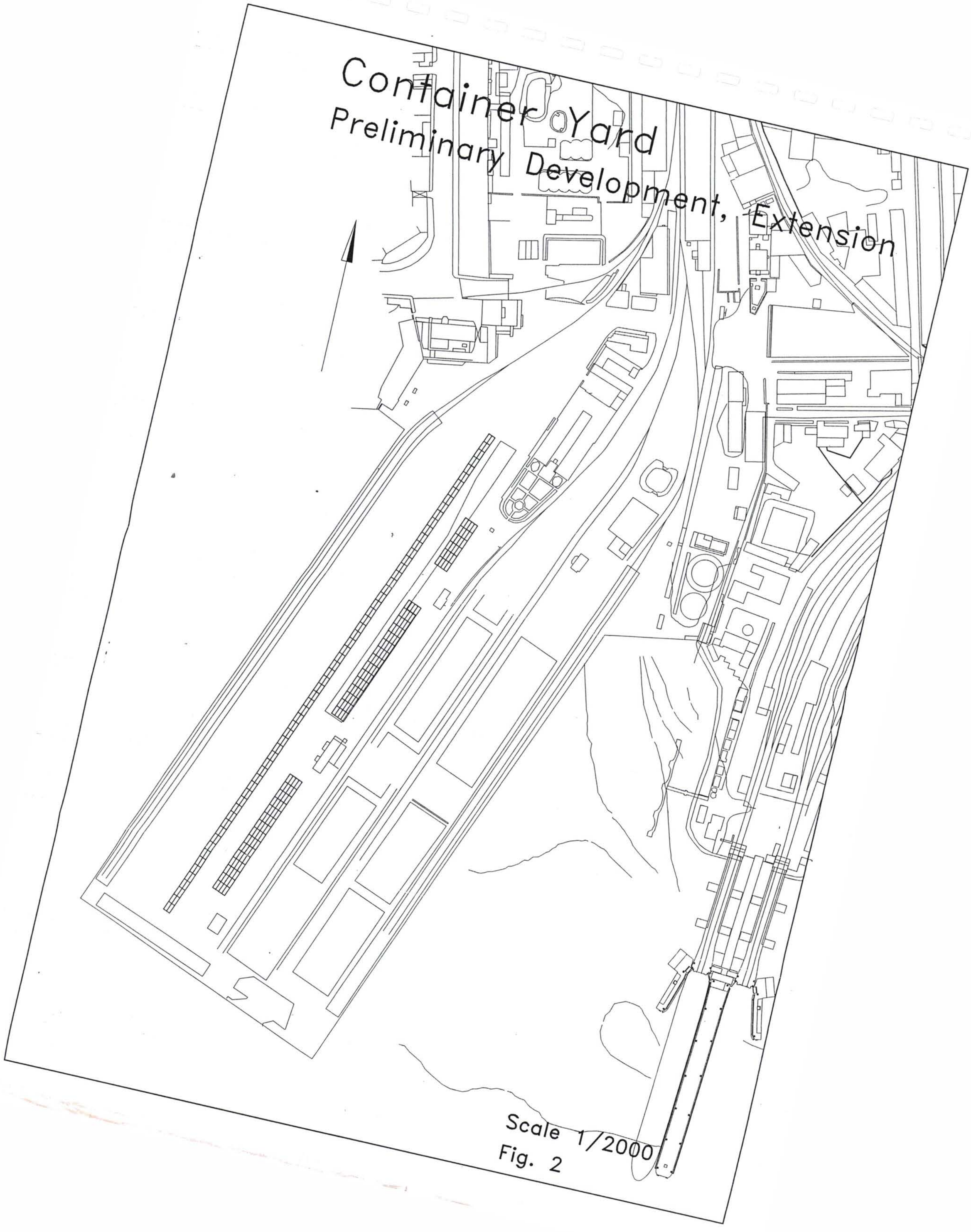

Container Yard
Preliminary Development, Extension
Scale 1/2000

Fig. 2

BAKU SEA PORT

MASTERPLAN FIRST DEVELOPMENT
GENERAL LAYOUT
INITIAL CONTAINER FACIKITIES

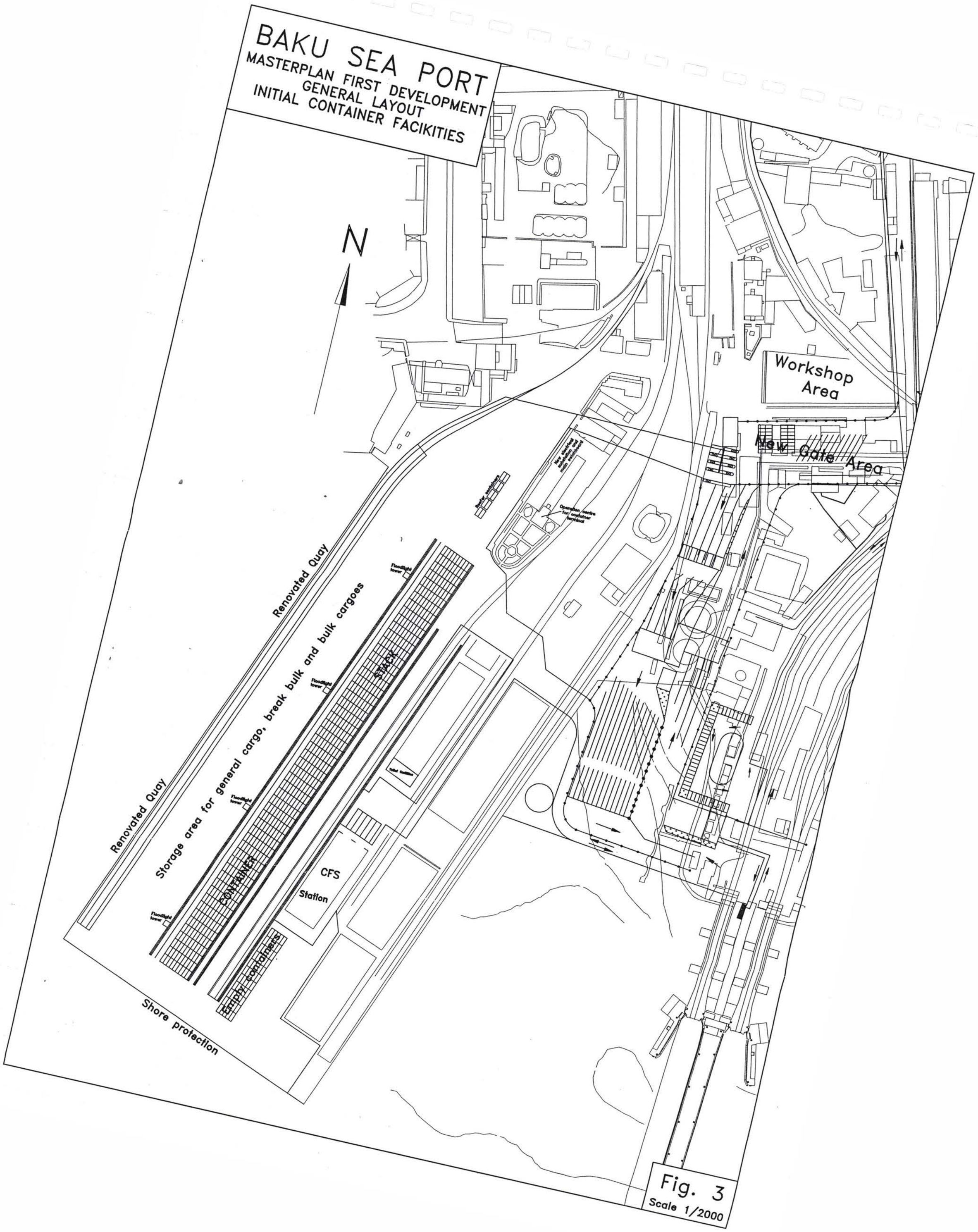


Fig. 3
Scale 1/2000

BAKU SEA PORT

MASTERPLAN FIRST DEVELOPMENT
GENERAL LAYOUT
AND CIRCULATION PLAN

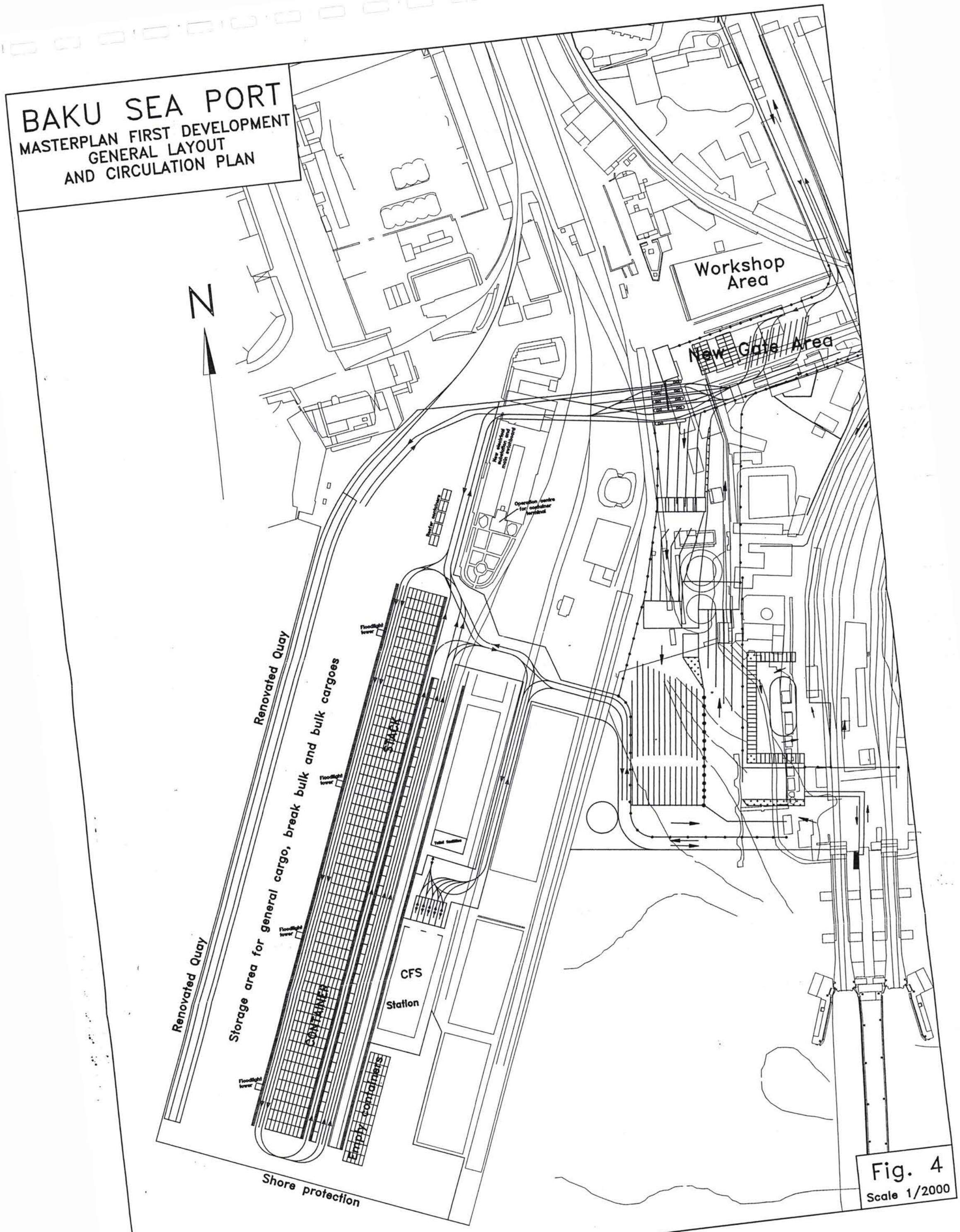


Fig. 4
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Volume 3:

Annex 1

Present Port Operations

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Volume III, Chapter 3: Present Port Operations

Chapter 3:
Present Port Operations

1. Introduction

The port of Baku consists at present of different parts, namely the

- Ferry Terminal
- General Cargo Terminal
- Timber Terminal
- Sea Station (Passenger Terminals)
- Absheron Bulk Complex (Oil Terminal).

