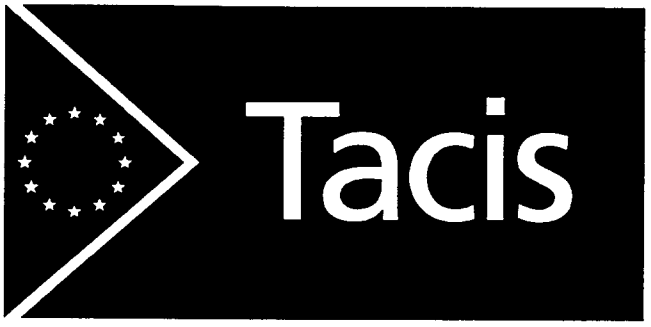

Development of the Port of Baku
Port Master Plan
Phase I Report
21 October 1996

Port Master Plan / Phase I Report - Cover Page

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Phase I Report .

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Volume I

Executive Summary

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Volume I: Executive Summary

Executive Summary

1. Introduction

This is one of 5 volumes which form the 1st phase report on the "Management Assistance and training" Project addendum for the rehabilitation of the Port of Baku. This 1st phase report (draft) consists of the following volumes:

Volume 1	Executive Summary
Volume 2	Traffic Forecast and Economic Assessment
Volume 3	Port Masterplan
Volume 4	Civil Engineering Assessment
Volume 5	Environmental Assessment

This executive summary contains a summary of the main points described and discussed in each of the other volumes.

Volume 2 presents on detailed traffic forecast by commodity and by country for the period 1996 - 2015 and an economic assessment.

Volume 3 is called "Port Masterplan" as it contains the main operational information necessary to do a port masterplan (which is done in the phase 2 report), with the exemption of civil engineering.

Volume 4 contains the civil engineering assessment and recommendations. It deals also with the sea level and the ongoing topographical survey.

Volume 5 contains a preliminary outline for the environmental assessment based on the "Scoping" exercise and preliminary data collection.

2. Background

In order to secure sustainability of the efforts the EU is putting into the TRACECA programme, the EU expressed its intention to foster projects that eliminate physical bottlenecks or increase considerably the capacity of the TRACECA Transport link. As the Port of Baku is one of the important parts of this transport link, several studies have been undertaken during the last years, aiming to arrange investments for the improvement of the port's infrastructures.

One of the main concerns was and still is the rise of the sea level. Due to this raised sea level, part of the port facilities have been either abandoned or are threatened seriously if the trend continues. However, the sea level measurements of the last year seam to indicate that the trend of rising is showing down, if not reversing. Two studies aiming at the preparation of tender

documents for improvement works are ongoing at the moment. These studies are financed by TACIS within the TRACECA programme:

- The redesign of the Ferry Terminals in Baku and Turkmenbashi.
- The rennovation of the general cargo facilities in Baku (the present addendum to the HPTI management assistance and training project).

3. Traffic Forecast and Economic Assessment

The economic output of Azerbaijan as measured by the gross domestic product (GDP) has been in continuous decline since 1990, and as measured on an index with 1990 equal to 100 the output in 1995 is 39.2. The decline is expected to abate in coming years. From around the turn of the century increases in the oil production as a result of a resurgence of the oil industry spurred by new investments by international oil companies is expected to ensure economic growth above the average compared to the other countries in the region. The political uncertainty in Azerbaijan concerning the conflict with Armenia over Nagorno Karabak and the political unrest in Georgia and Tchetchniya may tend to cloud the economic outlook.

The cargo volumes handled in the port has dropped dramatically until 1995, while the preliminary cargo statistics for 1996 indicate a moderate recovery. This is illustrated in Table 1-1

Types of Cargoes/Year	1987	1991	1992	1993	1994	1995	1996 *)	Estimat 1996
Total Dry Cargo	1,238.1	897.4	688.5	518.1	407.3	142.0	192.5	299.0
Total Ferry Traffic	5,850.0	1,920.1	1,094.8	638.5	553.7	781.5	565.0	8000.0
Total Liquid Cargo **)	n.a.	8,671.5	3,556.0	3,370.7	869.4	91.0	104.0	160.0
Total Turnover	n.a.	11,489.0	5,339.3	4,527.3	1830.4	1014.5	1106.0	1510.0

Notes: *) = estimate on 9 month basis

**) = data of Caspian Shipping Company (Port of Absheron)

Source: Port of Baku

From a review of the expected economic development and transportation infrastructure in the hinterland of the port of Baku comprising the Central Asian republic in addition to the republics of Georgia and Armenia it can be concluded that the port of Baku could be developed and reemerge as a gateway for the transportation requirements of the region.

A mainstay of the position of Baku as a transportation gateway has been the ferry services operated by the Caspian Shipping Company. In the future the establishment of the TRACECA rail and road link between the Georgian ports of Poti and Batumi and Baku with further links to the Central Asian republics will again not only revive the ferry link across the Caspian Sea, but will also have the potential of attracting transit cargoes to the port of Baku, primarily in the form of containers to be transshipped to and from the other Central Asian republics. The reemergence of the oil industry and the substantial investments expected to be made by the international oil companies will create new cargo opportunities, particularly in the form of containerized cargoes, for the port.

Several shipping companies in addition to the Caspian Shipping Company are providing water transportation services to and from the port of Baku and in the Caspian Sea and on the Russian waterway system. Given that Azerbaijan authorities and the port of Baku will allow foreign flag operator to serve the transportation requirements of the country, more than adequate transportation capacity is expected to be available.

"Bottlenecks" in the form of the limited navigation season (approximately six months of the year) and draft restrictions on the Russian waterways combined with the Russian government policy of limiting access to the waterways to Azerbaijan flag vessels as a means of putting political pressure on the Azerbaijan government, are limiting the market opportunities for waterborne transport to and from the port of Baku. Competition from the alternative railroutes via Tchetchniya when an if reopened could also present competition for the port.

Other institutional and invisible or intangible barriers that may act as barriers to the development of the business of the port are in the main:

- Lack of a commercial, professional attitude among port management and operational personnel, which is a heritage of the former Soviet system where no competition existed.
- The reported widespread practice at all levels regarding the extortion of bribes or unofficial payments for the performance of services both by port employees and by public servants.

A review has been made of the transportation cost of alternative routes. Due to the constant rate changes and the fact that the rates at present do not necessarily reflect the actual cost of transportation, it was concluded that this analysis should be based on estimates of the actual transportation costs rather than on existing tariffs. The observations and conclusions that can be drawn from this analysis for bulk cargoes are in the main:

- Water transportation is the competitive alternative for cargoes to and from the Southern European region represented by the North Adriatic and Northern Europe/Baltic region represented by St. Petersburg.
- The rail corridor through Tchetchniya is the lowest cost alternative for bulk cargoes to and from Western Europe represented by Frankfurt and is also a serious competitor to water transportation to and from St. Petersburg. Cargoes on this route to and from the Central Asian republics will use the ferry service between Baku and Turkmenbashi.
- The TRACECA route is the lowest cost transportation alternative for bulk cargoes to and from the Black Sea region and the United States, and will represent the best alternative transportation route for bulk cargoes to and from Southern Europe when the waterways are closed during the winter.
- Elimination of the draft restrictions will change the competitive position for bulk cargoes to and from Western Europe represented by Frankfurt and will make water transportation the low cost alternative for this region. Furthermore it will make water transportation to and from Northern Europe represented by St. Petersburg even more competitive.

For general cargoes the following observations and conclusions can be drawn:

- The TRACECA route is the lowest cost alternative for the Black Sea region and the United States. Like for bulk cargoes, the TRACECA route will be the alternative route to water transportation to and from Southern Europe.

- The Tchetchniya corridor is the lowest cost alternative for general cargoes to and from Northern Europe (St. Petersburg) and Western Europe (Frankfurt). In both cases the Baku - Turkmenbashi ferry will be used to and from the Central Asian republics.
- Water transportation is the most cost effective mode of transportation for general cargoes to and from Southern Europe represented by the North Adriatic region. The TRACECA route will represent a competitive alternative when the inland waterways are closed during the winter.
- The elimination of the draft restrictions on the inland waterways will shift the competitive position of general cargoes to and from the Northern Europe/Baltic route in favour of water transportation and further increase the existing competitive advantage for general cargoes to and from Southern Europe. For the other regions the elimination of draft restrictions will not change the competitive situation.

From a review of the general development trends in the world transportation industry that may influence the future development of the port of Baku, it is concluded that the opening of the TRACECA route, the developments of the oil industry in the region and the general recovery of economic activity both in Azerbaijan and the other Central Asian republics, the overall volume of general cargoes, most of which will be containerized in the relatively near future, will create the need for the establishment of a "Container Freight Station" (CFS) in the Baku area. The establishment of the port of Baku as a CFS will represent a significant business opportunity for the International Sea Port of Baku, which will also greatly enhance the port's marketability as a multimodal cargo handling centre and thus create new business opportunities. The time frame, for which this business opportunity will be available to the port will be relatively short, and immediate action should therefore be taken by the port management to establish the port as a CFS.

Other business opportunities and a challenge for the port will be to attract new operators to establish both bulk and regular liner services between Baku and the other ports in the Caspian Sea and on the Russian waterway system.

Based on a review of economic and cargo statistics combined with interviews with shippers and consignees, freight forwarders, officials in ministries and the ports in both Azerbaijan and Turkmenistan a baseline for the year 2000 of the cargo flows that can be expected through the port of Baku both through the cargo terminal as well as the Container Freight Station (CFS) to be established in the port was developed. In addition a scenario analysis was performed to forecast the expected cargo flow developments to the year 2015 under three scenarios. These are:

- A most likely scenario
- An optimistic/high growth scenario
- A pessimistic/low growth scenario.

The projected cargo flows under the three scenarios are summarized in Table 7-9, Table 7-10 and Table 7-11.

Some general observations that can be made with respect to the future cargo flow potential through the port are:

The majority of the cargoes that will be handled via the general cargo terminal will in the main be:

- Cargoes generated from Azerbaijan's trade with countries with ports within the Caspian Sea basin. These can be considered captive cargoes, for which water transportation will have a competitive advantage.

- Bulk, neobulk and general cargoes shipped on the inland waterway system to and from Northern Russia, Northern Europe and the Baltic region via St. Petersburg on the waterway system.
- Transshipment cargoes coming by rail to and from Ukraine and Southern Russia to and from Iranian ports. Some of these cargoes will be transshipped to and from other Middle East countries in addition to India and Pakistan.
- Cargoes that for reasons of dimensions, weight and other physical characteristics cannot be handled by rail or truck and consequently have to be handled on ships via the Russian waterways and on the Caspian Sea.
- The main volume of cargoes handled will be transit cargoes coming on or destined for transshipment on the TRACECA route and the Tchetchniya rail corridor. This traffic will be railcars in addition to increasing volumes of trucks and containers, most of which will be shipped onwards on the ferry connection between Baku and Turkmenbashi.

If the port of Baku is successful in establishing the port as a Container Freight Station (CFS) in cooperation with the railroad and the major container operators, the port will also handle substantial volumes of containerized cargoes destined for or originating in Baku and its hinterland.

The key prerequisites for the future success of the port in attracting cargoes that are available to be handled through the port are in the main for the port management and its administrative and operational staff to adopt a commercial attitude to the conduct of its business. In this respect it will be necessary for the port to:

- Market and sell its services to the shippers and consignees both as an independent operation and in close cooperation with ship operators and other transportation companies, their representatives and intermediaries serving both the shippers and consignees and the transportation companies.
- Market and sell the services of the port to attract shipping companies and other transportation companies to use the port as part of their services to serve the needs of the transportation users. In this connection it is important for the port to recognize its that its primary business is cargo handling and not enter into competition with its customers/user and their representative. As examples it would be detrimental to the interests of the port to establish freight forwarding, shipping agency or other services in competition with other commercial entities.
- Ensure operation and productivity according to normal world standards. The transportation industry is an international business, and as such the user of the port services will expect the productivity, operating standards and port and cargo handling charges of the port are maintained according to international norms and standards.
- Eliminate of the practice of extortion of bribes and corruption in the port. The reported widespread practice of extortion of bribes by both port employees as well as public servants, such as customs officials, are hidden charges, which increase the cost of the use of the port and has been a deterred in the use of the port. In order for the port to function properly such unprofessional and illegal practices have to be rooted out.

4. Port Operations and Capacity

In 1995 some 142.000 t of general and bulk cargoes were handled at the main terminal of the Port of Baku. In 1996 (first 9 month) the throughput was 60.000 t.

The Berths Capacity for 6 operational berths was calculated to be 4.21 million t.p.a.

The equipment capacity (crane capacity) is of 3.0 million t.p.a. at the quay side and 3.6 million t.p.a. in the complex, i.e. quay-side and "second line" cranes.

The storage capacity was calculated to be:

for open storage areas	1.73 mio t.p.a. (bulk)
	227.000 t.p.a (general cargo)
for covered storage areas	287.000 t.p.a. (with a dwell time of 15 days)

The total storage capacity is as follows:

Open Storage	
Bulk	1.728 mio t.p.a.
Break Bulk	0.227 mio t.p.a.
Containers	0.026 mio t.p.a.
Total	**1.981 mio t.p.a.**
Covered Storage	**0.287 mio t.p.a.**
Direct Transshipment	**2.160 mio t.p.a.**
Grand Total	**4.428 mio t.p.a.**

Preliminary Findings

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

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

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

The port was found unprepared for future container traffic. Neither 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.

5. Equipment, Workshops and Marine Craft

The assessment comprises the port's cargo handling equipment, its maintenance and repair facilities and the existing marine craft.

The findings and recommendations are as follows:

5.1 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 inoperational), 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.

5.2 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 workers' motivation.

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

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

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

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

5.3 Marine Craft

The major part of the marine craft should have dry docking, painting and general overhandling. Some vessels should be taken out of service. Once the finance situation of the port has improved, some new marine craft should be purchased.

6. Civil Engineering

At the main complex, some old steel structures protrude at the waterfront. The surface consist partly of asphalted area of covers of the culverts, of concrete pavement and of unpaved sections. In general, the pavement is not in good shape. The drainage system and the waterside culvert for power distribution and water supply are not in good shape. The fendering system is not any more in good shape.

The inspection of building has been limited to the warehouses. They are fit for cargo storage.

The timber terminal consists of three different construction phases. Due to high water level, the terminal was flooded until very recently. The water level had fallen a bit so that the apron was just above the water. However, the water did some serious damage to the apron and pavement.

The Absheron Oil Terminal needs rehabilitation of some parts of the construction. However, only jetties ## 1 and 3 belong to Baku Sea Port. It is not yet clear who owns the breakwater and who is responsible for its maintenance. The jetties # 2 and 5 are abandoned by now.

In general, emphasis should be put on the renovation of the main complex, i.e. the quay walls, the

surface and some other facilities.

The port is served with water, steam heat, electrical and waste water services. All these utility services are provided from municipal sources (the municipality of Baku) and are fairly reliable. During the 2nd phase planning, the utilities and other services will be highlighted in detail.

7. Environmental Assessment

As the project still is in an early stage, some of the recommendations mentioned below may need to be revised, based on the final engineering design that is selected.

Conclusions

With respect to the present environmental situation in the Port of Baku, in the city itself and Baku Bay, which has been described as "disastrous" by nearly all institutions concerned, negative impacts of the planned rehabilitation project of the multi purpose terminal can be considered as negligible, if the construction is carried out correctly, taking all environmental precautions into account.

Recommendations

As stated before, the main negative environmental impacts are not directly related to port construction and port operation.

The sound disposal of ship's waste is only possible in connection with a municipal waste management. At present this is not the fact. The municipal sewage is obviously untreated going to the sea and the garbage of Baku seems to be just partly collected and disposed. A proper municipal waste management is an absolute necessity.

(The Port of Baku should be prepared to respond to an oil spill, with updated equipment and training.)

8. Preliminary Port Development Concept

The Consultants recommend the following use of the different terminals in the future:

- The Port of Baku main terminal ("main complex") to be rehabilitated and to be used as a "Multi Purpose" / "Multi Mode" common user terminal. The necessary facilities and equipment to be made available.

- The container traffic operations at the Ferry Terminal to be done jointly with the container operations of the main terminal.

- To leave the Timber Terminal out of the present rehabilitation programme but consider it as a "spare area" for the future.

- Not to invest in Absheron Oil Terminal for the time being. Future rehabilitation works should be done with the participation of the main users and part-owners.

9. Conclusions

Based in the analyses made by the HPTI-team it can on a preliminary basis be concluded that the port has the potential to attract sufficient traffic volumes to warrant investments for rehabilitation works and for cargo handling equipment etc.

Further planning will be required in order to develop a port masterplan including a schedule of the necessary investment and their financial feasibility.

Volume II

Traffic Forecast and Economic Assessment

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Volume II: Traffic Forecast and Economic Assessment

Traffic Forecast and Economic Assessment

1. Economic Overview

1.1 Recent Economic Development

Azerbaijan's GDP has declined continuously since 1990. Total output, as measured by GDP - index fell from 100 in 1990 to 39,2 in 1995, with the largest reduction in transport and communication, followed by construction, industry and agriculture.

Table 1-1: Development of GDP in Azerbaijan since 1990

	1990	1991	1992	1993	1994	1995
GDP at current prices (billion manat)	1.5	2.7	24.1	157.1	1676.4	-
GDP constant prices (mio manat)	1466.0	1455.7	1126.8	866.4	676.7	575.2
Index 1990=100 of which by sector:	100	99.3	76.9	59.1	46.2	39.2
industry	100	92.2	75.4	59.2	43.9	-
agriculture	100	97.1	72.8	61.2	53.1	-
construction	100	102.7	76.5	51.1	27.1	-
transport & communication	100	90.3	43.0	28.8	23.0	-

Source: Azstat: Azerbaijan in figures,1994
Azerbaijan - country profile

The decline in output has been due to continuing disruption of trade links among FSU Republics, reduced oil production resulting from depletion of existing fields, and the dislocation resulting from the Nagorni Karabakh conflict. Real GDP is estimated to have fallen further in 1996. However, activity appears to be increasing in the informal sector and the emerging private sector.

