Tacis

Development of the Port of Baku
Port Master Plan
Port Development Plan

# Phase II Report, Vol. III

16 December 1996

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# Part A - Introduction

This Volume , the Port Master Plan, covers all operational issues of the Port of Baku. During the second phase of the Port Master Plan Study a detailed modal split of the relevant traffics for the Port of Baku has been elaborated and described in Volume II. For the future traffic patterns hereinafter recommendations for the future organisational structure and a detailed operational concept for the general cargo terminals including a time phased development plan of the port are describe. Beside the rehabilitation of old structures, a concept for multi modal container handling in the course of future containerisation of cargo transport for Baku has been developed

The Volume III of this Report is structured in the Parts:

B - Organisational Structure of the Port

C - Future Port Operations

D - Cargo Handling Equipment

E - Port marine Crafts

In this phase of the study, part B and C have been new elaborated for the future port development.
Part D - Cargo Handling Equipment and Part E - Port marine Crafts have been taken from the previous report.

# Part B - Organisational Structure of the Port

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 clear 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

The current organisation structure of the Port (Table B-1 overleaf) 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 (Table B-2 overleaf).

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 the management methods "MBO - Management by Objectives". The implementation will be coached by the Management Assistance Project and is scheduled for early 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 companies for operation. Therefore the development of the General Cargo Terminal will further require an organisational separation of the container terminal operation from the traditional general cargo section.

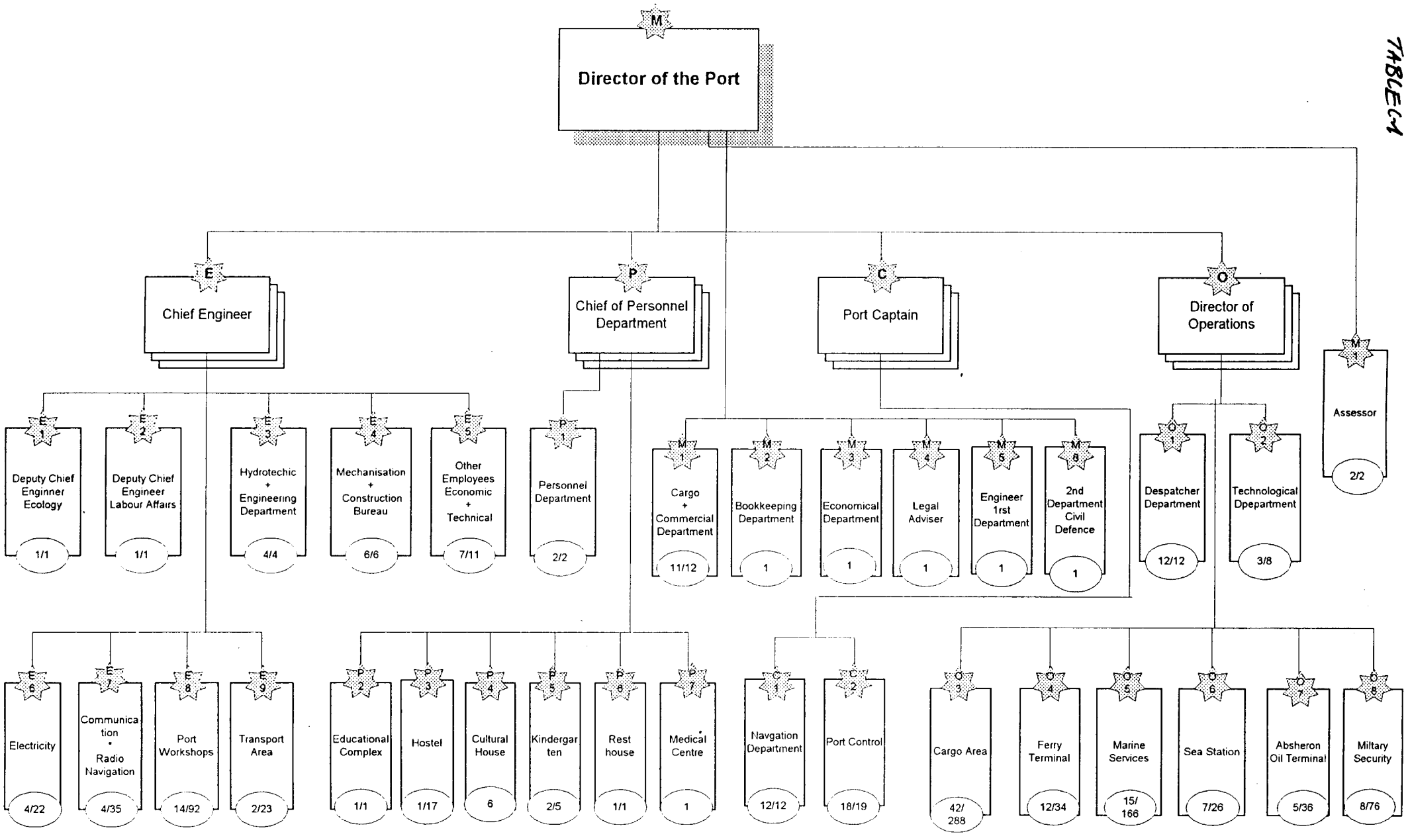
In addition to the commercial port operation, the Port also carries out Maritime Administrative functions. In the course of building up a new legal framework for Azerbaijan in the maritime sector, it is recommended to shift the national tasks and the ports authority into a "National Maritime Administration" 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, 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 Table B-3 overleaf). The intended establishment of a Free Port would also been administrated by the Maritime Administration.

TABLE 4

# Port of Baku

## Structure in April 1996




Number of the Department / Section in the Organisation Scheeme

Number of Employees in The Department / Section

# Port of Baku

Proposal for new Organisation

TABLE C-2

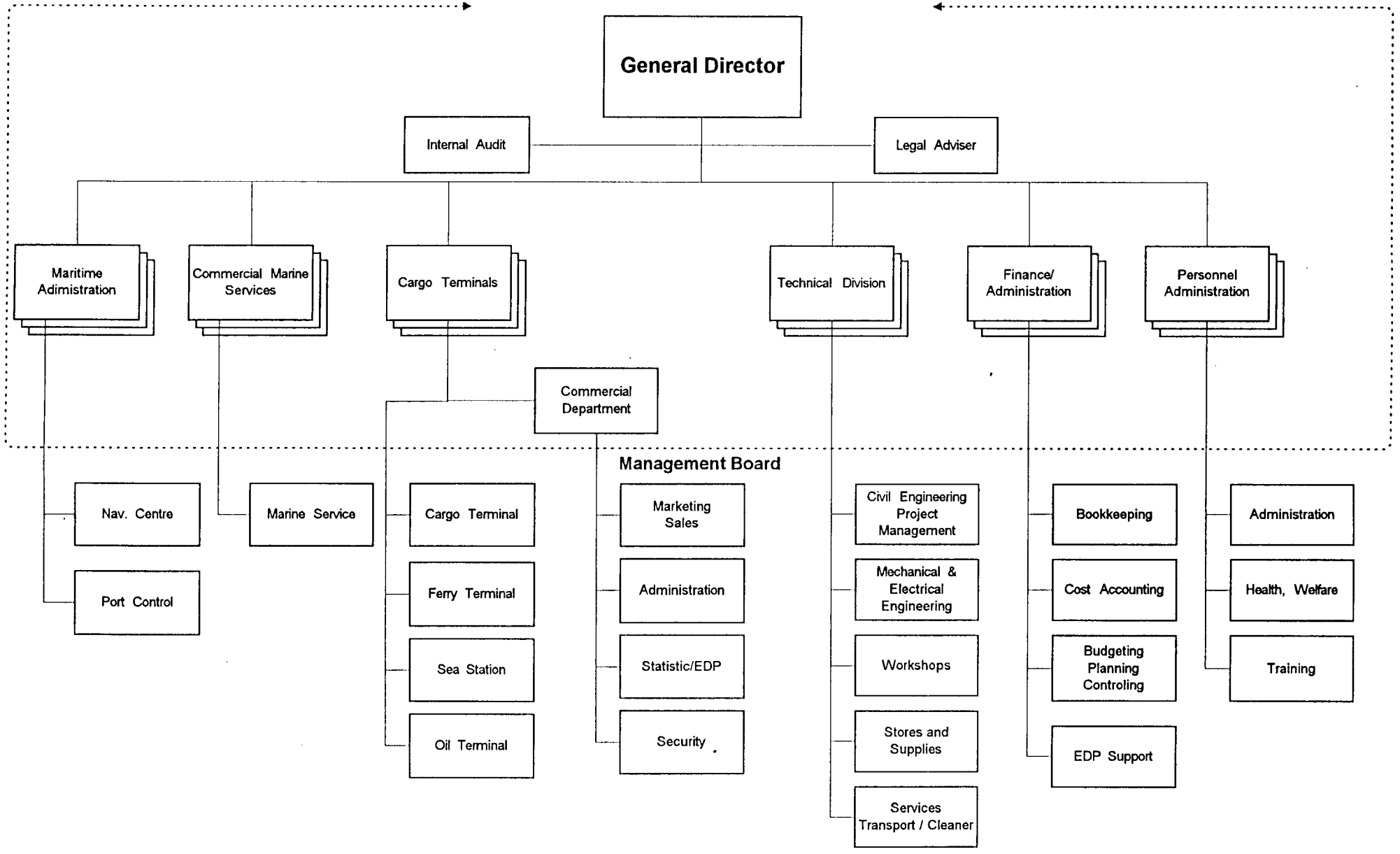
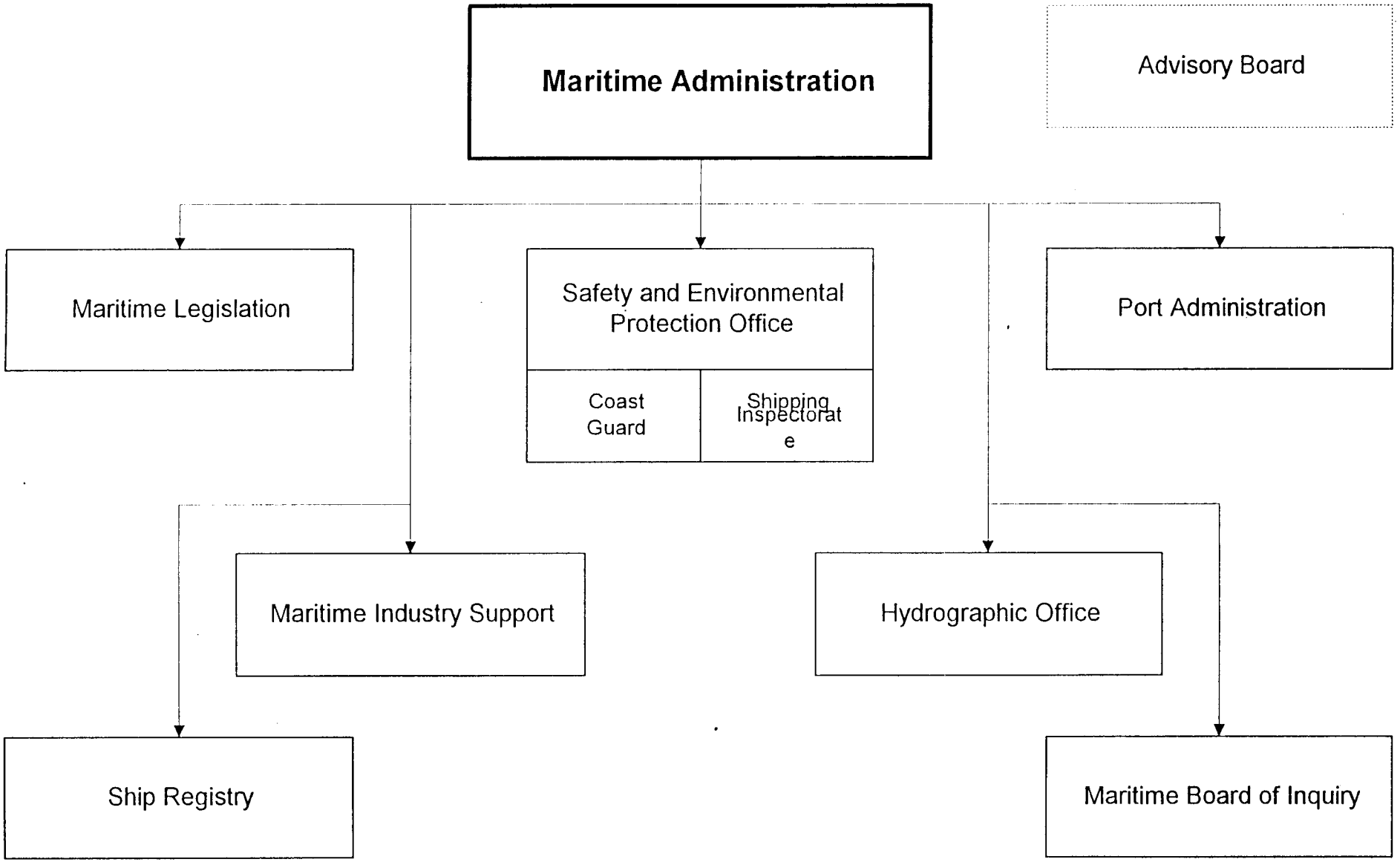


TABLE C-3


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

# Part C - Future Port Operations

## 1. Introduction

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, most likely scenario:

**Table C-1 Cargo Volume, Most Likely Scenario**

| General Cargo | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| ('000 tonnes) | 750 | 906 | 1.155 | 1.488 |

| Containerised Cargo | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| Full (TEU) | 29,167 | 42,377 | 56,750 | 75,891 |
| Empty (TEU) | 5,000 | 6,691 | 8,954 | 11,983 |
| Boxes | 30,750 | 39,255 | 49,248 | 65,905 |

The modal split gives cargo volumes for the various transport modes which determine the cargo handling activities in the Port. Whereas the non-containerised cargoes, import or export, are discharged from ship and loaded to railway waggons (direct delivery) or put to the open area (indirect delivery) for intermediate storage or vice versa, the modal split for containerised cargo shows the Export and Import Container Traffic Cargo Flow, projected for year 2000 (Volume II), for the most likely scenario:

**Export Container Traffic Flow**

- Terminal transfer to / from the Ferry by Mafi or Chassis-Trailer: 3,500 TEUs
- Caspian Sea/River Vessels: 2,100 TEUs
- Trans-Sibirian Land Bridge, Ferry: 600 TEUs
- Block Train (Baku - Poti): 11,600 TEUs
- Railway (traditional): 2,900 TEUs

**Import Container Traffic Flow**

- Terminal transfer to / from the Ferry by Mafi or Chassis-Trailer: 3,500 TEUs
- Caspian Sea/River Vessels: 2,100 TEUs
- Trans-Sibirian Land Bridge, Ferry: 600 TEUs
- Block Train (Baku - Poti): 11,600 TEUs

- Railway (traditional): 2,900 TEUs

For the further elaboration of the Master Plan, only the "most likely scenario" of the forecast and modal split is taken into consideration.

# 2. General Pattern of Cargo Handling Activities

The interpretation of the forecasted cargo towards the required cargo handling activities of the Port of Baku leads to following activities to be taken into account:

- containers in/out control by "Interchange" activities
- container transport from/to ferry (the main terminal provides the tractor with driver, the shipping lines provide the chassis/trailer)
- Container handling at quay side (ship - shore - ship)
- Container stacking activities at the "CY" Container Yard for a reasonable dwell-time
- Container control in the CY either by "Stacking Card System" or EDP
- Container Freight Station activities for the stuffing or stripping of containers
- Railway container unloading and loading activities
- Receipt/delivery of container by truck
- Receipt/delivery of non-containerised cargoes by quay-side either direct delivery or via storage
- Receipt/delivery of non-containerised cargoes by truck

## 2.1 Future Handling of General Cargo and Bulk Cargo

The handling methods for bulk, neo bulk and general cargo will not much differ from the past. Harbour cranes will discharge the ships after berthing or will load the ships with export cargo. After the rehabilitation of some of the existing harbour cranes sufficient cranes capacity for all 6 optional berths will be available, i. e. 6 berths x 2 cranes/berth = 12 cranes. As the lifting capacity of the cranes differs from 6 to 42t, all types of cargoes may be handled. The annual loading capacity was calculated to be between 3.0 and 3.6 million tons p. a.

The cranes can be fitted with attachments for the handling of special cargoes, e. g. magnetic plates for the handling of scrap, clam-shells for the handling of dry bulk cargoes, etc. All these attachment equipment's are available in sufficient numbers.

After discharging from the ship, the crane 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 waggons it is vital to have at least one railway track

under the cranes along the berths.

The open storage area for bulk, neo 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 ca. 50m, 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 "2nd line cranes / yard cranes" should be abandoned.