In the following only the Absheron Bulk Terminal, where only oil is transshipped, and the General Cargo Terminal will be taken into consideration according to the contract signed.

The oil terminalr's operation is more or less reduced to berthing and unberthing the vessels and connecting the ship to the pumps and shore based pipeline system. Therefore, this section is very short. The main focus is set on the operation of the general cargo terminal.

Because of the close neighbourhood of the ferry terminal and the general cargo terminal and the close relationship of parts of the cargo operations between the ferry terminal and the general cargo terminal the interfaces between these two port areas have been observed where it was necessary.

2. Present Situation

2.1 General Information and Procedures of Port Operations

2.1.1 Commodities Handled at Baku International Seaport

The commodities which were handled / transshipped at the port of Baku are shown in the table overleaf.

Table 2-1: Commodities Handled at the Port of Baku 1995 and 1996 (in thousand tons)

Commodity	Total (thousand tons)	
	1995	1996
General Cargo Terminal		
Building materials	-	-
Salt	99.0	42.0
Grains	4.2	72.0
Timber / Wood	0.8	6.2
Metal	23.3	35.3
Equipment / Machinery	2.2	-
Chemicals	-	-
Containerized Cargo	4.8	0.6
Other General Cargo	7.7	7.3
Total Dry Cargo	**142.0**	**163.4**
Ferry Terminal	**781.5**	**472.6**
Ferry Traffic		
Absheron Oil Terminal	91.0	85.3
Liquid Bulk		
Total	**1,014.5**	**721.3**

Source: Baku International Seaport

2.1.2 Typical Vessels Operating in The Caspian Sea

A selection of the most common vessel types is shown in the table below.

Table 2-2: Selection of Typical Vessels Calling Baku International Seaport

Kind	Type	Length o.a. (m)	Width o.a. (m)	max. Draught (m)	Capacity (tdw)
Caspian Shipping Co.					
RoRo-Ferry	Kompositor Kara Karaev	125.90	16.22	5.66	4673
Railroad Cargo & Passenger Ferry	Dagestan	154.47	18.30	4.50	3950
Dry cargo vessel	Kishinyov	123.50	15.0	4.50	4150
Dry cargo vessel	Geroj Mekhti	114.0	13.0	3.73	3135
Dry cargo vessel	Buniat Sardarov	118.10	13.40	3.95	3135
Tanker	Nikifor Rogov	146.64	17.38	8.00	11525
Tanker	Apsheron	146.88	17.40	5.3	7410
Tanker	General Shikhlinskiy	124.97	16.63	4.15	4600
Russian Ships					
Dry cargo vessel	Baltiysky	96.0	13.0	3.26	2122
Dry cargo vessel	Ladoga	81.0	11.90	4.01	1855
Dry cargo vessel	Sormovsky	114.0	13.0	3.42	3135
Dry cargo vessel	Volgo-Don	138.50	16.50	3.0	3994
Iranian Ships					
Dry cargo vessel	Iran Basir	128.20	13.60	4.0	3638
Dry cargo vessel	Iran Bashir	93.60	13.40	4.5	2500

The size of the vessels is limited by the Volga-Don-Canal which only allows a max. width of 18 meters and a maximum draft of 4 m.

The Volga-Don-Canal is only navigationable during summer season due to ice, which usually doesn't allow navigation between November and April.

2.1.3 Procedures of Vessel's Dispatch and Cargo Operations

Divisions Involved

Dispatch Office

There is a Central Dispatch Office responsible for the coordination of vessel dispatch for all terminals of Baku International Seaport. The dispatch office coordinates i.a.

- vessel anchorage
- pilotage
- towing
- vessel berthing/unberthing
- vessel shifting
- railway wagon distribution
- ship operations at Absheron oil terminal
- control of cargo operations at other terminals.

The dispatch office is occupied 24 hours per day and 7 days per week. In total the staff consists of 12 employees, whereof 4 are chief dispatchers, 1 dispatcher and the rest are people for technical planning and communication purposes.

The chief dispatchers are working in shifts of 12 hours each. Each shift (8-20 / 20 - 8 hrs.) is manned with one chief dispatcher. During daytime (8.00-17.00 hrs.) one dispatcher assists the chief dispatcher and mainly does the routine works.

The dispatch office is equipped with telephone and telex and the port's loudspeaker-system for communication. A VHF-radio communication system to communicate with the vessels is available at another location.

Harbour Master

The harbour master and his sub-divisions

- Navigation Department and
- Port Control

are responsible for the nautical safety of all vessel movements in the port of Baku and its approaches, clearing vessels in and out, prevention of pollution and for sanitary services. Furthermore they co-ordinate the traffic in the port.

Maintenance of the fairways and the navigational aids like buoys, beacons, lighthouses etc. is co-ordinated by the Navigation Department but executed by third parties (e.g. Caspian Maritime Roads for the light buoys).

Area Managers

The area managers are responsible for planning and execution of cargo operations in their areas as e.g. ferry terminal, general cargo terminal etc.

They are also responsible for the performance regarding cargo operations, for the safe and economical

dispatch of vessels and for their resources as manpower and equipment.

Procedures

Information on Vessel's Calls

The Port Regulations require that all vessels to be berthed have to be announced to the port not later than 6 hours[1] prior to their arrival. This announcement has to be handed over to the Dispatch Office which continuously keeps the information up-to-date according to new information from the agent and the vessel.

Furthermore all vessels with a destination at any private terminal within Azerbaijan have to show up in the port of Baku in order to get their clearance here as Baku is the only state operated port in the Republic of Azerbaijan. After clearance by customs, immigration and other related authorities and after paying their fees the vessels may proceed to their final destination in Azerbaijan.

Information on Planned and Present Status of Berth Occupation

The dispatch office daily prepares a schedule for arrival, departure and shifting of vessels. This schedule specifies the name of the vessel, the time and the berth for each event. This daily vessel plan is the basic information for the coordination of pilots, tugboats, mooring gangs etc.

Selection of Berth

The vessel's berth usually depends on the kind of vessel and its cargo. The table below shows which kind of vessels are calling at the various terminals.

Table 2-3: Vessel Types and Related Terminals at Baku International Seaport

Terminal	Kind of Vessels
Absheron Bulk Complex	Tankers
Ferry Terminal	Cargo Ferries
General Cargo Terminal	Dry Cargo Vessels and Ro/Ro Vessels
Sea Station (Passenger Terminal)	Passenger Ships
Timber Terminal	Dry Cargo Vessels

The berth is selected by the dispatch office and then immediately all relevant information is transmitted to the area manager who is involved.

---

1 Absolutely minimum notice! Vessels from Astrakhan have to be announced latest 2 days, vessels from Kianli 15 hours, vessels from Turkmenbashi 10 hours and vessels from Iran 10 hours prior to arrival.

2.1.4 Shift System

The working hours for normal day workers and office staff are from 8 to 17 hrs. from monday to friday with 1 hour lunch break.

Operation people which are working in a shift system have the following working schedule:

1st shift: from 8.00 to 20.00 hrs.
2nd shift: from 20.00 to 8.00 hrs.

Each shift is interrupted by two breaks (60 min + 30 min).

2.2 Absheron Bulk Complex (Oil Terminal)

Absheron Bulk Complex, which is also known as Baku Oil Terminal, is located some 47 km east-north-east of Baku on the Absheron Peninsula and is sheltered by the island of Piallahi Adasi (Artyom) to the north-east. The forenamed island is linked to the mainland by a causeway at its southern end, which forms together a deep sheltering bay, only open to north-north-west.

The terminal was built for the import of crude oil which is stored in tanks of the state-owned oil company. The crude oil tanks are adjacent to the jetties. From these tanks the oil is pumped via pipeline to a refinery near Baku and from there some oil products such as Diesel fuel and Kerosene were pumped back to tanks on a hill nearby. From there, by gravity force, these oil products were loaded on tankers to be exported or used for bunkering. Since the pipeline for the oil products between Baku and Absheron Oil Terminal is out of order by maintenance reasons, no more oil products are exported and the tanks are not filled any more. The remaining fuel in the tanks is loaded on the vessels for bunker purpose only.

2.2.1 Existing Infrastructure

Berths

The oil terminal provides in total 5 jetties (whereof 4 are constructed as finger piers) which are under jurisdiction of the government owned Azerbaijan Oil Company (jetties no. 2+5) respectively Baku International Seaport (jetties no. 1,3 and 4). The water depth around the jetties is said to be around 10 m.

For further details see table below.

Table 2-4: Berths at Absheron Bulk Terminal

Jetty No.	No. of Berths	Under Jurisdiction of	Purpose
1	2	Baku International Seaport	Import of crude oil
2	2	Government Oil Company	Import of crude oil[3]
3	2	Baku Seaport[2]	Export of Diesel and Kerosene
4	1	SOCAR	Service jetty for floating crafts
5	2	Government oil Company	Import of crude oil[4]

In total 4 jetties were designed for cargo operations with two berths each. Berth no. 4 only serves as service berth for accommodation of the service crafts like tugboats etc.

Furthermore there are a administration building, a seamanr's rest house and some small buildings on site.

Terminal Access and Aids to Navigation

Sea Access

Sea access is without any major difficulty. Pilots are not available and not necessary as stated by the Terminal Manager. The access channel is approx. 100 m wide and approx. 600 m long and provides a depth of minimum 10 m. Only one-way traffic at a time is allowed. The channel is marked by 11 units light buoys and maintenance is executed by Caspian Marine Road Company. However, the maintenance is obviously hardly done. The lights are not functioning, and, generally, the aids to navigation have to be improved.

Road Access

A two lane asphalted road, which needs some rehabilitation, leads to Absheron Oil Terminal. As only staff is transported by road this is not of major interest for the port. A reclaimed dam connects jetties no. 1,2 & 5 with the shore. The dam is not paved and filled with sand after it has been recently over flooded.

Rail Access

There is no railway link to Absheron Oil Terminal

2.2.2 Existing Suprastructure

Jetties

The jetties are equipped as follows:

- jetties nos. 1 & 2 with pipes for imported crude oil
- jetty nos. 3 with pipes for exported oil products (Diesel and Kerosene)
- all jetties except no. 5 with fire fighting system (sea water line) and bunker pipes.

---

[2] Leased from Azerbaijan Oil Company.

[3] Being Dismantled

[4] Dismantled

At jetty no. 5 all facilities have been removed completely in 1980 since they are no longer in use.

Storage Areas

The storage tanks belong to a government owned oil storage company respectively to the Oil Gas Exploring Company and therefore are not assets of the port.

In total there are 16 tanks with a 140,000 t total installed storage capacity for crude oil. Additional there are 2 water tanks on the ground level.

On the hills there are at present 36 tanks with 5,000 tons storage capacity each for oil products (total: 180,000 tons). The capacity is said to be extended in the near future.

Floating Crafts

At the service berth (jetty no.4) the following floating crafts are moored:

- 1 floating crane of 25 tons lifting capacity
- 2 tugboats of different size
- 1 oil sweeping launch.

All crafts are manned with a permanent crew and the crafts are apparently in operational condition.

2.2.3 Manpower & Qualifications

The Oil Terminal is manned by 36 staff members in total, consisting of the following grades/functions:

- 1 chief of the terminal
- 4 dispatchers
- 8 tallymen
- 7 technicians (incl. 3 electricians)
- 16 labourers.

Due to lack of work at present 15 people were sent on vacation on their own expenses.

2.2.4 Computer / EDI - System

There is absolutely no EDP-system available. Even with common communication systems as e.g. telefax, telex, walkie-talkies etc. the port is not equiped sufficiently. Every activity is carried out manually, nearly all documents are handwritten.

2.2.5 Commodities Handled

In times of the Soviet Union crude oil was imported from Kazakhstan, Turkmenistan and Russia. Since the collapse of the Soviet Union oil is only discharged from the oil platforms some 40 km off Absheron in the Caspian Sea and from Neftecala, approx. 100 km south of Baku.