1.2 Medium Term Prospects

Azerbaijan's medium term prospects are greatly enhanced by the country's petroleum resources. However, the country faces very serious economic and political constraints, and it is unlikely to regain former economic activity before the beginning of the 21st century.

The pace of development of Azerbaijan`s oil resources is the major economic variable in the country´s medium term outlook. Until World War II, Azerbaijan supplied most of the Soviet Union`s requirements for oil. Since then, its oil production has been steadily dropping (1994-9,6 Mio tons) as a result of depletion of its existing fields.

Carrying out the program to expand petroleum output is complicated by Russian claims regarding the petroleum resources under the Caspian Sea and by the need to locate and build a new pipeline to bring the increased output to international markets.

If the geopolitical difficulties with Georgia, Armenia and Chechnya cannot be overcome, Azerbaijan´s medium term economic prospects would be diminished. However, it is likely that existing difficulties will be overcome, perhaps with delay of a couple of years from the technically feasible schedule for expanding output of the oil industry.

If the delay were only two years, Azerbaijan would begin to receive significant benefits from increased oil products in about 2000. The major increase is expected to come in the following several years. Total export earnings are projected to increase to more than 2,5 billion US $ a year. In 1994 total export earnings from petroleum product exports were about 200 million US $[1]. (1)

2. Development of the Transport Sector

2.1 Review of Historic Traffic

Until 1991 Azerbaijan´s transport sector was integrated in the global transport system of the former Soviet Union, which was geared to move huge volumes of bulk commodities among centralized production facilities over long distances according to centralized and fairly rigid annual plans. Given the long distances within the country long and medium distance freight transport relied primarily on the railway, and to a far lesser extent on inland waterways. Road transport was used primarily for short trips as a feeder to the railway and for distribution of goods within urban areas. As a result, the railway system was the most intensively operated in the world, carrying about 90% of surface transport in terms of km, excluding pipelines.

Growth in transport levels is closely related to GDP . This relationship holds broadly true for Azerbaijan, where total freight transport has declined sharply since 1990, as has the economy as a whole. Transport´s relation to GDP shifts over time, too. Comparisons with other countries show that transport demand is also related to the structure of a country´s economy .

Research work concerning the former Soviet Union shows, that transport demand has grown rather faster than the general economic growth.

Total transport grew at on average annual rate of 4.0 percent between 1970 and 1990, while GNP grew at an annual rate of 1,3%. The relevant elasticity thus was about 3. The negative development within the last five years in Azerbaijan shows that there is a similar correlation between the decline of the whole economy and the volume of freight transport.

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[1] World Bank: Economic Review

Table 2-1: Development of the Freight Transport- Railway and Ships - in Azerbaijan (million tons)

Mode	1985	1991	1993	1994
Railway	n.a.	31.0	25.0	16.35
Sea	26.7	15.1	6.47	6.3
Total	n.a.	46.1	31.47	22.65
Index 1991=100		100	68	49

Source: Caspian Sea Water Level, Final report
Stat. Bundesamt; Länderbericht GUS-Staaen 1994
own calculation

As a consequence of this strong correlation the handling volume of the Port of Baku declined from 11,5 Mio tons to 1.0 Mio tons in 1995 (See Table 2-2).

Table 2-2: Handling Volume of the Port of Baku (1000 tons) since 1987

Types of Cargoes/Year	1987	1991	1992	1993	1994	1995	1996 *)	Estimate 1996
Building Materials	691.1	620.0	279.3	78.9	15.1	--	--	
Salt	238.3	19.4	81.5	35.0	34.4	111.4	60.0	80.0
Grains	0.0	0.0	20.6.	0.0	34.5	4.2	15.0	60.0
Timber/Wood	67.1	22.0	19.2	20.2	12.4	0.8	6.0	15.0
Metal	48.2	172.0	208.3	225.3	202.5	11.6	10.0	20.0
Equipment	3.8	2.5	9.7	3.5	2.6	2.2	3.5	5.0
Chemicals	133.4	5.0	4.6	23.4	0.9	--	--	--
Container	0.0	5.6	12.6	51.6	7.2	4.8	3.0	4.0
Other General Cargo	55.7	50.9	57.9	80.2	107.7	7.0	95.0	115.0
TOTAL DRY CARGO	1,238.1	897.4	693.7	518.1	417.3	142.0	192.5	299.0
TOTAL FERRY TRAFFIC	5,850.0	1,920.1	1,094.8	638.5	553.7	781.5	565.0	800.0
TOTAL LIQUID CARGO **)	n.a.	8,671.5	3,556.0	3,370.7	869.4	910.0	104.0	100.0
TOTAL TURNOVER	n.a.	11,489.0	5,344.5	4,527.3	1.840.4	1,014.5	861.5	1,199.0

Notes: *) = estimate on 9 month basis
**) = data of Caspian Shipping Company (Port of Absheron)
Source: Port of Baku

According to the Port of Baku authorities, the main trading directions of dry cargo in the past were

- imported building material from Turkmenistan
- imported salt from Turkmenistan

- imported cereals from Latvia
- transit timber from Russia to Iran
- transit metals from Russia, Ukraine, and Kazakhstan to Iran
- transit equipment and machines from western countries to countries in central Asia
- imported chemicals from Kazakhstan and Uzbekistan
- exported cotton to Bulgaria, Turkey and Italy

It is not worth while to analyze the decline of the handling volume in detail, because the knowledge of the reasons is not helpful for forecasting purposes, and because former traffic will never return to the pattern of the past.

2.2 Future Transport Demand

In looking to the future, there is a need to assess the range of economic growth likely to occur in Azerbaijan, changes in the structural nature of the economy and the mix of output, and the consequent impact of both on the demand for transport. Freight transport in the country will generally follow economic growth patterns and will continue to reflect overall economic developments for domestic inland traffic and international flows.

Economic forecasts are difficult in any circumstance. Uncertainty stems from the undetermined pattern of trade flows between and to and from TRACECA-states, the rate of economic recovery, and the degree of structural change within the economy once economic recovering begins.

Structural change and a move to a market economy will eliminate uneconomic, obsolete, and ecologically harmful industrial plants. A move from state owned industrial giants to smaller consumer-oriented firms is likely to alter transport patterns significantly.

The overall downturn of the economy and the expected shift from raw materials and industrial goods to lower-density general freight will keep overall transport levels below those of the eighties for years, probably until 2015. The other significant trend expected is an increasing shift from rail to road.

The dynamics of the shift from rail to road depends upon the onset and vigour of economic growth of TRACECA-states. Several forecasts for different Eastern Europe States assume the ratio of transport demand to GDP will be 1 to 1 for rail and road transport until the economy begins to grow; thereafter, it is assumed transport demand will grow at 1.25 to 1 ratio, with a general shift to road. The assumption is that transportation to a market-based economy will cause a shift toward lighter industrial and consumer goods. In a privatized, deregulated, market-oriented environment, road transport increasingly will become the mode of choice for shippers of high value or time-sensitive commodities, since road transport offers faster and more flexible service than railways.

Several factors affect the pace and size of the shift of freight traffic from the rail system to road transport:
- the speed at which the economy recovers and becomes more market-oriented,
- the rate of growth in new businesses that generate time and service-sensitive traffic that never will be shipped by rail
- the speed at which road transport services are privatized and pushed by the drive of self sufficiency to provide flexible, fast and reliable service.

As stated above the oil industry has to initiate the impacts in Azerbaijan, which foster the shift from rail to road transport. The contracts with different consortia, which were signed in the past, give hope, that this process will accelerate.

3. The Economic Environment of the International Seaport of Baku

Until 1990 the port of Baku was a main link in the overall railway system of the former Soviet Union as well as an important base for the Soviet shipping fleet. The Baku - based Caspian Shipping Co. (KSC) was the sole local owner of vessels - as well as of ports and shipyards - transporting more than 95% of the whole annual cargo volume shipped via the Caspian Sea, which was concerning the port of Baku mainly national and transit cargo.

Table 2-2 shows the development of cargo handled in the port of Baku since 1990.

But the old patterns of trade flows through the port of Baku will not be restored.

Future cargo flows through the port of Baku will mainly be influenced by
economic activity in the hinterland of the port

- the economic activity in the transit countries
- the quality and structure of the traffic links to the hinterland
- the quality and structure of the competing traffic corridors.

3.1 The Hinterland of the Port of Baku

The hinterland of a port normally can be defined by the region, from where the goods, which are handled in the port, come or to where they go. As the port of Baku is located at the Caspian Sea it is not so easy to separate the hinterland of Baku. For other ports with direct access to the oceans the hinterland can be defined much easier than in this case. For the port of Baku it is more difficult.

In this study we can define the three countries: Armenia, Georgia and Azerbaijan as the hinterland of Baku for goods which come from the East or to go to the East (mainly Turkmenistan, Kazakhstan, Uzbekistan, Tajikistan and Kirghizstan). These countries on the east side of the Caspian Sea, however, can be defined as the hinterland of Baku for goods which come from the West or go to the West out of these countries.

That is why we define the hinterland of Baku by the eight TRACECA-states.

Table 3-1 (overleaf) shows main indicators concerning population and area of the TRACECA-states. These figures show that, with exception of Armenia, all countries have a relative low population density.

Table 3-1: **Population and area of TRACECA-States**

Country	Population (Mio)	Area (1,000 km²)	Inhabitants / km²
Georgia	5.4	69.7	77.5
Armenia	3.5	29.8	116.7
Azerbaijan	7.3	86.6	84.6
Kazakhstan	16.9	2,717.3	6.3
Turkmenistan	3.9	488.1	8.0
Uzbekistan	21.6	447.4	48.4
Tajikistan	5.6	143.1	39.2
Kirghizstan	4.5	198.5	22.8

Source: Stat. Bundesamt

Gross domestic product in all TRACECA countries is - compared to international standards - very low in these countries. The standard of living, as shown by the population´s per capita GDP, varies between 400 and 1,500 US $ per year. These figures are even below figures for developing countries like Tunisia (1,800) or Mexico (3,300). Table 3-2 shows the GDP and GDP per capita figures for all TRACECA-states in 1993. Actual figures would show, that the standard of living decreased in the meantime.

Table 3-2: **GDP and per capita income in TRACECA-States 1993**

Country	GDP/capita 93 (US $)	GDP 1993 US $ billion
Georgia	500	2.8
Armenia	700	2.5
Azerbaijan	600	4.4
Kazakhstan	1,500	24.9
Turkmenistan	1,400	5.3
Uzbekistan	900	17.8
Tajikistan	400	2.3
Kirghizstan	700	3.1

Source: Prognos

Low GDP and low per capita income in underdeveloped countries is normally proceeded by a high share of agriculture and low share of the service industries relating to GDP. This rule can be confirmed by the special figures concerning the TRACECA- states, which are shown in Table 3-3.

Table 3-3: Distribution of GDP at current prices (%) 1993

Country	Agriculture	Industry	Other (services)
Georgia	52.3	23.7	22.9
Armenia	49.3	25.8	15.0
Azerbaijan	27.1	32.4	35.6
Kazakhstan	12.9	40.2	51.0
Turkmenistan	n.a	n.a	n.a
Uzbekistan	28.7	26.8	34.1
Tajikistan	19.0	47.7	34.4
Kirghistan	34.7	28.0	30.9

Source: World Bank: Statistical Handbook 1995

Azerbaijan, Kazakhstan and Tajikistan have high shares of the industrial sector relating to GDP, whereas Georgia, Armenia, Uzbekistan and Kirghistan show high shares of the agricultural sector relating to GDP. Only Kazakhstan has a considerable share of the service industry, which results probably from Kazakhstan´s role in the former Soviet Union.

3.2 Future Economic Activity in the Hinterland of Baku

It is presumptuous to try and make a long-term forecast of economic developments in the TRACECA - countries. The uncertainties regarding political stability are too great; slumps and radical changes in the production, employment and liquidity too dramatic. The transition has not yet progressed far enough and the danger of war and latent problems with minorities is very critical.

On the other hand, there have often been such dramatic changeover situations in the past for groups of countries, for instance west European reconstruction after World War II. There are many other countries; which have been devastated by wars, revolutions or government overthrows in the past. There are many examples for successful economic recovery of these countries.

One of the few certainties in quantitative empirical research on long term economic growth is that political instability has a negative effect on growth and investment. But that is the limit to certain knowledge.

For the purposes of the forecasts in this study the thesis is, that the economic future of TRACECA-states is already indicated to a large extent by how far they have today progressed in the process of transition, i.e. the creation of general conditions that allow for private-sector activities[2]. The following criteria to measure a country´s position in the process of transition

- privatization of companies
- restructuring of major companies
- price liberalization, freedom of trade
- protection of competition

[2] See Prognos: Economic and Demographic Development in Europe, Basel 1995

- liberalization of foreign trade and currency system
- reform of banking system
- existing EU trade restrictions
- foreign direct investment received

were used by Prognos in order to make a ranking list of the states.

In categorizing the countries the base of work to a large extent were studies carried out by EBRD[3]. It assessed the countries according to the above criteria on a scale of 1= very poor to 4 = very good. Better knowledge about single countries was used to correct the EBRD estimates. The results are shown in Table 3-4.

Table 3-4: Assessment of the position in the transition process and estimated average change of GDP in % p.a. 1995 - 2015

Country	Average position	Estimated growth rates (% p.a.)
Armenia	1.6	1.0
Azerbaijan	2.5	3.5
Georgia	1.3	0.5
Kazakhstan	1.5	1.0
Kirghizstan	2.4	4.0
Tajikistan	1.5	1.0
Turkmenistan	2.5	3.5
Uzbekistan	1.8	2.5

Source: Prognos as well as own estimations

The good position of Azerbaijan and Turkmenistan in this ranking list is a result of the good prospects for the oil and gas industry in this countries. Different international consortia partly even with Russian membership made contracts with the Azerbaijan authorities, which guarantee heavy investment in the exploration of new oil fields of the country.

A major boost has been given to the sector by US $ 8 billion investment agreement signed in 1994 to exploit the Azeri, Chirag and Guneshli deep water fields.

The government of Azerbaijan has now signed a second agreement for a US $ 1.7 billion project concerning the exploitation of the Karabakh field. Further negotiations are in progress concerning the Shakhdeniz field.

[3] EBRD: Transition Report

3.3 Development of the Transport Sectors in TRACECA-States

As stated above growth in transport levels is closely related to growth of GDP.

Forecasts for Eastern European states assume the ratio of transport demand to GDP will be 1 to 1 for rail and road transport until the economy begins to grow. Thereafter it is assumed transport demand will grow at 1.25 to 1 ratio, in other words the elasticity of transport demand is estimated to be 1.25.

We will use this elasticity to estimate the overall growth of transport demand in the TRACECA - states till 2015, which is shown in the following table:

Table 3-5: Growth of transport demand till 2015 in the TRACECA - states

Country	annual growth rate of GDP (% p.a.)	annual growth rate of transport demand (% p.a.)	total growth of transport demand in % 1995-2015
Armenia	1.0	1.25	28.2
Azerbaijan	3.5	4.40	125.0
Georgia	0.5	0.60	12.7
Kazakhstan	1.0	1.25	28.2
Kirghizstan	4.0	5.00	165.0
Tajikistan	1.0	1.25	28.2
Turkmenistan	3.5	4.40	125.0
Uzbekistan	2.5	3.30	91.4

Source: Prognos and own calculations

Following these figures the strongest growth of transport demand will occur in Kirghizstan followed by Azerbaijan, Turkmenistan and Uzbekistan. In the other TRACECA-states future growth in transport demand will be low and beneath 50 percent for the whole period.

3.4 Structural Changes in Transport Demand

In broad terms, the shift to a market economy will significantly reduce the level and composition of rail traffic as the economy as a whole will shift away mainly from the production of basic commodities and toward production of higher value goods. An additional shift will come with the growth of competition from the trucking industry, a shift that will be enhanced by increased shipper choice. The railway authorities will have to undergo a major change in operations and services in order to be able to respond to coming changes.

For the reasons described above freight road traffic is likely to increase faster than rail traffic, putting increased demands on the highway infrastructure.

As a market economy develops and shippers become free to choose modes of transport, short-haul rail traffic will be highly vulnerable to competition form trucking, which offers door-to-door service, more flexibility, and greater reliability. Moreover, it is probably unprofitable for rail to carry such short distance traffic, a conclusion railways will undoubtedly reach when they measure market costs and revenues according to lines of business.

Former trade and traffic patterns, based on traditional sources of supply and consumption, have been greatly disrupted. Much traffic that used to flow as a result of the larger planned economy no longer flows, and traffic will never return to the patterns of the past.

For the scope of this study mainly harbour related traffic is of importance. That is why we have to develop ideas about future traffic and trade patterns in the hinterland of the port of Baku.

3.5 Future Trade and Traffic Pattern in the TRACECA-States

As stated above it is presumptuous to make long term forecasts of economic developments in the TRACECA-states. To predict future traffic and trade flows is hazardous, too. But, nevertheless, we can try to formulate some expected trends, which are likely to develop during the process of integration into international labour division.

Until 1989 the TRACECA states were satellites in the COMECON-system. Their trade was mainly oriented on this system. Trade with hard currency countries hardly took place. Even in 1994-five years after disruption-the extra republic trade of TRACECA-states is relatively unimportant.

Table 3-6: Extra republic trade of TRACECA states in 1994 (million U.S. dollars)

Country	Exports	Imports
Georgia	43	94
Armenia	57	187
Azerbaijan	362	292
Kazakhstan	1,095	514
Turkmenistan	n.a.	n.a.
Uzbekistan	1,006	1,127
Tajikistan	382	374
Kirghistan	7.0	18

Source: The World Bank: Statistical Handbook 1995 States of the Former USSR

Only Kazakhstan and Uzbekistan export reasonable volumes of goods to economies outside the CIS-states (Commonwealth of Independent States). Azerbaijan exports totalled 362 million US $ in that year, the imports 292 million US$.