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 the Ferry Terminal with the existing link span can serve such traffic, an acquisition of a pontoon barge device is not necessary

## 2.2 The Future Handling of Containers

As the modal split on export and import containers traffic flow shows, containers will arrive and depart by ship, rail, road and ferry. Because of not sufficient available area for handling and stacking of containers within the ferry terminal's premises, the General Cargo Terminal will handle all multi modal container bound for the ferry. This joint operation of container traffic to and from the ferry requires a direct connection road between the two terminals. The biggest share of container traffic will be carried by the block trains, followed by the ferries and other modes, a minor share will come and go via berth. The "sea-bound" containers carried by Caspian sea/river vessels will be distributed among the vessels with bulk, neo bulk and general cargoes. The container handling at the quay side can be done by the existing harbour cranes as some of them have the necessary lifting capacity (1 x 43t and 4 x 32t). The cranes will lift the containers by means of an attached "spreader", either fixed size for 20' or 40' containers, or variable.

The horizontal transport between the ship and the container yard, or vice versa, can be done by the equipment to be selected for the container yard, e. g. tractor-trailers, as the number of containers in and out by ship is minor volume only.

As the storage area at the general cargo/multi mode terminal is restricted, a yard gantry crane system is envisaged for the container stacks in the container yard. This system generally has a high land-use factor. More advantages are described in the paragraph "equipment selection". The yard gantry crane is loading/discharging containers to and from railways, trucks and tractor-trailers. The crane may be supported

by either "reach stacker" or forklift truck equipment in order to spread up the container operations. This additional container handling equipment will also be necessary for the handling of loaded reefer-containers, special cargoes on container-flats and for containers with dangerous cargoes if they are not stacked within the RTG-stack.

A separation of containers in the container yard in export and import blocks, by shipping lines, forwarders etc., is envisaged in order to save operation time.

A combination of a heavy forklift truck and reach stacker is of advantage because a few container operations, e. g. the handling of container flats (platforms) with cargo need either special attachment gear or the handling by forklift truck.

A railway track and a traffic lane for direct railway-truck operations should be considered to be integrated in one side of the container stacks under a yard gantry crane, other stacks must have at least a traffic lane for road vehicles.

Extra container handling equipment is also necessary for the handling of empty containers which may be stacked either in the free container blocks or, depending on the occupancy rate, in separate blocks outside the reach of the yard gantry cranes. The stacking of empty containers (MT) is then carried out by means of a forklift truck with adequate capacity (15t) and a high mast to be capable to stack empty containers 4 or 5 high (block storage). The rows of the container blocks in the container yard should be parallel with the railway tracks for better hand use and better operations, as the container yard will reach up to the storage area for non-containerised cargoes at one side and up to the transit sheds area at the other side, at least during the first stages of development, as it is described under "Port Planning".

The number of equipment requested in the container yard will be generally determined by the number of "moves" to be carried out in the average per 1 container in the stack. For a yard gantry crane, an average of 3 moves per container should be considered, i. e. 1 move into stack, 1 move out of stack and 1 move for shifting within the stack. The equipment for the handling of empty containers is generally calculated with an average number of 2.2 moves per container, i. e. 1 move in, 1 move out and 10% for stack operations.

The CFS (Container Freight Station) operations, e. g. receipt/delivery of general cargo, in combination with stuffing/stripping of containers will be carried out by means of forklift trucks with a capacity of 2-2.5t. This type of equipment is able to do about 50,000t/a.

The dispatch of the block trains in the container yard will be as follows:

For the block trains from and to Poti it is assumed that they have in average 20 wagons with 3 TEUs each, i. e. 60 TEUs per block train or 42 "boxes", if 20'/40' ratio = 0,75. 42 moves with the envisaged handling equipment will be done in not less than 4 hours (~ 10 moves/h). Some time is needed for the re-loading of the train. For shunting and interchange procedures 2 hours will be sufficient for each direction.

- 2 hours shunting/interchange in
- 4 hours unloading operations (1 RTG)
- 4 hours loading operations (1 RTG)
- 2 hours shunting/interchange out

= 12 hours dispatch time for each block train.

The theoretical dispatch capacity for block trains is therefore, with the planned container yard capacity, up to 2 trains per day, provided an operations time of 24 hours/day. This capacity is sufficient for the projected

volume of the likely scenario in the first phase and may be extended when needed. With the removal of the bulk and break bulk cargo handling to the Timber Terminal, more area will be available for additional container stacks.

The terminal transfer of containers between the ferry terminal and the main complex will be carried out by a tractor-trailer system. It is envisaged that the containers are standing on chassis-trailers during the voyage of the ferry. These trailers belong to the shipping line and/or cargo owners. The operations department of the main complex (multi-modal terminal) has only to provide tractors with sufficient capacity in order to tow these trailers either into the ship or out of the ship via its ramp and then further on the container yard (or vice versa). The tractor operators belong also to the staff of the multi-modal terminal. The number of tractor units to be considered follows the number of containers/year coming and going between the container yard and the ferry terminal, i. e.: (most likely scenario, year 2000:

3,500 TEUs in, 3,500 TEUs out = 7,000 TEUs (80% = 20' containers, 20% = 40' containers)
7,000 TEUs x factor 0.9 = 6,300 containers ("boxes")
6,300 boxes: 360 days/year = 17.5 ~ 18 boxes/day
that is, e. g. 9 boxes in and 9 boxes out in the average per day. For this operations, a minimum of 2 tractors or tug masters is requested. These terminal transfer containers must also be included in the interchange procedures and documentation flow.

# 3. Functional Requirements

In order to carry out all the expected activities in the Port, the following functional requirements of facilities, staff and organisational set-ups must be taken into account.

## 3.1 Berths Requirements

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

From the amount of cargo throughput per year via the berths, both containers and non-containerised cargoes as stated in the "most likely" scenario the numbers of 6 operational berths in the port with the stated capacity of 4.2 t/a., which was calculated with an average Berth Occupancy Rate (BOR) of 65%, is more than adequate. It can be assumed that the several berths will generally not be specialised for certain cargoes, e.g. general cargoes, containers, etc. (maybe the vessels have to shift alongside the berth occasionally, also will the performance of the operations staff be kept (or even improve). Moreover, if a rehabilitation of the timber terminal will take place as it is planned for the 2nd phase of Development (most likely scenario), the total number of berths available will increase from 6 to 8.

Ships will not change in design as it was stated before, and will carry in the average a cargo to or from Baku of 2,500 t as Baku in most cases will be the only port of call.

Ship arrival and service time patterns will not change considerably, there will be (as in the past) a scheduled arrival and service organisation. Waiting time to berths will therefore hardly occur with the given number of

berths and the mentioned organised arrival and service time patterns, only due to some strong winds which sometimes, but in few occasions, will delay the berthing of ships due to navigational safety standards. There is a seasonal impact on the arrival time patterns of ships, as during the winter season the Volga-Don-Canal System is closed for up to 3 months/year. This, of course, does not have an impact on the inter Caspian Sea maritime transport links, and is generally considered in the average BOR p.a.

The number of ship calls and average berthing time is calculated in Table C-2 overleaf. For calculation of berth requirements, following assumptions have been made:

- The average performance for bulk, break bulk cargoes, with the little part of general cargoes, is now 83 t per ship-hour at berth.

- The container handling rate of the shore crane will not be less than 10 moves (=containers) per hour, i.e. 13 TEUs (average relation TEU/container = 0.75)

- The average t/call is assumed to be not less than 2,500 t

The availability of a certain number of berths in connection with a reasonable BOR may be a general proof of berth capacity. The consultants looked in more detail in the service time pattern in connection with the existing standards. The average service time of ships with the average mix of cargoes, containers and others, will be of about 30 hours only. The comparison between the available berth-hours of 6 berths, a BOR of 60% only and 360 operational days p.a.

| 360 x 24 x 6 x 0.6 = 31,104 hours |
|---|

shows that there is ample berth capacity for all projected scenarios, with the exemption of the "High Scenario", year 2015; but with 2 additional berths at the timber terminal even for the high scenario the number of berths will be adequate.

The available berth capacity is sufficient also in the case of changes in the average ship loads, arrival time and service time patterns which may decrease the possible BOR to 40% only (for the number of ship calls in the "most likely" scenario).

A down-grading of the cargo forecast will have a positive impact on the berth availability.

Table C-2 Import/Export Cargoes (Sea bound), No. of Ship calls and Average Berthing Time

| | Low Scenario | | | | Most Likely Scenario | | | | High Scenario | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2000 | 2005 | 2010 | 2015 | 2000 | 2005 | 2010 | 2015 | 2000 | 2005 | 2010 | 2015 |
| Cargo | | | | | | | | | | | | |
| Non-Container ('000 t) | 750 | 793 | 875 | 967 | 750 | 906 | 1,115 | 1,488 | 750 | 1,097 | 1,732 | 2,802 |
| TEUs | 4,167 | 7,583 | 8,500 | 9,667 | 4,167 | 8,917 | 11,917 | 16,000 | 4,167 | 11,250 | 18,917 | 31,917 |
| Average Gross Weight | 58,338 | 103,162 | 119,000 | 135,338 | 58,338 | 124,838 | 166,838 | 224,000 | 58,338 | 157,500 | 264,838 | 446,838 |
| Total t x 1000 | 808 | 899 | 994 | 1,102 | 808 | 1,030 | 1,322 | 1,712 | 808 | 1,255 | 2,057 | 3,249 |
| No. Of Ship calls | | | | | | | | | | | | |
| (average) | 323 | 360 | 398 | 441 | 323 | 412 | 529 | 685 | 323 | 502 | 823 | 1,300 |
| Ship's Time in Port | | | | | | | | | | | | |
| Average t/call | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 |
| TEUs/call | 13 | 21 | 21 | 22 | 13 | 22 | 23 | 24 | 13 | 23 | 23 | 25 |
| t x TEU, gross | 182 | 294 | 294 | 308 | 182 | 308 | 322 | 336 | 182 | 322 | 322 | 364 |
| TEUs (hour) | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| t remaining (hour) | 2,318 | 2,206 | 2,206 | 2,192 | 2,318 | 2,192 | 2,178 | 2,164 | 2,318 | 2,178 | 2,178 | 2,136 |
| Performance t/hour/call | 83 | 83 | 83 | 83 | 83 | 83 | 83 | 83 | 83 | 83 | 83 | 83 |
| h/call TEUs | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 |
| h/call | | | | | | | | | | | | |
| other cargoes | 28 | 27 | 27 | 27 | 28 | 27 | 26 | 26 | 28 | 26 | 26 | 26 |
| total h/call | 29 | 29 | 29 | 29 | 29 | 29 | 28 | 28 | 29 | 28 | 18 | 18 |
| total h/a at berth | 9,367 | 10,440 | 11,542 | 12,789 | 9,367 | 11,948 | 14,812 | 19,180 | 9,367 | 14,056 | 23,044 | 36,400 |
| total h/a, gross | | | | | | | | | | | | |
| at berth | 10,013 | 11,160 | 12,338 | 13,671 | 10,013 | 12,772 | 15,870 | 20,550 | 10,013 | 15,060 | 24,690 | 36,400 |
| berths hours available at main terminal (60% BOR), 6 berths, 360 days | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 | 31,104 |

Total hours/s, gross include 2 hours pre call for clearance.

## 3.2 Storage Area Requirements

Not less important than the berths capacity of a Port is the capacity of its storage areas. The following tables show the different requirements for storage areas, either for containers or other cargoes in $m^2$ with reasonable dwell times which depend on the type of activities, cargoes and organisational structures, and with different stacking heights.

In Table C-3 below, for the most likely scenario the storage requirements for the Container Freight Station (CFS) are been calculated:

**Table C-3 Required Storage area for Container Freight Station (CFS) - Most Likely Scenario**

| Year | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| t / year | 53,200 | 79,223 | 106,018 | 141,876 |
| Average t/$m^2$ | 1.6 | 1.6 | 1.6 | 1.6 |
| Average dwell time (days) | 7 | 7 | 7 | 7 |
| Useably area (60%) | 647 | 963 | 1,208 | 1,724 |
| Total area (100%) | 1.078 | 1.605 | 2.147 | 2.873 |

The required container yard area for Twenty Foot Equivalent Units (TEU) has been calculated in terms of ground slots per year in table C-4. The assumptions therefore are a stacking height of max. 3 containers, an average dwell time of 7 days, 360 days operation of the terminal, a maximum stack occupation of 75% in order not to hamper stacking operations. The required number of ground slots is in creasing from 253 slots in the year 2000 up to 656 slots in the year 2015. As per experience an area of 0.5 $m^2$/TEU per year has been proven as sufficient operational space for the planned container yard layout.

**Table C-4 Required Container Yard Area for TEU Ground Slots**

| Year | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| TEU | 29,167 | 42,377 | 56,710 | 75,891 |
| Ground Slots | 253 | 367 | 491 | 656 |
| Area ($m^2$) | 14,584 | 21,189 | 28,355 | 37,346 |

The required area for empty containers (MT's) is calculated in Table D-5 below, for the most likely scenario. The assumption therefore are a stacking height of 4 containers, an average dwell time of 11 days, 360 operational days per year and block stowage.

**Table C-5 Required Area for Empty Containers**

| Year | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| TEU per year | 5,000 | 6,691 | 8,954 | 11,983 |
| Ground Slots | 39 | 52 | 69 | 92 |
| Area ($m^2$) | 624 | 832 | 1,104 | 1,472 |

In table C-6 overleaf, the operational area requirement for non-containerised cargo is shown under the assumption of 360 operational days, average stowage factor of 1.6 t/$m^2$, 11 days average dwell time and 40% area requirement for operations.

**Table C-6 Storage Area Requirements for Non-Containerised Cargoes, Open Storage ("Most Likely" Scenario), '000 t**

| Cargo/Year ('000 t) | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| Dry Bulk | 390 | 464 | 564 | 697 |
| Neo Bulk | 310 | 415 | 555 | 743 |
| General Cargoes | 50 | 27 | 36 | 489 |
| Total t/a | 750 | 906 | 1,155 | 1,488 |
| t/m$^2$ | 1.6 | 1.6 | 1.6 | 1.6 |
| Dwell Time | 7 | 7 | 7 | 7 |
| | | | | |
| Area (useably), m$^2$ | 8,990 | 10,860 | 13,844 | 17,836 |
| Area (total), m$^2$ | 17,980 | 21,720 | 27,688 | 35,672 |

Assumptions:
- Average t/m$^2$ = 1.6
- Average dwell time = 7 days
- Part of general cargoes will also go via shed
- Useable area = 50% of total storage are

Calculation of area (: m$^2$) = $\frac{\text{cargo throughput (t) x dwell time}}{}$
The total area requirements for the cargo terminal according to the most likely scenario is compiled in the table below:

**Table C-7 Total operational Area for the Terminal - Most Likely Scenario**

| Year | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| Full Container Area (m$^2$) | 14,584 | 21,189 | 28,355 | 37,346 |
| Empty Container Area (m$^2$) | 624 | 832 | 1,104 | 1,472 |
| CFS Area (m$^2$) | 1,078 | 1,605 | 2,147 | 2,873 |
| Non Container Cargo Area (m$^2$) | 11.936 | 14.418 | 18.307 | 23.080 |
| **Total Area Requirement for the Terminal** | **28,222** | **38,044** | **49,913** | **65,971** |

As the existing main open storage area is about 45,000 m$^2$, for the most likely scenario the storage area at the main terminal can cope with the demand up to the year 2007, latest. The existing warehouses (sheds have not been taken into account except for CFS storage needs and for certain kinds of fruits and vegetables or other food stuff). Ro/Ro cargoes, mainly "Rolling Stock" will also not have a considerable impact on the main storage areas as such type of cargoes can be placed in several small free areas within the port for a couple of days.

Areas for the port's own car and equipment parts is foreseen, but this use of area will not be taken into account because for these requirements sufficient area will always be available.
For the most likely scenario, the timber terminal should be ready for operations (bulk and neo bulk cargoes) by 2007 latest.

## 3.3 Cargo Handling Equipment Requirements

The requirements in cargo handling equipment are a result of the forecast of future cargo throughput and

operational matters. Before the required number of equipment can be determined, the right equipment must be selected. 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 Direct System, in which straddle carriers are responsible for in-yard stacking and un-stacking, 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/un-stacking, 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 in use at a time, each carrying out a function to which it is best suited.

There are the following choices:

- Forklift truck system which means
  - huge land requirements
  - use of multi-purpose equipment
- Straddle carrier system which means
  - less land requirements than operation with forklift trucks
  - additional space is required for a so-called 'Holding Area' which is the physical interface between external transport by trucks and internal transport executed by straddle carriers (trucks cannot be loaded/unloaded in the yard because there are no truck lanes)
- Rubber-tyred yard gantries (RTG) which means
  - best land utilisation
  - high productivity because of short distance between yard area and quay side.

As a result to the comparison of the equipment the "Rubber-tyred Yard Gantry" system is the most suitable system due to the following reasons:

- high land utilisation
- long working life
- flexibility (the RTG can move from one to another stack, even to stacks besides)
- units may be highly automated
- low operating costs per TEU
- increase of productivity.