In the years until 1991 4-5 million tons p.a. have been handled. At present only 2 vessels per month are dispatched. In the first six months of 1996 in total 29,000 t of crude oil on average have been discharged.

2.2.6 Planning of Cargo Operations

The vessels are announced by the central dispatch office at Baku and the relevant information is then transmitted to the terminalr's dispatch office. Vessel berthing and unberthing is organized and controlled by the dispatchers. Also staff for cargo operations is arranged by the terminal dispatcher. Furthermore the dispatchers organize the supply of the vessels with water, bunkers etc.

After connecting the vessel to the pipe system and after approval of the documents cargo operations may start.

Neither the terminal nor the oil company have any pumps for cargo operations. They are completely executed by vesselr's pumps.

2.2.7 Performance

As there are no pumps on the terminal, the performance depends on the pump performance of the vessels. On average a ship of 7,000 tons cargo capacity will be discharged within approx. 6 hours, whilst a ship of 3,500 tons capacity needs approx. 3-4 hours to be discharged.

2.3 General Cargo Terminal

2.3.1 Existing Infrastructure

Berths and Quay Operation Areas

The general cargo terminal comprises 7 berths whereof 3 berths (berths nos. 4, 5 & 6) with a total length of 410 m are located at the western side of the pier, 1 berth (no. 7) with a length of 200 m is located at the southern end and 3 berths with a total length of 375 m are located at the eastern side of the pier.

A detailed description is shown in the table below.

Table 2-5: Berths at the General Cargo Terminal

Berth No.	Length (m)	Water depth (m)	Purpose
4	149	7.25	General Cargo, Bulk, Break bulk
5	149	7.25	General Cargo, Bulk, Break bulk
6	105	7.25	General Cargo, Containers, Break
7	195	7.25	bulk
8	135	4.10	General Cargo/RoRo
9	133	4.10	Unitized General Cargo
10[5]	94	4.10	Unitized General Cargo see footnote

The surface of the pier is approx. 2 m above the level of the Caspian Sea.

Hinterland

The terminal covers a total area of approx. 182.000 sqm which is divided into

- quay operation area (payload allowance up 3-6 tons/sqm)
- open storage area (payload allowance 10 tons/sqm)
- sheltered storage area (payload allowance 3 tons/sqm)
- railway operation & manoeuvring area
- traffic areas (payload allowance 10 tons/sqm)
- areas covered by various buildings.

Terminal Access and Aids to Navigation

Sea Access

From the approach buoy, which is located approx. 3 nm south-west of Nargin Island, a fairway with traffic separation leads into the Bay of Baku. This fairway has a length of some 6 nm until it is split-up into various approach channels which lead to the different terminals. The approach channel to the general cargo terminal, which has a width of 100 to 150 m and which is once more split, has a length of 2.5 nm.

Pilotage is compulsory for foreign vessels only. The pilot will board about half way in the main access fairway. Vessels may leave or enter the port by day and night, except foreign vessels which only may manoeuvre during daytime for safety reasons.

The aids to navigation in the access to the Baku Port Terminals are composed of 22 units of buoys type "BPM-4", painted green or red and equipped with green or red lights for night visibility. The energy supply for the lights is done by a gas-filled chamber in the buoy's construction. The buoys are hardly maintained and should be overhauled urgently. The lights are not working. In addition, there are four access transit signs (landmarks) established for the safety of navigation. The general approach buoy is equipped with a radar reflector.

---

5 Out of order since reconstruction works (new piles already in front of old quay wall) were stopped after collapse of Soviet Union.

Within the Port of Baku's main complex there is also a radar equipped traffic control station which is, however, most of the time off duty because of the lack of spare parts. This traffic control centre should also be considered to be rehabilitated, at least in its main elements.

Road

At the gate of the general cargo terminal, which is located at the end of Prospekt Neftyanikov, there is a customs office where customs clearance takes place. The trucks entering the port area have to wait in front of the terminal gate. There is no dedicated parking area for waiting trucks. In case of peak situations waiting trucks are queuing up on the Prospekt Neftyanikov. The gate is open 24 hours a day. It serves as ingate and also as outgate.

Railway

The terminal is linked to the railway network of the national railway by two access gates. On the terminal there are in total 5 lines of double-track rails with the russian gauge system of 1524 mm. The following table shows more details.

Table 2-6: Railway Tracks at the General Cargo Terminal

Track No.	Location	Length (m)	Remarks
1 & 2	along berths nos. 8-10	337 / 310	almost over paved
3 & 4	between sheds 1-3 & 4-6	443 / 441	partly over paved
5 & 6	north-west side of sheds nos. 4-6	426 / 421	in poor technical condition
7[6], 8 & 9	under portal cranes in 2nd line along berths nos. 4-6	343 / 343 / 402	
10 & 11	along berths nos. 4-6	455 / 429	

The railway tracks are apparently in a very poor condition and require major rehabilitation works. Repair works carried out in the past were not in a professional way but of provisional character.

All switches have to be operated manually.

6 Said to be out of order

2.3.2 Existing Suprastructure

Cargo Handling Equipment

Cranes

In total 18 portal jib cranes are available in the general cargo terminal. All cranes have a equal gauge of 10.5 m.

The cranes are distributed over the terminal area as follows:

Table 2-7: Portal Cranes at the General Cargo Terminal

Berth Area	No. of Cranes	Registr. No.	Manufacturer	Lifting Capacity (tons)	Outreach (meters)	Year of Con-struction	In Opera-tion
4 - 6	1	10	Kirow	10	30-7.5	1960	yes
	1	32	Takraf / Albatros	10/20	32/16-8	1990	yes
	1	6	Abus	15	25-8	1958	no
	1	29	Takraf / Kondor	40	32/25-8	1986	yes
	1	21	Takraf / Sokol	16/32	32/20-8	1977	yes
	1	22	Takraf / Sokol	16/32	32/20-8	1978	yes
	1	24	Takraf / Sokol	16/32	32/20-8	1982	yes
	1	30	Takraf / Sokol	16/32	32/20-8	1987	yes
7	1	16[7]	Ganz	6	30-8	1972	no
	1	20[1]	Takraf / Albatros	10/20	32/16-8	1976	no
8 - 10	1	18				1975	yes
	1	28	Ganz	6	30-8	1986	yes
	1	12				1960	yes
2nd line 4 - 6	1	8	Abus	10	32-8	1958	yes
	2	11,13[1]	Ganz	6	30-8	1960	yes/no
	1	25	Takraf / Albatros	10/20	32/16-8	1984	yes
	1	31	Takraf / Albatros	10/20	32/16-8	1988	no

Of the mentioned cranes the majority needs major rehabilitation works or even should be scrapped due to their age and their very weak technical condition. For further details see technician's report.

Other Equipment

For yard operations the cranes in the second line behind the berth are assisted by the following equipment:

Table 2-8: Cargo Handling Devices in the Yard

Kind	Capacity	No. of Items	In	Total

[7] Not connected to power supply, but said to be in operationable condition.

	(tons)		Operationable Condition		
				Existing	Operationable
Forklift trucks	1.5 2.5 3.0 3.5 4 5 10	17 1 8 1 1 3 2	6 - 2 1 - - 1	33	11
Terminal Tractors	-	4	2	4	2
Trailers	25	approx. 100	80	100	80
Bobcats	-	4	4	4	4

Furthermore a great number of additional equipment like locomotives, hoppers, wire slings, grabs, clamps etc. is available. For further details refer to technical section of the study.

Storage Areas

Warehouses / Sheds

In total there are five warehouses / sheds on the terminal. Details are shown in the table below.

Table 2-9: Warehouses / Sheds

Shed No.	Kind	Used for	Dimensions (meters)	Area (sqm)
1	3-section stone built	empty	30.6x108.6	3,094.9
2	2-section stone built		30.6x66.0	1,870.5
3	2-section stone built		30.6x72.6	2,072.3
4	prefabricated metal		21.7x93.3	2,024.6
5	shed		24.5x62.3	1,555.2
6[8]	prefabricated metal shed		*24.5x62.3*	*1,555.2*
Total				**10,617.5**

The metal sheds are located on ramps (approx. 80 - 110 cm high, depending different levels of terminal surface) in order to have easy access between railway wagons and warehouses respectively vice versa.

Open Storage Areas

Open storage areas are declared as shown in the table below.

[8] Completely destroyed by fire and already completely removed.

Table 2-10: Declared Open Storage Areas

Area No.	Dimensions (m)	Area (sqm)	Used for	Remarks
1	195x25	5,000	general cargo/Ro/Ro	pavement almost
4	270x15	4,000	general cargo	in very poor
5	393x61	24,000	bulk cargo	condition
6	224x61	11,328	timber	

The total declared open storage area is 44,328 sqm. But, smaller areas in between may also serve as open storage area after execution of some surface rehabilitation works. In total it is estimated that approx. 50,000 sqm of open storage area are available.

2.3.3 Manpower & Qualifications

Organisational Structure of the Operations Department

The operations department consists of 7 sub-departments. For further details see table.

Table 2-11: Staff of Operations Department

Sub-Department	Employees	Labourers	Total
Director	1	-	1
Port Dispatchers	12	-	12
Cargo Complex No. 1	41	183	224
thereof			
General Cargo	*25*	*114*	*139*
Terminal	*9*	*41*	*50*
Mechanisation	*6*	*11*	*17*
Timber Terminal	*1*	*17*	*18*
Consume Services	12	22	34
Ferry Complex	15	151	166
Marine Services	5	31	36
Absheron Bulk Terminal	7	19	26
Sea Station	3	5	8
Technological Dept.			
Total	**96**	**411**	**507**

Source: Baku International Seaport

Operations Staff

For the calculation of the cargo throughput capacity of the port it is of major relevance to identify the number of labourers working in the Operations Division and their kind of qualifications. The number of all other employees, i.e. for administrative works, in planning departments, in the maintenance department, in the marketing department, in the accounting & invoicing department etc. are not compiled as the future organizational structure of the port is just changing and the final decision about the future structure of the

port was not made yet. Due to this circumstance in the following it is assumed, that the port will provide sufficient manpower to fulfill these tasks also in the future.

The dockers, those people who are directly involved in cargo handling operations, are separated into 4 classes, whereof those people holding a certificate class 1 are the highest experienced and skilled persons. As per September 1996 the split of qualifications was as follows:

Table 2-12: Qualification Structure of the Dockers

Kind of Qualification	Number of Employees
Class 1	29
Class 2	33
Class 3	20
Class 4	14
Non Classified	-[9]
Total	**96**

Source: Baku International Seaport

2.3.4 Computer / EDI - System

At present there is no EDP-system for assistance in operational matters available. Most of the documents are handwritten. Even photocopiers and typewriters are very rare.

2.3.5 Commodities Handled at the General Cargo Berths

[9] Some labourers which are not classified are paid as "class 4 workers".

Commodities

The most handled commodities at the general cargo terminal are:

- cotton in bundles
- paper in coils and on pallets
- metal as break bulk
- timber[10] as break bulk
- building materials (e.g. sand) in bulk or as break bulk
- salt in bulk
- grain in bulk
- chemicals in drums and bags
- equipment / machinery
- scrap.

Bulk cargo is usually directly transshipped. Caused by insufficient distribution of rail-way wagons during the last months bulk cargo must more and more be stored on the terminal for a certain time period.

Furthermore containers are transshipped but mainly between railway wagons and trucks respectively vice versa or for intermediate storage on behalf of the ferry terminal. It is planned to integrate a container terminal on the general cargo terminal for this purpose.

Cargo Units

For later dimensioning of crane capacities, capacity of storage areas and internal transport devices (forklifts, trailers etc.) it is of importance to know the dimensions of the cargo units which are usually handled in the Port of Baku.

The following figures are based on observations made within the port.

Table 2-13: Selected Typical Cargo Units in the Port of Baku

Commodity	Unit	Layers stack-able	Avg. Weight (kg)	Avg. Volume (cbm)
sawn timber	bundles	3-4	3,500	4
steel wires	rolls	-	n.a.	1
steel profiles	bundles	3	n.a.	1
aluminium profiles	bundles	3	n.a.	12
salt	in bulk			
scrap	in bulk			

10 Since the timber terminal is flooded and no longer operationable.

As further observations could not be made due to absence of other cargoes in the port, for further calculations as e.g. capacity calculations, an average volume of 1 cbm per ton is assumed.