It can be expected that as a consequence of the integration into international trade the volumes of traded goods with partners outside CIS will grow considerably. That is why the traffic flows from West to East (Import from Western Europe and America to TRACECA) and from East to West (exports) will increase. Traffic flows between TRACECA and South East Asia are expected to grow as well.

The chances, however, for the integration process are quite different for the single TRACECA-states.

They depend mainly from

- the existing trade and exchange rate regimes
- the availability of natural resources
- the quality and competitiveness of industrial goods and
- the infra- and supra structure, which is necessary to handle international trade.

3.5.1 Trade Regulations

In Azerbaijan the dominant role of central government in foreign trade is being reduced.

All quotas and licensing restrictions for both imports and exports were removed by spring 1995 with the exception of some "strategic goods" such as oil and cotton.

Tariffs on imports from non FSU countries had been eliminated by August 1992. Since 1994 the official manat rate has been set weekly based on weighted average of exchange rates quoted by commercial banks. Both current and capital account convertibility is still heavily restricted.

Armenia has signed agreement on free trade with Russia, Ukraine, Turkmenistan and Georgia, which envisage exemption from customs, tariffs, and taxes. Agreements on trade-economic collaboration are signed on an annual basis. There is no export tax and import taxes are low on most products. Till now Armenia is not a member of the TIR-Convention. Certain formalities over payment problems still need to be resolved.

In Georgia the trade regulations have been liberalized since 1994. There are no heavy import restrictions. From former times some existing export restrictions should have be eliminated till end of 1965.

Kazakhstan is part of a common customs area with Russia, Belarus and Kirghizstan which has been politically adopted but the implementation of which is still being worked out. This will give exemption from customs tariffs and taxes.

In 1995 a new customs code was adopted which was based on a combination of Russian and international standards. However, this does not appear to have been fully implemented with worth still needing to be undertaken to provide the necessary regulatory documentation.

Kirghizstan is not a member of the TIR-Convention. However, it has an arrangement with Russia for allocation of carnets. They have approached the JRU and they are expected to become members by late 1996, subject to negotiation and legislation.

In Tajikistan duties on imports are considered low. Only 10 export items are taxable and import tax varies between 2 % and 10 %. Tajikistan is not a member of the JRU but has applied for CMR.

Uzberkistan was expected to join the TIR system in March 1995, following ratification last year. Ratification of the CMR convention was also indicated to come soon.

In Turkmenistan all exports and imports have to be registered and managed by a new stock exchange. Aim of this new law is to get an general over view about external trade relations.

For all TRACECA-states it can be recorded that liberalization of external trade more or less takes place. Since accession to the International Monetary Fund the TRACECA countries were pledged to strict macroeconomic stabilization programmes which included liberalization of trade regimes and unification of the exchange rates.

3.5.2 Availability of Natural Resources

The TRACECA-states partly possess rich natural resources, which can enable them to earn considerable amounts of hard currency in the future, a prerequisite for growing and stable imports of goods which have to be imported for the reformation and restructuring process in the various sectors of the economies. The two most important sectors in the TRACECA-states are agriculture and energy. In the energy sector, oil, gas and partly coal are the prime commodities. Ores and salts are major commodities, too. In agriculture, grain and cotton are the dominant commodities.

Table 3-7 gives an overview about the main national resources of TRACECA states.

Table 3-7: National Resources of TRACECA states

Georgia	Armenia	Azerbaijan	Kazakhstan	Turkmenistan	Uzbekistan	Tajikistan	Kirghistan
manganese, coal, timber	agricultural land	agricultural land, oil, gas, iron ore	chrome, lead, wolfram, cop-per, zinc, gold, iron ore, coal, oil	natural gas, oil, oidinebromine, sodium sulphate salts	natural gas, oil, coal, gold, silver, copper, lead, zinc, wolframite, tungsten	cotton, wheat	hydroelectricity, coal, gold, mercury, uranium

Source: The World Bank: Statistical Handbook States of the Former USSR

Concerning the agricultural sector Table 3-8 shows the major agricultural products grown in the TRACECA-states.

Table 3-8: Major agricultural products of TRACECA states

Georgia	Armenia	Azerbaijan	Kazakhstan	Turkmenistan	Uzbekistan	Tajikistan	Kirghistan
tea, citrus, citrus products	grain, potatoes vegetables, grapes	grapes, cotton, tobacco, fruits, vegetables	grain, wool, meat	cotton, grain, vegetables, fruits, livestock	cotton, grain, vegetable, fruit, silk cocoon	cotton, fruit grapes, wheat	livestock, cotton wool, silk, hemp, fodder, vegetable, fruit, grain

Source: The World Bank: Statistical Handbook States of the Former USSR

3.5.3 Industrial Activities in the TRACECA-States

Until 1989 the TRACECA-states were integrated in the COMECON-system of labour division. For Soviet economic planning purposes the former Soviet Union was divided in twenty planning regions - Azerbaijan, Georgia and Armenia belonging to the Trans-Caucasus, which were selected for special purposes within the whole complex.

Azerbaijan, for instance, was i.a. dedicated to produce most of the oil production hardware, or, as a second example to manufacture the air conditioning machines for the whole union.

As a consequence special industrial structures were developed in the planning regions. The main industrial activities of TRACECA-states are figured in Table 3-9:

Table 3-9: Main industrial activities of TRACECA-States

Georgia	Armenia	Azerbaijan	Kazakhstan	Turkmenistan	Uzbekistan	Tajikistan	Kirghizstan
light industry, iron, steel, teak tobacco	light industry, metallurgy, machine building, food processing, chemical production	oil production, equipment for oil products, petrochemicals, food and beverages, textiles, electrical equipment	metallurgy, heavy machinery, machine tools, petro-chemicals, food processing, textiles	textiles, oil and gas products, chemicals, electricity-generating	cotton harvesters, textile-machinery, chemicals, metallurgy, aircraft	agroprocessing, labour intensive industries, machine building	metallurgy, agricultural machinery, food processing, tobacco processing, textile, sugar refineries, leather

Source: The World Bank: Statistical Handbook States of the Former USSR 1992

However, most of the industrial plants in the TRACECA-states, are in a bad shape, because of the shortage of reinvestment, obsolete equipment and lack of maintenance. Low productivity is typical for the whole stock of capital in these countries, and the goods produced in these plants often fail in international competitiveness.

3.5.4 Transportation Infrastructure in the TRACECA-States

A prerequisite for a successful economic recovery of the TRACECA-states is the rehabilitation of the transport infrastructure. Without a system of railways, streets, channels, ports etc. in working order no economy can recover. Traffic infrastructure has the same importance for an economy as blood vessels have for the human body. If they are in bad condition parts of economy or even the total economy will languish for ever. Bad traffic links can endanger the whole recovery process.

An economy with rich natural resources needs exports to earn hard currency. Dollars are needed to import the goods the economy cannot produce or other economies can produce better because of comparative cost advantages.

For trading purposes good transportation infrastructure is an inescapable condition.

Railway

The international seaport of Baku is connected with its hinterland in the west by three railway lines

- the railway connection between Azerbaijan and Georgia and Black Sea ports of Poti and Batumi via Tbilisi. This line is also connected to the Russian rail system on the Black Sea and the port of Sochi and Tuapse and further to the Russian rail system via Krasnodar. From Tbilisi via Armenia it is also connected to the Turkish rail system
- the rail system between Azerbaijan and Armenia, with links to the Iranian and the Turkish rail system
- the rail system between Azerbaijan and Chetchnya with links to the Russian rail system both to the north to Azerbaijan and to the west to Grozny and Krasnodar.

The Turkmenbashi port rail terminal is connected to the Central Asian railway system via Ashkhabad onto the Central Asian republics. The system is linked to the Russian system via Kazakhstan providing connections to the Russian Far East and also to the Peoples Republic of China. The Turkmenistan rail way system is also connected to the Iranian system, which provides links to Teheran and the port of Bandar Abbas. There are also several east-west lines through Kazakhstan providing alternate routes between the Central Asian republics and Central and European Russia and norther Europe.

Two additional railway infrastructure projects are planned

- a rail line round Lake Van planned by the Turkish government
- a rail line along the east side of the Caspian Sea connecting Bandar Torkmen, Kizyl-Artek via Turkmenbashi to Astrakhan.

Both lines, if they are constructed, could catch cargo flows to and from Turkey via Iran and Central Asian republics or to Russia on the west side of the Caspian Sea without touching the port of Baku.

Road

Most roads in the TRACECA-states are in poor shape. Nevertheless the road transportation system is extensive and long distance road haulage is possible in several directions from the port of Baku:

- trucks to the west mainly choose the highway passing Evlakh, Gandja to Georgia and Turkey
- cargo to and from Iran and to the port of Bandar Abbas at the Arabian Gulf is shipped via the highway touching Lenkaran and Astara
- road traffic to and from the Russian Federation and to the new Baltic States Estonia, Latvia, and Lithuania is shipped via the highway at the western coast of the Caspian Sea.

The port of Turkmenbashi is connected with the hinterland by different roads to Kazakhstan, Uzbekistan, Tajikistan and Kirghizstan.

Major Inter-Central-Asian Highways are:

H 34 Tashkent-Dushanbe
H 37 Turkmenbashi-Ashgabad-Mary-Cardzaev-Bukhara-Samarkand
H 39 Almaty-Bishkek-Shikment-Tashkent-Samarkand-Termez
H 41 Bishkek - Djalal-Abad - Uzbekistan - Osh the Pamir - Dushanbe -Termez

The Transcaucasian route connects the Central Asian transportation system via Turkmenistan, the ferry-connection between Turkmenbashi and Baku with the Georgian ports of Poti and Batumi. This sea link provides competitive access from Central Asia to Western Asia , Ukraine and Europe via Chechnya and via Georgian and Turkish rail and road corridors. Additionally, it provides road connections to Iran.

Waterway

The Russian inland waterway system connects the ports at the Caspian sea with the Black sea and the Baltic sea.

Main restrictions reduce the importance of this waterway connections

- the Volga-Don is only open six months a year due to ice conditions,
- the normal fully loaded draft of 3,5 meters of a typical inland waterway vessel cannot be utilized, because of problems in the Nizniy Novgorod area and at the Kochetovsky lock and dam.

It is reported that Russian and Turkmenian authorities have made a commitment about a new ferry terminal in a new port at Asia near Astrakhan. This terminal could be a strong competition for the most transport chains, which could be connected by the port of Baku.

Additional port capacities are planned by Russia and Iran near Astara. It is reported that a common Russian and Iranian joint venture was founded, to finance new facilities for 10 million tons of cargo in Olja. This new port could a strong competitor for Baku especially for transit cargo from Russia to Iran.

Conclusions

The port of Baku could be a main link of different transport chains which are needed to handle

- the regional trade within the TRACECA-states,
- the exports and imports of Central Asian TRACECA-states with Europe and America
- the exports and imports of Georgia, Armenia and Georgia to and from the Far East, i.e. China, Korea, Japan etc.

There are different main traffic corridors, which compete for potential cargo flows with and within new trade patterns of TRACECA-states.

The most important competing routes, which divert traffic from the traffic chains concerning Baku are the corridors from Bandar Abbas through Iran and the different corridors through Russia mainly directed the new Baltic States and Western Europe.

4. The Port of Baku - Its Role in the Transportation Infrastructure

The purpose of this section to describe the strategic geographic position of Baku to emerge as a transportation and transshipment centre for cargoes to and from the Central Asian region. At the same there are factors that may divert cargoes from Baku.

4.1 Baku - A Transportation Gateway on the Caspian Sea

In the Soviet Union all water transportation activities in the Caspian Sea region was controlled from Baku through the Caspian Shipping Company headquartered in Baku. During the Soviet regime the company was developed into a conglomerate marine transportation and operations company comprising a varied fleet comprising tankers, dry cargo vessels, ro-ro vessels, passenger-rail ferries, offshore oil support vessels and ice breakers operating both in the Caspian Sea as well as on the Russian inland waterways and in worldwide trading. The company also controlled the ports of Baku, Bekdash and Krasnovodsk (now Turkmenbashi, Turkmenistan), Makhachkala (Dagestan), Aktau and Bautino (Khazakstan), and four major shipyards organized as Kaspmorsudoremont. In addition the company also performed agency services through Transflot, dredging services through Kaspmorput and wholesale and retail trading through Torgmortrans.

Following the break-up of the former Soviet Union and the establishment of the independent republics of Azerbadjian, Turkmenistan and Khazakstan the all encompassing influence of the Caspian Shipping Company was also divided between the respective newly independent republics. The company retained, however, control of most of its fleet of vessels, including the rail-passenger ferries operating in the Caspian Sea, the Port of Baku and the shipyards in Azerbadjian. The port of Baku was as of January 1, 1994 separated from the Caspian Shipping Company as an independent entity and is now operating as the International Sea Port of Baku.

The rail ferry services across the Caspian Sea established in 1961 were for many years a key strategic link in the transportation system in the region, and at the peak of operation the ferry services were operated by eight ferries of the "Dagestan" class operating in a continual shuttle. The key characteristics of these vessels are presented as Table 4-1. The ferry services operated with these vessels were:

Table 4-1

These vessels were operated on three routes, all originating in Baku:

- Baku - Krasnovodsk (now Turkmenbashi, Turkmenistan): The sailing distance is 165 n. miles, and the transit time is approximately 13 hours. At the peak operations in the mid 1980's this link was served with six or seven sailings per day. Currently the link is served by four to five sailings per week at a highly irregular sailing schedule, which is based on cargo availability.
- Baku - Aktau (Khazakstan): The sailing distance is 253 miles and the transit time is about 22 hours. Regularly scheduled sailings were performed until the service was stopped in 1992.
- Baku - Bekdash - Krasnovodsk: This ferry link of 280 miles sailing distance with a transit time of 22 hours was maintained with daily sailings in the 1980's. Currently this link is served on a sporadic basis.

Currently four of the Dagestan class vessels are used to serve the route between Baku and Turkmenbashi on an irregular and sporadic basis, whereby sailings are undertaken when the vessels have sufficient cargoes of railcars and trucks to fill the main deck. The remaining four vessels are operated in international ferry services outside the Caspian Sea region.

The Caspian Shipping Company was and is one of the major providers of general cargo, dry bulk and liquid bulk transportation services in the Caspian Sea, all of which is based in Baku. The vessels of the Caspian Shipping Company served both the transportation requirements inside the Caspian Sea as well as on the Volga Don and Volga Balt inland waterways. Following the breakup of the Soviet Union and a dramatic decline in the demand for transportation services, more than 40% of the total fleet has been moved outside the Caspian Sea and is operated on international transportation routes in the Baltic Sea, the Black Sea and the Mediterranean.

In addition to its role as a ferry terminal for the rail ferries operating in the Caspian Sea, the port of Baku has also acted as a transshipment point for cargoes to and from Iranian ports to and from Ukraine and Russia. The Tchetchniya conflict and the closing of the rail link through Tchetchniya has resulted in a dramatic decline in these cargoes. A future lasting peace agreement resulting in lasting peace in Tchetchniya and reopening of the rail link will most likely reestablish Baku as a transshipment point for Russian and Ukrainian cargoes.

Until 1991 the Caspian Shipping Company was the only local operator of vessels in the Caspian Sea. Since that time several companies owned by the republics bordering the Caspian Sea has been set up. These are:

- The North Caspian Shipping Company based in Astrakhan, Russia was established in 1992. This company operates three tugboats, ten one thousand dwt barges and seven river tugs. In addition several of the Russian river shipping companies like the White Sea - Onega Shipping Company, Volgo Tankers based in Samara and Volga Shipping Company based in Rostov also operate their vessels in the Caspian Sea.
- Kazakhstan currently operates three bulk carriers outside the Caspian Sea plus one small reefer vessel of about 60 dwt used to carry fruits and vegetables in the Caspian Sea. The Kazakhstan Shipping Company is reported to have ordered two ro-ro vessels of about 7,000 dwt for delivery in 1997-98.
- Turkmen Shipping Company based in Turkmenbashi currently operates four dry cargo vessels of about 3000 dwt. One of these vessels is a modern open hatch type vessel capable of carrying 176 TEU (twenty feet equivalent units of containers). Orders for two river sea bulkers have been placed, and plans have been presented to expand the fleet to 20 vessels. Currently the vessels are primarily engaged in the transportation of Turkmen cotton exports via Russian river system to the Black Sea and the Mediterranean.

- Two Iranian shipping companies are currently operating in the Caspian Sea. These are the Caspian Sea Shipping Company, which is a subsidiary of Iranian Line and Khazar Shipping Company. The latter company has since 1992 operated the route between Baku and Bandar-e-Anzali carrying primarily metals and containerized cargoes.

The establishment of the TRACECA rail and road link between the Georgian ports of Poti and Batumi and Baku with further links to the Central Asian republics will again not only revive the ferry link across the Caspian Sea, but will also have the potential of attracting transit cargoes to the port of Baku, primarily in the form of containers to be transshipped to and from the other Central Asian republics.

4.2 Baku - The emerging Oil Capital in the Caspian Sea Region

Aside from the TRACECA route, the most positive development for Baku as well as for the national economy of Azerbadjian, is the establishment of the Azerbadjian International Oil Consortium (AIOC) and its signing of a 30 year oil exploration agreement with the government in September 1994 . This is a consortium comprising British Petroleum, Statoil, Amoco, Pennzoil, Ramco, UNOCAL, McDermott, Turkish Petroleum, Lukoil and SOCAR, the Azerbadjian national oil company. The agreement comprises both exiting fields and exploration of new oil tracts offshore in the Caspian Sea. Currently the consortium is engaged in the upgrading of existing production fields and are also upgrading a semisubmersible drilling rig to undertake drilling in the Caspian Sea. The latter is expected to be starting exploration drilling within a relatively short time. There are also plans for a second rig to be upgraded and outfitted for exploration drilling.