According to information presently available the specification for the yard equipment is as follows, a detailed specification for the equipment will follow in a later phase of the study.

**Forklift Trucks (including Empty Container Handlers)/Reach Stackers**

Heavy duty Forklift Trucks (FLT) 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.

high telescopic mast to enable a 4 to 5-high container stacking.

The FLTs of 2.5 t capacity are planned for stuffing and stripping activities in the CFS as well as for internal CFS' shifting of cargoes.

The number of the required handling equipment is shown in the tables C-11 and C-12 overleaf:

### Table C-11 Theoretical Number of Container Handling Equipment Requirements, by Year and Moves; Low and Most Likely Scenarios

| Year<br>Low | Containers | Moves<br>(x3) | Containers<br>empty | Moves<br>(x2.2) | RTGs | FLTs<br>15t |
|---|---|---|---|---|---|---|
| **2000** | 18,750 | 56,250 | 3,000 | 6,600 | 0.9 | 0.3 |
| **2005** | 21,210 | 63,360 | 3,017 | 6,637 | 1 | 0.3 |
| **2010** | 22,401 | 67,203 | 3,200 | 7,040 | 1.1 | 0.4 |
| **2015** | 25,345 | 76,035 | 3,621 | 7,966 | 1.2 | 0.4 |
| **Most Likely** | | | | | | |
| **2000** | 26,250 | 78,750 | 4,500 | 9,900 | 1.2 | 0.5 |
| **2005** | 33,902 | 101,706 | 5,353 | 11,777 | 1.6 | 0.6 |
| **2010** | 42,533 | 127,599 | 6,716 | 14,775 | 2 | 0.7 |
| **2015** | 56,918 | 170,754 | 8,987 | 18,772 | 2.6 | 0.9 |

The table C-11 does not include the following auxiliary equipment:
FLTs for CFS operations (2,5t); calculations based on other assumptions.
FLTs and reach stackers 40.45t capacity, FLT 25 t capacity.
As the main equipment of the described system is the rubber-tyred gantry crane (RTG), the reach stackers and FLTs are additional supporting equipment and therefore do not follow the theoretical requirement calculation.
Tractors and trailer are calculated on type of operations, moves and distances in the container yard etc.

### Table C-12 Number of required Container Handling Equipment

| Equipment | RTG | Reach Stackers | FLT 42t | FLT 25t | FLT 15t | FLT 2,5t | Tractors + Trailers | Tractor Ferry |
|---|---|---|---|---|---|---|---|---|
| **Low Scenario** | | | | | | | | |
| **Phase 1** | 2 | 1 | 1 | 1 | 1 | 2 | 3 sets | 4 |
| **Phase 2** | + 1 | + 1 | + 1 | - | - | + 1 | + 1 | - |
| **Most Likely Scenario** | | | | | | | | |
| **Phase 1** | 2 | 1 | 1 | 1 | 1 | 2 | 3 sets | 4 |
| **Phase 2** | + 2 | + 1 | + 2 | + 1 | + 1 | + 2 | + 2 | + 1 |

Despite the theoretical numbers of equipment which is shown in Table C-??, the real equipment requirements must follow not only the number of moves or tonnes to be handled, but also operational considerations etc., e. g. different operations at the same time (rail way, truck etc.), number of separate container storage blocks etc.

RTGs: should be 2 in number because of 2 blocks of containers to be operated from beginning; extension in

phase 2.
Reach Stackers and FLTs 40-45t: This equipment is planned to support the RTG-operations during peak times and for operations beyond the reach of the RTGs, e. g. handling of container flats, containers with dangerous cargoes or reefer-containers etc.

FLTs 25t: Same as above, equipment for handling of special full 20' containers.
FLT 15t: will follow the recommendations for empty container handling equipment.
Tractor/Trailer: 1 set = 1 tug + 2 trailers, sufficient number in view of available equipment.

## 3.4 Staff Requirements

The future staff requirement is mainly based on the future container terminal activities, e.g. equipment operators and other staff. The existing staff meanwhile will be on duty for the handling of bulk and break bulk cargoes but should be further reduced. The consultants propose that no new staff will be employed in the next future; existing staff should be trained for the handling of the new equipment. Since staff changes from the general cargo operations to the container operations should be considered. The future staff must be of a "interdisciplinary" type, e.g. staff must be capable to "jump" from one job to the other within their possibilities. A foreman of general cargo operations should also be able to do a similar jobs in container operations. A dispatcher should also be engaged in "interchange" for containers, etc. In the context there is no extra staff planned for interchange, this can be carried out by the dispatchers staff available.

The staff requirements are detailed shown in the tables C-18 to C-21 in the Table section.

Staff Timber Terminal

When the Timber Terminal will get in operation, the following number of operations staff should be considered:

- Top Management = None
- Middle management = 2 Dispatcher
- Level 3 Staff = 25 foremen, equipment, operators and clerical staff
- Level 4 Staff = 14 "labour A"
- Level 5 Staff = 18 "labour B"
- Level 6 Staff = 2 "labour C"

This manpower will be sufficient for 2 brigades for 2 shifts (2-shift system). A third shift is offered on request. Manpower is to be organised from the a.m. staff (overtimes) or with casual labour.

## 3.5 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 and Water Police, Forwarders and Ship's Agents
- Customs Clearance Area
- Yard Planning Office
- Ship's Planning Office
- Dangerous Goods Area
- Reefer Plugs
- Workshops
- Sufficient rail tracks for "direct delivery" route by rail and container traffic by rail, e. g. block trains
- Sufficient light-masts for night work

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

However, proper planning of the access roads is not an easy task as the Port of Baku is connected to a street with dense traffic by a gate which is obviously too small. A one-way traffic system would ease the gates throughput of trucks (hour to about 10 units). It is planned to have a new in-gate with interchange in connection with the access road to the ferry terminal. The existing gate will then be used as out-gate facility (also with interchange). For the in-gate area some 6,800 $m^2$ is planned which include a parking area for 16 trucks bound for the CY and about 30 parking places for port's staff and visitors. The truck in-gate will have 3 lanes which will be sufficient for the forecasted traffic by road (planning parameter = 1 lane for 50,000 boxes per truck and year). The out-gate will then have 2 lanes ready for outbound traffic.

The road traffic through the in-gate with sufficient gates and parking spaces for clearance procedures etc. Is generally determined by the largest amount of TEUs by road, which is 13,6000 TEUs to consignees (most likely scenario, year 2000). This traffic must be considered twice (in and out) and in number of movements. 27,2000 TEUs x factor 0.9 = 24,480 boxes or movements; divided by 360 operational days per year = 68 boxs/day, with an average gate-disposition time of 10 hours/day, 6.8 vehicles will be dispatched per hour. If the average dwell time for dispatch per vehicle is 1 hour, a minimum number of parking spaces of 7 is required. As there is a parking area for not less than 15 trucks available, parking places are sufficient in number, even if the dwell time will be higher during the first stage of development.

It is envisaged to have the truck dispatch of the gates during day time only (= 10 hours net), e. g. from 08.00 to 16.00 h. The time in the gateway for interchange procedures should not exceed 15 minutes/truck = 4 trucks/hour or 40 trucks/day and gate. 3 in-gates are planned, the gate capacity will then be 3 x 40 trucks = 120 trucks/day for in-gate. As out-gate procedures are faster, 5 minutes per truck will be sufficient = 12 trucks/hour or 120 trucks/shift (day).

A new office building with an area of 400 $m^2$ will cope with the required number of offices for staff (operations, interchange) as well as for water police, customs, forwarders, etc. (= 20 offices + kitchens, lavatories etc.).

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.

## 3.6 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 CY. 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 CY, if required, in order to avoid queuing at the gates.

- There is a Tacis Project ongoing 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 then 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 CY, 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

- 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 RTG 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. Phased Development Concept

## 4.1 Introduction

This master plan deals with all facilities of the port except the ferry terminal. The planning for renovation of the ferry terminal is carried out by the consultants Ramboll. This master plan development has been worked out in close collaboration with the Port Authority and with the ferry terminal project of Ramboll.

As shown on Fig. 1 the port has three sites of operation.

- The Main Harbour Location in Baku bay
- The „Timber Terminal", also in Baku bay but separated from the Main Location
- The Oil Terminal on the East coast of Apsheron peninsula. Only part of that facility belongs to Baku Sea Port.

As discussed before, the oil terminal is not taken into account in this master plan development for the following reasons:

- Its cargo volume has decreased to the present low levels
- The facilities need upgrading presumably at high cost
- Renovation can only be supported by long term liquid bulk cargo contracts. If such traffic should develop, it should bear the renovation cost of the facility.

Fig. 2 gives an overview of the present situation of the Main Harbour Location. In a joint effort, the complete port territory of the Main Harbour Location has been surveyed on the account of the HPTI and the Ramboll teams. The Western part of Fig. 2 consists of a hard copy of the digitised topographical survey of that area. The Eastern part consists of digitised old maps of the Port. The digitisation of the Eastern part of the topographical survey is being processed by Ramboll when writing. Hence, beginning 1997 a complete updated map of this Main Location will be available both as hard copy and in digitised form. The Main Harbour Location is the present centre of activity of the Port. The Port administration building is nearby, as indicated on Fig. 2. The capacity of the rail connection to this location is considerably higher than today's needs. The road access is good except for gate facility. This location has been designed as a railway port.

Fig. 3 gives an overview of the Timber Terminal area. This sketch is not very precise, as no recent maps of the area could be made available. Any detailed planning of renovation of the Timber Terminal should be preceded by a topographical survey and the production of a reliable map. Part of the area and of the quays have been flooded until recently by the sea. Hence development of this facility requires raising of the area. Fig. 3 gives an overview of the surrounding of the Timber Terminal. This map is also old and not very accurate any more. However, it shows the good railway connection to the terminal. The terminal is accessible from the main road by a poor, partly not surfaced road of some 700m. Gate facilities are virtually non existing, as they were not needed under the Soviet regime.

The cargo forecasts presumes a shift of the Port's core business from the dominating transit activity of former times towards a service and distribution centre. A shift from the dominating rail transport of former times towards multi-modal transport and interchange function is part of the forecast. The forecast takes it for granted that the Port grabs the present opportunity to fill in the vacuum to provide multi-model interchange and distribution services of containers in Baku region. Part of that assumption is the realisation of the free

port area. A substantial part of the traffic will consist of containers that do not cross the quays and that will neither come in nor go out of the port by ship. Modern quay handling equipment and cargo systems reduce the time of ships at quay considerably. Hence, as can be seen in many ports, the importance of quays reduces in time and shifts towards bigger apron and back yard areas.

Hence for the elaboration of the physical master plan the following guidelines are to be respected:

- Good road access and gate facilities are needed for the container multi-modal terminal.
- The free port area should be fenced as a free customs area.
- Extension should go in the first place to apron and back up areas.

Two alternative master plan developments have been worked out and discussed with the Port Management.

In alternative I the container services have been allocated to the Main Harbour Location and the bulk and break bulk cargo handling have been switched to the Timber Terminal in a second phase of development.

- In alternative II the container services have been allocated to the Timber Terminal while the traditional cargo is handled at the Main Harbour Location.

Both alternatives consist of two phases plus an extra development phase, to be planned towards the end of the planning period i.e. towards the year 2015.

Both alternative Master Plans have been budgeted and submitted to the Port Management for consideration. Alternative I was preferred by both the Port Management and our team of experts for the following reasons:

- The investment required in the Phase One Development is considerably lower for alternative I than for alternative II.
- From operational point of view alternative I is more attractive than alternative II.
- The capacity of the Timber Terminal as container terminal (alternative II) is not sufficient at the end of the forecast period.

After thoroughly consideration of both alternatives, the Port Management has decided for the development of the General Cargo Complex as a Multi Purpose Terminal covering also the multi modal container handling as per Alternative 1.

## 4.2 Port Development Phases

### 4.2.1 First Phase Development

In the period between the first and the second development phase it is anticipated that all cargo handling is done at the Main Harbour Location. For that raison all first phase developments are concentrated on this location. No renovation is foreseen for the Timber Terminal at this stage.

The first phase development plan is summarised on Fig. 5, 6 and 7.
It consists mainly of the following investments:

## Renovation of the Western and Southern quays

These quays are presently at the end of there technically justified physical live. Presently at regular intervals major repairs are necessary, thus compromising there availability. For that raison, these quays should be renovated. The Western quay needs also renovation but with the present forecasted cargo flow these berths are not needed in the period between the first and second development phases. Fig. 5 indicates the location of the quays to be renovated. The present Ro/Ro ramp on the South quay will during this renovation be removed. For the first years no major Ro/Ro traffic is expected. On the other hand, the capacity of the train ferry terminal is sufficient to provide berthing facility for the Ro/Ro vessels that might occasionally call at the port on top of the regular rail ferries service.

## First development of the container yard (Fig. 5 and 6)

Given the limited space of the yard the option has been taken to handle the containers in the yard with rubber mounted gantries with limited span. Fig. 6 outlines the stacking system. Fig 5 shows the anticipated truck circulation. It is anticipated that block trains loaded with containers will circulate between Poti (Georgia) and the terminal in Baku Port as a regular service. This development is starting just now and it is expected that it will get momentum within the very next future. Apart from the equipment, that is discussed elsewhere in this report, investment is needed for the foundations of the gantries. The foundations will be fit with a cable that guide the gantries when travelling along the stacks, thus allowing them to manoeuvre within narrow limits perpendicular to the axis of the stacks. This device improves the safety of the operations, especially alongside trains. In order to provide space for the foundation of the gantry between the double rail track in the middle of the yard area it is necessary to rip one rail track over the length of the stack. Warehouse No. 5 needs to be adapted and amended for container freight station services.

## Surfacing of part of the yard (Fig. 5)

The surface between the quay rail tracks and the first yard tracks on the West side is not in good condition. This is partly due to the use of asphalt surfacing, that has deteriorated over the years and partly due to the repairs of the quay that have proven to be necessary. Therefore it is foreseen to renovate these surfaces in order to allow smooth running of the harbour equipment. In the area of the anticipated container stacking, a vast platform at the level of rail wagons needs levelling and the complete container stacking area needs surfacing. An existing electric power under station and o flood lights tower, now located in the future container stacking yard, needs to be relocated

## New entry gate and adjacent parking facilities (Fig. 7)

The present port area is designed as a railway port. Hence, the present gate, located at the North West of the yard is not fit for the anticipated increase of truck traffic. At the present gate there is no possibility to provide parking facilities for cars or trucks. This gate connects the port with a street with dense traffic. In the short period we have been working in Baku, the increase of road traffic and especially on this connecting street to the port is obvious. For that raison, a circulation plan inside the port area has been developed (Fig. 7). In this plan is foreseen to fit the port with a new entrance gate complex and to use the present gate as exit for all traffic. The entrance gate complex is fit with a parking facilities for trucks during pre clearing (capacity 14 big trucks with trailers). Parking facilities are foreseen for customs, port employees, shipping agents and forwarders as well as the access to the Northerly located catering facility of the Caspian Shipping Line. All these facilities are located outside the (Free) Port area. An administrative building for

customs, port personnel and representatives of shipping agents and forwarders is located next to the three gate entry gate and is part of the port's fencing. The access road to the main street, located to the North needs upgrading. It is the common access road to the port and to and from the Ferry Terminal.

### New workshops

The construction of the new entrance gate complex and the entrance and exit complexes of the Ferry Terminal necessitate the relocation of the workshops, presently located in that area. Apart from the needed removal of these workshops in order to create the necessary space for these new facilities, there is an urgent need to reorganise the scattered workshops into a centralised facility and to upgrade there equipment. The new centralised workshop is foreseen in the open area between the administrative building and the gates, West of the rail access to the Western quay.

## 4.2.2 Second Phase Development

The second phase development will be necessary in order to provide additional capacity for the growing container activity in the Port of Baku. In this alternative phased master plan it is foreseen to renovate the Timber Terminal and to shift the bulk cargo and break bulk cargo to this renovated terminal. In this way, space is freed for the increasing container traffic and for the traffic of general cargo in the Main Harbour Location. As the bulk and break bulk cargoes are mainly ship and train bound, there is no need to foresee a main entrance complex. However, the access road needs upgrading.

The first phase development plan is summarised on Fig.. 8 and 9.
It consists mainly of the following investments:

### Extension of the container stacking area and adapting existing warehouse No4 for CFS services (Fig. 8)

Offices, toilet facilities, flood lights towers and an electrical power under station need relocation and upgrading. The surface of the container stack extension needs levelling and at least partially resurfacing. For this phase of development, the shift to container handling and increased truck bound cargo is a pre condition. Hence from operational point of view it is logic to remove the rail tracks in the container yard stacking area. In the Eastern half of the port area, warehouse no 4 is adapted for CFS services and stacks for empty containers are planned. Parts of the Eastern half of the port area as well as the area between the gates and the yard need to be re surfaced. The foundation of the gantries is extended over the full length of yard so that a full block train can be loaded or unloaded.