Handling of Dangerous Cargo

Dangerous cargo must be labelled, packed and marked as required in international rules and regulations. Delivery of dangerous goods for storage in the port requires a written application, accompanied by a copy of the respective transport documentation.

The afore mentioned applications and documents have to be submitted to the Director of Operations of the port prior to the delivery of the goods.

The accompanying document must, according to international regulations, display the following information:

- full technical name of the dangerous substance
- UN - number
- dangerous characteristics of the substance

Handling and storage of dangerous cargo conducted by port personnel according to applicable national laws. In case of doubt in safety, such as damaged or unsuitable packages, insufficient documentation or any other risk to safety storage, the cargo can be refused from the port. The prot preserves the right to split consignments if larger quantities or unsociableness would require seperation or segregation.

The existing port facilities neither include an allocated area for the storage of dangerous goods, nor an insulated ground area for a protection from leakage and spillages of dangerous goods. These items, among others for the protection of the environment, will be considered in the further port master planning.

2.3.6 Planning and Execution of Cargo Operations

The area manager plans and executes cargo operations based on the information which he receives from the dispatch office.

For cargo operations there is a "Official Normative" regulating the cargo operations and especially the performance (tons of cargo to be loaded or discharged per vessel day).

All information regarding the cargo to be discharged is collected at the Dispatch Office from the agent and the vessel. After the decision at which quay the vessel has to be berthed, detailed information regarding cargo operations is handed over to the area manager who is involved. This information usually contains the following data:

- general data of the vessel
- planned ETA
- cargo information (i.e. kind of cargo, amount)
- scheduled ETD or shifting.

Based on this information the area manager plans cargo operations, which includes i.a.

- planned starting time of cargo operations
- number of gangs required
- number and kind of equipment required
- planned cargo handling performance (tons per shift).

The area manager keeps the dispatch office always informed about the prospect of cargo operations or changes in order to have up-to-date information at the dispatch office.

After discharging the cargo is normally taken under the responsibility of the warehouse or yard manager, who only will deliver the cargo after presentation of the "Delivery Order" in case of necessary intermediate storage. In case of direct transshipment between railway wagons and vessel or vice versa the delivery order must be available prior to vesselr's dispatch.

For loading operations the information about the export cargo is received by the area manager from different sources, as e.g. forwarding agents and the shipping agents.

The loading plan is prepared by area managerr's staff and after approval by the ship's command and /or the line respectively their agent handed over to the stevedores.

2.3.7 Disposition of Manpower and Equipment

The number of gangs which have to work on the vessels are planned by the area manager. The equipment to be used is announced by the technological department.

For typical vessel operation on a three-hold river-sea-vessel three gangs may work simultaneously. The whole team (called "Brigade") consists of around 22 persons per gang these are:

- 1 crane driver
- 1 crane supervisor
- 2 labours in the cargo hold
- 2 labours on shore,

which makes 18 persons, plus electrician, mechanic, shed foreman and, not included, tallymen.

2.3.8 Performance

The cargo handling performance for loading and discharging vessels (tons/units x vessel x day) is regulated by the "Gross Normatives", issued by the Ministry of Ports and USSR Fleet in Moscow. This Normative is still basis for cargo operations in many ports of the former Soviet Union, so in the port of Baku. Each port has its own specific figures regarding the performance, keeping local circumstances into consideration.

The present Normative is due to be changed in order to make it applicable for present commodities and in accordance to modern demands.

The performances according to the Normative for some selected cargoes are listed on the table overleaf.

Table 2-14: Cargo Handling Performance for Selected Cargoes according to Normative

Type of cargo	Loading (L) / Discharging (D) / Transshipment (T)	Normative (tons/units x vessel x day)
Bulk cargo		
Salt	D	5,500
Salt by sea-river-ships	D	5,500
Ballast, gravel, barytes	D	5,100
Ballast, gravel, barytes by sea-river-ships	D	4,300
Ore	L	4,500
Perlite	L	2,900
Sand	D	4,100
Grain in bulk[1]	D/T	3,000
General cargo		
Unitized general cargo	L	1,580
Unitized general cargo by sea-river-ships	L	1,000
Unitized general cargo by sea-river-ships	D	1,250
Cotton bales[1]	L	800
Break bulk		
Timber from Astrakhan	D	1,520
Timber from Astrakhan by sea-river ships	D	1,700
Metal	L	3,200
Metal by sea-river-ships	L	2,000
Sawn timber, wood	L	1,000
Sawn timber, wood by sea-river-ships	L	650
Pipes of more than 1m diam. by sea-river-ships	L	1,200
Containers[11]	L/D	100 TEU
on multi-purpose vessels	L/D	150 TEU
on liner vessels	L/D	300 TEU
at container terminal		
RoRo[1]	L/D	500
containers	L/D	1,200
cars		

In case that the performance is lower than given by the Normative, a penalty has to be paid to the shipping line. In case of higher performance it is to the benefit of the operator.

Additionally there is a "Technological Map" which defines the staff and equipment to be used for the different cargoes and transshipment technologies, issued in 1982 by the Chief of the Technological Department.

11 Not classified for the Port of Baku, examples given from St. Petersburg.

2.3.9 Analysis of Present Technical and Operational Bottlenecks

Several technical and operational bottlenecks are hampering efficient cargo operations. The following factors are in general limiting the efficiency of all cargo handling procedures within the Seaport of Baku:

- Lack of modern planning procedures (export storage, berth planning, ship planning)
- The cargo handling gear is apparently (and also stated in the technical part) in a very weak condition and needs a major overhaul or even should be scrapped.
- The railway tracks require major rehabilitation and relocation according to future demands.
- No dedicated container handling gear is available (neither for transshipment nor for stacking in/out and transport).
- The cranes which were found not worthy for rehabilitation works should be removed and scrapped as soon as possible in order not to hamper cargo operations. The crane rails apparently require major rehabilitation works. At present the seaside crane rail at berth no. 5 is interrupted due to repair works on the quay wall.
- The pavement is almost broken and needs replacement. High wear of tyres due to this reason and because of other obstacles.
- Insufficient gate area with insufficient truck parking area
- Lack of sufficient railway wagons for direct transhipment and therefore additional handling of cargo due to intermediate storage on the terminal.
- Bad land utilisation at bulk storage areas due to lack of mobile walls for separation of goods and increasing storage height.
- Lack of a modern EDP-system to assist operational procedures, modern planning procedures, invoicing, marketing etc.
- Lack of modern communication systems like e.g. walkie talkies for the operations staff.

2.3.10 Recommendations for Immediate Improvement of Cargo Operatons

At the general cargo terminal the following measures should be done in order to improve cargo operations and to increase the efficiency:

- repair of the pavement in order to decrease the tyre wear of the equipment and to decrease equipment down times
- removal of all rubbish and all obstacles from the terminal surface for the same reason
- use of mobile concrete walls for the separation of bulk cargo and for the increase of land utilization by increased storage heights

- purchase of mobile container handling gear for yard storage
- purchase of semi-automatic spreaders for container handling (automatic spreaders have a weight of around 7 tons and are not recommended as they reduce the lifting capacity of the 40 t - crane to not more than 33 t
- rehabilitation of the quay operation area under the crane portals that tractor-trailer units can operate in this area without any obstacles
- improvement of the communication system by purchase of walkie-talkies for the cargo operation brigade, the operation managers and the dispatchers
- improving of equipment maintenance in order to increase reliability and efficiency according to technician's report
- removal of all buildings which are no longer in use and already written-off
- removal of all written-off equipment in order to increase storage and manoeuvring areas.

2.4 Timber Terminal

Due to the high water level of the Caspian Sea, the Timber Terminal was submerged and therefore abandoned in January 1995. Until this time, the annual cargo throughput per year was as follows

Table 2 - 15 Annual cargo turnover of the Timber Terminal

Year	Metric tons
1990	304,200
1991	366,000
1992	352,500
1993	182,700
1994	75,600

Source: Statistics, Port of Baku

Also the sea water level has lowered some 40 cm recently and the apron is above water level subsequently, the terminal will not be operational without a comprehensive renovation of its structures. Also, the superstructure has changed since cargo handling cranes have been removed and brought to the main port complex in order to save the equipment from the water.

The timber is now being handled at the main port complex without capacity problems for the cargo throughput in general has decreased considerably.
However, the timber terminal will be included in the future port development concepts as it still is a part of the port with an advantageous location and therefore, after rehabilitation, an alternative site for the handling of bulk cargo etc. The engineering assessment of the timber terminal will provide more technical details.

3. Analysis of Present Cargo Handling Capacity

3.1 Absheron Bulk Complex (Oil Terminal)

The capacity of a liquid bulk terminal depends, besides aspects like size of the storage facilities and average dwell time of the goods, mainly on technical matters as i.a.

- pump capacity
- tank capacity
- vessel's size.

A rough calculation under the assumptions that

- jetties no. 1 and 2 are in operationable condition for imports
- jetty no. 3 is in operationable condition for exports
- the interrupted pipeline for exports between Baku and Absheron is rehabilitated
- the average throughput per ship is 7000 tons in 6 hours + 2 hours preparation, berthing and unberthing
- the terminal operates 24 hours a day and 360 days per year
- the berth utilisation factor is at its maximum of 0,65 (according to UNCTAD methodology)

leads to the following theoretical berth capacity:

6 berths x 875 tons/h x 24 h x 360 days x 0,65

21.3 million tons p.a.

According to estimations made by Baku International Seaport the Oil Terminal has a installed annual cargo handling capacity of

25 million tons.

As the storage tanks are not assets of the port and as it is furthermore assumed that rehabilitation of the facilities will be carried out by future operators, the capacity of the Absheron Oil Terminal is not further compiled.

3.2 General Cargo Terminal

The general approach to capacity calculation will be described in the following to make it possible to follow the calculations.

The calculation of the cargo throughput capacity of a terminal has to be divided into five sub-capacities as there are :

- annual berthing capacity
- capacity of the ship / shore cargo handling devices
- capacity of yard handling equipment
- the terminal's road and rail capacity
- the terminal's annual cargo storage capacity.

Additionally, the availability of manpower and equipment for internal moves may also limit the capacity of a terminal.

The lowest of the above mentioned capacities will be the capacity of the terminal. In the following general indicators for the capacities of each productive factors will be introduced.

In general the cargo which has to be handled can be divided as follows:

- low throughput cargo
  such as e.g. small consignments and palletised and pre-slung cargo with an average throughput of 400-500 tons per shift[1] and gang

- medium throughput cargo
  such as e.g. forest products, iron and steel with an average throughput of 800-1,000 tons per shift and gang

- high throughput cargo
  typically containers and RoRo cargo with an average throughput of 1,200-1,5000 tons per shift and gang.

In another UNCTAD publication a table showing some various figures which are given in the table is presented.

Table 3-1: Performance Check-List

Cargo Class	Tons per Ship-Day
Conventional general cargo:	
on deep-sea routes	700
on short-sea and coastal routes	500
Fully palletised general cargo	900
Packaged forest products	1,500
Bundled iron and steel products	2,000
Pre-slung cargo	900
RoRo-Units	2,500
Containers:	
on deep-sea routes	300 - 500 TEU
on short sea and feeder routes	275 TEU

1 A shift of 8 hours is meant; in Baku shifts per 12 hours are worked.

Cargo Class	Tons per Ship-Day
Dry Bulk:	
Loading	70% of ship loader rated capacity
Discharging	50% of unloader rated capacity
Liquid Bulk	Ship's pumping capacity (avg. 5-10% of dwt capacity per hour

Source: UNCTAD - Port Development Handbook

The calculation of the cargo handling capacity is usually based on the following assumptions:

- the cargo handling equipment which is considered to be used is in usable condition and fulfils all demands regarding lifting capacity, lifting speed, travelling speed, technical reliability etc. according to manufacturer's data
- no operational constraints as e.g. lack of manpower, equipment etc. are existing
- the berth is in proper condition to fulfil this purpose
- all cargo handling and stacking areas are available
- the utilisation of the productive factors is assumed to be 100%
- all required data is available at the time when it is needed for planning activities (e.g. for yard planning, berth planning, dispatch planning)
- there are no constraints hampering the free access of goods to and from the port.