At the present time these initial activities of the AIOC are generating cargo volumes, which are estimated to be approximately 20,000 to 30,000 tons per year, most of which is brought in via the TRACECA route. Some large oversize or overweight units, which cannot be handled on the railway, are also brought in by ship via the Volga Don waterway. In addition cargoes are brought by ship from Northern Europe via the Volga Balt waterway. Over the next few years until the year 2000, when the fields are expected to be developed for production, a conservative estimate of the annual cargo volumes needed to be transported for the AIOC is expected to exceed 200,000 to 300,000 tons per year by the year 2000. In the following years this volume is expected to increase as new fields will be opened for production.

Most of the cargoes transported for the oil industry is however brought directly to the facilities operated by the AIOC in two shipyards in the Baku region, ShelfProektStroi (SPS), which is a major module fabrication yard, and the STRIZH plant, where among other thing pipes are being coated before being transported to the offshore production sites. There will, however, also be cargo volumes shipped in by the many contractors of the AIOC coming in smaller volumes, which will have the potential of being handled at the port of Baku. Significant proportions of these cargoes will be supplies and equipment that will be containerized.

"First oil" (the initial major production volume in the terminology of the oil industry) from the fields developed by the AIOC is expected to start flowing in the next few years. For this purpose the decision has been made to upgrade and use an existing pipeline terminating in Novorossisk on the Russian Black Sea coast. A new pipeline will be constructed from Shangashaz via Tiblisi in Georgia to connect with the exiting pipeline to Novorossisk. The construction work will be completed in about 1.5 years from the present time (i.e. the spring of 1998). The construction and upgrading of this pipeline is also expected to generate substantial cargo volumes. The construction team will be headquartered in Baku.

The pipeline route for the "main oil" (full production of the fields) is still to be decided. The preference of the AIOC is reported to be from Baku through Azerbadjian and Georgia to the Black Sea and across Turkey to the oil terminal in Ceyhan on the Turkish Mediterranean coast. Other routes are also being considered. This pipeline will be constructed between the years 2000 to 2005.

Recently another oil consortium was established in Baku, the Caspian International Petroleum Co. (CIPCO), whose main participants are Pennzoil and Agip. CIPCO are currently in the process of starting exploration, and will initially drill three wells. For each well approximate 3000 to 4000 tons of supplies will have to be brought in through Baku, most of which will be transported on the TRACECA route. A representative from CIPCO has indicated that this consortium will rely heavily on the experience of AIOC in terms of transportation of its equipment and supplies once the operation is expanded, and the TRACECA route is expected to be used extensively.

Another interesting development in the oil industry, which could be of importance to the port of Baku, is the activities undertaken on the Tengiz field near the port of Aktau in Kazakhstan. These activities are led by the American oil company Chevron. Currently most of the activities are concerned with seismic exploration. If production quantities of oil are found, it will be a significant boost to the region and substantial quantities of cargoes will be transported to Tengiz via Aktau. The port of Baku would be well positioned to act as a transit port for supplies and equipment to be transported for both the current relatively small volumes and the future significant tonnages required for the development of the oil activities in this region.

4.3 Competitive and alternative Traffic Routes/Corridors for Cargoes handled in the Port of Baku

In addition to the TRACECA route there are two main railroad lines of importance to the port of Baku:

- The rail system between Azerbadjian and Armenia between Baku and Yerevan, which at the Julfa border station in Nagorno Karabak provides a link to the Iranian rail system. It is also connected to the Turkish rail system at Gumri. The very important border rail station between Azerbadjian and Iran located at Julfa, is currently occupied by Armenian forces and closed. Prior to the outbreak of hostilities this border station had a throughput capacity of 300 railcars per day and at any point in time more than 3000 Soviet railcars were in operation inside the territory of Iran.
- The rail system between Azerbadjian and Tchetchniya extending between Baku and Makhachkala and onto the Russian rail system both to the north to Astrakhan and to west to Grozny and Krasnodar. This system also connected with the several There are also several east-west rail lines through Kazakhstan providing alternate routes between the Central Asian republics and Central and European Russia and northern Europe. This rail link, which was a major artery for the transportation of transit cargoes to and from Ukraine and Russia through the port of Baku is now effectively closed due the hostilities between Russian forces and Tchetchniyan guerrillas. At the same time cargoes to and from Azerbadjian and the Central Asian republics using this line have been diverted to the ferry link between Baku and Turkmenbashi.

Two planned railway infrastructure projects could, if they are constructed, divert cargoes that currently are being shipped via the Baku - Turkmenbashi rail ferry service and cargoes from the port of Baku in general:

- A rail line round Lake Van planned by the Turkish government to improve shipments of cargoes to and from Turkey via Iran and the Central Asian republics.

- A rail line along the east shore of the Caspian Sea connecting Bandar Torkmen, Kizyl-Artek via Turkmenbashi to Astrahan would form a competitive alternative to shipping cargoes via the ferry and Baku connecting to the Russian rail system on the west side of the Caspian Sea.

Local cargoes to and from Iran and transit cargoes shipped through the port of Bandar Abbas in the Arabian Gulf are often trucked to and from Azerbadjian as an alternative to the use of the shipping lines operating between Baku and Iranian Caspian Sea ports.

Transportation on the Caspian Sea and access to the Russian inland waterway system enabling navigation through to the Black Sea and the Baltic Sea has always been an important part of the transportation infrastructure of Azerbadjian and a mainstay of the business of the port of Baku. There are, however, limitations and restrictions reducing the importance of the inland waterways:

- The Volga-Don is closed six months of the year due to ice conditions. The limited access of the waterway system has prevented potential users from considering this alternative, and have rather based their transportation requirements on the waterway system.

- There exist significant "bottlenecks" on the Russian waterways preventing the full use of the normal fully loaded draft of 3.5 meters of the typical inland waterway vessels:

  - A water level of only 6,3 meters compared to the design level of 68 meters at the Cheboksary hydroelectric station presents draft restrictions on the Volga river in the Niznij Novgorod area. Full 3.5 meter draft is maintained only a few hours per day
  - Channel erosion and a sinking water level at the Kochetovsky Lock and Dam on the lower Don river system allows a maximum draft of only 3.0 meters limiting the loading capacity of the vessels.

The possibly most serious detriment to the port of Baku is the fact that Azerbadjiani vessels have been denied access to the Russian waterways system. As a result of diplomatic differences between Azerbadjian and Russia concerning among other issues the rights to oil fields in the Caspian Sea basin caused Russian authorities to close the Volga-Don waterway system to Azerbadjiani vessels effective November 1995. Although it has been reported that the sanctions against Azerbadjiani vessels were lifted in June 1996, there have been reluctance of operators of Azerbadjian flag vessels to enter the Russian waterways from fear of sanctions.

Another development which may detract cargoes away from the port of Baku is the planned developments in the new port of Alia in the Volga delta. Russian authorities are reported to be undertaking construction of new ferry terminal in a new port at Alia near Astrakhan, which unlike Astrakhan, will be kept open and navigable all year. It is reported that Mr. Nikolai Petrovitch Zakh, Minister of Transportation of Russia, has made a commitment that the construction will be completed in the fall of 1996, and that ro-ro truck and rail ferry services are planned to operate between this port and Turkmenbashi and Iranian ports from the time that the port is opened. If these plans are realized, cargoes that historically were and in the future will have the potential of being shipped via the Baku - Turkmenbashi ferry service and via the port of Baku to and from Iran (i.e. prior to the Tchetchniya conflict and following a possible reopening of this rail transportation corridor) will be diverted and not be available to the port of Baku once the Tchetchniya conflict is resolved and the rail corridor through that country is reopened.

4.4 The Regulatory and legislative Environment and other Factors

In addition to the physical barriers that may influence the development of the port of Baku as the transportation gateway of the region, there are also several other institutional and other invisible or intangible barriers that may act as barriers to the development of the business of the port:

- Lack of a commercial professional attitude among port management and operational personnel, which is a heritage of the former Soviet system where no competition existed.
- The reported widespread practice at all levels in the port regarding the extortion of bribes or unofficial payments for the performance of services. Bribes are even reported to be extorted from drivers of trucks to obtain space on the ferry from Baku to Turkmenbashi.
- The operation of the ferry between Baku and Turkmenbashi, which is an important factor in establishing Baku as a transportation centre is not operated in accordance with normal practices for such ferry operations:
  - The practice of the Caspian Shipping Company of operating the ferry service on an ad hoc schedule and not starting a voyage until the main deck is filled with railcars and trucks. Truckers are reported to have been forced to wait five to six days or more, which is a strong deterrent to use the services of the ferry.
  - The road access is poor and staging/marshalling areas for trucks are virtually non-existent and well below acceptable standards.
  - The sanitary conditions are reported to be well below normal world standards on similar ferries.
  - The Caspian Shipping Company is reported to have used its political influence in attempts to maintain its prior monopoly in the transportation of Azerbadjian foreign trade by attempting to prevent foreign flag vessels to handle cargoes in the port of Baku.
- Customs officials and officers are reported rules and regulations and bureaucratic procedures in order to extort bribes from shippers and consignees and other users of the port.

5. The Cost of Transportation by Alternate Routes and Means of Transportation

The purpose of this section is to review the cost of transportation for cargoes originating in and destined for Azerbadjian as well as transit cargoes to and from the Central Asian Republics. Two alternative methods could be used for this purpose:

- Use current transportation tariffs and rates quoted by the operators of the various modes of transportation, i.e. rail, truck and water
- Estimate the actual production costs of the various modes of transportation.

An observation with respect to the transportation tariffs of the FSU countries is that these tariffs did not reflect the actual cost of the transportation work performed, and substantial subsidies or rebates compared to actual cost were reflected in these rates. As a result there have been numerous rate changes and increases in the transportation tariffs to eliminate the subsidies and to make the rates reflect the actual production costs. In addition it is difficult to obtain reliable quotes for transportation. Another factor to be considered in this connection is that cargoes may be transported on routes that currently are not available, but may be opened in the future. It was therefore concluded that this analysis should be based on estimates of the actual transportation costs rather than on existing tariffs. For this purpose the transportation costs were developed based on the evaluation of transportation costs performed for Lois Berger International Inc. for the port of Turkmenbashi using the Transportation Cost Module developed by the National Ports and Waterway Institute of the Louisiana State University.[4]

It will have to be recognized that cargoes will continue to be routed based on government fiat or decrees, or that transportation of some vital commodities will be subsidized and thus mode of transportation will be directed regardless of cost advantages or disadvantages. It is expected, however, that such activities will be gradually reduced to a minimum in the future.

The main assumptions made with respect to the development of the transportation costs are as follows:

Rail transportation

- The costs are based on non-specialized railcars operated in block trains between terminals, and both variable and fixed costs were included. It was assumed that 50 % of the cars were returned empty, while 50 % were loaded on the return leg.
- No border crossing charges other than to change the bogies from Russian to European gauge were included. Other charges are however considered to be negligible.
- The cost were based on standard rates of US $ 1.58 per ton -km in the FSU and US $ 1.80 in the EU countries based on German railway data.
- Routings were based on norms derived from railway specialists, while distances were obtained from railways and various railway publications

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Feasiblity Study: Turkmensbashi Port Development, Phase 1 Draft Report, submitted by Louis Berger International, Inc. et al.

Truck transportation

- A typical Eurostandard tractor and semitrailer with a maximum payload of 25 tons driven an average of 80,000 km per year was used as the basis for the calculations.
- 20 % empty hauls were assumed
- Distances were derived from transportation companies and from various publications, and the most common routings were used based on discussions with transportation companies.
- A transportation cost of US $ 0.027 per ton-km was used for the basis of the calculations.

Water transportation

- The cost were calculated based on a typical vessel trading on the Russian inland waterway system, the Black Sea and the Caspian Sea of 2,700 dwt.
- Draft limitations on the Russian waterway system were considered for vessel voyages on these routes. These are:
  - On the Volga river the draft is limited in the Niznyi Novgorod area. Due to low water level in the Cheboksary hydroelectric station, the maximum draft of 3.5 meters is only maintained once a day for several hours
  - On the Don river system lack of maintenance and erosion at the Kochetovsky Lock and Dam built in 1920 allows passage of vessels with a draft of 3.0 meters or less.

  As a result typical utilization rates of 0.6 for outbound shipments and 0.3 for inbound shipments were used for estimation of costs on the Russian waterway system. Significant cost advantages can be obtained if these "bottlenecks" are removed. There are, however, no indications that Russian authorities are planning to make the necessary investments to remove these obstacles to efficient water transportation.

- Shipping companies have indicated average utilization rates of 0.8 for outbound movements and 0.6 for inbound movements in other areas.
- Canal charges used in the calculations were US $ 9,800 for the Volga-Caspian Canal, US $ 13,300 for the Volga-Don Canal, US $ 4,000 for the Azov Canal and US $ 10,000 for the Volga-Balt Canal.
- Cargo handling charges vary considerably between the various ports. For the purpose of these calculations, handling charges of US $ 5 per ton were assumed for bulk cargoes, while US $ 20 per ton were used for general cargoes.
- Water transportation distances and thereby total transportation costs are assumed to be virtually the same for Baku and Turkmenbashi.

The costs for transit cargoes to and from the Central Asian republics represented by Ashgabad, Turkmenistan and to and from Baku, Azerbadjian were calculated for transportation of both bulk and general cargoes. The routes analyzed were only those where alternative transportation modes are available. Consequently cost calculations of movements within the Caspian Sea region where other modes of transportation will by definition not be competitive and can thus be considered "captive cargoes" for the ports on the Caspian Sea were not included. The analysis was therefore limited to encompass transportation costs to and from the following regions:

- The Black Sea
- Northern Europe and the Baltic Region
- Western Europe represented by Frankfurt, West Germany
- Southern Europe represented by the Adriatic Sea
- The United States

In addition the impact of eliminating the "bottlenecks" on the Volga Don waterway was evaluated. This is described below.

5.1 Shipments to and from the Black Sea Region

The following transportation route alternatives were considered for transport to and from the Black Sea region:

- By water - Novorossisk
- By rail - Novorossisk
- By water - Odessa
- By rail - Odessa (Ashgabat only)
- Via the TRACECA route by rail - Novorossisk
- Via the TRACECA route by rail - Poti
- Via the TRACECA route by truck - Poti
- Via the TRACECA route by rail and water - Odessa
- Via the Trancaucasian route by rail - Odessa (Baku only)

The results of this analysis is presented as Tables 5-1 and 5-2.

Tabel 5-1 Transportation Costs for Bulk and General Cargoes between the Black Sea Region and Ashkhabat

Origin/destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $
Novorossisk	Water, bulk	3,299	16	49.00
Novorossisk	Water, general cargo	3,299	16	64.00
Novorossisk	Rail	3,579	11	56.50
Novorossisk	TRACECA rail/ferry/rail via Poti	2,165	8	35.80
Odessa	Water, bulk	3,755	18	49.70
Odessa	Water, general cargo	3,755	18	64.70
Odessa	Rail	4,456	14	70.40
Odessa	TRACECA rail/ferry/rail via Poti/water	2,685	8	43.20
Poti	TRACECA rail/ferry/rail	1,685	7	28.20
Poti	TRACECA	1685	6	43.90

Table 5-2 Transportation Costs for Bulk and General Cargoes between the Black Sea Region and Baku

Origin/destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $	
Novorossisk	Water, bulk	3,299	14	35.20	
Novorossisk	Water, general cargoes	3,299	14	50.20	
Novorossisk	Rail	1,330	5	2,100.00	
Odessa	Water, bulk	3,755	18	35.90	
Odessa	Water, general cargo	3,755	18	50.90	
Odessa	TRACECA rail to Poti/water	1,850	5	28.40	
Poti	TRACECA rail	850	5	19.40	
Poti	TRACECA truck	850	3	23.00	

As shown in this table the TRACECA route is highly competitive both for bulk and general cargoes to all destinations analyzed compared to all water transportation. The cost advantage of the TRACECA route by water and rail between both Ashgabat or Baku and Novorossisk for bulk cargoes compared to all water transportation is US $ 14, i.e. a cost advantage of 39 %, while for general cargoes on the same route the cost advantage of the TRACECA route is approx. 50% compared to all water transportation. With the exception of cargoes that cannot be moved overland and via the ferry, such as oversize and special cargoes, the all water transportation route to and from the Black Sea will not be able to compete with the TRACECA route.

5.2 Northern Europe and the Baltic Region

The following routings were considered for shipments to and from Northern Europe represented by the port of St. Petersburg as the gateway to this region:

- By water via the Volga/Balt river and canal systems
- By rail through Kazakhstan and northern Russia (from Ashgabat only)
- By rail through Tchetchniya
- By rail ferry via Turkmenistan and Kazakhstan through northern Russia (Baku only)

As shown in Tables 5-3 and 5-4 water transportation via Baku for both bulk and general cargoes to and from this region will be competitive only as long as the Tchetchniya rail link is closed.

Table 5-3 Transportation Costs for Bulk and General Cargoes between the Norther Europe/ Baltic (St. Petersburg) Region and Ashkhabat

Origin/ destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $
St. Petersburg	Water, bulk	5,354	27	55.50
St. Petersburg	Water, general cargo	5,354	27	70.50
St. Petersburg	Rail	4,551	15	71.90
St. Petersburg	Rail- ferry - rail via Tchetchniya	3,635	13	55.50

Table 5-4 Transportation Costs for Bulk and General Cargoes between the Northern Europe/ Baltic (St. Petersburg) Region and Baku

Origin/ destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $
St. Petersburg	Water, bulk	5,354	25	41.70
St. Petersburg	Water, general cargo	5,354	27	56.70
St. Petersburg	Rail via Tchetniya	2,800	9	44.20
	Rail via ferry to Turkm. and Kazakhstan	5,386	18	86.70

When and if this rail link is reopened, water transportation will still be competitive for bulk cargoes. For general cargoes on the other hand the rail link via Tchetchniya will have a cost advantage of approx. US $ 11 per ton or 19% compared to water transportation.

5.3 Western Europe represented by Frankfurt, West Germany

The following transportation routes were considered as alternatives for cargoes to and from Western Europe:

- By water via a north Adriatic port and by rail to Frankfurt
- By rail via Kazakhstan and Russia (Ashgabat only)
- By rail via Tchetchniya and Brest to Frankfurt
- By rail via the TRACECA route to Poti and then by water to a north Adriatic port and then onwards by rail to Frankfurt
- By truck via the TRACECA route to Poti and then by water to a north Adriatic port and then onwards by truck to Frankfurt

The results of the analysis is shown as Tables 5-5 and 5-6.