### Renovation of the Timber Terminal (Fig. 9)

Given the specificity of the bulk and break bulk cargoes, the Timber Terminal is renovated according to the original layout, but raised to a level adequate to cope with future high sea levels. The office building is in reasonable good shape and can probably be re used but needs to be adapted to the new yard level. The quays need renovation as they have their top level at present just above the sea level. The complete surface needs raising and at least part of it will need a good surface. There is need for a good modern workshop. The road access and rail access need at least partially to be raised and upgraded. Water

distribution, electricity distribution, flood lights towers, drainage systems, etc. need to be renewed at the new quay and yard levels. The renewed terminal will need an adequate fence. The gate needs renewal but should not be sophisticated.

### 4.2.3 Phase Three Development

Neither the Main Harbour Location nor the Timber Terminal offer possibilities for major extensions in the future. Both facilities are squeezed between neighbouring facilities and or industries. However smaller additions are possible. The guideline should be to enlarge the yards instead of the length of quays, as is according to modern port development since many years.

#### The Main Harbour Location (Fig. 10)

There exists a plan to enlarge the main harbour complex by adding 100m of yard into the sea. Apart from objections from the nautical point of view discussed elsewhere, this extension is not in harmony with the above mentioned trend. The extension provides an extra 20.000m² of yard and requires an extra 400m of quay wall length. It is proposed to extend the yard area by 100m to the West. Such development increases the yard area by some 37.000m² and would require an extra 380m of quay wall. However for this development, the berthing facility of the water tanker has to be sacrificed and should be accommodated at the new quay if there is still need for the facility at that time. The water surface between the new quay at the West side of the Yard and the ferry terminal becomes narrow, thus necessitating thus assistance for the vessels to berth.

#### The Timber Terminal

Extension of quay length at this terminal is nearly impossible as the terminal is squeezed between the quay of a construction company on the East side (not indicated on Fig. 3 and 4) and the rail access bundles on the West side (see Fig. 4). The Eastern part of the yard could be extended land inwards over some distance if a road and a steam pipe located near the fence are re located. Part of that area is at present occupied by refugee settlements. Hence, extension of the Timber Terminal area is nearly non existing.

## 4.3 Cost Summary per Development Phases

Table C-24 shows the investment costs per development phases of the port.

**Table C-24 Investment Cost Summary per Development Phases (US$) - Most Likely Scenario**

| Item | 1st Phase | 2nd Phase | 3rd Phase |
|---|---|---|---|
| **A) Civil Works** | | | |
| **- Quay Walls** | 7,091,000 | -.... | 6,080,000 |
| **- Foundation of Gantries** | 450,000 | 600,000 | -.... |
| **- Pavement & Backfill** | 1,520,000 | 2,280,000 | 4,830,000 |
| **- Others** | 3,949,410 | 901,200 | 3,659,375 |
| **- Timber Terminal** | -.... | 13,000,000 | -.... |
| **Total** | 13,010,410 | 16,781,200 | 14,569,375 |
| **B) Cargo Handling** | | | |
| **- Rubber Tyred Yard Gantries** | 2,000,000 | 2,000,000 | no estimate |
| **- Reach Stackers** | 600,000 | 600,000 | |
| **- Forklift Trucks** | 1,130,000 | 1,730,000 | |
| **- Tractors & Trailers** | 540,000 | 310,000 | |
| **Total** | 4,270,000 | 4,640,000 | |
| **C) Rehabilitation and Replacement of existing equipment** | 4,005,000 | 4,640,000 | no estimates |
| **Total** | 4,005,000 | 3,750,000 | |
| **Grand Total** | 21,285,410 | 25,171,200 | |

# 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:

- ship-to-shore cranes (SSC)
- forklifts (FLT)
- terminal tractors
- bobcats
- 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 Alow@, Amiddle@ and Ahigh@ (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, six (6) shall be scrapped and twelve (12) 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 for a period of about six months. A lump sum was calculated for this task.

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 | 3 | 0 | 1 | 4 | 3 | 1 | 12 |

Following the demand of three operational 6-t cranes out of the existing number of six cranes in this range, it is recommended to repair crane N° 16, 18 and 28.

The remaining three cranes (asset N° 11, 12 and 13) have passed their economical live and shall be scrapped. Still exploitable components should be removed, possibly repaired and be used for the rehabilitation of the remaining cranes (asset N° 16, 18 and 28).

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 overleaf gives an overview of the actions recommended for each single crane, based on inspection results and repair cost estimates.

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

1 crane is not used at present

2 crane is not connected to power supply at present

## 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 overleaf 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.

## 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 | |
| 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*

## 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.

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.

### Container Handling Equipment

At present, there is no container handling equipment available in the port. The demand for such equipment to cover initial container handling is as follows:

- reach stacker: 2 pcs
- forklift: 1 pc

As the technical specifications should consider the future operational system and other parameters such as standardisation, repair facilities in the port, spare parts supply, etc., detailed technical specifications will be set up prior to tender, when the Port of Baku has taken the necessary steps.

# 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 hereinafter.

## 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. A list of the existing machinery is attached. 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 will 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. A detailed list of the available equipment is attached hereinafter. 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.

ELECTROMOTOR WORKSHOP

D-6: Equipment List

| 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 | | |

FORKLIFT/TRACTOR WORKSHOP

## Equipment List

| 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 | |

MACHINE/CRANE WORKSHOP

Equipment List

| 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 | |

# 4. Summary

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

## 4.1 Equipment

### Cranes

Out of the 18 cranes existing in the port, 12 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.

### Container Handling Equipment

As mentioned in Chapter 2, there is no container handling equipment available in the port. Due to the initial demand for container handling equipment, two reach-stackers and one 36-t forklift need to be procured.

## 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.

# 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<br>2 | "SALATIN ASKEROVA"<br>"KAPITAN QASIMOV" | The vessels are in working condition but require dry docking for the hull etc. and possible underwater repairs.<br>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<br>6<br>7 | "NMS 73"<br>"NMS 16"<br>"NMS 21" | Boats need dry-docking, sandblasting and painting.<br>Boats have unusual design and therefore efficiency is limited.<br>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<br>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<br>13 | "KUR"<br>"SHAFAG" | In good condition ("SHAFAG" was not in Port) |
| 14 | "SPK PAHLAVAN" | Said to be in working condition.<br>Needs maintenance and painting. |
| 15 | "SABIR BABAYEV" | In working condition.<br>Needs maintenance and dry docking as soon as possible. |
| 16 | "NMS 26" | Not in working condition, must be repaired. |
| 17<br>18<br>19 | "LIMANCHI"<br>"CHASARLI"<br>"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 2 "Condition Survey Report"

# Annex Volume III

# Table Section

## List of Tables

**Table C-13 Container Handling Equipment**
**Purchasing Price and Costs of Operations (without Operators)**

**Low Scenario**

| Costs | Equipment | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| mio | RTG | R.St. 45t | FLT, 45t | FLT, 25t | FLT, 15t | FLT, 2,5t | Tractor/Trailer Sets * | Tractors |
| Unit Price, mio US$ | 1.0 | 0.6 | 0.6 | 0.3 | 0.15 | 0.04 | 0.14 | 0.03 |
| Unit Phase 1 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 3.0 | 4.0 |
| Costs Phase 1, mio US$ | 2.0 | 0.6 | 0.6 | 0.3 | 0.15 | 0.08 | 0.42 | 0.12 |
| Unit Phase 2 | + 1 | + 1 | + 1 | - | - | + 1 | + 1 | - |
| Costs Phase 2, mio US$ | 1.0 | 0.6 | 0.6 | - | - | 0.14 | 0.14 | - |
| Maintenance Costs/a (% of Purchasing Price)/Unit | 6 % | 10 % | 10 % | 10 % | 10 % | 10 % | 4 % | 4 % |
| Energy Consumption (Liter Diesel/h)/Unit** | 45 | 25 | 25 | 20 | 18 | 10 | 10 | 10 |
| Operations hours/a/Unit | 3,450 | 5,000 | 5,000 | 5,000 | 620 | 406 | 3,600 | 1,800 |
| Energy Costs/Unit/a | 20,183 | 16,250 | 16,250 | 13,000 | 1,451 | 528 | 4,680 | 2,340 |
| Total Operations Costs (US$) | 160,366 | 86,325 | 86,325 | 56,325 | 16,451 | 9,056 | 30,840 | 14,160 |
| Phase 1 | 240,549 | 172,650 | 172,650 | 56,235 | 16,451 | 13,584 | 41,120 | 14,160 |
| Phase 2 | | | | | | | | |

Total Equipment Purchasing Costs, Phase 1 = 4.27 mio US$
* 1 set Tractor/Trailer consist of 1 Tractor and 2 Trailers
** The price/l Diesel = 0.13 US$

Abbreviations: RTG = Rubber Tyred Gantry Cranes
R.St. = Reach Stackers
FLT = Fork Lift Trucks

**Table C-14 Container Handling Equipment**
**Purchasing Price and Costs of Operations (without Operators)**

**Most Likely Scenario**

| Costs | Equipment | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| mio | RTG | R.St. 45t | FLT, 45t | FLT, 25t | FLT, 15t | FLT, 2,5t | Tractor/Trailer Sets * | Tractors |
| Unit Price, mio US$ | 1.0 | 0.6 | 0.6 | 0.3 | 0.15 | 0.04 | 0.14 | 0.03 |
| Unit Phase 1 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 3.0 | 4.0 |
| Costs Phase 1, mio US$ | 2.0 | 0.6 | 0.6 | 0.3 | 0.15 | 0.08 | 0.42 | 0.12 |
| Unit Phase 2 | + 2 | + 1 | + 2 | + 1 | + 1 | + 2 | + 2 | + 1 |
| Costs Phase 2, mio US$ | 2.0 | 0.6 | 1.2 | 0.3 | 0.15 | 0.68 | 0.28 | 0.03 |
| Maintenance Costs/a (% of Purchasing Price)/Unit | 6 % | 10 % | 10 % | 10 % | 10 % | 10 % | 4 % | 4 % |
| Energy Consumption (Liter Diesel/h)/Unit** | 45 | 25 | 25 | 20 | 18 | 10 | 10 | 10 |
| Operations hours/a/Unit | 5,600 | 4,000 | 4,000 | 4,000 | 1,000 | 660 | 3,600 | 1,800 |
| Energy Costs/Unit/a | 32,760 | 13,000 | 13,000 | 10,400 | 2,340 | 858 | 4,680 | 2,340 |
| Total Operations Costs (US$) | 185,520 | 99,000 | 99,000 | 61,200 | 17,340 | 9,716 | 30,840 | 14,160 |
| Phase 1 | 371,040 | 198,000 | 297,000 | 122,400 | 34,680 | 19,432 | 51,400 | 17,700 |
| Phase 2 | | | | | | | | |

* 1 set Tractor/Trailer consist of 1 Tractor and 2 Trailers
** The price/l Diesel = 0.13 US$

Abbreviations: RTG = Rubber Tyred Gantry Cranes
R.St. = Reach Stackers
FLT = Fork Lift Trucks

**Table C-15 Existing Cargo Handling Equipment Rehabilitation and Replacement Costs**

| Equipment | Ship-Shore Cranes | FLTs | Tractors | Trailers |
|---|---|---|---|---|
| **Units for Rehabilitation** | 12 | 14 | 5 | 60 |
| **Costs, mio, US$** | 3.6 | 0.07 | 0.015 | 0.06 |
| **Units to be replaced** | - | 4 | 1 | - |
| **Costs, mio US$** | - | 0.16 | 0.1 | - |
| **Maintenance Costs, US$/a** | 6 % | 10 % | 4 % | 4 % |
| **Energy Costs, US$/a** | 30,240 | 2,800 | 1,260 | - |
| **Operation h/a** | 2,160 | 4,000 | 3,600 | - |
| **Consumption/h** | 400 kw | 20 l | 10 l | - |

Diesel/Fuel/l = 0.13 US$
1 kwh = 148 Manat (~ 0.035 US$)

**Table C-16 Cargo Handling Equipment for the Rehabilitated Timber Terminal (Phase 2 Development)**

| Equipment | Ship-Shore Cranes | FLTs | Tractors | Trailers |
|---|---|---|---|---|
| **Units for Rehabilitation** | 8 | - | - | - |
| **Costs, mio, US$** | | | | |
| **Units to be purchased** | - | 8 | 5 | - |
| **Costs, mio US$** | 2.4 | 1.2 | 0.15 | to be taken from Main Terminal |
| **Maintenance Costs, US$/a** | 6 % | 10 % | 4 % | |
| **Energy Costs, US$/a** | | | | |
| **Operation h/a** | 2,160 | 620 | 1,800 | |
| **Consumption/h** | 400 kw | 18 l | 10 l | |

Diesel/Fuel/l = 0.13 US$
1 kwh = 148 Manat (~ 0.035 US$)

**Table C-18 Additional Manpower Demand for Future Container Handling Opertaions/Shift**

Low Scenario

| Kind of Operations | Year | | | |
|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 |
| | Phase 1 | | Phase 2 | |
| Ship-Shore-Handling | to be carried out by Existing Staff | | | |
| Interchange | to be carried out by Existing Staff | | | |
| Dispatchers | 2 | | - | |
| Container Yard and Railway Operations | | | | |
| RTG Operators | 2 | | + 2 | |
| Reach Stacker Operators | 1 | | + 1 | |
| FLT Operators | 4 | | + 2 | |
| Signal and Tallymen | 3 | | + 3 | |
| Foremen | 2 | | + 2 | |
| Office Container Yard | 1 | | + 1 | |
| Locomotive Operators | 1 | | | |
| Labour A | 2 | | + 2 | |
| Labour B | 2 | | + 1 | |
| Labour C | 1 | | + 1 | |
| CFS-Operators | | | | |
| Foremen CFS | 1 | | - | |
| FLT-Operators | 2 | | + 1 | |
| Labour A | 4 | | + 2 | |
| Labour B | 1 | | + 1 | |
| Labour C | 1 | | + 1 | |
| Empty Container Stacks | | | | |
| FLT-Operators | 1 | | - | |
| Ferry-Terminal | | | | |
| Tractor Operators | 4 | | - | |
| Total Staff Required | 35 | | + 20 | |

## Table C-19 Additional Manpower Demand for Future Container Handling Opertaions/Shift

**Most Likely Scenario**

| Kind of Operations | Year | | | |
|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 |
| | Phase 1 | | Phase 2 | |
| Ship-Shore-Handling | to be carried out by Existing Staff | | | |
| Interchange | to be carried out by Existing Staff | | | |
| Dispatchers | 2 | | + 1 | |
| Container Yard and Railway Operations | | | | |
| RTG Operators | 2 | | + 2 | |
| Reach Stacker Operators | 1 | | + 1 | |
| FLT Operators | 5 | | + 6 | |
| Signal and Tallymen | 4 | | + 3 | |
| Foremen | 3 | | + 2 | |
| Office Container Yard | 2 | | + 1 | |
| Locomotive Operators | 1 | | | |
| Labour A | 3 | | + 1 | |
| Labour B | 3 | | + 1 | |
| Labour C | 2 | | + 1 | |
| CFS-Operators | | | | |
| Foremen CFS | 1 | | - | |
| FLT-Operators | 2 | | + 1 | |
| Labour A | 6 | | + 2 | |
| Labour B | 2 | | + 1 | |
| Labour C | 1 | | + 1 | |
| Empty Container Stacks | | | | |
| FLT-Operators | 1 | | 1 | |
| Ferry-Terminal | | | | |
| Tractor Operators | 4 | | + 2 | |
| Total Staff Required | 45 | | + 27 | |

## Table C-20 Future Operations Staff (2 Shifts) at Main Terminal

**Low Scenario**

| | Level | | | | | |
|---|---|---|---|---|---|---|
| **Staff** | **1** | **2** | **3** | **4** | **5** | **6** |
| **A) Existing** | 1 | 12 | 45 | 100 | 115 | 6 |
| **B) Additional Phase 1** | - | 2 | 44 | 12 | 6 | 4 |
| **C) Additional Phase 2** | - | - | 24 | 8 | 4 | 2 |
| **D) Total Phase 1** | 1 | 14 | 94 | 112 | 121 | 10 |
| **E) Total Phase 2** | 1 | 14 | 118 | 120 | 175 | 12 |

Levels:

1 = Top Management
2 = Middle Management
3 = Foremen, Equipment Operators, Clericals
4 = Labour A (Dockers, Specialised)
5 = Labour B (General Port Workers)
6 = Labour C (Cleaners, Caretakers etc.)