The different sub-capacities are calculated in the following sections.

3.2.1 Berth Capacity

Caused by the variety of ship types a general capacity of berths is not easy to identify. But the following procedure using the formula:

$$C_B = R \times U \times N \times T$$

in which
C_B = annual capacity in tons per berth
R = average throughput per ship (tons / ship / shift)
U = berth utilization
N = number of working days p.a.
T = number of shifts per day

will lead to acceptable results.

The following figures concerning berth utilisation can in principle be regarded as desirable:

Table 3-2: Berth Utilisation Indicators

Number of Berths	Utilisation Rate (in %)
1	30
2	50
3 and more	65

Source: UNCTAD Monographs on Port Management, Volume 9

Under the assumptions that

- average throughput per ship and shift (12 hours) = 1,500 t (R)
- berth utilization factor according to table above = 0.65 (U)
- working days p.a. = 360 (N)
- shifts per day = 2 (T)

the berthing capacity per berth is

$$R \times U \times N \times T = 1{,}500 \times 0.65 \times 360 \times 2 = 702{,}000 \text{ t per berth}$$

respectively for 6 operationable berths

» 4.2 million tons p.a.

3.2.2 Equipment Capacity

Ship / Shore Cranes

The capacity of the ship / shore equipment is determined by the equipment used and the various possible combinations. In general, the values shown in the table below, can be accepted as indicators for typical equipment and cargoes.

Table 3-3: Typical Performance of Ship / Shore Devices (in t per hour and gang)

Handling Device	General Cargo	Forest Products Iron and Steel	Containers
12/16 t crane	60 - 80	80 - 120	--
30/40 t crane	--	120 - 150	180 - 200
Cont. Gantry Crane	--	--	250

Source: UNCTAD Monographs on Port Management, Volume 9

According to the technician's report after rehabilitation measures cranes will be available as follows:

- 4 x 16/32 t - cranes plus 1 x 10/20 t - crane at berths nos. 4 - 6

- 1 x 10/20 t - crane plus 1 x 6 t - crane at berth no. 7
- 2 x 6 t - cranes at berths nos. 8 - 10
- 2 x 10/20 t - cranes in the 2nd line at berths nos. 4 - 6

which means in total
- 4 x 16/32 t - cranes
- 4 x 10/20 t - cranes
- 3 x 6 t - cranes.

If it is assumed that
- the 6 t - cranes will handle 50 t per hour
- the 10/20 t - cranes will handle 80 t per hour
- the 16/32 t - cranes will handle 120 t per hour
- the crane working time per shift is 9 hours
- 2 shifts per day may be worked
- 360 days p.a. will be worked
- the availability factor will be 0.9 (90%)
- the berth utilization factor is 0.65

the calculation will be as follows:

6 t - cranes= 50 t/h x 9 h x 2 shifts x 360 days x 0.9 x 0.65 x 3 cranes = 568,620 t p.a.
10/20 t - cranes= 80 t/h x 9 h x 2 shifts x 360 days x 0.9 x 0.65 x 4 cranes = 1,213,056 t p.a.
16/32 t - cranes=120 t/h x 9 h x 2 shifts x 360 days x 0.9 x 0.65 x 4 cranes = 1,819,584 t p.a.

which leads to a total theoretical crane capacity of

» 3.6 million tons p.a.

If it is taken into consideration that the 2 10/20 t cranes in the 2nd line at berths nos. 4 - 6 will not be able to work over the quay, the quayside crane capacity will be

» 3.0 million tons p.a.

Capacity of Yard Handling Equipment

As there is a big variety of different goods with various handling techniques and break bulk and bulk cargo don't need yard equipment as there are cranes in the 2nd line for this purpose it is not considered that yard handling equipment is a limiting factor at present. Furthermore there is a large amount of trailers available.

In terms of container handling equipment it must be stated that there is no adequate handling gear available at present. It is assumed that further tractors, special container trailers and forklift trucks with top spreader and reach stackers have to be purchased with increasing amount of containers to be handled in future.

3.2.3 Storage Capacity

The annual storage capacity of a area depends on the following factors:

- size and layout of the storage area
- access to port infrastructure
- ground pressure allowance
- kind of cargoes to be stored (e.g. weight, density)
- dwell time of the stored cargo
- number of layers the cargo may be stacked
- kind of handling equipment.

For container terminals some indicators for land utilisation with regard to international standards can be named as shown in the table below.

Table 3-4: Typical Land Utilisation for Container Storage Areas

Device for Containe	Average Land Utilisation for Storage
Forklift Truck (ful cont.)	275 TEU / hectare
Forklift Truck (empty cont.)	800 TEU / hectare
Straddle Carrier	400 TEU / hectare
Rubber Tyred Gantry	700 TEU / hectare
Railmounted Gantry	1,000 TEU / hectare

For other cargoes the following indicators might be useful:

Table 3-5: Typical Land Utilisation and Dwell Times for Different Cargoes

Cargo type	Avg. dwell time (days)	Avg. land utilisation (tons/sqm)
General cargo	12	1.25 - 1.50
Forest products	14,5	1.50 - 1.75
Iron & steel	14,5	1.50 - 1.75

In the following, according to the already mentioned procedures and indicators the cargo throughput capacity is elaborated for

- bulk cargo and break bulk over the open storage area
- general cargo over the warehouses and
- containers over the open storage area.
- direct transshipment

Open Storage

a) Bulk cargo

C_T = total annual open storage capacity of the port area in tons
A = 24,000 = storage area in sqm
U = 3 = utilization factor depending on goods (tons / sqm)
T = 15 = estimated average dwell time of goods in days
N = 360 = number of working days p.a.

$C_T = A \times \times U / T =$
24,000 x 3 x 360 / 15 =
1.728 million t p.a.

b) Break bulk

C_T = total annual open storage capacity of the port area in tons
A = 9,000 = storage area in sqm
F = 0.6 = factor for net storage area (reduction for manoeuv. space)
U = 1.75 = utilization factor depending on goods (tons / sqm)
T = 15 = estimated average dwell time of goods in days
N = 360 = number of working days p.a.

$C_T = A \times F \times U \times N / T =$
9,000 x 0.6 x 1.75 x 360 / 15 =
226,800 t p.a.

c) Containers

C_T = total annual open storage capacity of the port area in tons
A = 0.4 = storage area in ha
U = 275 = utilization factor considered a forklift truck system (TEUs / ha)
T = 15 = estimated average dwell time of goods in days
N = 360 = number of working days p.a.

$C_T = A \times U \times N / T =$
0.4 x 275 x 360 / 15 =
2,640 TEU p.a. respectively 26,400 t p.a

Covered Storage

C_T = total annual covered storage capacity of the port area in tons
A = 10,618 = storage area in sqm
F = 0.6 = factor for net storage area (reduction for manoeuv. space)
U = 1.5 = utilization factor depending on goods (tons / sqm)
T = 12 = average dwell time of goods in days
N = 360 = number of working days p.a.

$C_T = A \times F \times U \times N / T =$
10,618 x 0.6 x 1.5 x 360 / 12 =
286,686 t p.a.

Direct transshipment to/from railway wagons

According to information received by the Area Manager the present capacity for direct transshipments was said to be 45 wagons = 3,000 t daily per gang and shift (which means 1 train). 2 trains can be handled simultaneously. Limiting factors are at present the number of available locomotives for wagon shunting, the number of staff and the operational length of railway tracks.

Therefore, the annual capacity for direct transhipment is:

2 trains x 3,000 tons x 360 working days =
2.16 million tons p.a.

The storage capacity is as follows

-	Open Storage		
-	Bulk	1.728 million t p.a.	
-	Break bulk	0.227 million t p.a.	
-	Containers	0.026 million t p.a.	1.981 million t p.a.
-	Covered Storage		0.287 million t p.a.
-	Direct transhipment		2.160 million t p.a.
	Total		**4.428 million t p.a.**

3.2.4 Road and Rail Capacity

Road capacities are not considered to be a determining factor for the capacity analysis of the terminal regarding operational aspects. Nevertheless with increasing container throughput the gate will require some major extension / reconstruction in order to avoid an operational bottleneck in this area.

Rail capacities are at present not taken into consideration for the same reason as above.

Consequently, the capacity of the road and railway links are not further compiled. In case of constraints with influence on the cargo throughput capacity special attention has to be kept on this.

As seen from the foregoing calculations the terminal's capacity is limited by the crane capacity to 3 million t p.a. Taking into consideration that direct transhipment due to lack of wagons and changing transport modes will play a minor role in the future, the storage capacity may limit the terminal's capacity to approx. 2.5 million t p.a.

4. Summary

After the collapse of the former Soviet Union the throughput in the port of Baku decreased drastically. This leads to extremely low utilisation of the assets.

The technical condition of all assets were found to be very poor. All buildings, cargo handling equipment,

terminal infrastructure such as the pipes at Absheron Oil Terminal or the pavement of the surface at the general cargo terminal require major rehabilitation works.

The terminals are partly over equipped, but the bad condition of the assets keeps them just operationable.

Organisational structures require some changes according to western standards in order to be competitive in this difficult times of transition. The port should give up some not profitable services like e.g. shops, laundry etc. and should concentrate on increasing performance of the staff.

Planning procedures in the operational departments do not correspond with western standards.

Also the EDP- and communication system was found to be very poor developed. Computers were not found in operation departments. The majority of documents is handwritten. Even photocopiers are nearly rare. Communication systems are telephones only and a loudspeaker-system at the general cargo terminal. This hampers operational procedures and decreases the performance drastically.

The port was found unprepared for future container traffic. Neither a sufficient quay crane nor specialized yard handling equipment nor adequate stacking areas were found.

Furthermore it was found that structures from Soviet times (as e.g. the Normatives for cargo handling performance) are still existing.

Due to the present low cargo throughput the remaining time until the expected increase of cargo throughput should be used to improve all assets in order to be prepared for future demands.

Volume III

Annex 2

Marine Craft Survey

PURIFIER:	ONE FOR GASOIL
OILY BILGE WATER SEPARATOR:	----
REFRIGERATION INSTALLATION:	----
FIRE FIGHTING SYSTEM:	----
SEAWATER/GENERAL SERVICE PUMPS:	IN WORKING CONDITION
PIPING IN ENGINEROOM:	REPLACEMENT NEEDED
ENGINEROOM VENTILATION:	NATURAL

REMARKS.

This tugboat was undergoing repairs afloat alongside the jetty of the port's vessels next to the ferry terminal.

Her condition is very poor and the design is totally outdated. The machinery is obsolete. There are no Kort nozzles fitted and the vessel has only one rudder in the centerline. The size of the hull does not correspond to the engine power installed and without nozzles the bollard pull must be very low. The manoeuvrability of this tug must be as well very poor with only one rudder in the centerline.
Today, hulls with the dimensions of this vessel with two nozzles, two rudders and two engines of 1,500 HP each develop a bollard pull in the range of 35 tons instead of may be 8 tons of this vessel.

All life saving equipment is obsolete and the vessel does by no means comply with any of the international Rules and Regulations presently in force such as MARPOL and SOLAS. The Classification with the Russian Register of Shipping is expired.

According to the fleetmanager, the costs for the required repairs of this tugboat are in the range of US$ 90,000.--.

It is recommended to stop all work on that vessel immediately and use the funds for urgent repairs on other vessels of the port.

Three sisterships, two built in 1961 in Baku and one, "N.SCHIRINOV", built 1971 in Astrachan, could not be inspected as they were not presented with the argument, that they are identical to "ELKHAN KAZIMOV".

As the design of these other three tugs is identical to the one inspected and described, also these three units should be taken out of service as soon as possible.

CONDITION SURVEY REPORT.

BAKU, 08.10.1996

NAME OF VESSEL: "GÜNASLI".