Table 5-5 Transportation Costs for Bulk and General Cargoes between the Western Europe Region and Ashkhabat

Origin/ destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $
Frankfurt	Water, bulk Adriatic/rail	7,355	28	89.50
Frankfurt	Water, general cargo d.o.	7,355	28	119.50
Frankfurt	Rail	6,700	19	109.30
Frankfurt	Rail- ferry - rail via Tchetchniya	4,985	18	83.40
Frankfurt	TRACECA Poti/water Adriatic/rail, bulk	6,235	23	94.80
Frankfurt	TRACECA Poti/water Adriatic/truck, bulk	6,235	22	121.30
Frankfurt	TRACECA Poti/water Adriatic/rail, gen. cargo	6,235	23	124.00
Frankfurt	TRACECA Poti/water Adriatic/truck, gen cargo	6235	22	15,130.00

Table 5-6 Transportation Costs for Bulk and General Cargoes between the Western Europe Region and Baku

Origin/ destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $
Frankfurt	Water, bulk Adriatic/rail	6,800	26	75.70
Frankfurt	Water, general cargo d.o.	6,800	26	105.70
Frankfurt	Rail via Tchetchniya	4,150	15	68.60
Frankfurt	TRACECA Poti/water Adriatic/rail, bulk	5,400	20	94.80
Frankfurt	TRACECA Poti/water Adriatic/truck, bulk	5,400	19	100.30
Frankfurt	TRACECA Poti/water Adriatic/rail, gen. cargo	5,400	20	124.80
Frankfurt	TRACECA Poti/water Adriatic/truck, gen cargo	5,400	19	13,030.00

As long as the Tchetchniya rail corridor is closed, bulk water transportation is competitive for cargoes both to and from Baku and the Central Asian republics. If and when this route is reopened and considered safe by cargo owners, it will represent the low cost alternative and will have the potential to attract significant cargo volumes both to Baku and the Central Asian republics. In the latter case the Port of Baku will attract these cargoes through the ferry service.

It should be noted however that a cost effective transportation solution for both bulk and general cargoes to and from areas located close to the major ports of Western Europe and the UK would be to ship the cargoes by deep sea vessels to and from Poti and then use the TRACECA route to and from Azerbadjian and the Central Asian republics.

The cost of the alternative of shipping cargoes to and from Western Europe on the inland waterways systems, i.e. the Rhine, Main and Danube rivers and further across the Black Sea for transshipment in Poti or through the Volga Don waterway system, has not been evaluated in this analysis. Given that the conflict in the former Yugoslavia is resolved and unrestricted navigation is possible, this route could represent an interesting routing alternative for cargoes to and from the central regions of Western Europe.

5.4 Southern Europe represented by the Adriatic Sea

The following routes were analyzed in relation to shipments to and from this region:

- By all water
- By all rail (from Ashgabat only)
- By TRACECA rail via Poti and onwards by water
- By TRACECA truck via Poti and onwards by water

As shown in Table 5-7 the all water route is competitive both for bulk and general cargoes compared to the TRACECA route.

Table 5-7 Transportation Costs for Bulk and General Cargoes between the Southern Eurpope Region and Ashkhabat

Origin/ destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $
North Adriatic	Water, bulk	6,355	25	66.50
North Adriatic	Water, general cargo d.o.	6,355	25	81.50
Venice	Rail	6,145	17	99.30
North Adriatic	TRACECA Poti/water Adriatic rail, bulk	5,035	17	73.20
North Adriatic	TRACECA Poti/water Adriatic truck, bulk	5,035	16	88.90
North Adriatic	TRACECA Poti/water Adriatic rail, gen. cargo	5,035	17	88.20
North Adriatic	TRACECA Poti/water Adriatic truck, gen. cargo	5,035	16	103.90

Table 5-8 Transportation Costs for Bulk and General Cargoes between Southern Europe Region and Baku

Origin/ destination	Mode of transportation	Distance (km)	Transit time (days)	Rate per ton - US $
North Adriatic	Water, bulk	5,800	23	52.80
North Adriatic	Water, general cargo	5,800	23	67.80
North Adriatic	TRACECA rail Poti/water Adriatic, bulk	4,200	14	58.40
North Adriatic	TRACECA truck Poti/water Adriatic, bulk	4,200	13	68.00
North Adriatic	TRACECA rail Poti/water Adriatic, gen. cargo	4,200	14	73.40
North Adriatic	TRACECA truck Poti/water Adriatic, gen. cargo	4,200	13	83.00

The cost advantage of the water route is, however, only 10 % for bulk cargoes and 8 % for general cargoes. With its reduced transit time and possibility of operating all year, the TRACECA route will most likely be considered as an alternative route for shippers and consignees of both bulk and general cargoes.

5.5 The United States

In this respect two alternative transshipment ports were considered:

St. Petersburg is the northern gateway to the FSU states for both bulk and general cargoes. From this gateway the following routes were considered:

- All water via the port of St. Petersburg
- All rail via Kazakhstan and northern Russia (Ashgabat only)
- Rail via the Tchetchniya route
- Piraeus is one of the major transshipment points in the Mediterranean for containerized cargoes, and was therefore selected as the southern transshipment point for general cargoes. The following routes were analyzed:
- All water via the Volga Don waterway
- Transshipment by water to Poti and via the TRACECA route
- Poti was selected as the southern transshipment point for bulk cargoes. To and from Poti the cargoes would be carried via the TRACECA route

For bulk cargoes the sailing distance and thus the deep sea transportation costs for cargoes via St. Petersburg and Poti to and from the United States is expected to be at a similar level. Given this fact, the lowest cost alternative by far is transshipment in Poti via TRACECA route with a cost per ton of US $ 28.20 to Ashkhabat and US $ 13.40 to Baku. The cost difference for all water bulk shipments via the port of St. Petersburg compared to Poti is so significant that St. Petersburg would never be considered as the transshipment point for bulk cargoes as long as the TRACECA route is open for traffic.

For general cargoes the St. Petersburg can be a competitive transshipment port, if the rail route via

Tchetchniya is operational. In this case the cargoes would under any circumstance be routed via the ferry link between Baku and Turkmenbashi to and from the Central Asian republics. When the Tchetchniya rail connection is unavailable, the lowest cost alternative route is the TRACECA route via Piraeus and Poti. The freight rates of the container lines serving the ports of Piraeus and St. Petersburg will also be a factor that may influence the routing of containerized cargoes.

5.6 Cost impact of Elimination of Draft Restrictions on the Volga Don Waterway

As pointed out under the assumptions in the introduction to this section there are draft restrictions on the Niznyj Novgorood areas on the Volga River and at the Kotchekovsky lock and dam on the Don River, both of which reduces significantly the carrying capacity of vessels operated on the river system. The cost impact of these "bottlenecks" has been evaluated assuming that the vessels operating would achieve the same average utilization as if they were operated outside these obstructions.
The results of this analysis is presented as Table 5-9 overleaf.

Table 5-9 Effect of Restricted Draft on the Russian River Systems for Vessel to and from Baku and Turkmenbashi

Cost with Draft Restrictions

To/from	Kilo-meters	Vessel cost	Canal fees	Total cost	Outbound utiliz. rate	Cargo tons	Inbound utliz. rate	Cargo tons	Total cargo	Cost per ton	Cost per ton/km
St. Petersburg	4,799	61,768	39,600	101,368	0.6	1,620	0.3	810	2,430	41.72	0.0087
Novorossisk	2,744	38,528	47,020	85,548	0.6	1,620	0.3	810	2,430	35.20	0.0128
Odessa	3,200	40,320	47,020	87,340	0.6	1,620	0.3	810	2,430	35.94	0.0112
North Adriatic	5,800	81,200	47,020	128,220	0.6	1,620	0.3	810	2,430	52.77	0.0091

Cost without Draft Restrictions

To/from	Kilo-meters	Vessel cost	Canal fees	Total cost	Outbound utiliz. rate	Cargo tons	Inbound utliz. rate	Cargo tons	Total cargo	Cost per ton	Cost per ton/km
St. Petersburg	4,799	61,768	39,600	101,368	0.8	2,160	0.4	1,080	3,240	31.29	0.0065
Novorossisk	2,744	38,528	47,020	85,548	0.8	2,160	0.4	1,080	3,240	26.40	0.0096
Odessa	3,200	40,320	47,020	87,340	0.8	2,160	0.4	1,080	3,240	26.96	0.0084
North Adriatic	5,800	81,200	47,020	128,220	0.8	2,160	0.4	1,080	3,240	39.57	0.0068

Reduction in Vessel Transport Cost without Draft Restrictions

To/from	Cost per ton	Percent reduction
St. Petersburg	10.43	25
Novorossisk	8.80	25
Odessa	8.99	25
North Adriatic	13.19	25

Source for Cost Data: Feasibility Study Turkmenbashi Port Development
Phase 1 Draft Report, submitted by Louis Berger International, Inc. et al. March 1996

As shown in this table the transportation costs between Baku/Turkmenbashi and the major origins and destinations would be reduced by between US $ 9 and US $ 13 equivalent to 25% of the ship transportation costs. If these "bottlenecks" were eliminated, the competitive situation of the all water transportation would be affected as follows:

- For bulk cargoes to and from the Black Sea region the competitive advantage of the TRACECA route will be reduced and water transportation will improve its competitve position, particularly to and from Odessa. For general cargoes on the other hand the competitive situation of the TRACECA route will not be changed in any significant way.
- For the Northern Europe and the Baltic Region water transportation both for bulk and general cargoes will be reduced by close to US $ 10.50 and will become a highly competitive transportation alternative even when the Tchetchniya rail route is open.
- For transportation to and from Western Europe represented by Frankfurt, West Germany the ship transportation cost reduction will be more than US $ 13 per ton, which will make water transportation the lowest cost alternative even when the Tchetchniya corridor is open. For general cargoes the Tchetchniya rail route will still remain the lowest cost alternative. As a consequence elimination of the draft restrictions will greatly enhance the competitive position of the water transportation route for general cargoes compared to the TRACECA route.
- To and from Southern Europe represented by the Adriatic Sea water transportation is the low cost alternative for bulk and general cargoes even with the draft restrictions. A cost reduction of more than US $ 13 as a result of the elimination of the draft restrictions will greatly enhance the competitive position of all water transportation.
- For cargoes to and from the United States the removal of the "bottlenecks" will have no impact on the competitive situation.

5.7 Overall Observations and Conclusions

The observations and conclusions that can be drawn from this analysis for bulk cargoes are in the main:

- Water transportation is the competitive alternative for cargoes to and from the Southern European region represented by the North Adriatic and Northern Europe/Baltic region represented by St. Petersburg.
- The rail corridor through Tchetchniya is the lowest cost alternative for bulk cargoes to and from Western Europe represented by Frankfurt and is also a serious competitor to water transportation to and from St. Petersburg. Cargoes on this route to and from the Central Asian republics will use the ferry service between Baku and Turkmenbashi.

- The TRACECA route is the lowest cost transportation alternative for bulk cargoes to and from the Black Sea region and the United States, and will represent the best alternative transportation route for bulk cargoes to and from Southern Europe when the waterways are closed during the winter.
- Elimination of the draft restrictions will change the competitive position for bulk cargoes to and from Western Europe represented by Frankfurt and will make water transportation the low cost alternative for this region. Furthermore it will make water transportation to and from Northern Europe represented by St. Petersburg even more competitive.

For general cargoes the following observations and conclusions can be drawn:

- The TRACECA route is the lowest cost alternative for the Black Sea region and the United States. Like for bulk cargoes, the TRACECA route will be the alternative route to water transportation to and from Southern Europe.
- The Tchetchniya corridor is the lowest cost alternative for general cargoes to and from Northern Europe (St. Petersburg) and Western Europe (Frankfurt). In both cases the Baku - Turkmenbashi ferry will be used to and from the Central Asian republics.
- Water transportation is the most cost effective mode of transportation for general cargoes to and from Southern Europe represented by the North Adriatic region. The TRACECA route will represent a competitive alternative when the inland waterways are closed during the winter.
- The elimination of the draft restrictions on the inland waterways will shift the competitive position of general cargoes to and from the Northern Europe/Baltic route in favor of water transportation and further increase the existing competitive advantage for general cargoes to and from Southern Europe. For the other regions the elimination of draft restrictions will not change the competitive situation.

It is impossible to evaluate all possible routes and origins and destinations. The analysis should nevertheless present an overview of and guideline to the competitive position of various routes and modes and transportation to and from typical destinations.

6. General Developments in Transportation Industry Influencing the Port of Baku

The purpose of this section is to describe the general developments in the world transportation industry that may influence the future development of the port of Baku, and also present business opportunities that may present themselves to the port as a result of these developments.

6.1 General Trends and Developments in the Transportation Industry

While it will be outside the scope of the present project to describe an overview of developments in the world transportation industry, there are , however, some general developments that will be highly pertinent and germane to the future development of the port of Baku:

- Focus on transportation and logistics. Industrial companies have increasingly recognized transportation as an important function in their overall cost structure. Physical distribution, transportation and logistics management using techniques such as "just in time" (JIT) and others are increasingly used to put focus on the material handling, warehousing and transportation costs of a company. Increasingly freight forwarders are being employed by the companies as specialists to assist in finding the best transportation and logistics management solutions.
- The freight forwarding industry. From being a highly fragmented industry with small entities operating locally or at most nationally within a country primarily providing documentary and customs clearance services, the freight forwarding industry is developing to be dominated by major international and multinational groups with offices and operations worldwide employing tens of thousand employees providing a wide variety of transportation and related services to their customers. These companies control vast volumes of cargoes, and are able on behalf of their customers, the users of transportation services, to negotiate favorable terms for transportation and other services. The industry is currently dominated by companies located in Germany, Switzerland, Japan and Sweden. Major forwarding companies working for the oil industry is already establishing a presence in Baku. Others are expected to follow as the volumes of cargoes transported to and from and also through Baku to and from the Central Asia Republics are increasing. The freight forwarders represent an important customer group for the port of Baku.
- The unitization and containerization of the general cargo trades. In order to reduce the handling cost, reduce the need for packing, reduce the possibility of cargo damage and theft and to enable the multimodal handling of the cargoes, general cargoes shipped in national and international trades are increasing unitized in trailers or in containers. Currently an average of 80% of the general cargoes shipped in international trades is containerized.
- The international container transportation companies have changed from being merely shipping companies providing water transportation services to become providers of multimodal transportation services using all modes of transportation between ports and so called "Container Freight Stations" (CFS). Through bills of lading are often issued to such CFSs. The port of Baku has the potential to become and should endeavor to establish itself as a CFS. (Please see Section 6.3.1 below.)
- General cargoes that are shipped in large quantities to warrant shipment in full or partial shipload lots, also called neobulk cargoes, are often transported in purposebuilt or specially adapted vessels, such as ro-ro automobile carriers, specialized reefer vessels for perishable and frozen cargoes, "open hatch" bulk vessels for forest products etc. Such specialized may also be introduced on the Caspian Se and the Russian waterways.
- Emphasis on road as opposed to rail transportation. The transportation philosophy and policy of the

former Soviet Union was to use the inland waterways and the railroad system for long distance transportation, and trucks for short distance and local transportation and distribution. In the rest of the world use the inland waterways where available and navigable is important for the transportation of bulk cargoes. For land transportation trucking has increasingly captured market shares from the railroads and in most countries the truck transportation industry performs most of the the transportation work performed.[5] The railroads have responded to the challenge posed by the truck transportation industry by providing services that can be competitive with or complementary to the trucking industry (e.g. TOFC (trailer on flat car) or COFC (container on flat car) services).

- Truck transportation companies and freight forwarders in their efforts to reduce the cost of transportation are increasing shipping unaccompanied trailers (e.g. 13.60 meter Eurotrailers) via ferries in short sea trades or by railroad (TOFC). At the port or railroad station of destination the trailers are met by a truck, which transports the trailer to the destination. Subseqently the trailer is reloaded and returned unaccompanied by ferry or rail. It is expected that such services will also develop on the ferry service between Baku and Turkmenbashi and other ferry links that may be developed to and from the port of Baku.

The successful ports of the world, both large and small, have recognized and adapted to the requirements of the users of transportation services and the major participants in the transportation industry. For the port of Baku it will be important to redefine its role in the transportation scene of the region in view of the general developments in the local, regional and worldwide transportation industry.

6.2 Developments in the Short Sea and Ferry Transportation

The Caspian Sea shipping services are comparable to the trades in the Baltic and North Sea and in the Mediterranean areas, and some observations of the developments of these trades may be relevant to the trades served by the port of Baku:

- The ferry transportation market has come more clearly segmented. The segments are:
  - Leisure/cruise/ recreational market - this market is served by modern passenger ferries with all types of facilities for passengers. The main source of income is the sale of tax free goods (e.g. alcoholic beverages, tobacco, chocolate and candy etc.). Transportation of trucks and trailers (and in some instances also railcars) is a supplementary source of revenues.
  - The transportation market - this market is divided in two segments:
  - Passenger transportation with fast ferries - these services are provided by catamaran or monohull fast ferries capable of transporting up to 500 to 600 passenger in addition to automobiles (and in some cases buses)
  - Ferry transportation of trucks and trailers - this is performed by combination passenger and truck/trailer/container ro-ro vessels. The number of passengers/drivers that can be accommodated is generally limited (e.g. up to 12 to avoid the need for a passenger certificate and up to 250 - 300 passenger spaces). These vessels are generally referred to as ro-pax vessels by the ferry industry. The "Dagestan" type vessels of the Caspian Shipping Company serving the ferry link between Baku and Turkmenbashi would be considered typical ro-pax vessels.

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1 In some European countries the use of truck transportation has become so pervasive as to congestion and pollution that laws and regulation have been imposed prohibiting truck transportation industry to operate during the weekends (e.g. Germany) or to limit the through traffic of trucks (e.g. Austria).