Note: Existing Staff = exluding Timber Terminal
Ferry Complex
Marine Services
Absheron Terminal
Sea Station
Technological Department
but including 60 Security Staff
(3 Shifts)
(5 in level 3, 55 in level 5)

Note: Existing Staff is reduced by 100 persons, level 4

## Table C-21 Future Operations Staff (2 Shifts) at Main Terminal

**Most Likely Scenario**

| | Level | | | | | |
|---|---|---|---|---|---|---|
| **Staff** | **1** | **2** | **3** | **4** | **5** | **6** |
| **A) Existing** | 1 | 12 | 45 | 100 | 115 | 6 |
| **B) Additional Phase 1** | - | 2 | 52 | 18 | 10 | 6 |
| **C) Additional Phase 2** | - | 1 | 38 | 14 | 4 | 6 |
| **D) Total Phase 1** | 1 | 14 | 97 | 118 | 125 | 12 |
| **E) Total Phase 2** | 1 | 15 | 135 | 122 | 129 | 16 |

Levels:

1 = Top Management
2 = Middle Management
3 = Foremen, Equipment Operators, Clericals
4 = Labour A (Dockers, Specialised)
5 = Labour B (General Port Workers)
6 = Labour C (Cleaners, Caretakers etc.)

Note: Existing Staff = exluding Timber Terminal
Ferry Complex
Marine Services
Absheron Terminal
Sea Station
Technological Department
but including 60 Security Staff
(3 Shifts)
(5 in level 3, 55 in level 5)

Note: Existing Staff is reduced by 100 persons, level 4

# Figure Section

## List of Figures

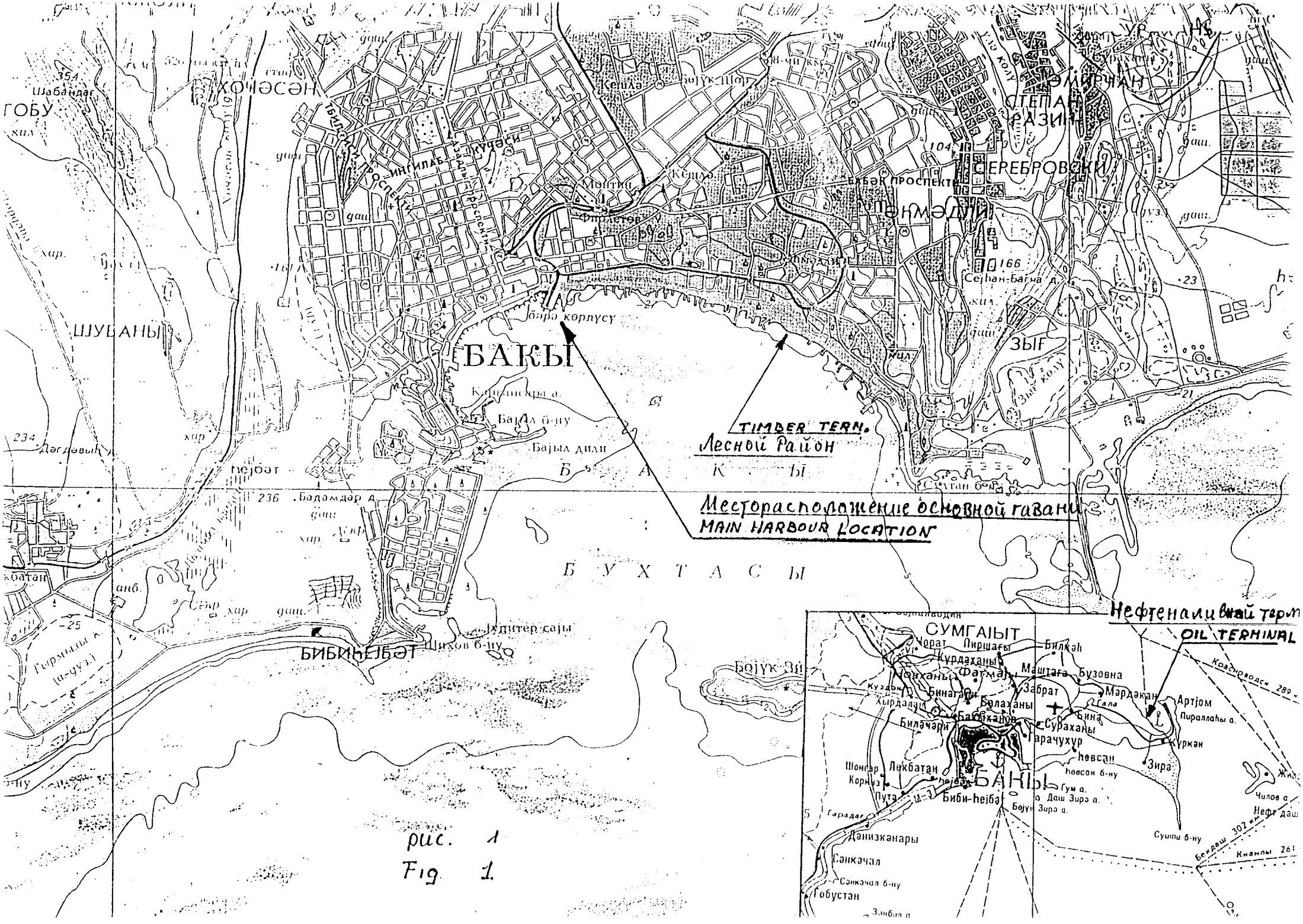
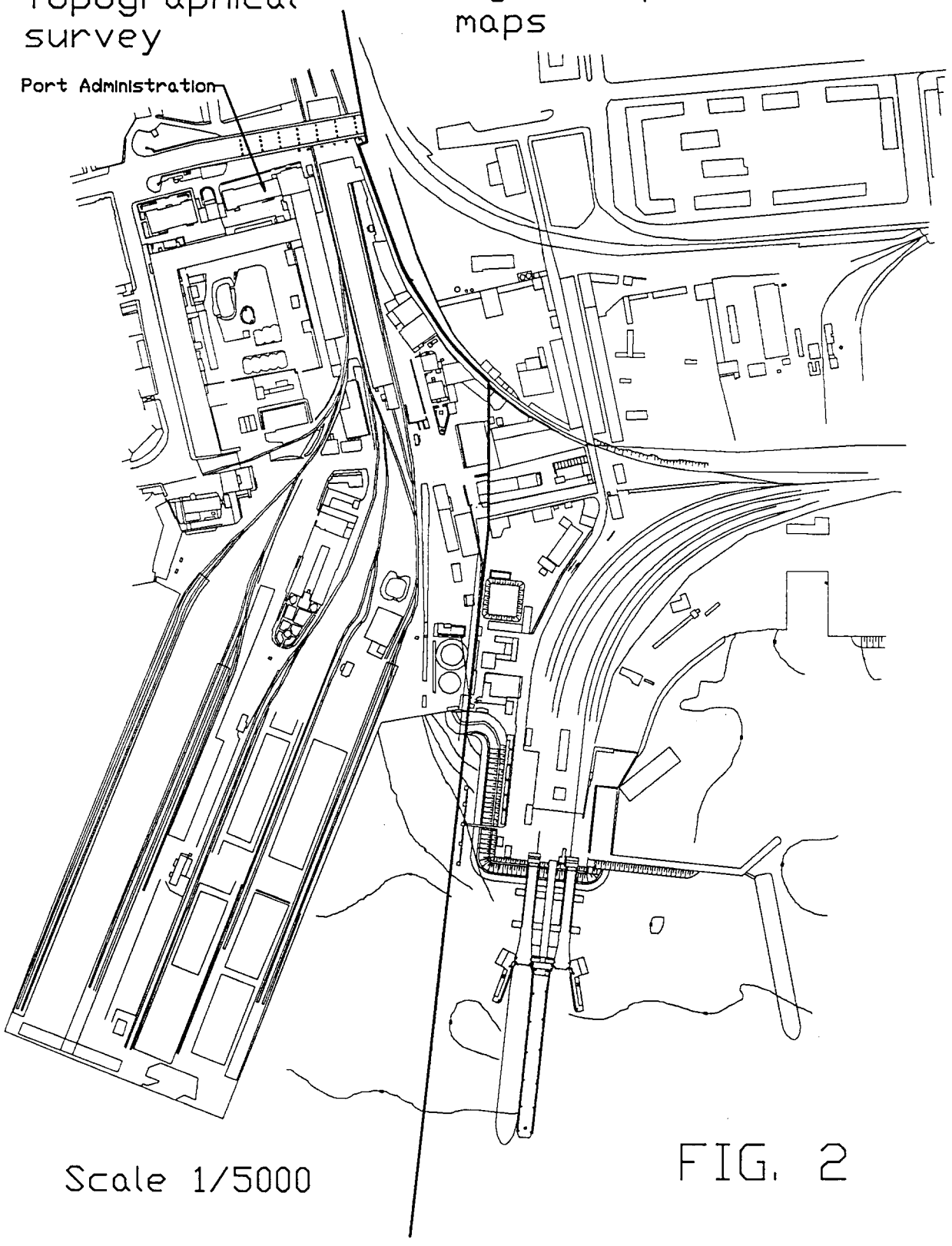

ГОБУ
ХОЧӘСӘН
ШУБАНЫ
БАКЫ
ЗЫГ
ПӘНМӘДИЛ
СЕРЕБРОВСКИЙ
СТЕПАН РАЗИН
ЭМИРЯН
БИБИЊЕЈБӘТ
Б У Х Т А С Ы
TIMBER TERN.
Лесной Район
Месторасположение основной гавани
MAIN HARBOUR LOCATION
Нефтеналивной терм
OIL TERMINAL
СУМГАЈЫТ
БАКЫ
Данизканары
Санкачал
Гобустан