TYPE OF VESSEL:	HARBOUR TUG
WHERE/YEAR BUILT:	LENINGRAD/1972
MAIN DIMENSIONS L/B/H/D:	29.3/8.2/4.3/3.8 m
VHF/SSB:	YES/----
RADAR/ECHOSOUNDER:	YSE/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/YES
INTERCOM/PHONE:	----/YES
GENERAL ALARM/FIRE ALARM:	YES /----
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	IN POOR CONDITION
CAPSTAN/H-POST:	----/----
TOWING WINCH/HOOK:	----/ YES
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	TWO, OK
ANCHOR:	TWO, OK

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	RUSSKI DIESEL 6Z 30/50
CYCLE/# OF CYLINDERS/HP/RPM:	2/6/600/300, 2 ENGINES
BORE/STROKE:	300/500 mm
2 VALVES/4 VALVES PER HEAD:	----/----, DOUBLE ACTING SCAVEN-
TURBOCHARGED/AFTERCOOLED:	----/----, GING PUMP
AIR/ELECTRIC START:	AIR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	----, DIRECT DRIVE
RATIO/PTO:	----/----
MACHINERY REMOTE CONTROLLED:	YES
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?/?
ROTATION/PITCH/# OF BLADES:	?/?/4
STEERING-/FIXED KORT NOZZLE:	TWO STEERING NOZZLES WITH CPP
ARRANGEMENT OF RUDDERS:	----
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	380 V / 50 HZ
NUMBER OF GENSETS AND TYPE:	1 x 4 CYL./4 CYCLE WITH T/C
OUTPUT/RPM:	30 KW/ 1500
HARBOUR GENSET:	----/----
OUTPUT/RPM:	----/----
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	TWO, 30 BAR

PURIFIER:	ONE FOR GASOIL
OILY BILGE WATER SEPARATOR:	----
REFRIGERATION INSTALLATION:	----
FIRE FIGHTING SYSTEM:	ONE 6 CYL./4 CYCLE DIESEL DRIVING TWO FIREPUMPS,CAP. ABT.2 x 100 cbm/h.
SEAWATER/GENERAL SERVICE PUMPS:	IN WORKING ORDER
PIPING IN ENGINEROOM:	SATIISFACTORY
ENGINEROOM VENTILATION:	MECHANICAL

REMARKS.

This tug has a combination of modern and completely outdated machinery installed. The 2-cycle engines, driving the CP propellers directly at 300 1/min are something for the museumm while the steering nozzles together with the CP propellers represent the most up to date propulsion equipment for modern tugboats. The fuel consumption of the 2-cycle engines is prohibitive and these engines would normally have been changed many years ago.

Given the age of the vessel it is not worthwile any more to replace the 2-cycle engines with economical 4-cycle engines.

This tug should be drydocked, the hull and superstructure sandblasted, necessary steel work carried out and new paint applied throughout. The safety equipment should either be serviced or renewed. The cost for the proposed work is estimated at about DM 250,000.--.

Once new tugboats will be available to the port, this unit should no longer be operated.

CONDITION SURVEY REPORT.

BAKU, 09.10.1996.

NAME OF VESSEL: "ARAZ".

TYPE OF VESSEL:	CREW BOAT
WHERE/YEAR BUILT:	ROSTOV/DON, 1975
MAIN DIMENSIONS L/B/H/D:	20.9/5.3/2.6/1.8 m
VHF/SSB:	YES/----
RADAR/ECHOSOUNDER:	----/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/ YES
INTERCOM/PHONE:	----/----
GENERAL ALARM/FIRE ALARM:	YES /----
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	OK / OK
CAPSTAN/H-POST:	----/----
TOWING WINCH/HOOK:	----/----
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	TWO
ANCHOR:	TWO

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	1 x 3D6, 1974
CYCLE/# OF CYLINDERS/HP/RPM	4/6/150/1500
BORE/STROKE:	120/150 mm
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	----/----
AIR/ELECTRIC START:	AIR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	ONE
RATIO/PTO:	?/ COMPR.,HYDR.P.,WATER P.
MACHINERY REMOTE CONTROLLED:	YES, WIRE OVER PULLEY
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?/?
ROTATION/PITCH/# OF BLADES:	?/?/?
STEERING-/FIXED KORT NOZZLE:	?/?
ARRANGEMENT OF RUDDERS:	?
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	24 V DC
NUMBER OF GENSETS AND TYPE:	----
OUTPUT/RPM:	----
HARBOUR GENSET:	----
OUTPUT/RPM:	----
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	ONE, 60 BAR

PURIFIER:	----
OILY BILGE WATER SEPARATOR:	----
REFRIGERATION INSTALLATION:	----
FIRE FIGHTING SYSTEM:	HALON
SEAWATER/GENERAL SERVICE PUMPS:	IN OPERATING CONDITION
PIPING IN ENGINEROOM:	IN ACCEPTABLE CONDITION
ENGINEROOM VENTILATION:	NATURAL

REMARKS.

This boat is permanently in service taking crew and other people from shore to ships at anchorage and vise versa.

Drydocking, sandblasting and new paint are recommended together with some steel work.

The life saving equipment needs to be replaced as the equipment seen on board is worn out or unserviceable.

Costs for the mentioned work are estimated at DM 100,000.--.

CONDITION SURVEY REPORT.

BAKU, 09.10.1996.

NAME OF VESSEL: "ULDUZ".

TYPE OF VESSEL:	SHIP'S STORES SUPPLY BOAT
WHERE/YEAR BUILT:	LENINGRAD/1976
MAIN DIMENSIONS L/B/H/D:	35.72/7.6/3.2/1.72 m
VHF/SSB:	YES/----
RADAR/ECHOSOUNDER:	----/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/YES
INTERCOM/PHONE:	----/----
GENERAL ALARM/FIRE ALARM:	YES/----
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	OK
CAPSTAN/H-POST:	----
TOWING WINCH/HOOK:	----
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	ONE
ANCHOR:	ONE

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	6USPN2A 18/22 - 225
CYCLE/# OF CYLINDERS/HP/RPM:	4/6/225/750
BORE/STROKE:	180/220 mm
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	YES/YES
AIR/ELECTRIC START:	AIR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	ONE
RATIO/PTO:	?/----
MACHINERY REMOTE CONTROLLED:	YES
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?/?
ROTATION/PITCH/# OF BLADES:	?/?
STEERING-/FIXED KORT NOZZLE:	?/?
ARRANGEMENT OF RUDDERS:	?/?
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	380 V/ 50 HZ
NUMBER OF GENSETS AND TYPE:	2x 4 CYL./4 CYCLE
OUTPUT/RPM:	2x 20 KW/1450
HARBOUR GENSET:	1x 2 CYL./4 CYCLE
OUTPUT/RPM:	12.5 KW
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	1 X 30 BAR

PURIFIER:	ONE FOR GASOIL
OILY BILGE WATER SEPARATOR:	----
REFRIGERATION INSTALLATION:	THREE 2-CYL. COMPRESSORS
FIRE FIGHTING SYSTEM:	HALON
SEAWATER/GENERAL SERVICE PUMPS:	IN WORKING CONDITION
PIPING IN ENGINEROOM:	ACCEPTABLE
ENGINEROOM VENTILATION:	MECHANICAL

REMARKS.

This boat is used to provide ships stores and fresh and refrigerated food to ships at anchorage. Temperatures down to minus 8 °C are said to be available with the refrigeration system on board. The vessel is operational but needs drydocking for bottom cleaning and a complete new paint application.

The propulsion engine is a robust, low output engine but with a high specific fuel consumption. Provided this vessel is operating between the port and the anchorage, i.e. on short voyages only, the high fuel consumption can be accepted as long as there are no major repairs required on the engine or the vessel in general.

Costs for drydocking, sandblasting and a complete new paint application as well as some other minor repairs is estimated to be in the range of DM 120,000.--.

CONDITION SURVEY REPORT.

BAKU, 09.10.1996.

NAME OF VESSEL: "KUR", "SHAFAG".

TYPE OF VESSEL:	SEWAGE/BILGEWATER/DIRTY OIL COLLECTING VSSL.
WHERE/YEAR BUILT:	BAKU/1988
MAIN DIMENSIONS L/B/H/D:	35.14/7.6/3.6/3.24 m
VHF/SSB:	YES /----
RADAR/ECHOSOUNDER:	----/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/ YES
INTERCOM/PHONE:	----/ YES
GENERAL ALARM/FIRE ALARM:	YES /----
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	YES / YES
CAPSTAN/H-POST:	----/----
TOWING WINCH/HOOK:	----/----
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	TWO
ANCHOR:	TWO

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	1 x 6USPN 2A 18/22 - 225
CYCLE/# OF CYLINDERS/HP/RPM:	4/6/225/750
BORE/STROKE:	180/220 mm
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	YES / YES
AIR/ELECTRIC START:	AIR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	YES
RATIO/PTO:	?/---
MACHINERY REMOTE CONTROLLED:	YES, WIRE OVER PULLEY
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?/?
ROTATION/PITCH/# OF BLADES:	?/?
STEERING-/FIXED KORT NOZZLE:	?/?
ARRANGEMENT OF RUDDERS:	?
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	380 V / 50 HZ
NUMBER OF GENSETS AND TYPE:	1 x 6 CYL./4-CYCLE
OUTPUT/RPM:	80 KW/1500
HARBOUR GENSET:	1 x 4 CYL./4-CYCLE
OUTPUT/RPM:	40 KW/1500
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	ONE, 30 BAR

PURIFIER:	----
OILY BILGE WATER SEPARATOR:	----
REFRIGERATION INSTALLATION:	----
FIRE FIGHTING SYSTEM:	HALON
SEAWATER/GENERAL SERVICE PUMPS:	WORKING
PIPING IN ENGINEROOM:	GOOD CONDITION
ENGINEROOM VENTILATION:	NATURAL

REMARKS.

MV."KUR" was found to be the best maintained of all vessels inspected. There is no immediate need of repairs.

MV."SHAFAG" could not be seen as she was not in port.

CONDITION SURVEY REPORT.

APSHERON,10.10.1996.

NAME OF VESSEL: "SPK PAHLAVAN".

TYPE OF VESSEL:	FLOATING CRANE, 25 TONS LIFTING CAPACITY
WHERE/YEAR BUILT:	BUDAPEST, 1979
MAIN DIMENSIONS L/B/H/D:	34.85/17.6/3.2/1.72 m
VHF/SSB:	
RADAR/ECHOSOUNDER:	
GONIOMETER/GPS:	
GYRO-/MAGNETIC COMPASS:	
INTERCOM/PHONE:	
GENERAL ALARM/FIRE ALARM:	
SOUND SIGNAL:	
NAVIGATION LIGHTS:	
MOORING ROPES/BOLLARDS:	VERY POOR CONDITION
CAPSTAN/H-POST:	-----
TOWING WINCH/HOOK:	-----
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	TWO
ANCHOR:	TWO

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	
CYCLE/# OF CYLINDERS/HP/RPM	
BORE/STROKE:	
2 VALVES/4 VALVES PER HEAD:	
TURBOCHARGED/AFTERCOOLED:	
AIR/ELECTRIC START:	
MECHANICAL/HYDRAULIC GOVERNOR:	
FIXED/RESILIENT INSTALLATION:	
ELASTIC COUPLING:	
REVERSE-REDUCTION GEAR:	
RATIO/PTO:	
MACHINERY REMOTE CONTROLLED:	
ENGINE CONTROLROOM:	
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	
PROPELLER DIAM./MATERIAL:	
ROTATION/PITCH/# OF BLADES:	
STEERING-/FIXED KORT NOZZLE:	
ARRANGEMENT OF RUDDERS:	
STEERING GEAR:	

ELECTRIC SYSTEM.

BOARD NET:	
NUMBER OF GENSETS AND TYPE:	
OUTPUT/RPM:	
HARBOUR GENSET:	
OUTPUT/RPM:	
TYPE OF SWITCHBOARD:	

AUXILIARIES.