- The liner transportation market - this market is served by small general cargo vessels (typical cargo capacity from 3,000 to 8,000 dwt) carrying general cargoes in break bulk and containers. Some vessels are also equipped to handle rolling cargoes (ro-ro vessels). In addition small ro-ro or lo-lo container vessels (from 100 up to 1000 TEU capacity) provide container feeder services on regular routes between major container ports functioning as load centers and smaller ports not served by the large container vessels
- The neobulk market - this market is often served by specialized vessels carrying full or partial shipload lots of general cargoes. Examples would be small reefer vessels carrying frozen fish, ro-ro automobile carriers, specialized vessels for forest products etc.
- Liquid and dry bulk vessels - most of these vessels are similar to those operating in the Caspian Sea. For some dry bulk trades vessels have been equipped with specialized cargo handling equipment onboard - so called "selfunloaders" - to reduce cargo handling cost and time.

6.3 New Business Opportunities for the Port of Baku

While it is always difficult to relate a generalized statement of world or regional developments to a specific port, such as the port of Baku, there are some obvious opportunities presented to the port of Baku.

6.3.1 Baku as a CFS - "Container Freight Station"

The opening of the TRACECA route, the developments of the oil industry in the region and the general recovery of economic activity both in Azerbadjian and the other Central Asian republics, the overall volume of general cargoes, most of which will be containerized in the relatively near future, will create the need for the establishment of a "Container Freight Station" (CFS) in the Baku area. The primary functions of such a CFS are in the main:

- Function as the terminal, through which container to and from the Baku area and its immediate hinterland are handled.
- Provide stuffing and stripping of "less than containerload" (LCL) cargoes
- Storage of cargoes and containers
- Transshipment of containers between different modes of transportation
- Repair and maintenance of containers as needed.

The port of Baku has all the prerequisites for the establishment a CFS for the Baku area:

- The port has the necessary area and storage facilities required
- The port has cranes and handling equipment for lifting of containers. Relatively small investments are required for additional handling equipment
- The port has all the functions required of a multimodal terminal:
- It has more than sufficient railroads tracks to be able to handle significant volume of cargoes and containers to and from railroad cars
- It has adequate road access and is serving the trucking industry both in the port and in the ferry terminal
- It has direct access to the general port and the ferry terminal for onwards shipment of the cargoes and containers
- It has a labor force of skilled cargo handling professionals.
- Customs officials are already established n the port, and the process has been started to establish the port area as a "Free Port Zone".

The alternative sites for a CFS in the Baku area would be one of the existing railway yards, since the major volumes of containerized cargoes can be expected to be received via rain in block trains operated on the TRACECA route. The importance of the TRACECA route and thus the railway in the transportation of containers to and from Baku clearly signifies that the establishment of a CFS in Baku will have to be done in close cooperation with the railway authorities.

The establishment of the port of Baku as a CFS will represent a significant business opportunity for the International Sea Port of Baku, which will also greatly enhance the port's marketability as a multimodal cargo handling center and thus create new business opportunities. The time frame, for which this business opportunity will be available to the port will be relatively short, and immediate action should therefore be taken by the port management to establish the port as a CFS.

6.3.2. Potential for attracting new Operators - New services to the Port

Although the port of Baku is open to serve vessels of all nationalities, the ships of the Caspian Shipping Company has dominated the use of the port. The challenge for the port will be to attract new operators to establish both bulk and regular liner services between Baku and the other ports in the Caspian Sea and on the Russian waterway system. Potential new services could be:

- Nonscheduled bulk and general cargo shipping services on the Russian waterways and on the Caspian Sea provided by ships of the other operators serving the region.
- Entry of regularly scheduled container feeder /ro-ro vessels capable of carrying both containers and trucks/trailers/rolling cargoes to operate between Baku and other Caspian Sea ports. The trade route between Baku and Aktau, Kazakhstan would most likely be the most interesting new link to open, while also the Iranian and Russian ports on the Caspian would provide interesting opportunities for enterprising shipping operators. The establishment of Baku as a CFS would be an added impetus to the establishment of such a ferry/feeder services.
- Entry of a conventional ro-ro ferry vessels to operate in competition with existing rail ferries between Baku and Turkmenbashi. The increased truck/trailer/container traffic opens the possibility of establishing an alternative service on this route.

Active contacts with and marketing of the services of the port of Baku will be required to attract new operators to use the port as a basis for new water transportation services.

7. Future Cargo Potentials of the Port of Baku

In former times more than 11millions tons of cargo were handled in the port of Baku. As stated above this cargo volume resulted mainly from strategic economic planning of the former Soviet Union.

Future traffic potentials, however, well be created mainly by the trade volumes of various independent states. The trade patterns of tomorrow are determined by the rules of comparative cost advantages, trade, regulations, traffic infrastructure, natural resources and overall economic development etc.

7.1 Commodities traded by TRACECA-States

Volume and structure of a country's imported and exported goods will not change dramatically within a short term. Exports are mainly determined by natural resources and by the structure of the economy and especially the structure of the capital stock. Imports are influenced by the availability of hard currency , the industrial structure, the needs of the population and, very important, by the development of income.

As figures stated above all TRACECA-states are on comparable development standards measured by GDP per capita. The capital stocks in these countries are mostly in a hopeless poor condition which will not allow high capacity utilization like in former times. Agricultural production - with exception of Kazakhstan - does not reach for self sufficiency. That is why these countries mainly have to import food, consumer goods and project cargo for industrial investment, and when they have no own energy resources, oil, gas and products thereof.

Exports of the states in the hinterland of Baku are mainly determined by their natural resources, the structere of industrial production and the degree of agricultural production.

Table 7-1 gives an overview over main commodities normally traded by the economies concerned.

Table 7-1: Commodities traded by TRACECA-states

Georgia

Exports:	Imports:
grain	oil and gas
aliminium	oil products
ores	food
bauxite	
coal	

Armenia

Exports:	Imports:
machines	oil and gas
food	iron and steel
products of the light industry	chemicals
	machines
	products of the light industry
	food

Azerbaijan

Exports:	Imports:
chemicals	chemicals
mineral products	vegetable oil
non ferrous metallurgy	machines
fibres	mineral products
agricultural products	beverages
machines	tobacco
	meat
	construction materials
	agricultural products

Kazakhstan

Exports:	Imports:
fuel and oil products	fuel and oil products
ferrous metals	machines
copper and copper products	electrical equipment
chemicals	vehicles
grain	ferrous metal products
salt	sugar
ores	chemicals

Turkmenistan

Exports:	Imports:
natural gas	grain
cotton	textiles
oil products	clothing
	pipes
	food

Uzbekistan

Exports:	Imports:
cotton	grain
tractors	rice
non ferrous metals	sugar
	tea
	food

Tajikistan

Exports:	Imports:
cotton	food
aluminium	clothing
agricultural products	sugar
cars	oil; oil products
gold	grain
mineral ores	

Kirghizstan

Exports:	Imports:
antimony	oil; oil products
tobacco	natural gas
non ferrous ores	timber
wool	metal products
cotton	chemicals
leather	non ferrous metals
machinery	
electrical goods	
clothing	
sugar	

Source: TACIS Inception Report
bfai: country reports
The World Bank

7.2 Estimation of traded Cargo Volume

Available statistical data concerning foreign trade normally give information about values of traded goods. For traffic purposes these data, however, are without significant relevance.

In the feasibility study for the Turkmenbashi port a review of World Bank country reports on the Central Asia region and other published materials was conducted in order to get information about trade volumes in this region. The review was suplemented by interviews with officials of the World Bank and other authorities. Some results of these efforts are figured in table 7-12 overleaf.

Table 7-2: Central Asian Countries Imports by Major Commodities and Origin, 1994

Country	Commodity	Unit	From CIS	From other countries	Total
Azerbaijan	Bread grain	Thousand tons		149.0	**149.0**
	Grouts	Thousand tons	0.7	0.5	**1.2**
	Sugar	Thousandtons	69.0	4.7	**73.7**
	Vegetable oils	Thousand tons	1.8	12.7	**14.5**
	Potatoes	Thousand tons	1.1	28.0	**29.1**
	Raw oil, condensation gas	Million tons	0.7	0.0	**0.7**
	Mineral or chemical fertilizer	Thousand tons	12.0		**12.0**
	Cotton fabric	Million meters	2.0		**2.0**
	Leather shoes	Thousand pairs	1.0	11.0	**0.0**
	TV sets	Thousands	0.0	0.0	**12.0**
	Buses	Thousands	1.0	1.0	**0.0**
	Cars	Thousands			**2.0**
Kazakhstan	Bread grain	Thousand tons		0.3	**0.3**
	Vegetable oils	Thousand tons	5.2	15.0	**20.2**
	Sugar	Thousand tons	40.0		**40.0**
	Gasoline	Thousand tons	332.0		**332.0**
	Diesel	Thousand tons	703.0	0.0	**703.0**
	Furnace oil	Thousand tons	380.0	0.0	**380.0**
	Leather shoes	Thousand pairs	0.1	0.2	**0.3**
	Refrigerators	Thousands	16.0	0.9	**16.9**
	TV sets	Thousands	23.0	11.9	**34.9**
	Buses	Thousands	0.6	0.1	**0.7**
	Cars	Thousands	4.2	0.5	**4.7**
	Trucks	Thousands	2.9	0.0	**2.9**
Kirghizstan	Bread grain	Thousand tons			
	Vegetable oils	Thousand tons	3.6		**3.6**
	Sugar	Thousand tons	5.0		**5.0**
Tajikistan	Bread grain	Thousand tons		296.0	**296.0**
	Vegetable oils	Thousand tons	2.6		**2.6**
	Sugar	Thousand tons	0.1	8.4	**8.5**
Turkmenistan	Potatoes	Thousand tons	0.4		**0.4**
	Bread grain	Thousand tons		338.0	**338.0**
	Vegetable oils	Thousand tons	35.0	19.0	**54.0**
Uzbekistan	Potatoes	Thousand tons	9.7	71.0	**80.7**
	Bread grain	Thousand tons		1.478.0	**1.478.0**
	Sugar	Thousand tons	48.0	173.0	**221.0**
	Cotton fabric	Million meters	17.0	0.3	**17.3**
	Cars	Thousands	0.6	0.3	**0.9**
	Trucks	Thousands	0.4	0.1	**0.5**

Source: Feasibility Study: Turkmenbashi Port Development, Phase I, Draft Report

Table 7-3: Central Asian Countries and Azerbaijan Exports by Major Commodities and Origin, 1994

Country	Commodity	Unit	To CIS	To other countries	Total
Azerbaijan	Gasoline	Thousand tons	0.6		**0.6**
	Diesel	Thousand tons	386.0	1.083.0	**1.469.0**
	Furnace oil	Thousand tons	27.0	42.0	**69.0**
	Cotton fibre	Thousand tons	13.0	66.0	**79.0**
	Buses		25.0		**25.0**
Kazakhstan	Bread grains	Thousand tons	1.867.0	22.0	**1.889.0**
	Coal	Million tons	30.0	0.6	**30.6**
	Raw oil, condensation gas	Million tons	5.7	0.1	**5.8**
	Gasoline	Thousand tons	136.0	16.0	**152.0**
	Diesel	Thousand tons	61.0	873.0	**934.0**
	Furnace oil	Thousand tons	19.0	356.0	**375.0**
	Cotton fibre	Thousand tons		41.0	**41.0**
	Refined copper	Thousand tons		122.0	**122.0**
	Raw zinc	Thousand tons		91.0	**91.0**
	Tractors	Thousands	1.4	0.1	**1.5**
Kirghizstan	Mineral or chemical fertilizers	Thousand tons		7.5	**7.5**
	Cotton fibre	Thousand tons		9.7	**9.7**
	Refined copper	Thousand tons		1.6	**1.6**
	Unrefined aluminium	Thousand tons		1.8	**1.8**
Tajikistan	Cotton fibre	Thousand tons	7.0	64.0	**71.0**
	Unrefined aluminium	Thousand tons		205.0	**205.0**
Turkmenistan	Natural gas	Billion cubic meters	25.0		**25.0**
	Mineral or chemical fertilizers	Thousand tons	0.4		**0.4**
	Cotton fibre	Thousand tons	18.0	237.0	**255.0**
Uzbekistan	Raw oil, condensation gas	Thousand tons	636.0	28.0	**665.0**
	Mineral or chemical fertilizers	Thousand tons	220.0	288.0	**508.0**
	Cotton fibre	Thousand tons	530.0	563.0	**1.093.0**

Source: Feasibility Study: Turkmenbashi port development
Phase I, Draft Report

These data show that roughly 45 mio tons were exported and 5 mio tons were imported by six TRACECA states without Armenia and Georgia. In the meantime these quantities may have dropped further following the rule between traffic demand and development of GDP.

1.4 million tons of total imports and about 9.5 million tons of total exports in 1994 were oil and oil products. Without these quantities exports totalled 35.5 million tons, of which were 30 million tons of coal exported by Kazakhstan.

The rest, i.e. 3.6 million tons of imports and 5.5 million tons of exports was, cargo, which mainly consisted of food, other consumer goods, cotton, cotton fibre, metals, fertilizers and vehicles.

The figures of table 7-3 show the major commodities traded by six countries. There should be more traded quantities, compared to the list of traded goods in Table 7-2. We estimate, that about 80 % of total trade was identified by this figures. Without the transports of the energy sector total trade thus should be about 11.5 million tons. There are no data about Georgia's and Armenia's trade volumes. These countries, however, cover 8.8 % of total GDP of all TRACECA states.

Making the assumption, that in Armenia and Georgia the part of GDP, which is traded is similar to the neighbouring countries, a total of 12.6 million tons-without energy transports-was traded by all TRACECA-states in 1994.

The handling volume of the port of Baku in this year totalled 1.8 million tons. 0.9 million tons of which were liquid cargo, and 0.96 million tons were dry cargo; i.e. 7.6 % of total non energy trade of TRACECA was handled in Baku.

7.3 Forecast of traded Cargo Volume

As stated above total transport demand will grow considerably until 2015 in some TRACECA states. The global transport demand elasticity of 1.25 which was used to calculate the development of overall demand cannot be used to forecast the growth of traded goods. In most countries of the world growth of international trade exceeds the growth of GDP considerably. Import and export elasticities range normally between 1.3 and 1.9. In East European countries the trade elasticities which could be calculated for many goods even tend to be a little higher.
For the purpose of this study the transport elasticity for traded goods of TRACECA - states is estimated 1.3, which means, that overall growth of traded goods will be in Azerbaijan and Turkmenistan 4.6 % per year, in Armenia, Kazakhstan and Tajikistan 1.3 % per year, in Georgia 0.65 % per year.

The whole non energy trade volume for all TRACECA states was eatimated - 12.6 million tons in 1994. In 1995 it should have dropped further another 15 % to 10.7 million tons. In 1996 it is reported that GDP in the most TRACECA-states is stagnating.That is why growth is estimated to start in 1997 for the most states.
The following figures are calculated for overall development of traded goods in the hinterland of the port of Baku:

Table 7-4: Development of non energy trade of TRACECA-states till 2015.

Country	Percentage share of total GDP	Non energy trade 96 (million tons)	annual growth rate in %	Non energy trade 2015 (million tons)
Armenia	4.0	0.4	1.3	0.5
Azerbaijan	7.0	0.7	4.6	1.6
Georgia	4.4	0.4	0.65	0.4
Kazakhstan	39.5	4.1	1.3	5.2
Kirghizstan	4.9	0.5	5.2	1.3
Tajikistan	3.6	0.4	1.3	0.7
Turkmenistan	8.4	0.8	4.6	1.9
Uzbekistan	28.2	3.0	3.25	5.5
Total	100	10.7		17.1

Source: own calculations

These figures show that total non energy trade will grow from 10.7 million to 17.1 million tons in 2015, i.e. about 65 percent within 19 years.

This seems to be slow, but we have to consider the structural change of traffic flows, which accompanies the growth: more light products and less heavy duty products will be traded.

7.4 Estimating the Market Share of the Port of Baku

Obtaining the market share of 1994 the figures of Table 15 would surrender a cargo volume of 1.3 million tons in 2015 for the port of Baku.

But in 1994 the geopolitical enviroment was not peaceful. In this year Russia closed the border to Chechnya. The closure not only disrupted external trade with FSU; transit cargo coming from or going to the new Baltic states or St.Petersburg could not be routed any longer on this corridor.

The conflict with Armenia over the Nahichivan continued in this year. Armenian forces still occupy Azerbaijan territory that used to produce more than 15 % of GDP.

Both, the conflict with Armenia and the closure of borders to Chechnya brought about total disruption of North-South trade, which does not take place any longer. Reopening the border crossings will reactivate traditional traffic flows from North to South and vice versa. Parts of these flows will choose traffic chaines, which are linked by the port of Baku.

That is why the market share of 7.6 % of total external trade with the hinterland is too low. 15 to 20 % should be realistic, when the geopolitical problems will be solved. This would mean a cargo volume between 2.5 and 3.4 million tons in 2015.

We estimate, that within this range the high rate will be more realistic because growth of trade will mainly occur with West Europe, North America and the South East. Traffic flows between the hinterland of Baku and West - Europe/North America are likely to choose the TRACECA corridor, when the transportation infrastructure is rehabilitated, the political conflicts are solved, and Georgia can guarantee safe transit traffic.

7.5 Commodity Mix of Future Cargo Flows

The trade flows of tomorrow to and from the hinterland of the port of Baku will change dramatically when the economies will recover.

A prerequisite for the recovery is successfull exploitation of the natural resources, which are located generously in this region. The international consortia engaged in the exploitation first of all need project cargo and construction material such as steel, timber, and other building material. Trade flows of these materials will primarily be affected by the level of fixed capital investment in the exploitation industry. When the returns of investment activity begins to flow hard currency streams will swell which primarily will be used to import goods, the industry in the hinterland cannot produce competitively. Such goods are in the first phase food and other consumergoods. In the next phase, when the economy begins with the rehabilitation of infra-and superstructure, large quantities of building material including cement, bricks and stone, sand and gravel are needed, which partly will be imported.