рис. 1

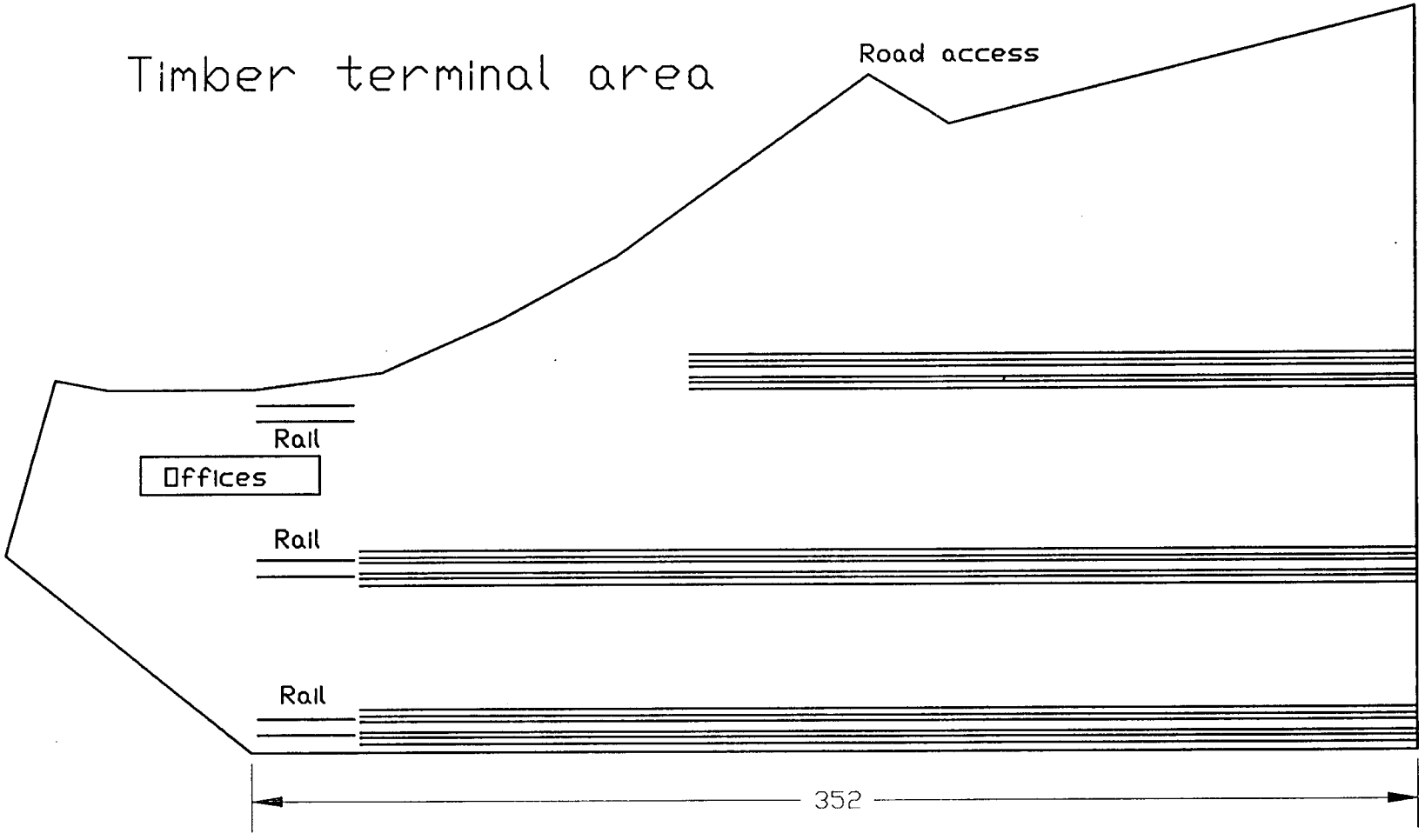
Fig. 1

# BAKU SEA PORT
# MAIN LOCATION



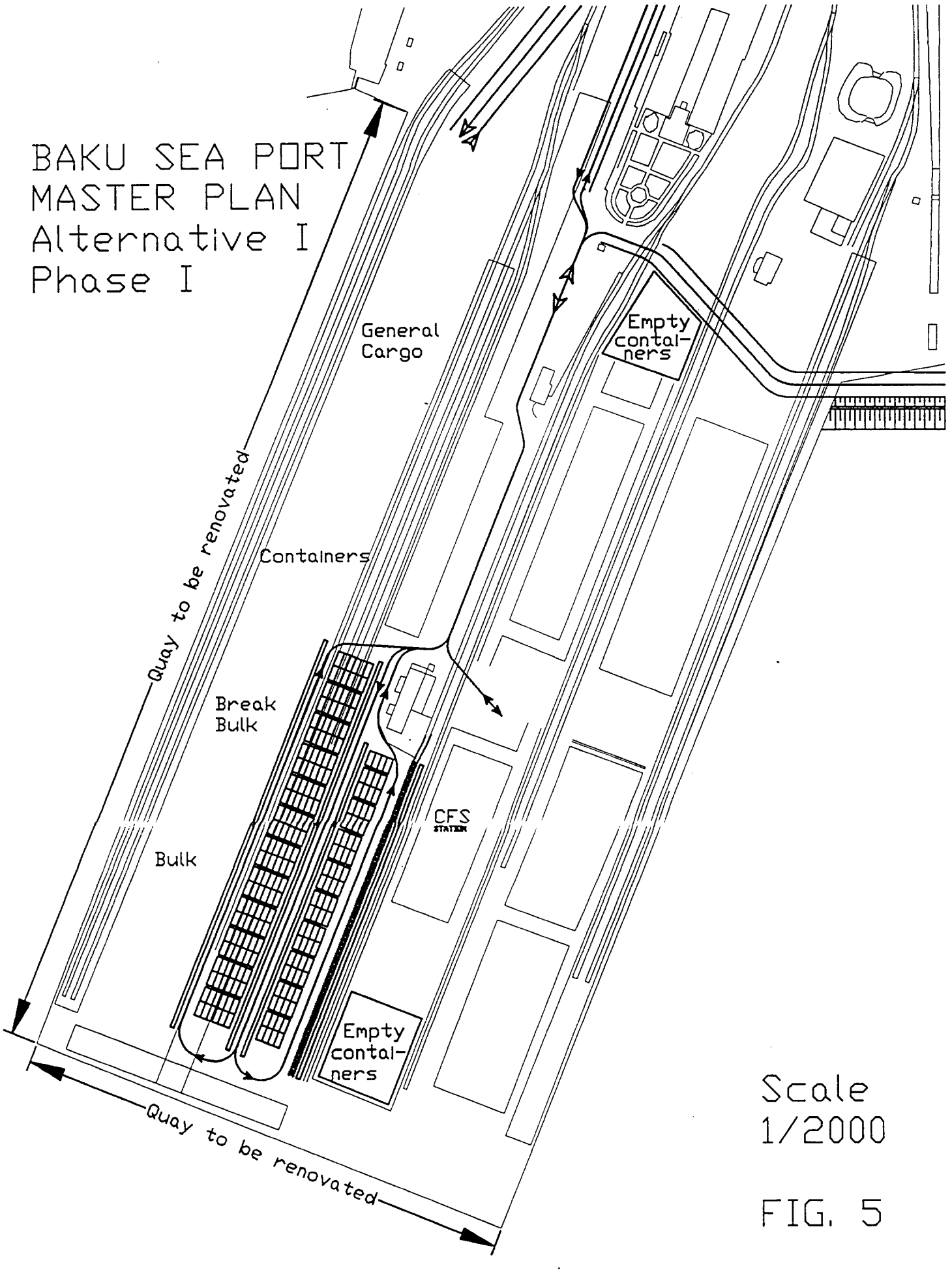

Scale 1/5000

FIG. 2




Scale 1/2000

FIG. 3

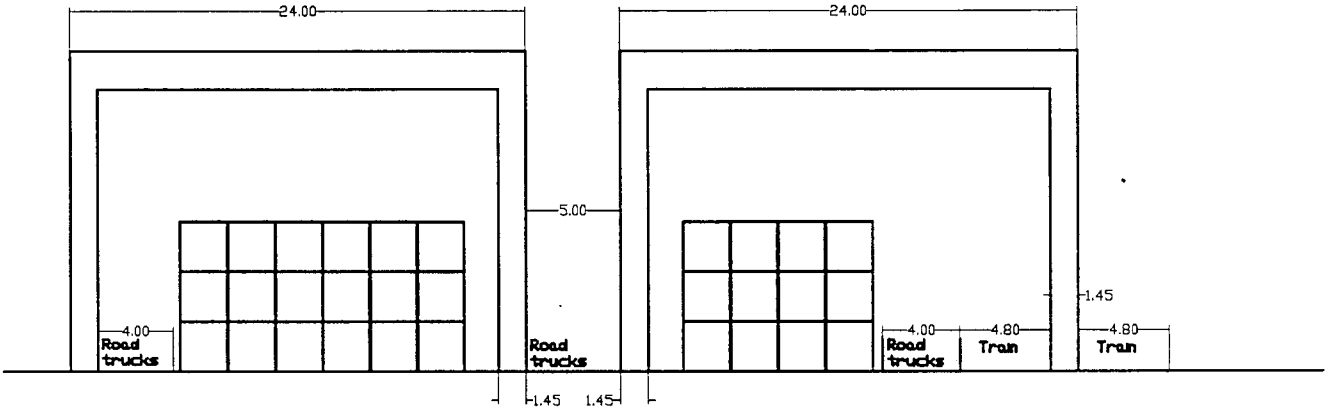



Scale
1/2000

FIG. 5

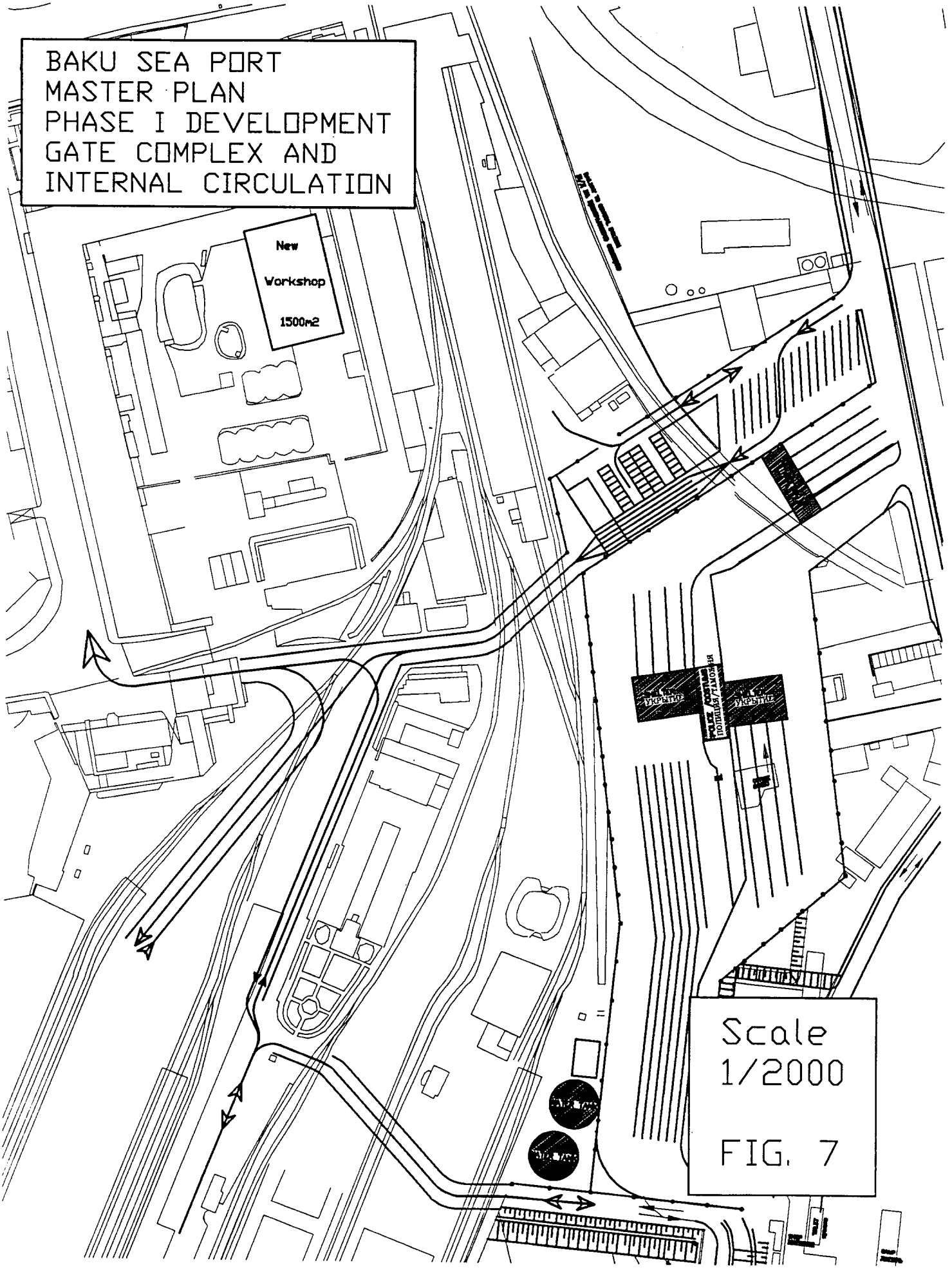
# BAKU SEA PORT
# MASTERPLAN
## ALTERNATIVE I
## PHASE I

CONTAINER STACKING SYSTEM




Scale 1/400

FIG. 6


BAKU SEA PORT
MASTER PLAN
PHASE I DEVELOPMENT
GATE COMPLEX AND
INTERNAL CIRCULATION
New
Workshop
1500m2
Scale
1/2000
FIG. 7

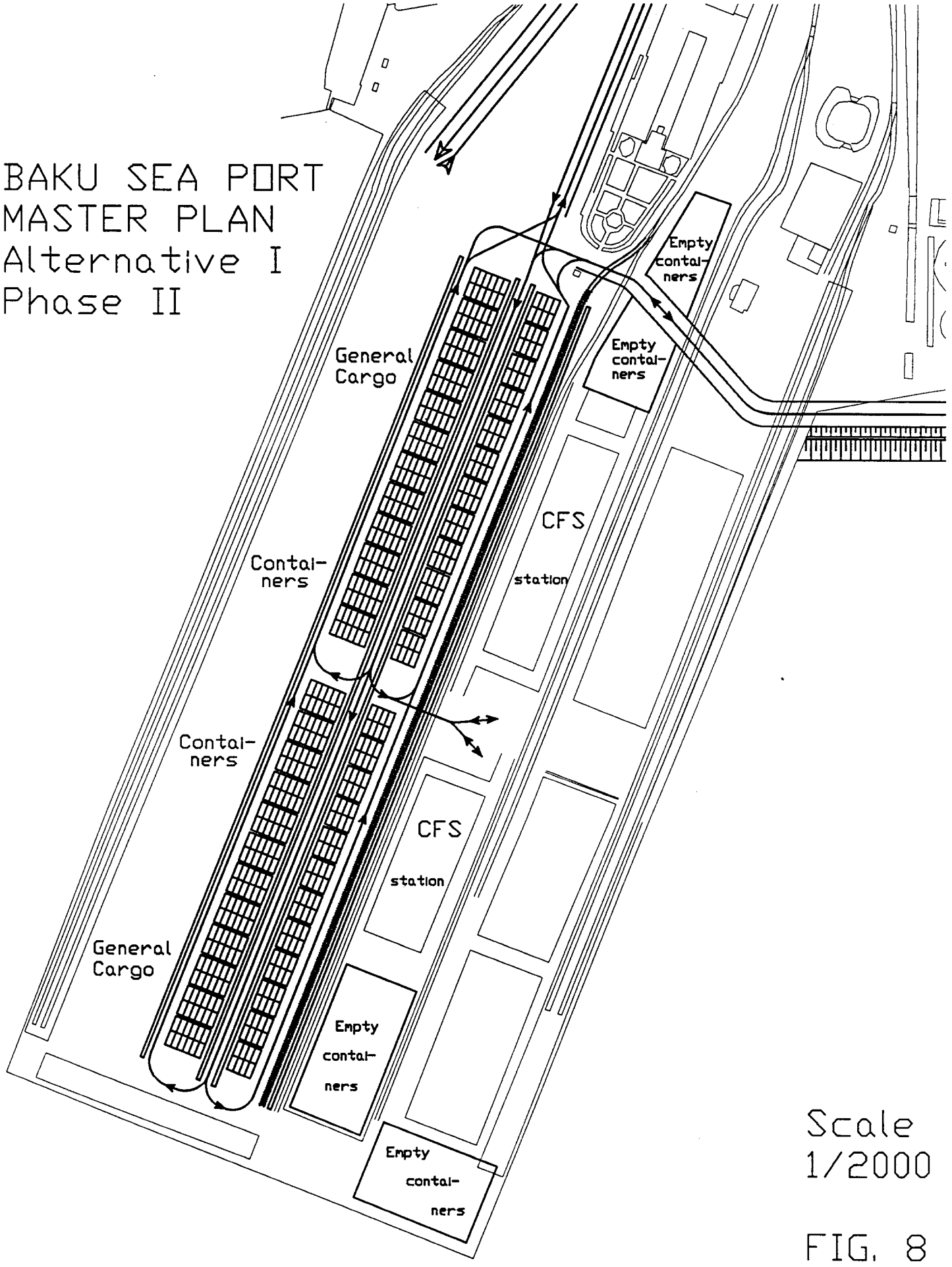
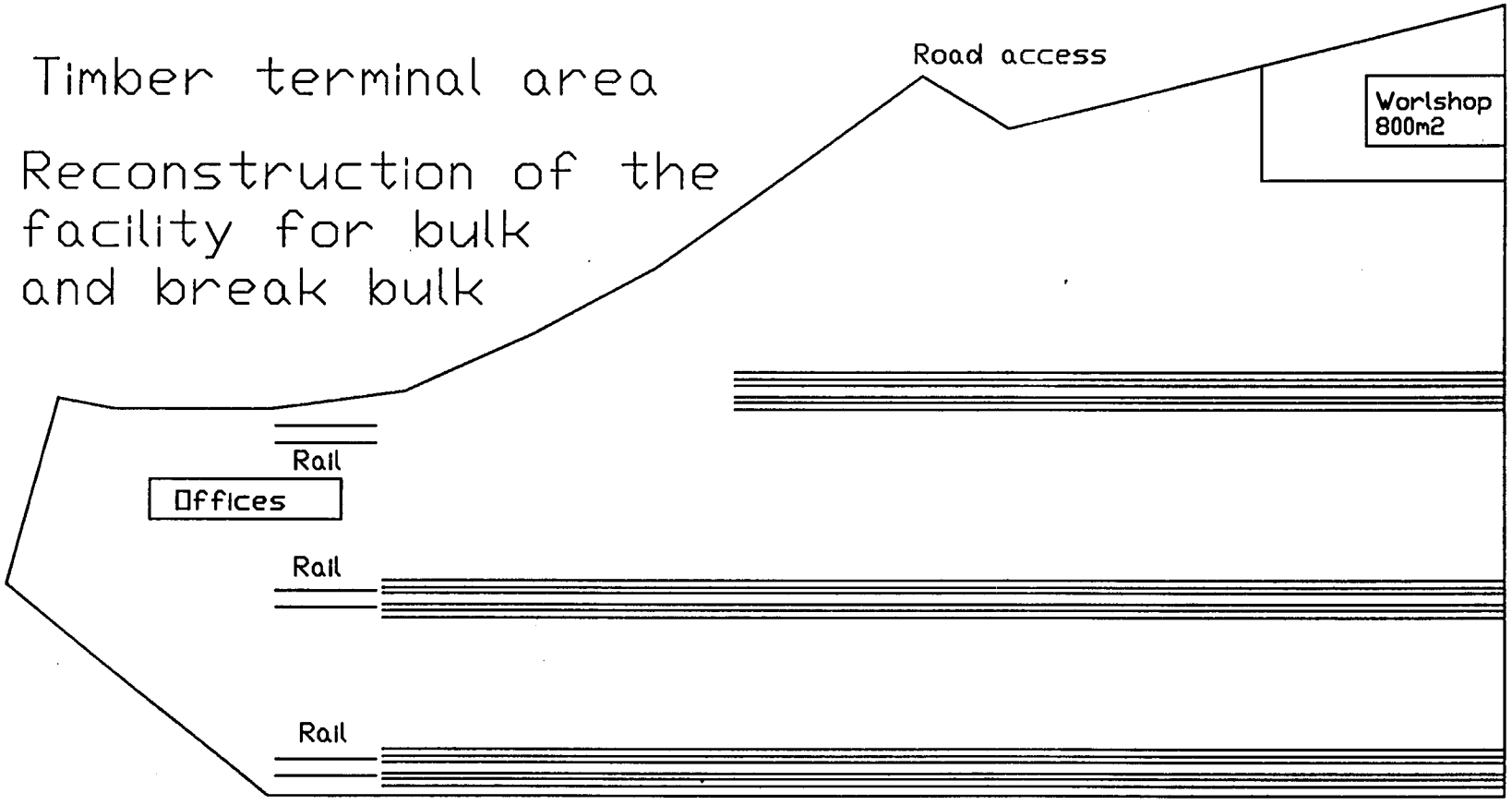

BAKU SEA PORT
MASTER PLAN
Alternative I
Phase II
General Cargo
Empty containers
Empty containers
CFS station
Containers
Containers
CFS station
General Cargo
Empty containers
Empty containers
Scale 1/2000