AIR COMPRESSOR:	

PURIFIER:
OILY BILGE WATER SEPARATOR:
REFRIGERATION INSTALLATION:
FIRE FIGHTING SYSTEM:
SEAWATER/GENERAL SERVICE PUMPS:
PIPING IN ENGINEROOM:
ENGINEROOM VENTILATION:

REMARKS.

During the visit at the oil terminal in Apsheron the Captain and Engineer of the floating crane were not at the site. Therefore there was no access to the engineroom and the controlroom of the crane and no information other than from the list of the Port's vessels was available.

The structure of the crane is in an advanced state of corrosion as can be seen from the fotographs. The same applies for the hull, the main deck and all equipment on deck. The crane certainly was never again painted after leaving the builders yard.

Due to the limited capacity of the crane, it can not even lift a 40'-container, its operational versatility is very limited. The crane was used at the oil terminal for the replacement of the elastic side fendering of the oil jetties.

Because of the very bad condition of the crane immediate repairs would be required. If the condition deteriorates further, it will not be justifiable to spend any money on it. At this time the repair costs are estimated in the range of at least two to three million DM.

For the above mentioned reasons the rehabilitation of this crane can not be recommended.

CONDITION SURVEY REPORT.

APSHERON, 10.10.96.

NAME OF VESSEL: "SABIR BABAYEV".

TYPE OF VESSEL:	HARBOUR TUG
WHERE/YEAR BUILT:	GOROCHOVEZ/1987
MAIN DIMENSIONS L/B/H/D:	29.3/8.2/4.3/3.8 m
VHF/SSB:	YES/RIVERRADIO
RADAR/ECHOSOUNDER:	FURUNO FR-360 M II/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/ YES
INTERCOM/PHONE:	YES / YES
GENERAL ALARM/FIRE ALARM:	YES / YES
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	POOR COND./ACCEPTABLE
CAPSTAN/H-POST:	----/----
TOWING WINCH/HOOK:	----/----
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	TWO
ANCHOR:	TWO

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	2 x 8ZN 25/34 OM4, 1987, 11.5 T
CYCLE/# OF CYLINDERS/HP/RPM:	4/8/800/500
BORE/STROKE:	250/340 mm
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	YES / YES
AIR/ELECTRIC START:	AIR
MECHANICAL/HYDRAULIC GOVERNOR:	HYDRAULIC
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	TWO
RATIO/PTO:	?/ PORT:FIREPUMP,SB GENERATOR
MACHINERY REMOTE CONTROLLED:	YES
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?/?
ROTATION/PITCH/# OF BLADES:	?/?/?
STEERING-/FIXED KORT NOZZLE:	STEERING NOZZLES WITH CP PROPS
ARRANGEMENT OF RUDDERS:	----
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	380 V / 50 HZ
NUMBER OF GENSETS AND TYPE:	ONE SHAFT GENERATOR
OUTPUT/RPM:	50 KW
HARBOUR GENSET:	ONE 6-CYL./4-CYC. DIESEL
OUTPUT/RPM:	50 KW/1450
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	TWO, 30 BAR

PURIFIER:	ONE LUBEOIL, ONE GASOIL
OILY BILGE WATER SEPARATOR:	---
REFRIGERATION INSTALLATION:	---
FIRE FIGHTING SYSTEM:	HALON
SEAWATER/GENERAL SERVICE PUMPS:	IN ORDER
PIPING IN ENGINEROOM:	IN ORDER
ENGINEROOM VENTILATION:	MECHANICAL

REMARKS.

This is the latest and most powerful tug of the port of Baku. Nevertheless she is in a poor state of maintenance as far as the hull, deck and superstructure is concerned. She should be drydocked as soon as possible for sandblasting and the application of new paint from top to bottom.

This tug as well has a combination of modern and outdated machinery installed. The main engines are equipped with only two valves per cylinder head and the lubrication of the rocker arm shafts is done manually by means of grease presses. There are no covers on the cylinder heads. Steering nozzles and CP propellers are state of the art.

The output of modern engines comparible in size is about two and a half times the output of the engines installed.

This tug should be kept in good condition as she will be the only one for the time being to handle larger vessels.

Maintenance costs are estimated to be in the range of DM 200,000.--.

CONDITION SURVEY REPORT.

BAKU, 11.10.1996.

NAME OF VESSEL: "NMS-26".

TYPE OF VESSEL:	OILSKIMMER/GARBAGE COLLECTOR
WHERE/YEAR BUILT:	SCHDANOW/1974
MAIN DIMENSIONS L/B/H/D:	14.85/4.3/2.4/1.0 m
VHF/SSB:	
RADAR/ECHOSOUNDER:	
GONIOMETER/GPS:	
GYRO-/MAGNETIC COMPASS:	
INTERCOM/PHONE:	
GENERAL ALARM/FIRE ALARM:	
SOUND SIGNAL:	
NAVIGATION LIGHTS:	
MOORING ROPES/BOLLARDS:	
CAPSTAN/H-POST:	
TOWING WINCH/HOOK:	
ANCHOR WINDLASS:	
ANCHOR CHAIN:	
ANCHOR:	

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	
CYCLE/# OF CYLINDERS/HP/RPM	
BORE/STROKE:	
2 VALVES/4 VALVES PER HEAD:	
TURBOCHARGED/AFTERCOOLED:	
AIR/ELECTRIC START:	
MECHANICAL/HYDRAULIC GOVERNOR:	
FIXED/RESILIENT INSTALLATION:	
ELASTIC COUPLING:	
REVERSE-REDUCTION GEAR:	
RATIO/PTO:	
MACHINERY REMOTE CONTROLLED:	
ENGINE CONTROLROOM:	
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	
PROPELLER DIAM./MATERIAL:	
ROTATION/PITCH/# OF BLADES:	
STEERING-/FIXED KORT NOZZLE:	
ARRANGEMENT OF RUDDERS:	
STEERING GEAR:	

ELECTRIC SYSTEM.

BOARD NET:	
NUMBER OF GENSETS AND TYPE:	
OUTPUT/RPM:	
HARBOUR GENSET:	
OUTPUT/RPM:	
TYPE OF SWITCHBOARD:	

AUXILIARIES.

AIR COMPRESSOR:	

PURIFIER:
OILY BILGE WATER SEPARATOR:
REFRIGERATION INSTALLATION:
FIRE FIGHTING SYSTEM:
SEAWATER/GENERAL SERVICE PUMPS:
PIPING IN ENGINEROOM:
ENGINEROOM VENTILATION:

REMARKS.

Except for the dimensions this unit is identical to the other three oilskimmers. This boat was seen dry on one of the jetties in Baku port and was found to be in poor condition.

Taking the age and the condition of this unit into consideration, it is not recommended to spend any money on this boat for repairs. Equipment which is still operational may be taken out and kept as replacement for the other three units which are still in operation.

CONDITION SURVEY REPORT.

BAKU, 08.10.1996.

NAME OF VESSEL:"SALATIN ASKEROVA","KAPITAN QASIMOV".

TYPE OF VESSEL:	EXCURSION BOAT, 200 PASSENGERS
WHERE/YEAR BUILT:	BAKU, 1975
MAIN DIMENSIONS L/B/H/D:	33.45/5.3/2.5/1.3 M
VHF/SSB:	YES/NO
RADAR/ECHOSOUNDER:	-/-
GONIOMETER/GPS:	-/-
GYRO-/MAGNETIC COMPASS:	-/YES
INTERCOM/PHONE:	YES/-
GENERAL ALARM/FIRE ALARM:	YES/-
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	YES
CAPSTAN/H-POST:	-/-
TOWING WINCH/HOOK:	-/-
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	ONE
ANCHOR:	ONE

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	3D12A, 2 ENGINES
CYCLE/# OF CYLINDERS/HP/RPM	4/12V/300/1500
BORE/STROKE:	120/150 MM
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	- / -
AIR/ELECTRIC START:	AIR, 60 BAR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	YES
RATIO/PTO:	?/AIR COMPRESSOR/HYDR.PUMP
MACHINERY REMOTE CONTROLLED:	YES, WIRE OVER PULLEY
ENGINE CONTROLROOM:	-----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?
ROTATION/PITCH/# OF BLADES:	?
STEERING-/FIXED KORT NOZZLE:	-----
ARRANGEMENT OF RUDDERS:	ONE PER SHAFT
STEERING GEAR:	HYDRAUULIC

ELECTRIC SYSTEM.

BOARD NET:	24 VDC
NUMBER OF GENSETS AND TYPE:	-----
OUTPUT/RPM:	-----
HARBOUR GENSET:	-----
OUTPUT/RPM:	-----
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	2 X 60 BAR

PURIFIER:	-----
OILY BILGE WATER SEPARATOR:	-----
REFRIGERATION INSTALLATION:	-----
FIRE FIGHTING SYSTEM:	HALON
SEAWATER/GENERAL SERVICE PUMPS:	YES
PIPING IN ENGINEROOM:	OK
ENGINEROOM VENTILATION:	NATURAL

REMARKS.

The vessels are in working condition but require drydocking for painting of the hull, the superstructure, the passenger spaces and possible underwater repairs. The engines are naturally aspirated and as far as fuel consumption and output are concerned, outdated and uneconomical. According to the fleetmanager, all parts for the vessels equipment are available and the engines are still in production.

Provided there will be sufficient customers in summertime for roundtrips off the coast, these two boats may be kept in operation.

1, 2 6

CONDITION SURVEY REPORT.

BAKU, 08.10.1996.

NAME OF VESSEL: "GARTAL".

TYPE OF VESSEL:	FIREFIGHTING BOAT
WHERE/YEAR BUILT:	ARALSK/1980
MAIN DIMENSIONS L/B/H/D:	15.1/3.96/2.4/1.2 m
VHF/SSB:	YES/----
RADAR/ECHOSOUNDER:	YES,OUT OF ORDER/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/----
INTERCOM/PHONE:	----/----
GENERAL ALARM/FIRE ALARM:	YES ---
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	IN POOR CONDITION
CAPSTAN/H-POST:	----/----
TOWING WINCH/HOOK:	----/----
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	ONE
ANCHOR:	ONE

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	1 x 6USPN2A 18/22 - 225
CYCLE/# OF CYLINDERS/HP/RPM	4/6/225/750
BORE/STROKE:	180/220 mm
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	YES/YES
AIR/ELECTRIC START:	AIR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	ONE
RATIO/PTO:	?/----
MACHINERY REMOTE CONTROLLED:	YES
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?/?
ROTATION/PITCH/# OF BLADES:	?/?/?
STEERING-/FIXED KORT NOZZLE:	?/?
ARRANGEMENT OF RUDDERS:	?/?
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	220 v /50 HZ
NUMBER OF GENSETS AND TYPE:	1 x 2-CYL./4 CYCLE
OUTPUT/RPM:	10 KW/1450
HARBOUR GENSET:	----
OUTPUT/RPM:	----
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	ONE, 30 BAR

PURIFIER:	----
OILY BILGE WATER SEPARATOR:	----
REFRIGERATION INSTALLATION:	----
FIRE FIGHTING SYSTEM:	ONE DIESEL DRIVEN FIRE PUMP, ENGINE TYPE 3D6,160 HP/1500 RPM, BORE/STROKE 120/150 mm, PUMP CAP. MAX 220 CBM/H AT 6 BAR. TWO FOAM NOZZLES ON A DERRICK TURNABLE 180° FROM PORT TO STERN TO STARBOARD.
SEAWATER/GENERAL SERVICE PUMPS:	OK
PIPING IN ENGINEROOM:	OK
ENGINEROOM VENTILATION:	NATURAL

REMARKS.

For today's requirements the boat is obsolete. The capacity of the firepump is too small and the arrangement of the two nozzles attached to a derrick at the rear section of the boat does not allow a quick change of the throwing direction. In case of a fire on one of the ferries or a tanker this boat would be completely useless.

It is therefore recommended to take this boat out of service as soon as a modern replacement is available.

CONDITION SURVEY REPORT.

BAKU, 08.10.1996.