For the recovery of the agricultural sector vehicles, trucks, tractors, and other hardware as well as fertilizers are needed. When production in the rural areas begins to grow, agricultural trade will increase: grain, cotton, fruits and groats will be important.

The rehabilitation of the industrial sector will be accompanied by the dismantling of huge industrial complexes. That is why we exspect scrap to be handled across borders in reasonable quantities.

Azerbaijan´s industry is concentrated mainly on petrochemicals; after recovery this part of industry should be able to export petrochemical products as well as it will need inputs from other industries abroad. Petrochemicals thus are exspected to be handled in the port of Baku, too.

As stated above the hinterland of Baku is rich of natural resources. Ferrous and non-ferrous ores will be exploited in the future, too. Partly they will be refined and processed in the hinterland and traded as metal, partly they will be traded as pellets or they will be exported without processing. That is why the port of Baku should be able to handle metals, pallets or ores, ferrous as well as non-ferrous.

To sum up, the following commodities mainly will be important for the port of Baku:

- project cargo
- construction materials
- steel
- timber
- building material
- food
- other consumer goods
- vehicles, trucks, tractors
- fertilizers
- grain
- cotton
- fruits
- groats
- scrap
- petrochemicals
- ores
- metals
- pellets

That is why the port of Baku should be able to handle metals, pallets or ores, ferrous as well as non-ferrous.

7.6 Cargo Potential of the Port and baseline Cargo Forecast for the Year 2000

The above analysis combined with interviews with shippers and consignees, freight forwarders, officials in ministries and the ports in both Azerbadjian and Turkmenistan presents an overall picture of the cargo flows that can be expected through the port of Baku both through the cargo terminal as well as the Container Freight Station (CFS) to be established in the port.

Some general observations that can be made based on the observations and analyses in the preceding chapters are:

- The majority of the cargoes that will be handled via the general cargo terminal will in the main be:
  - Cargoes generated from Azerbadjian's trade with countries with ports within the Caspian Sea basin. These can be considered captive cargoes, for which water transportation will have a competitive advantage.
  - Bulk, neobulk and general cargoes shipped on the inland waterway system to and from Northern Russia, Northern Europe and the Baltic region via St. Petersburg on the waterway system.
  - Transshipment cargoes coming by rail to and from Ukraine and Southern Russia to and from Iranian ports. Some of these cargoes will be transshipped to and from other Middle East countries in addition to India and Pakistan.
  - Cargoes that for reasons of dimensions, weight and other physical characteristics cannot be handled by rail or truck and consequently have to be handled on ships via the Russian waterways and on the Caspian Sea.
- The main volume of cargoes handled will be transit cargoes coming on or destined for transshipment on the TRACECA route and the Tchetchniya rail corridor. This traffic will be railcara in addition to increasing volumes of trucks and containers, most of which will be shipped onwards on the ferry connection between Baku and Turkmenbashi.

If the port of Baku is successful in establishing the port as a Container Freight Station (CFS) in cooperation with the railroad and the major container operators, the port will also handle substantial volumes of containerized cargoes destined for or originating in Baku and its hinterland.

In the past the port was allocated cargoes by government fiat or decree according to the plans develloped by central authorities. Although the port has a virtual monopoly on port operations in Baku, it is in competition with other modes of transportation (i.e. rail and truck), and for virtually all cargoes handled by the port, the shippers and consignees will have the choice of using other means of transportation. Holding onto the current traffic volumes handled and developing future cargo potential will not happen as a result of the mere existence of the port with its virtual monopoly.

The primary business of the port is to provide the cargo handling facilities and services required by the users of the port. Port users are shippers and consignees, ship operators and other providers of transportation services such as the railroad companies and trucking companies. In a wider defintion the companies serving or representing the primary users, e.g. shipping agents, freight forwarders, ship brokers and other intermediaries engaged in the transportation industry can also be defined as part of the users or customers of the port.

The key prerequisites for the future success of the port in attracting cargoes are in the main for the port management and its administrative and operational staff to adopt a commercial attitude to the conduct of its business. In this respect it will be necessary for the port to:

- Market and sell its services to the shippers and consignees both as an independent operation and in close cooperation with ship operators and other transportation companies, their representatives and intermediaries serving both the shippers and consignees and the transportation companies.
- Market and sell the servuces of the port to attract shipping companies and other transportation companies to use the port as part of theri services to serve the needs of the transportation users. In this connection it is important to recognize that the port should recognize its that its parimary business and not enter into competition with its customers/user and their representative. As examples it would be detrimental to the interests of the port to establish freight forwarding, shipping agency or other services in competition with other commercial entities.

- Ensure operation and productivity according to normal world standards. The transportation industry is an international business, and as such the user of the port services will expect the productivity, operating standards and port and cargo handling charges of the port are maintained according to interantional norms and standards.
- Eliminate of the practice of extortion of bribes and corruption in the port. The reported widespread practice of extortion of bribes by both port employees as well as public servants, such as customs officials, are hidden charges, which increase the cost of the use of the port and has been a deterred in the use of the port. In order for the port to function properly such unprofessional and illegal practices have to be rooted out.

The cargo flows achieved in the recent and current years is not necessary a correct baseline for projections of the future cargo potential of the port. Given the above and assumptions of a normally functioning port management structure and rehabilitated port infrastructure in addition to upgraded and well fuctioning cargo handling equipment and practices, a baseline cargo volume of existing cargoes and cargoes that can be attracted to the port for the year 2000 has been developed. The baseline existing and future cargo opportunities available to the port of Baku are presented as Table 7-5 and can be summarized as follows:

Table 7-5: Recent History and Baseline Cargo Forecast to the Year 2000 for the Port of Baku

(in thousands of tons)				Estimate	Baseline
Commodity:	1993	1994	1995	1996	2000
Dry bulk cargoes					
Building materials	78.9	15.1	0	0	100
Salt	35	34.4	34.4	80	120
Grains	0	34.5	34.5	60	170
Total	113.9	84	68.9	140	390
Neobulk cargoes					
Timber and lumber, transit	20.2	12.4	0.8	15	15
Timber and lumber, imports					30
Metals, import				5	50
Metals, transit	225.3	202.5	11.6	15	50
Scrap metal, exports					60
Project cargoes for oil industry					10
Cotton exports					10
Misc. food products, imports					50
Fruits and vegetables, export					35
Total	245.5	214.9	12.4	35	310

(in thousands of tons)				Estimate	Baseline
Commodity:	1993	1994	1995	1996	2000
General Cargoes					
Misc. general cargoes, break bulk	107.1	111.2	2.9	120	50
Containerized cargoes	51.6	7.2	4.8	4	50
Total	158.7	118.4	7.7	124	100
Total dry bulk, neobulk and general cargoes	**518.1**	**417.3**	**89**	**299**	**800**
Liguid bulk cargoes					
Crude oil, total	3,370.7	869.4	91	160	
Grand total, excl. ferry traffic	**3,730**	**1,168**	**172.3**	**335**	**800**
CFS - Container handling					
Cargo tons					300
TEU, number					25,000
	13,382				

Note: Cells with the number 0 indicate no cargo volume, while cells with no date indicate that no date was available

Dry bulk cargoes - captive cargoes to and from Azerbadjian

Building materials - import

Bulk gravel imported from Turkmenistan used in the construction industry was a major dry bulk cargo handled in Soviet times. The volume dropped from 620,000 tons in 1991 to nothing in 1995 and the current year. The reason for the decline is the dramatic reduction in construction activity, and currently the demand for gravel in Azerbadjian is covered by local production. With the expected economic recovery, it is likely that the Azerbadjian domestic production will not be sufficient to cover the total demand for gravel, cement and sand, and imports from Turkmenistan will again be necessary. The base volume from around the year 2000 is expected to be 100,000 tons per year and will increase at the average projected growth rate of the transportation demand.

Salt - import

This is a raw material imported by the Samib division of HimZavod of Sumgait, and is used as a feedstock in the production of surface active agents, such as caustic soda, chlorine and chloric acid in addition to various detergents. In recent years this factory received salt from both the Ukraine and Russia in addition to Turkmenistan. Presently an agreement has been signed with Turkmenistan for a barter arrangements whereby salt as raw material imports will be paid with the delivery of finished products such as various detergents. The current contract volume is 120,000 tons per year, all of which will be carried in bulk by the Caspian Shipping Company from the port of Turkmenbashi to the port of Baku. This volume is also used as the baseline cargo volume for the year 2000.

Grain-imports

The total annual grain import requirement of Azerbadjian is estimated to be approx. 800,000 tons. Grain is a commodity bought and handled on a competitve basis in the international market, and will be handled in the port of Baku only when water transportation is the least expensive mode of transportation. Most of the grain is handled from world markets through the Black Sea via the Georgian ports of Poti and Batumi and then shipped by rail to Baku. Grain purchased from the Ukraine and Russia is shipped primarily by rail and to a lesser extent via the Volga Don waterway. Kazakhstan is also a supplier of grain to Azerbadjian. Currently a long term intergovernmental agreement have been signed between the Azerbadjian and Kazakhstan for the import of 100,000 tons per year to be shipped. According to officials of the importing organization, the State Corporation "Azerbreadproduct", their preference would be to ship the entire volume of imports from Kazakhstan via the ports of Aktau in Kazakhstan and Baku, since water transportation is the lowest cost alternative. However, due to the poor technical condition of the cargo handling equipment and the port facilities in Aktau resulting in unexpected delays and extra costs, it is unlikely that it will be feasible to ship more than approx. 30,000 tons by ship from Aktau in 1997, which equal to the volume in 1996. The remaining volume will have to be shipped by rail.[6] The total volume of grain handled in the port of Baku in 1996 is expected to be 60,000 tons, of which 30,000 tons has been and will be coming from Aktau and the remaining 30,000 tons has arrived via the Volga Don waterway during the navigation season. For the baseline forecast it is expected that the port of Aktau will have been rehabilitated and can handle the full contract volume of 100,000 tons. In addition it is expected that the port of Baku will be able to attract a volume of approximately 10% of the remaining import volume of 700,000 tons, i.e. 70,000 tons. In 2000 the port is therefore expected to handle 170,000 tons of grain as the baseline forecast. This volume is expected to remain relatively constant for the forecast period.

Metallurgical products - imports and exports

All business activities of the ferrous and non-ferrous metals and minerals industry is handled by the Azerbadjian state owned company "Metallurgy" State Concern with headquarters in Baku. This industry generates substantial volumes of cargoes both for import and export from its three main divisions:
The ferrometals division, which has three entities:

- Azerbanda Mining Industries produce ferrous ore concentrates with a sulfuric content of 60%. The production capacity is one million tons per year, all of which in prior times were supplied to Georgia by rail. Due to the current situation in Georgia, its only customer, the production is next to nothing.
- Azerbajian Pipemaking Plant: The production capacity of this plant is 650,000 tons of pipe per year, which in previous years were primarily exported to Russia, Ukraine, Khazakstan and the other republics of the FSU. Due to the slowdown in the economic activity of their customers within the FSU, the annual production volume is now reduced to 50,000 tons, which is shipped to their customers in the FSU in addition to Turkey and Iran. All their output has been and is currently shipped by rail. During full production the following raw material quantities were received:
  - 100,000 tons of pig iron from Russia and Ukraine
  - 50,000 tons of various steel products from Russia and Ukraine
  - 50,000 tons of limestone from Ukraine
  - 50,000 tons of fire protection stone from Russia and Ukraine

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1 The cost of ship transportation was quoted as being US $ 35 per ton, while transportation via rail on the Tchetchniya route would be US $ 40 per ton (when the route is available). If the Tchetchniya route would continue to be unavailable as was the situation in 1996 the only route would be to ship by rail through Turkmenistan and onwards by ferry from Turkmenbashi to Baku. The total cost of the latter route was stated to be US $ 80 per ton. In 1996 approximately 60,000 tons would been shipped by water from Aktau to Baku, while the remaining volume of 40,000 tons would be shipped on the rail route via Turkmenistan and the ferry.

- Dashsalakli Bentonite Clay Plant. The annual production capacity of this plant is one million tons per year, out of which was exported in the past to the metallurgical industries of primarily Russia and Ukraine and to a lesser extent to Kazakhstan. A dramatic declining the demand from their former customers have forced the management to find new customers in the world markets. The relatively low value of the product combined with high transportation costs have prevented them from securing new contracts.[7]

The non-ferrous metals division with three entities as follows:

- Zaglik Aluniti Ore Management plant located in the Dashkestan region of Azerbadjian, in which alunite is mined and converted to alumina. Of the total output the following volumes are shipped:
  - About 1.5 to 2.0 million tons per year to the Aluminum plant in Gandja
  - About 60,000 tons per year shipped to the Aluminum plant in Sumgait
  - About 100,000 tons per year per shipped by rail and ferry from Baku to Turkmenbashi and onwards to an aluminum plant in Tadsjikistan
  - Volumes of alumina is also shipped by rail to Russia and other markets, primarily by rail. The Russian customers are aluminum plants located in Bratsk, Irkutsk and Krasnojarsk in Siberia, and shipment by a mode of transportation other than rail is impractical and costly.
- The Gendja Aluminum Plant used to receive between 600,000 to 700,000 tons of bauxite from Georgia in addition to the alumina from Zaglik. Currently the bauxite is received from Australia, and in 1995 the volume received through the port of Poti in Georgia was 77,000 tons. The output capacity was stated to be about 450,000 tons of aluminum per year shipped to the FSU and other markets by rail.
- The Sumgait Aluminum Plant. This plant receives also input materials in addition to the intercompany transfer of raw materials described above from Russia, all of which is shipped in by rail:
  - 20,000 tons of anode mass
  - 2,000 tons of cryolite
  - 1,500 tons of torite

All raw materials and finished goods of the three divisions of this major stateowned group are shipped by rail from the respective plants. Russian companies are currently a both major suppliers of input materials and major customers of the finished products, all of which are shipped by rail. During the Tchetchniya conflict and the closing of the northbound rail corridor, the cargoes to and from Russia have been shipped via the Baku - Turkmenbashi ferry and onwards through Turkmenistan and Kazakhstan to Russia. The management would not consider shipment by the Caspian Sea and the Russian waterways as a viable alternative for the following main reasons:

- The Russian waterways are only open six months of the year, which is unacceptable from the point of view of logistics.
- The cargo carrying capacity of river vessels of 3,000 tons is small and therefore increase the cost of transportation.
- Since none of their customers are located on the Russian waterways, there would be both additional costs and risks associated with multiple cargo handling and cargo transfer operations, (i.e. rail to Baku for loading on a river vessel, transportation to a Russian inland river port for transloading to rail for transportation by rail to the customers' plants.)

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2 The product will have to be shipped out by rail to Georgian ports and onwards to world markets. According to the management the current world market price is US $ 36/ton, while their production cost is US $ 12/ton. The rail transportation cost in Azerbadjian is US $ 7/ton, and US $ 8/ton in Geogia. In addition the cost of handling in the port of Poti is US $ 6/ton for a total transportation cost FOB Poti of US $ 21/ton. The total cost FOB Poti is therefore US $ 3/ton, which leaves US $ 3/ton for transportation and handling in the receiving market. Even at a price of US $ 30/ton FOB Poti management has been unable to find interested buyers in world markets.

Although the cargo volumes generated by these industry could present interesting business opportunities for the port of Baku other than handling via the ferry terminal, no cargo volumes have been included in either the base or the forecasted cargo potential for the port of Baku.

Neobulk cargoes - transit and competitive import/export cargoes

The definition of neobulk cargoes is as follows: "General cargoes that are shipped in sufficiently large quantities to warrant shipment in full or partial shipload lots in general cargo or specialized, purposebuilt vessels (e.g., reefer vessels, ro-ro car carriers, open hatch bulk carriers for forest products)". In the port of Baku neobulk cargoes will be represented by both transit and captive cargoes shipped to and from Azerbadjian on the Caspian Sea and on the inland waterway system of Russia to and from the Baltic and the Black Sea. The main neobulk cargo opportunities available to the port of Baku are:

Timber/lumber - transit cargoes

In the past these cargoes were received primarily from northern Russia and Finland. These cargoes arrived by rail and were shipped through the port to Iran and onwards to India and Pakistan. Currently most of the transit cargoes, which are sensitive to transportation costs, are shipped by the inland waterways to Astrakhan in the Volga delta and onwards by ship to Iran. During the winter, when the waterways are closed, Baku is still receiving these transit cargoes by rail. In addition cargoes for the domestic construction industry is received both by rail and via the inland waterway system from northern Russia. Total volume expected for 1996 is 15,000 tons via the port, most of which were transit cargoes. Many of the traders handling these cargoes are located in Baku, and the port should have every opportunity to continue to obtain a share of these cargoes, particularly during the winter when the inland waterways are closed. The baseline cargo volume is expected to be 15,000 tons in the year 2000. The port should have every opportunity to increase this volume through active marketing of its services.

Timber/lumber - import cargoes

These cargoes were and will continue to be imported from northern Russia and Finland mainly for the construction industry. The total annual volume used by the domestic construction industry is estimated at approximately 100,000 cu. meters per year. As shown in the transportation cost analysis the inland waterway system is the most cost effective system for this route. However, since the waterways are closed due to ice six months of the year and the waterways and port can expect competition from the railroad, it is unrealistic to expect the port to capture more than 30 % of the total volume. The baseline volume expected to be handled in the port will there be approximately 30,000 cu. meters per year representing approx. 15,000 tons of cargo.

Metals - transit

In the past years the port handled substantial volumes of metals shipped in transit from Russia to Iran and onwards to other Middle East and Far Eastern countries. These cargoes arrived by rail and were transshipped for water transportation to Iranian ports. These transit shipments stopped in 1994. Currently 15,000 tons of the total expected volume for 1996 of 20,000 ton volume of metals to be handled by the port are trial shipments from Ukraine coming by rail for onward shipment to India and Pakistan via Iranian ports. Given that the trial shipments are successfully and efficiently handled the transit cargoes of metals on this route can be increased significantly in the future. A conservative estimate is set for 50,000 tons as the baseline volume achievable by the port in the year 2000.