FIG. 8

# BAKU SEA PORT
# MASTER PLAN
# Alternative I
# Phase II




Scale 1/2000

FIG. 9

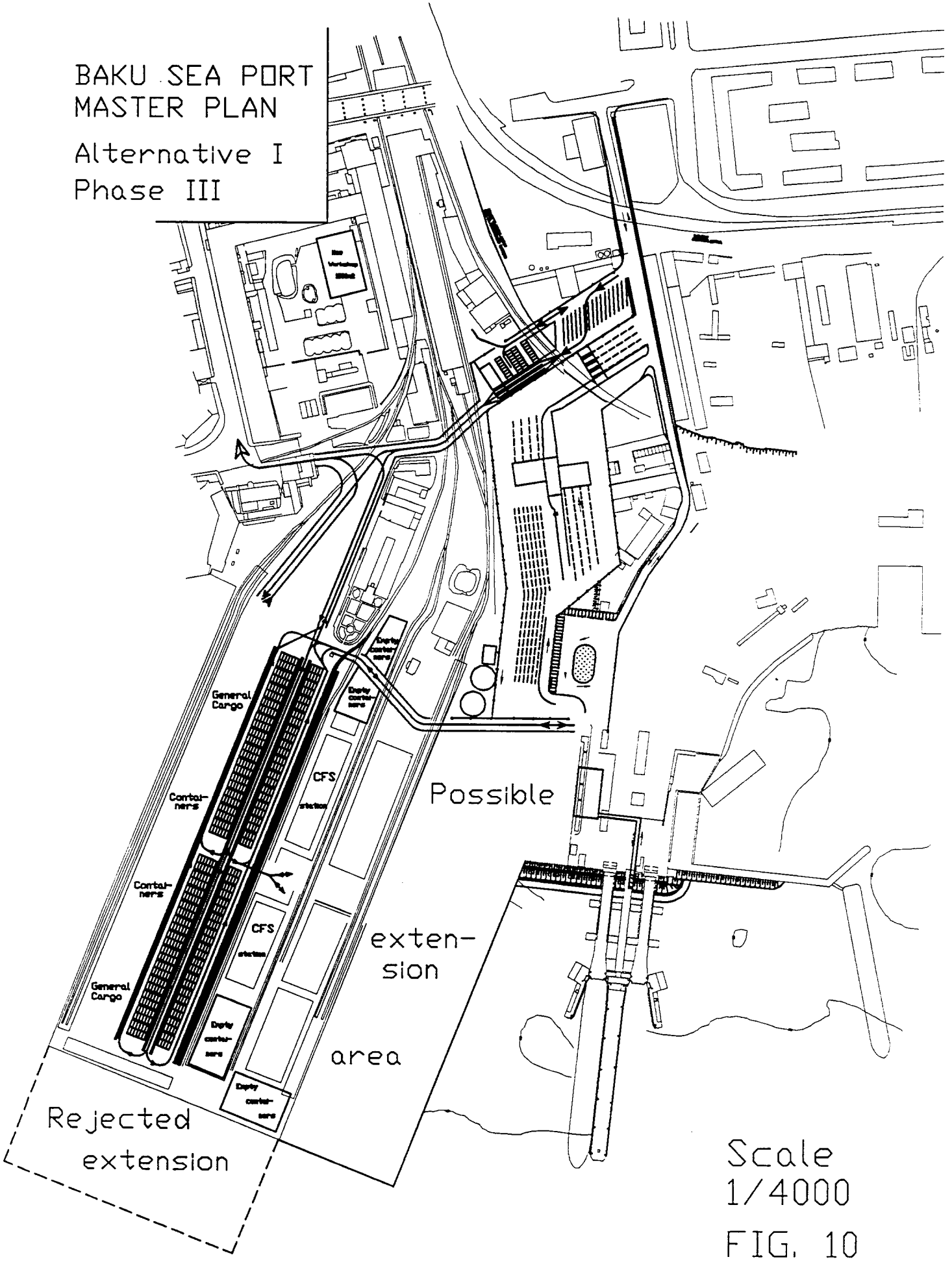
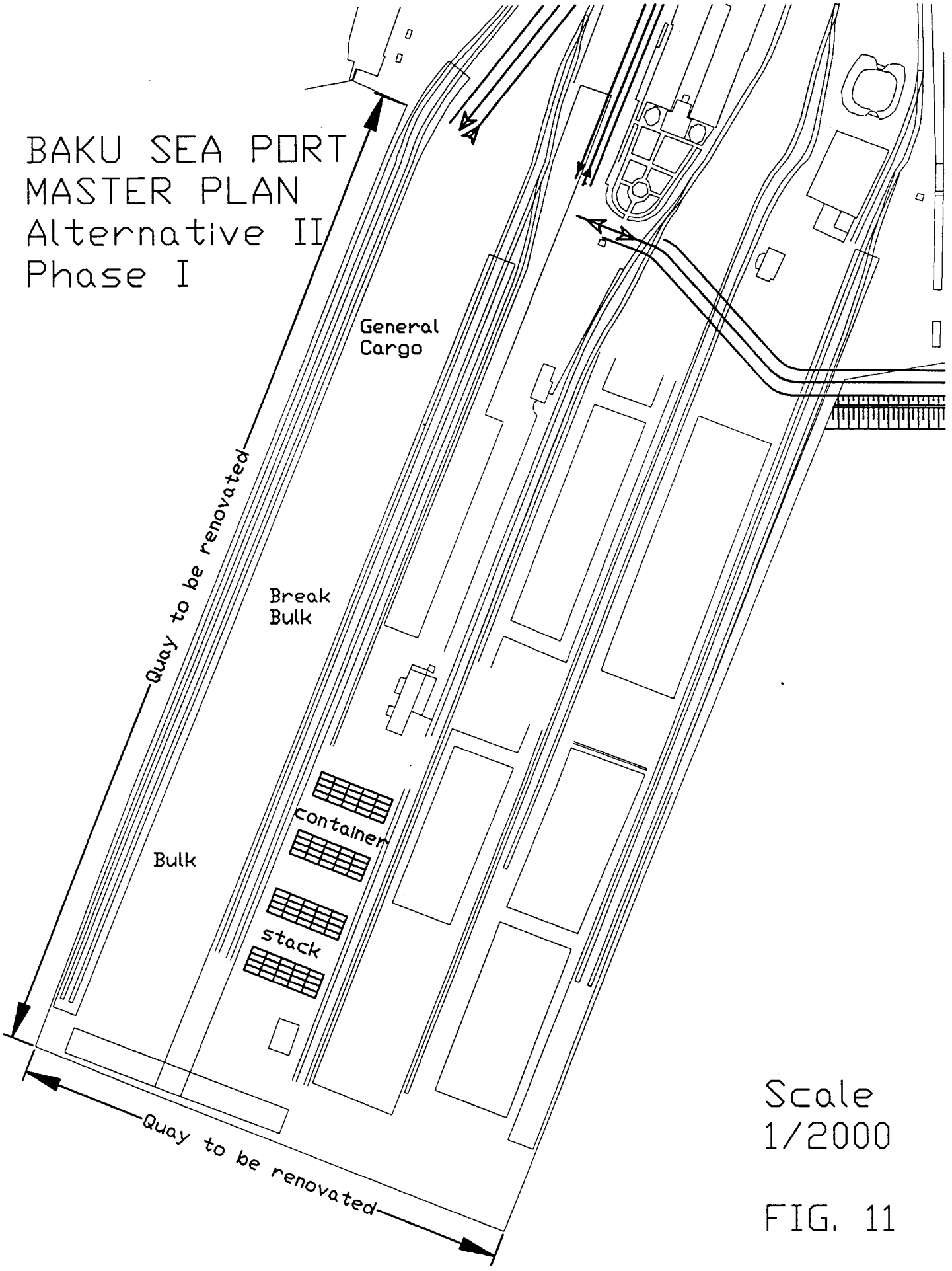

BAKU SEA PORT
MASTER PLAN
Alternative I
Phase III
General Cargo
Contai-ners
CFS
Contai-ners
CFS
General Cargo
Possible
exten-sion
area
Rejected extension
Scale 1/4000