NAME OF VESSEL: "BELEDCHI"

TYPE OF VESSEL:	PILOT BOAT
WHERE/YEAR BUILT:	LENINGRAD/1968
MAIN DIMENSIONS L/B/H/D:	19.8/4.66/2.55/1.3 m
VHF/SSB:	YES/----
RADAR/ECHOSOUNDER:	----/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/YES
INTERCOM/PHONE:	----/----
GENERAL ALARM/FIRE ALARM:	YES /----
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	IN POOR CONDITIION
CAPSTAN/H-POST:	----/----
TOWING WINCH/HOOK:	----/----
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	TWO
ANCHOR:	TWO

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	1 x 3D12
CYCLE/# OF CYLINDERS/HP/RPM	4/12V/300/1500
BORE/STROKE:	120/150 mm
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	----/----
AIR/ELECTRIC START:	AIR, 60 BAR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	YES
RATIO/PTO:	?/ WATERPUMP,HYDR.PUMP, COMPR.
MACHINERY REMOTE CONTROLLED:	YES, WIRE OVER PULLEY
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER	LUBRICATED: WATER
PROPELLER DIAM./MATERIAL:	?/?
ROTATION/PITCH/# OF BLADES:	?/?
STEERING-/FIXED KORT NOZZLE:	?/?
ARRANGEMENT OF RUDDERS:	?
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	220 V/ 50 HZ
NUMBER OF GENSETS AND TYPE:	ONE
OUTPUT/RPM:	10 KW/1450
HARBOUR GENSET:	----
OUTPUT/RPM:	----
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	1 x 60 BAR

PURIFIER:	----
OILY BILGE WATER SEPARATOR:	----
REFRIGERATION INSTALLATION:	----
FIRE FIGHTING SYSTEM:	HALON
SEAWATER/GENERAL SERVICE PUMPS:	IN WORKING CONDITION
PIPING IN ENGINEROOM:	SATISFACTORY
ENGINEROOM VENTILATION:	NATURAL

REMARKS.

This pilot boat is outdated and needs to be replaced. The equipment and facilities on board are either worn out or are not in line with todays requirements, especially the communication equipment and the navigational aids. The boat is 28 years old and should be taken out of service as soon as a new, modern boat is available.

CONDITION SURVEY REPORT.

BAKU, 08/11.10.1996, APSHERON, 10.10.96.

NAME OF VESSEL: "NMS-73", "NMS-16", "NMS-21".

TYPE OF VESSEL:	OILSKIMMER/GARBAGE COLLECTOR
WHERE/YEAR BUILT:	SCHDANOW/1984, 1978, 1989
MAIN DIMENSIONS L/B/H/D:	17.00/4.30/2.40/1.20 m
VHF/SSB:	YES/ ----
RADAR/ECHOSOUNDER:	----/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/YES
INTERCOM/PHONE:	----/----
GENERAL ALARM/FIRE ALARM:	----/----
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	YES
MOORING ROPES/BOLLARDS:	OK
CAPSTAN/H-POST:	----
TOWING WINCH/HOOK:	----
ANCHOR WINDLASS:	ONE INCLINED SPILL HEAD
ANCHOR CHAIN:	ONE
ANCHOR:	ONE

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	MAZ, TRUCK ENGINE
CYCLE/# OF CYLINDERS/HP/RPM	4/6V/135/?
BORE/STROKE:	? / ?
2 VALVES/4 VALVES PER HEAD:	?
TURBOCHARGED/AFTERCOOLED:	----/----
AIR/ELECTRIC START:	----/ YES
MECHANICAL/HYDRAULIC GOVERNOR:	YES/----
FIXED/RESILIENT INSTALLATION:	YES/----
ELASTIC COUPLING:	----
REVERSE-REDUCTION GEAR:	PLANETARY
RATIO/PTO:	?/HYDR.PUMP, SEAWATER PUMP,GEN
MACHINERY REMOTE CONTROLLED:	WIRE OVER PULLY
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	----/YES
PROPELLER DIAM./MATERIAL:	ABT.400 mm
ROTATION/PITCH/# OF BLADES:	?/?/4
STEERING-/FIXED KORT NOZZLE:	----/YES
ARRANGEMENT OF RUDDERS:	ONE BEHIND THE PROPELLER
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	24 VDC
NUMBER OF GENSETS AND TYPE:	----
OUTPUT/RPM:	----
HARBOUR GENSET:	----
OUTPUT/RPM:	----
TYPE OF SWITCHBOARD:	CLOSED

AUXILIARIES.

AIR COMPRESSOR:	----

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CONDITION SURVEY REPORT.

BAKU, 08.10.1996.

NAME OF VESSEL:"ELKHAN KAZIMOV".

TYPE OF VESSEL:	HARBOUR TUG
WHERE/YEAR BUILT:	BAKU/1959
MAIN DIMENSIONS L/B/H/D:	28.2/7.0/3.5/2.94
VHF/SSB:	YES/----
RADAR/ECHOSOUNDER:	----/----
GONIOMETER/GPS:	----/----
GYRO-/MAGNETIC COMPASS:	----/YES
INTERCOM/PHONE:	----/----
GENERAL ALARM/FIRE ALARM:	YES /----
SOUND SIGNAL:	YES
NAVIGATION LIGHTS:	OK
MOORING ROPES/BOLLARDS:	POOR CONDITION
CAPSTAN/H-POST:	----/----
TOWING WINCH/HOOK:	----/YES
ANCHOR WINDLASS:	YES
ANCHOR CHAIN:	POOR CONDITION
ANCHOR:	POOR CONDITION

PROPULSION SYSTEM.

MAIN ENGINE TYPE:	6ZRP 25/34-I, 2 ENGINES
CYCLE/# OF CYLINDERS/HP/RPM	4/6/300/500
BORE/STROKE:	250/340 mm
2 VALVES/4 VALVES PER HEAD:	TWO
TURBOCHARGED/AFTERCOOLED:	----/----
AIR/ELECTRIC START:	AIR
MECHANICAL/HYDRAULIC GOVERNOR:	MECHANICAL
FIXED/RESILIENT INSTALLATION:	FIXED
ELASTIC COUPLING:	-----
REVERSE-REDUCTION GEAR:	TWO
RATIO/PTO:	? / ----
MACHINERY REMOTE CONTROLLED:	NO, ONE TELEGRAPH/ENGINE
ENGINE CONTROLROOM:	----
PROP.SHAFT BEARINGS OIL/WATER LUBRICATED:	WATER
PROPELLER DIAM./MATERIAL:	?
ROTATION/PITCH/# OF BLADES:	?
STEERING-/FIXED KORT NOZZLE:	----/----
ARRANGEMENT OF RUDDERS:	ONE RUDDER IN THE CENTERLINE
STEERING GEAR:	HYDRAULIC

ELECTRIC SYSTEM.

BOARD NET:	220 V/ 50 HZ
NUMBER OF GENSETS AND TYPE:	2, 4 CYL., NAT.ASPIRATED
OUTPUT/RPM:	25 KW/1500
HARBOUR GENSET:	----
OUTPUT/RPM:	----
TYPE OF SWITCHBOARD:	CLOSED

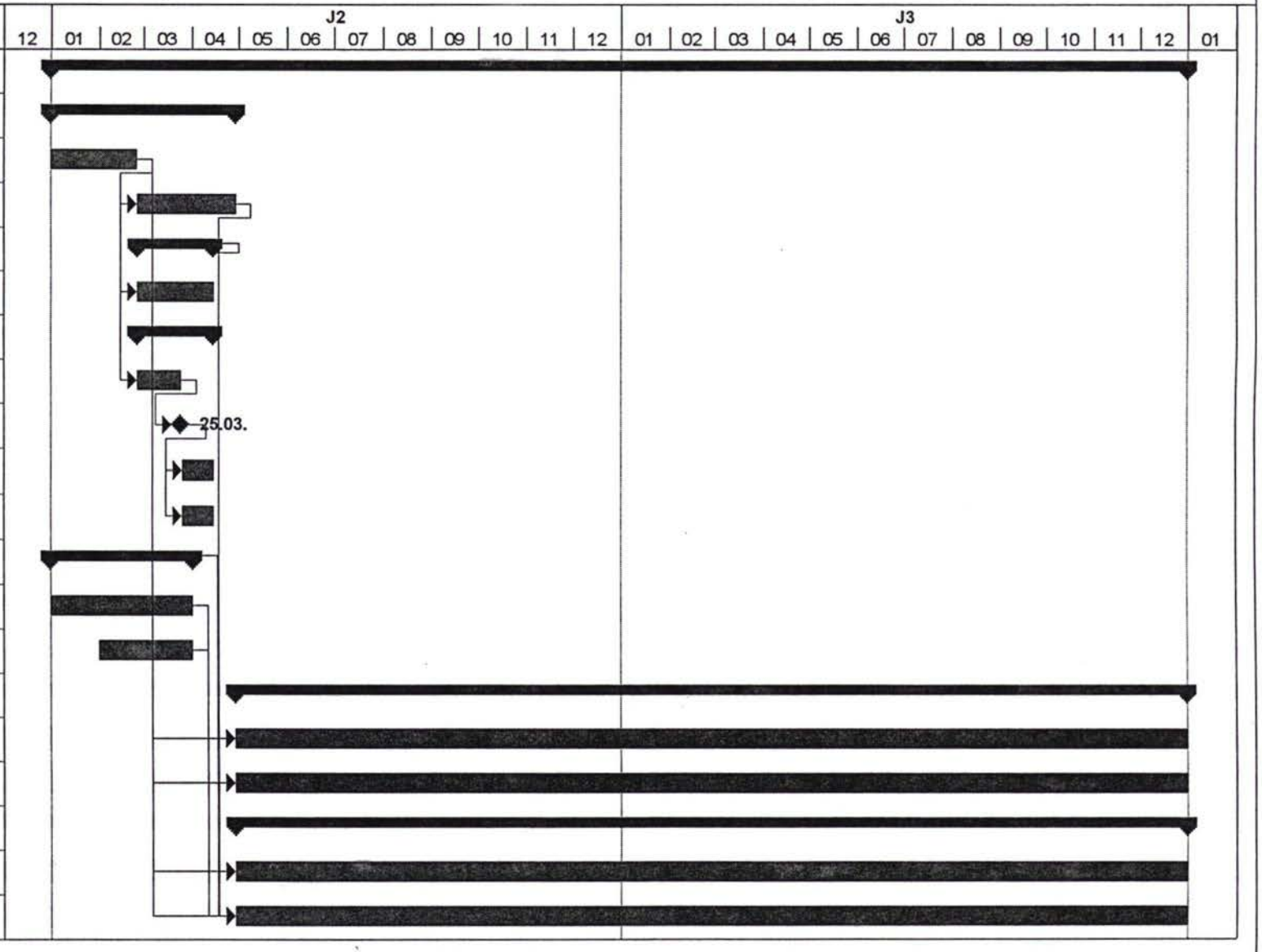
AUXILIARIES.

AIR COMPRESSOR:	TWO, 30 BAR

FIG. D-1

Development of Baku Port
Equipment Rehabilitation Programme and Technical Assistance to the Maintenance and Repair Workshops

Nr.	Activity	Time
1	**Rehabilitation Equipment**	**524t**
2	**Project Preparation**	**86t**
3	Specification of Spareparts, Material, etc.	40t
4	Procurement Spareparts, Material, etc.	46t
5	**Setup of Workshops**	**36t**
6	Renovation and Organisation of	36t
7	**Training Workshop Staff**	**36t**
8	Basic Training, Workshop	21t
9	Selection of 4 Workgroups	1t
10	Training: Hydraulic Systems	14t
11	Training: Electronic Systems	14t
12	**Setup of Sparepart Store**	**67t**
13	Installation of Stores System	67t
14	Training of Storekeeping Staff	45t
15	**Rehabilitation Programme Cranes**	**438t**
16	Workgroup 1 Cranes - Workprogramme	438t
17	Workgroup 2 Cranes - Workprogramme	438t
18	**Rehabilitation Programme Forklifts/Trucks**	**438t**
19	Workgroup 1 Trucks / FLT-Workprogramme	438t
20	Workgroup 2 Forklifts - Workprogramme	438t



Tacis / TRACECA Programme