FIG. 10



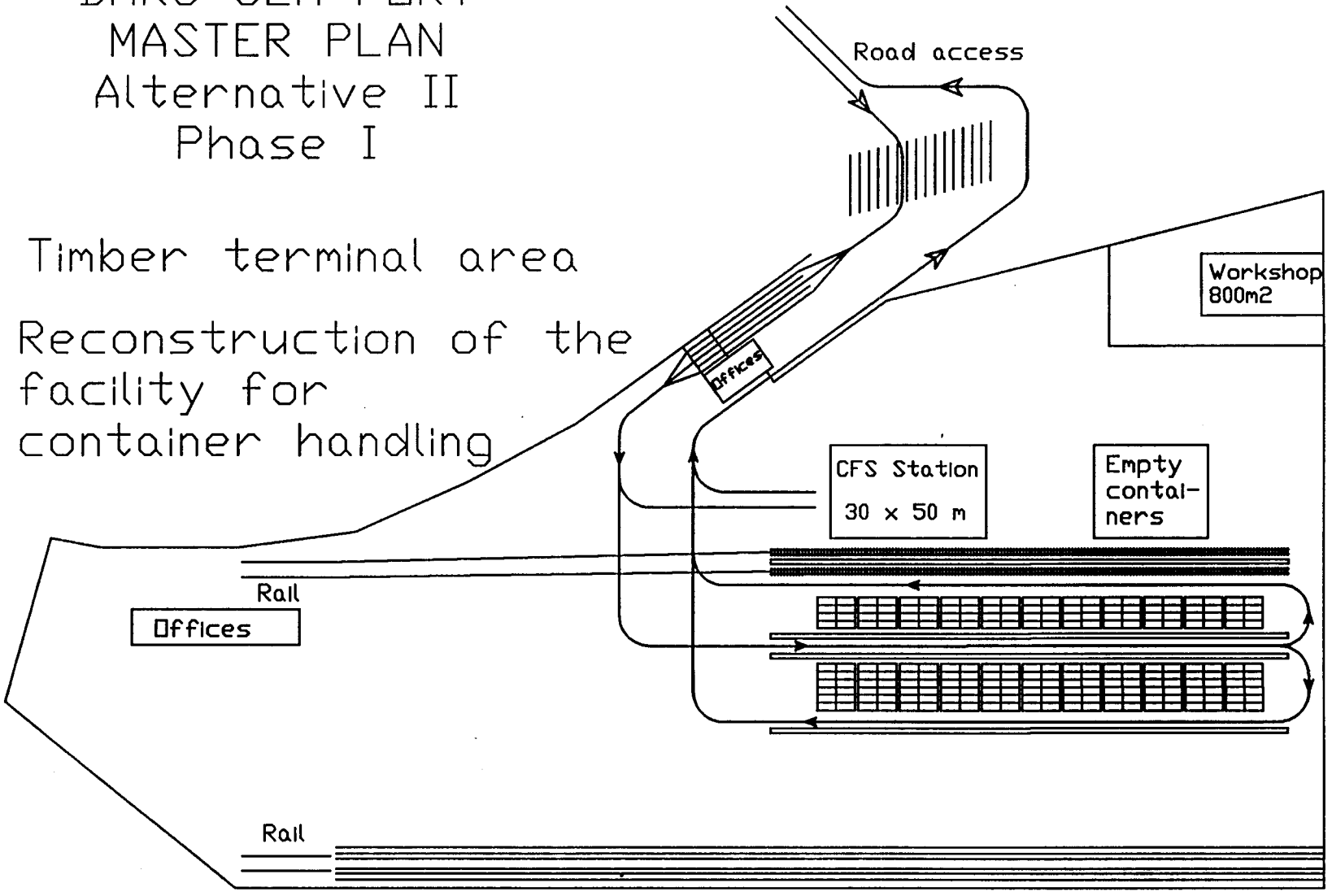

Scale
1/2000

FIG. 11

# BAKU SEA PORT MASTER PLAN Alternative II Phase I

Timber terminal area

Reconstruction of the facility for container handling



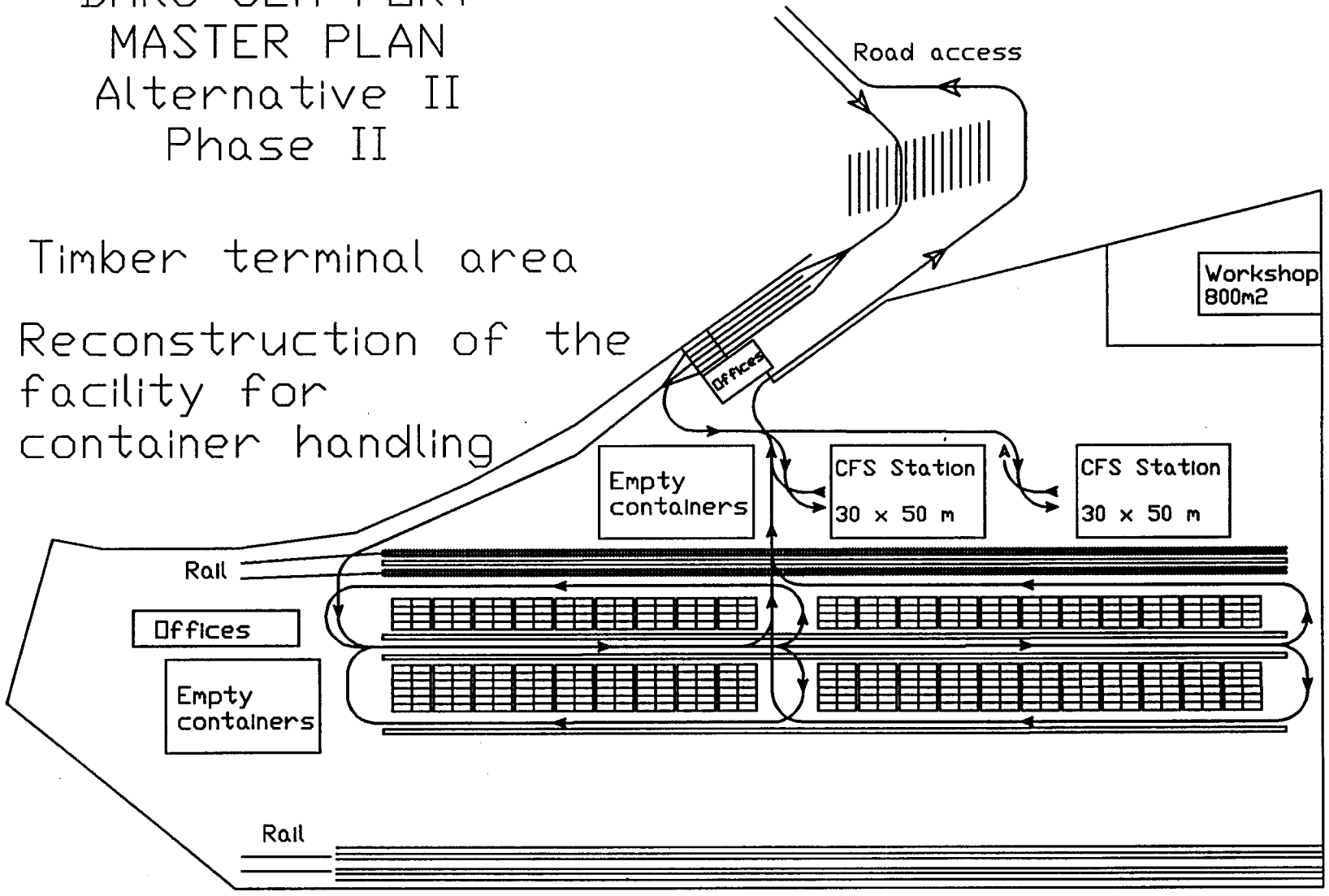

Scale 1/2000

FIG. 12

BAKU SEA PORT
MASTER PLAN
Alternative II
Phase II

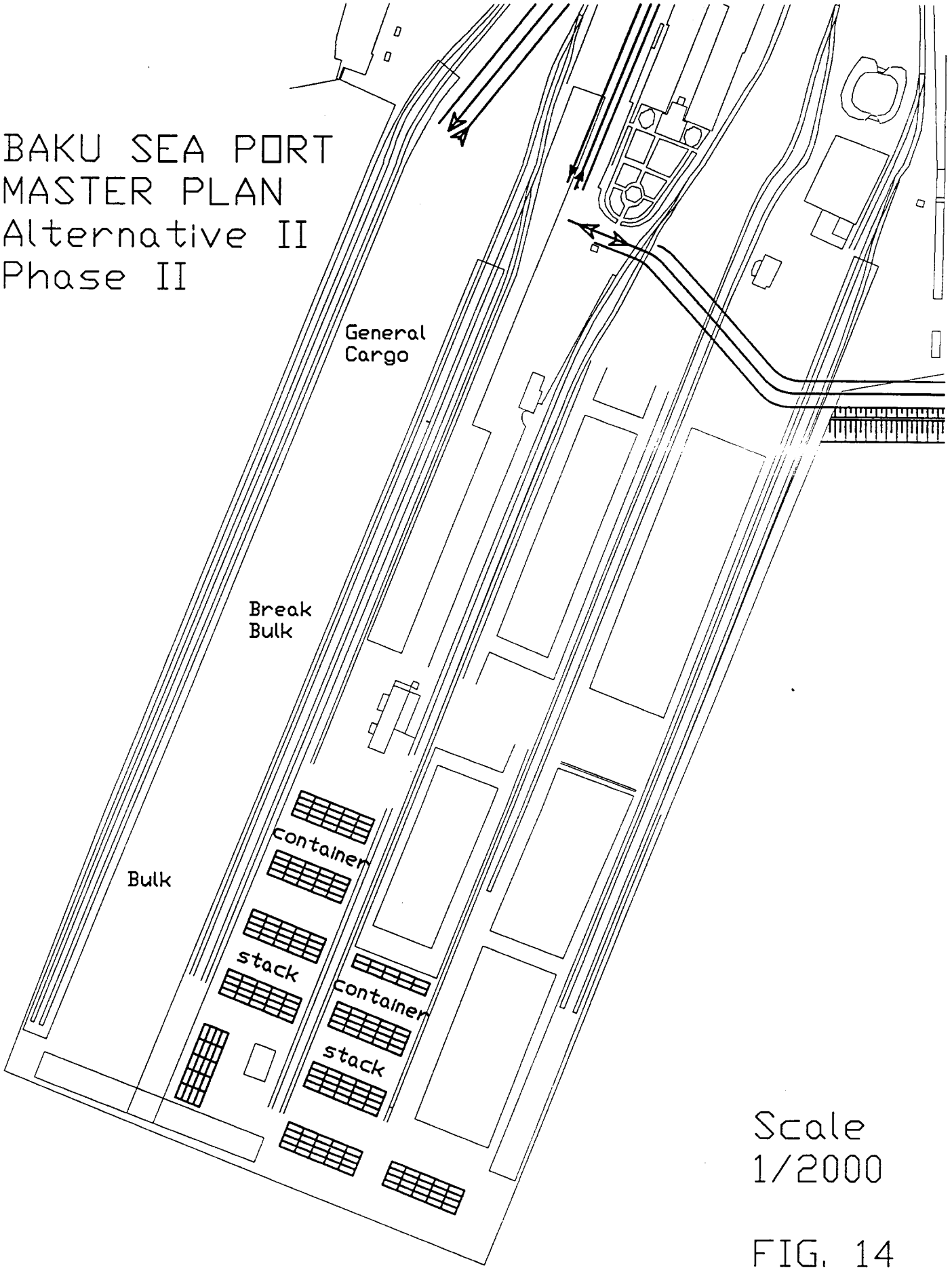
Timber terminal area

Reconstruction of the facility for container handling




Scale 1/2000

FIG. 13




Scale
1/2000

FIG. 14

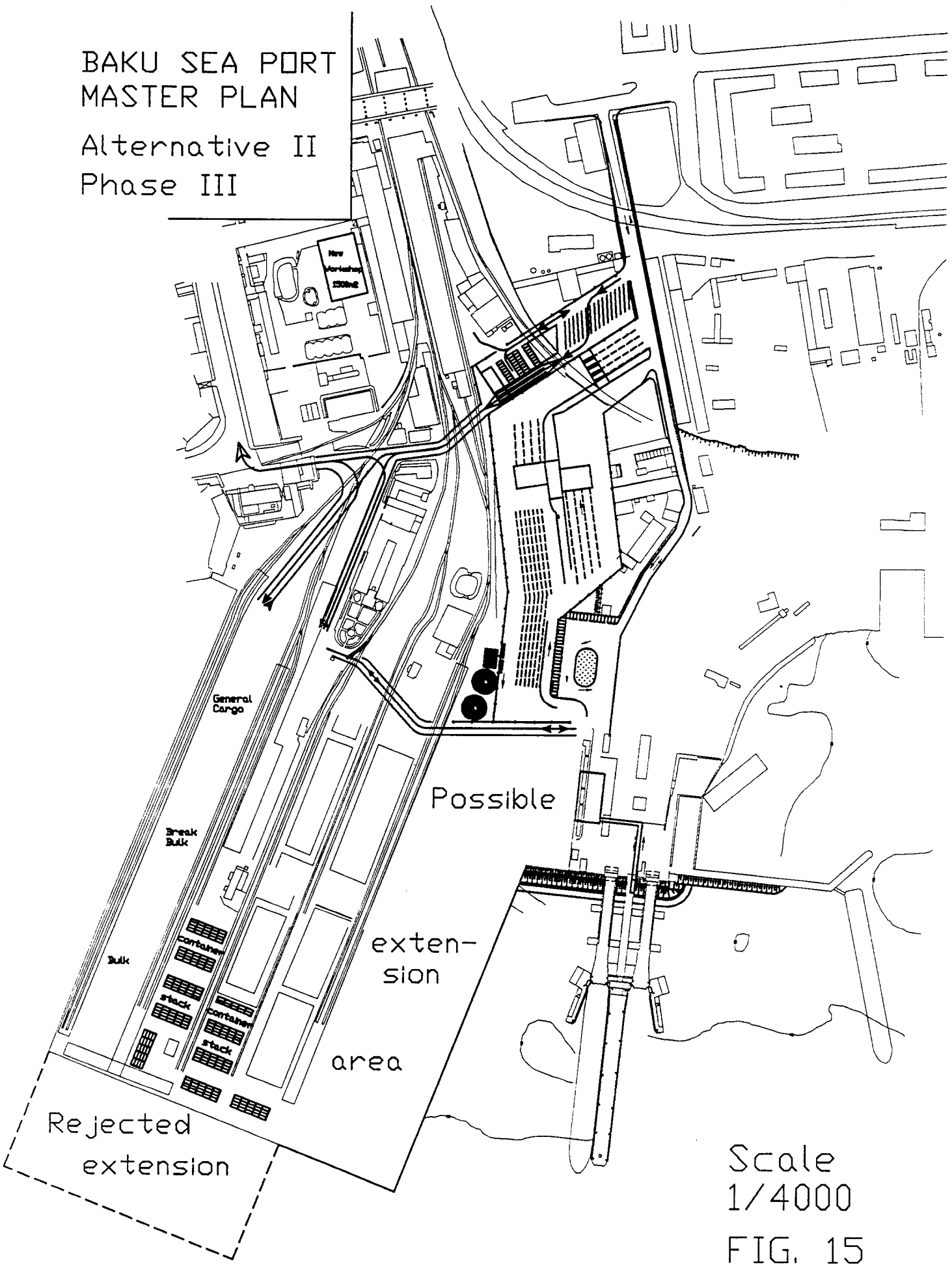

BAKU SEA PORT
MASTER PLAN
Alternative II
Phase III
General Cargo
Break Bulk
Bulk
Container
Stack
Container
Stack
Possible
exten-
sion
area
Rejected
extension
Scale
1/4000

FIG. 15

Volume III
Annex 1

# Assessment of Current Port Operations

# Table of Content

## Assessment of Current Port Operations

# 1. Introduction

The port of Baku consists at present of different parts, these are 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 terminal'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[1] (In thousand tons)**

| Commodity | Import (thousand tons) | | Export (thousand tons) | | Transit (thousand tons) | | Total (thousand tons) | |
|---|---|---|---|---|---|---|---|---|
| | 1995 | 1996 | 1995 | 1996 | 1995 | 1996 | 1995 | 1996 |
| General Cargo Terminal | - | - | - | - | - | - | - | - |
| Building materials | 99.0 | 42.0 | - | - | - | - | 99.0 | 42.0 |
| Salt | 4.2 | 11.9 | - | - | - | - | 4.2 | 11.9 |
| Grains | 0.4 | - | - | - | 0.4 | - | 0.8 | - |
| Timber / Wood | - | 0.7 | - | - | 23.3 | - | 23.3 | 0.7 |
| Metal | - | - | - | 1.1 | 2.2 | - | 2.2 | 1.1 |
| Equipment / Machinery | - | - | - | - | - | - | - | - |
| Chemicals | 2.8 | 1.5 | 2.0 | - | - | 0.3 | 4.8 | 1.8 |
| Containerized Cargo | 3.7 | 2.6 | 3.8 | - | 0.2 | - | 7.7 | 2.6 |
| Other General Cargo | | | | | | | | |
| **Total Dry Cargo** | **110.1** | **58.7** | **5.8** | **1.1** | **26.1** | **0.3** | **142.0** | **60.1** |
| Ferry Terminal | | | | | | | | |
| Ferry Traffic | 463.8 | 197.7 | - | - | 317.7 | 107.9 | 781.5 | 305.6 |
| Absheron Oil Terminal | | | | | | | | |
| Liquid Bulk | 91.0 | 136.2 | - | - | - | - | 91.0 | 136.2 |
| Total | **664.9** | **392.6** | **5.8** | **1.1** | **343.8** | **108.2** | **1,014.5** | **501.9** |

Source: Baku International Seaport

[1] Estimates based on 9 months.

### 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 | 4,673 |
| Railroad Cargo & Passenger Ferry | Dagestan | 154.47 | 18.30 | 4.50 | 3,950 |
| Dry cargo vessel | Kishinyov | 123.50 | 15.0 | 4.50 | 4,150 |
| Dry cargo vessel | Geroj Mekhti | 114.0 | 13.0 | 3.73 | 3,135 |
| Dry cargo vessel | Buniat Sardarov | 118.10 | 13.40 | 3.95 | 3,135 |
| Tanker | Nikifor Rogov | 146.64 | 17.38 | 8.00 | 11,525 |
| Tanker | Apsheron | 146.88 | 17.40 | 5.3 | 7,410 |
| Tanker | General Shikhlinskiy | 124.97 | 16.63 | 4.15 | 4,600 |
| Russian Ships | | | | | |
| Dry cargo vessel | Baltiysky | 96.0 | 13.0 | 3.26 | 2,122 |
| Dry cargo vessel | Ladoga | 81.0 | 11.90 | 4.01 | 1,855 |
| Dry cargo vessel | Sormovsky | 114.0 | 13.0 | 3.42 | 3,135 |
| Dry cargo vessel | Volgo-Don | 138.50 | 16.50 | 3.0 | 3,994 |
| Iranian Ships | | | | | |
| Dry cargo vessel | Iran Basir | 128.20 | 13.60 | 4.0 | 3,638 |
| Dry cargo vessel | Iran Bashir | 93.60 | 13.40 | 4.5 | 2,500 |

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 does not 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 coordinate the traffic in the port.

Maintenance of the fairways and the navigational aids like buoys, beacons, lighthouses etc. is coordinated 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[2] 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

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[2] 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.

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.

### 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[4] |
| 3 | 2 | Baku International Seaport[3] | Export of Diesel and Kerosene |
| 4 | 1 | Baku International Seaport | Service jetty for floating crafts |
| 5 | 2 | Government oil Company | Import of crude oil[5] |

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 seaman'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.

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.

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[3] Leased from Azerbaijan Oil Company.

[4] Being Dismantled

[5] Dismantled

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 common communication systems as e.g. telefax, telex, walkie-talkies etc. were not found. 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 13 vessels with approx. 2,600 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 terminal'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 vessel'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[6] | 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.

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

## 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.

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 1,635 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[7], 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.

7 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[8] | Ganz | 6 | 30-8 | 1972 | no |
| | 1 | 20[1] | Takraf / Albatros | 10/20 | 32/16-8 | 1976 | no |
| 8 - 10 | 1 | 18 | Ganz | 6 | 30-8 | 1975 | yes |
| | 1 | 28 | | | | 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.

8 Not connected to power supply, but said to be in operationable condition.

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 (tons) | No. of Items | In Operationable Condition | Total | |
|---|---|---|---|---|---|
| | | | | Existing | Operationable |
| Forklift trucks | 1.5 | 17 | 6 | 33 | 11 |
| | 2.5 | 1 | - | | |
| | 3.0 | 8 | 2 | | |
| | 3.5 | 1 | 1 | | |
| | 4 | 1 | - | | |
| | 5 | 3 | - | | |
| | 10 | 2 | 1 | | |
| 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[9] | 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.

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

Table 2-10: Declared Open Storage Areas

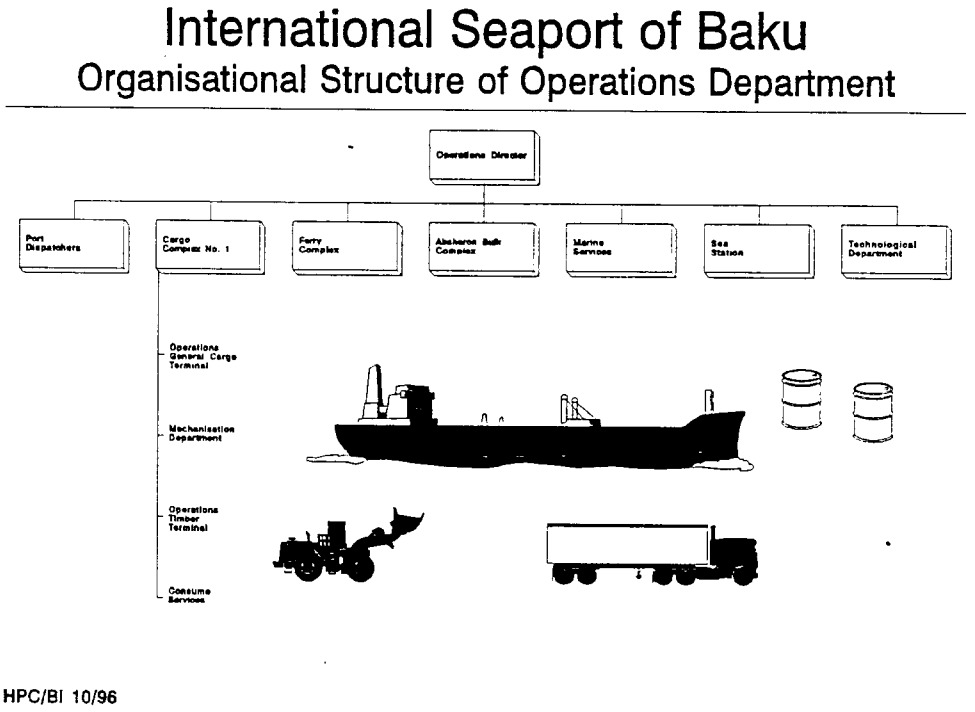
| Area No. | Dimensions (m) | Area (sqm) | Used for | Remarks |
|---|---|---|---|---|
| 1 | 195x25 | 5,000 | general cargo/Ro/Ro | pavement almost in very poor condition |
| 4 | 270x15 | 4,000 | general cargo | |
| 5 | 393x61 | 24,000 | bulk cargo | |
| 6 | 224x61 | 11,328 | timber | |

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 organisational structure is shown on the picture below.

**Figure 2-1:**




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

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 4 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 | -[10] |
| **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

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[11] 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

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10 Some labourers who are not classified are paid as "class 4 workers".

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

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 stackable | 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 | | | |

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 separation 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 vessel'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 manager'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 1 m diam. by sea-river-ships | L | 1,200 |
| Containers[12] | | |
| on multi-purpose vessels | L/D | 100 TEU |
| on liner vessels | L/D | 150 TEU |
| at container terminal | L/D | 300 TEU |
| RoRo[1] | | |
| containers | L/D | 500 |
| cars | L/D | 1,200 |

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.

12 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 transshipment and therefore additional handling of cargo due to intermediate storage on the terminal.
- Bad land utilization 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 Operations

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 utilization 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 palletized and preslung 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 overleaf is presented.

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

**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 palletized general cargo | 900 |
| Packaged forest products | 1,500 |
| Bundled iron and steel products | 2,000 |
| Preslung cargo | 900 |
| RoRo-Units | 2,500 |
| Containers: | |
| on deep-sea routes | 300 - 500 TEU |
| on short sea and feeder routes | 275 TEU |
| 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 utilization 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 utilization can in principle be regarded as desirable:

**Table 3-2: Berth Utilization Indicators**

| Number of Berths | Utilization 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

$$\approx 4.2 \text{ million tons p.a.}$$

### 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 utilization with regard to international standards can be named as shown in the table below.

**Table 3-4: Typical Land Utilization for Container Storage Areas**

| Device for Container Storage | Average Land Utilization for Storage |
|---|---|
| Forklift Truck (full 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 Utilization and Dwell Times for Different Cargoes**

| Cargo type | Avg. dwell time (days) | Avg. land utilization (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.

$$C_T = A \times U / T =$$
$$24{,}000 \times 3 \times 360 / 15 =$$
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.

$$C_T = A \times F \times U \times N / T =$$
$$9{,}000 \times 0.6 \times 1.75 \times 360 / 15 =$$
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.

$$C_T = A \times U \times N / T =$$
$$0.4 \times 275 \times 360 / 15 =$$
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.

$$C_T = A \times F \times U \times N / T =$$
$$10{,}618 \times 0.6 \times 1.5 \times 360 / 12 =$$
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 transshipment 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 transshipment | | 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 transshipment 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 utilization 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.

Organizational 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:

# Condition Survey Report of Existing Marine Craft

# 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.

# 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: | ---- |

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

REMARKS.

No.73 and No.21 were inspected afloat, while No.16 was seen dry on one of the jetties in Baku port. The two afloat units are in service while the third one is due for repairs.

The propulsion system is of a quite unusual design with no possibility to reverse the direction of the propeller. Instead two moveable flaps are used to reverse the waterstream behind the propeller to the front of the vessel. It is obvious, that the efficiency of the propulsion system and the steering capability of these boats are limited due to the poorly designed access of water to the propeller and the appertuences fitted around and behind the propeller.

The machinery of the two afloat vessels is in working condition and does not require major overhauls. All hulls need drydocking, sandblasting and a complete new paint application.

No.16 needs a general overhaul of the machinery, sandblasting and painting of the hull and a general overhaul of the collecting equipment.

Without new oilskimming equipment in place, these three units should be overhauled as soon as possible and then put back to work. Costs are estimated at DM 100,000.-- per boat.

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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 |

| | |
|---|---|
| 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.

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# 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.

| | |
|---|---|
| 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.

F. Praël

Dipl.-Ing. F. Praël

| | |
|---|---|
| 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.

F. Praël

Dipl.-Ing. F. Praël

| | |
|---|---|
| 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.

F. Praël

Dipl.-Ing. F. Praël

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

REMARKS.

No.73 and No.21 were inspected afloat, while No.16 was seen dry on one of the jetties in Baku port. The two afloat units are in service while the third one is due for repairs.

The propulsion system is of a quite unusual design with no possibility to reverse the direction of the propeller. Instead two moveable flaps are used to reverse the waterstream behind the propeller to the front of the vessel. It is obvious, that the efficiency of the propulsion system and the steering capability of these boats are limited due to the poorly designed access of water to the propeller and the appertuences fitted around and behind the propeller.

The machinery of the two afloat vessels is in working condition and does not require major overhauls. All hulls need drydocking, sandblasting and a complete new paint application.

No.16 needs a general overhaul of the machinery, sandblasting and painting of the hull and a general overhaul of the collecting equipment.

Without new oilskimming equipment in place, these three units should be overhauled as soon as possible and then put back to work. Costs are estimated at DM 100,000.-- per boat.

F. Praël

Dipl.-Ing. F. Praël

| | |
|---|---|
| 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.

F. Praël

Dipl.-Ing. F. Praël

| | |
|---|---|
| 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.

F. Praël

Dipl.-Ing. F. Praël

| | |
|---|---|
| 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.--.

F. Praël

Dipl.-Ing. F. Praël

| | |
|---|---|
| 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.--.

F. Praël

Diipl.-Ing. F. Praël

| | |
|---|---|
| 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.

F. Praël

Dipl.-Ing. F. Praël

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.

F. Praël

Dipl.-Ing. F. Praël

| | |
|---|---|
| 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.--.

F. Praël

Dipl.-Ing. F. Praël

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.

F. Trail