Metals - import

The major user of imported metals is the construction industry, which is importing its construction metal requirements from Russia and Ukraine. Kazakhstan can also be a supplier of metals via the port of Aktau, and this year approximately 5,000 tons of construction metal was imported by water from Kazakhstan. Currently the domestic import demand for construction metal is estimated at 250,000 tons per year, most of which was imported from the Ukraine and Russia with equal shares for each country. All cargoes are currently arriving by rail. Consequently the port should have the potential to achieve a reasonable large market share in the future, since the cagoes are coming from areas, where water transportation should be competitive with other modes of transportation. The port should have the potential to achieve a baseline import volume to be transported on the waterways from Russia and Kazakhstan of approx. 50,000 tons per year, representing a 20 % market share of the construction metal imports. In addition the shipyards and oil fabrication industry will be expected to require substantial volumes of steel and metal in future years. Most of it will be shipped directly to the fabrication plants, although the port should have the potential to attract some of these cargoes.

Scrap metal - export

In previous years approx. 50,000 to 60,000 tons of scap metal exported to Pakistan via Iranian ports were handled at the port. This year the volume was reduced to 3,000 tons. As a result of dismantling and renewal of the major industrial complexes and oil installations in Azerbadjian, it is expected that exports of scrap metal will be resumed in future years. Scrap metal is a commodity highly sensitive to transportation costs, and it can be expected that major portions of this commodity will be handled by water transportation, particularly for transportation to scrap metal plants in India and Pakistan via Iranian Caspian Sea ports. The base load volume is expected to be similar to previous years, i.e. 60,000 tons.

Project cargoes for the oil industry (modules, pipe, equipment etc.) - import cargoes

The current volumes of cargoes is estimated by oil industry sources to be 20,000 to 30,000 tons per year, a volume which will increase significantly in future years as the exploration and construction in preparation of full production activities for the industry is going on. A conservative estimate of future cargo volumes is between 200,000 and 300,000 tons per year by the year 2000. The freight forwarders have in close cooperation with the oil industry thoroughly tested and found the TRACECA route via Poti to function without problems. As a result major portions of these cargoes will be shipped on the TRACECA route via the port of Poti directly to the two facilities used the international consortia, i.e. ShelfProektStroi (SPS) and STRIZH yards in Baku. Large and oversized modules, which cannot be handled on the TRACECA route have been shipped in the past and will in the future be shipped by water via the Volga Don waterway directly to the two yards used by the oil industry. There will, however, be supplies arriving in smaller volumes of cargoes coming both via the waterways from Northern Europe via St. Petersburg. The latter will have the potential of being handled via the port. As a result it will have to be recognized that the port will attract relatively small volumes of the oil project cargoes, since these will in the main for practical reasons be shipped directly to the two module plants. An average of five shipload lots arriving by vessel from Northern Europe representing 10,000 tons is a conservative estimate of the port's potential market share of shipload lots in the year 2000, which should be realistically achievable by the port. If the port is established as a CFS for containerized cargoes, the port will in addition have the potential to attract substantial volumes of containerized cargoes shipped to the oil industry via the TRACECA route.

Cotton exports - competitive cargoes

In the past most of the cotton exports of Azerbadjian have been sold on FOB basis and shipped out by truck and rail to Turkey, Europe and the United States. The total annual export volume of cotton from Azerbadjian is estimated to be between 50,000 and 60,000 tons per year. For this commodity cargo water transportation to the Mediterranean is a highly competitve transportation mode. As such the port should be able to compete for between 10,000 to 12,000 tons per year to be handled during the Volga Don shipping

season, all of which would be shipped neobulk in full or partial shipload lots. This represents a market share of 20 %, which is a conservative estimate of what should be achievable by the port. Cotton is also an attractive return cargo for the containers carrying imports to Azerbadjian. Those cargoes not handled by water transportation could therefore be captured through the port's CFS.

Miscellaneous food products - imports

To date these cargoes have been handled in relatively small quantities through the port and grouped in the statistics in the category "Miscellaneous general cargoes". The major volumes of these cargoes have arrived primarily by rail and also by trucks. Azerbadjian is a significant importer of food products. The annual import volumes of major food products total imports of foods and food products with sufficient volumes for having the potential of transportation in partial and full shipload lots are in the main[3]:

Table 7-6 Estimated imported Food Product Volumes

Commodity	Estimated import volume (tons)
Sugar	160,000
Potatoes	180,000
Meat and meat products	130,000
Dairy products (milk, butter, milk powder, cheese etc.)	2,000,000
Flour	350,000
Fish and fish products	30,000
Total	**2,850,000**

These products are procured in the world markets, and major portions will continue to be imported by rail and truck both via the TRACECA route via Georgian ports and from Russia, Iran and Turkey. Some of the cargoes have, however, the potential of being shipped also via Iranian ports or via the Russian inland waterways:

- Wheat flour, which to a large extent is imported from India via Dubai and Bandar Abbas. Most of these cargoes are currently trucked in via Iran. Small quantities are also shipped via Iranian Caspian Sea ports to Baku.
- Potatoes are to a large extent now imported from Turkey and Iran, most of which are shipped by rail and truck from Turkey and by truck from Iran. The latter could have the potential to be shipped via Iranian ports as an alternative to transportation by truck.
- Cargoes originating from areas in Ukraine and Russia located close to the waterways, e.g. sugar and dairy products from Ukraine and dairy products, fish, meat and dairy products from Russia, could have the potential of being transported by ship through the port of Baku.

With the exception of wheat flour and sugar, the other cargoes will require refrigeration to be handled in the port, and the ships will have to have reefer holds. Presently proper storage facilities for reefer cargoes are not avilable at the port, and neither are specialized reefer vessels available in the Caspian Sea to serve the needs of shippers and consignees of reefer cargoes. When such facilities and shipping services are availalbe, the port shoulg be able to compete for such cargoes. As a baseline cargo potential the port should have the potential to attract a share of the sugar and wheat flour trades, and a market share of of 10 % of these import cargoes should be reasonable target for the port to achieve. The baseline volume forecasted is therefore set at 50,000 tons in the year 2000.

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3 The import volumes are compiled based on data received from the Ministry of Trade and interviews with various commercial import organizations

Fresh and canned fruits and vegetable - exports

Azerbadjian is a major producer of fruits and vegetables, and has an extensive canning industry for these products. Although the vegetable and fruit crops have decreased in recent years, it is expected that the agricultural production of fruits and vegetables and also the canning and preserving industry will be revived in the coming years to a level equal to that achieved in the recent past. These cargoes should have export potential to neighboring countries, including those with ports in the Caspian Sea and on the waterways (i.e.Russia and Ukraine). The potential export volumes are[9]:

Table 7-7: Estimated exported Food Product Volumes

Commodity	Estimated export volumes (tons)
Fresh vegetables	300,000 to 350,000
Fresh fruits	70,000 to 100,000
Canned and preserved vegetables and fruits	350,000
Total	**720,000 to 800,000**

The fruits and vegetables will require refrigerated facilities and reefer holds on the vessels, similar to the import cargoes described above. The canned and preserved vegetables can, however, be handled without such facilities, and a market share of 10 % representing a baseline cargo volume of 35,000 tons should be achievable by the port.

Neobulk cargoes are general cargoes, most of which are also containerizable. Many of these cargoes are perishable and sensitive to transit time. As such it can be expected that volumes of these cargoes, and particularly those to and from Western Europe, United States and New Zealand (imports of dairy products), will be containerized in the future. As a consequence, those neobulk cargoes not handled by ship in the port will have the potential of being routed as container cargoes via the CFS to be established in the port of Baku. The level of containerization will to a large extent depend on the number of containers made available by the container liner operators serving the trade. The container trade will most likely be import driven, and consequently the avaiability of containers for the export trades will to a large extent depend on the number and types of containers brought in to serve the import trades of Azerbadjian.

General cargoes (captive and transit cargoes)

The cargo statistics of the port do not contain a detailed breakdown of the commodity composition or the origin/destination of these cargoes. The cargo volume dropped dramatically from 1994 to 1995 (i.e. 118,400 tons in 1994 to 33,300 tons in 1995). The expected volume in 1996 of 124,000 tons indicates that the port is recovering market shares and cargo volumes lost in 1994. A wide variety of commodities are included in this category. The major commodities and expected developments of these cargoes are:

4 These volumes are compiled based on data received from the Ministry of Trade.

Equipment and machinery

This category includes all types of equipment from tractors and farm machinery to industral machinery and plants. With the recovery of the economy, which will be driven by the oil industy following the resurgence of oil production following the turn of the century, major vaolumes of cargoes in this category can be expected as a result of the major renewal requirements in the both agriculture and in the industry.

Chemicals and petrochemicals

This category includes a wide variety of chemicals and petrochemicals produced at the major chemical, refinery and petrochemical complexes at Sumgait and the Abseron peninsula. Immediate cargo opportunities for the port include handling of difficult cargoes sucha s caustic soda and sulphuric acid to the shipped to Turkmenistan. In the longer term refurbishment of the chemical and petrochemical industry using the increased output of oil and gas as feedstocks will repepresent interesting opportunities, although the major cargo waterborne volumes will most likely be shipped out from dedicated and specialized terminals at the respective plants.

Other general cargoes

These include a wide variety of cargoes, which in the main are caroes such as:

- Fertilizer - imports and transit.
- Various ores and metals
- Miscellaneous foods and consumables
- Miscellaneous containerized cargo

In 1996 the total volume of miscellaneous cargoes is expected to represent a volume of 120,000 tons, while containerized cargoes is expected to be 4,000 tons. It should be noted that in the baseline forecast for the year 2000 several of the cargoes counted in this category are included among the neobulk category.The baseline cargo volume for the year 2000 is conservatively estimated to be 100,000 tons evenly divided between containerized and breakbulk cargoes.

The major general cargo trade routes in addition to the dry bulk and neobulk trades described above are:

- To and from Aktau, Kazakhstan: Current cargo volumes include in addtion to the dry bulk grain imports described above, imports of various metal products. Transit export cargoes coming from Kasakhstan include various chemicals. Transit imports include Lada automobiles reexported from Turkey and miscellaneous general cargoes. Interviews with freight forwarders have indicated future potential of increasing volumes of containerized cargoes and requirement of truck ferry transportation to and from Kazakhstan, if regularly scheduled ferry or container feeder/ro-ro liner service had been available on this route. In future years the oil industry operating both offshore Aktau and onshore in the immediate hinterland will require substantial volumes of supplies. Currently most of the supplies for the oil industry is for oil exploration. When the development of the fields will be started shortly after the turn of the century, the volumes required by the oil industry will increase substantially. The TRACECA route via Baku is expected to be a preferred transportation route based on interviews with freight forwarders serving the oil industry.
- To and from Iranian ports: This trade is served by Iranian vessels, which in addtion to the transit cargoes described under "Neobulk" above, also handle various general cargo imports, such as wheat flour, rice and other general cargoes from Iran and from India and Pakistan. With increased marketing efforts, larger volumes of general cargoes, containers in addition to neobulk cargoes should have the potential of being attracted to this route.

At the present time containerisation of the Azerbadjian trade is so minimal to be equivalent to be nonexistent. One of the major reasons is a general lack of equipment and facilities to handle containers. Experience from other developing and emerging economies and trades should indicate that the containerization of the general cargo will reach international levels within a time period of between five to

seven years. In the time period between 2000 and 2005 the level of containerisation of the Azerbadjian general cargo trade will be expected to have reached the world level of approximately 80 % .

Liquid bulk cargoes

Crude oil - cabotage

The volume of cargoes handled at the liquid bulk terminal is reduced dramatically. The current cargoes, which are cabotage crude oil cargoes handled in domestic trades to the refineries on the Abseron peninsula, was 91,000 tons in 1995 and is expected to reach 160,000 tons this year. Volumes to be used as feedstocks for the local refineries will most likely increase in the future.

Crude oil - transit

It is reported that a contract to transport crude oil in transit from Aktau, Kazakhstan through the port of Baku's oil terminal and onwards through the existing pipeline to Poti, Georgia is currently being negotiated between the governments of Azerbadjian and Kazakhstan. The shipments are scheduled to start this year. The volume of oil to be transported is reported to be minimum 10 million tons per year. These oil cargoes will be transported across the Caspian Sea in tankers from Aktau to Baku. If such a volume is to be handled, an average of six tankers of 5,000 dwt will have to be discharged at the oil terminal every day of the year. In order for the oil terminal to handle such a volume, the terminal will most likely have to be upgraded.

Crude oil - new oil and main oil from the international oil consortium

The early oil is expected to start flowing around the turn of the century, and existing pipelines to the Black Sea will be upgraded for the purpose of this transportation. Several pipeline alternatives are being considered for the main oil. It is expected that this oil will be handled in dedicated facilities, and not through the port's oil terminal.

Refined products and petrochemicals

Azerbadjian has an extensive refinery industry located on the Abseron peninsula and large petrochemical and chemical plants at Sumgait. Liquid bulk refined products and petrochemicals from these plants will most likely not be shipped through the port's liquid bulk terminal, but rather through dedicated terminals at the respective plants.

As the thebaseline forecast for the year 2000 it is assumed that the contract between Kazakhstan and Azerbadjian described above is signed enabling the shipment of 10 million tons per year. Given that a contract of a such a volume is entered, it will enable the port to obtain the funds for the oil port to be rehabilitated or reconstructed. Without a long term contract the rehabilitation of the oil port will most likely not be feasible.

CFS terminal cargoes

The CFS terminal will function as a multimodal handling terminal serving primarily the needs of containerized import and export cargoes to and from Baku and its hinterland. As the containerization of the Azerbadjian foreign trade of general cargoes, including neobulk cargoes not handled in partial and full shipload lots, the cargo volumes of this terminal will have the potential of reaching significant volumes. The cargo potential of the CFS would be the neobulk cargoes and other general cargoes destined to or shipped from Baku and its hinterland not handled to and from the port by vessels, most of which will be containerized in the future. Thus the CFS will enable the port to attract cargoes that otherwise would not be handled by the port.

The general cargo import and exports of Azerbadjian is expected to be containerized to a level comparable to the rest of the world, where an average of 80 % of the general cargo volume is containerized. Based on interviews with freight forwarders and representatitves of major container lines serving the region currently, it is estimated that the intial potential volume of such a CFS could be a minimum of between 2,500 to 3,000 TEU (twentyfoot euivalent units) in 1997 increasing to at least 25,000 TEU by the year 2000. With the expected rapid recovery and growth of the Azerbadjian economy following the year 2000, increased import demand for consumer goods and industrial equipment in addition to the general supplies and equipment for the oil industry will create increased cargo volumes for the CFS.

In addition to the containerized cargo volumes generated by the CFS and the cargo flows gererated by the general cargoes through the port, the CFS will also have the potential of handling the containers shipped in transit by the ferry service between Baku and Turkmenbashi.

Ferry traffic

The ferries operating between Baku and Turkmenbashi handles a major part of the cargo flow between Azerbadjian and the Central Asian Republics in addition to transit cargoes. The ferry traffic is, however, outside the scope of this study and a forecast for the ferry traffic has therefore not been developed as part of this project. Rehabilitation of the ferry terminal and thus the forecast of the cargo flows through this terminal is handled by a separate contract under the TACIS program granted to a consortium led by Ramboll. Reference is therefore made to the report developed by Ramboll with respect to the forecast of cargoes to be transported by the ferry. It should be noted that the ferry traffic will be complementary and not competitive to the traffic to be handled via the bulk and general cargo terminals of the port.

Passenger traffic

Other than the ferries operating between Baku and Turkmenbashi, all of which have passenger transportation facilities, the potential for developing passenger traffic other than recreational and sight seeing tours with small boats in the Baku Bay, is cconsidered to be minimal or non-existent. A separate forecast of passenger traffic has therefore not been made.

7.7 Scenario Description

From the baseline cargo forecast developed to the year 2000 three separate forecast based on three different scenarios of the potential development of factors having impact on the future cargo volumes to be handled through the port have been made. These are:

- A most likely scenario
- An optimistic/high growth scenario
- A pessimistic/low growth scenario.

It should be noted that these scenarios are developed on the same basis as those presented in the forecast of the ferry between Baku and Turkmenbashi.

7.7.1. Likely scenario

This scenario describes the overall situation expected by a majority of observers of the region, and should represent a development trend with a probability of more than 50 %.

Macroeconomic development

Under this scenario it is expected that the uncertainties associated with respect to key polical issues, which has clouded the economic sitation of Azerbadjian in the recent past, are resolved in the near future:

- Creation of peace with Armenia over Nagorno Karabak. The current cease fire agreement achieved in this conflict, which has displaced more than 900,000 people and caused massive destruction of the infrastructure, is replaced with a permanent peace agreement brokered by international mediators. The lingering uncertainty and the possibility of resumption of open warfare is superseded by optimism and an UN supported program to rebuild the devastation in the warzone.
- The Tchetchniya conflict is ended with a cease fire followed by a peace agreement ensuring lasting peace in the region. The Russian goverment and the separatists reaches an agreement whereby \the republic is gaining a more indepndent status while still being a part of Russia.
- A policy of liberalization of the economy and attraction of foreign investments is implemented by the Azerbadjian government. With its long history of oil and gas exploration and strong influence of the private sector in the economy, the entrepreneurial spirit has survived the many years of communist regime, and the reform program of the government has rekindled the spirit. The private sector florishes as a result of the increased activities in the oil and gas sector and creates new employment opportunities and increasing incomes among the population. Economic output is, however, not at a level similar to the peak output of previous years until approximately the year 2005.
- Development of the oil and gas reserves. The agreement signed in September 1994 with an interantional oil consortium to develop the Azerr, Chirag and Guneshli oil and gas fields is followed by other similar agreements with interantional oil consortia on the basis of the Caspian Sea oil producing countries reaching an agreement covering the sharing of the oil resources following the break-up of the FSU. The major issue of the investment in the construction of alternate piplines to export the increased output to countries outside the FSU is made, and the construction is started around the turn of the century.

The expected economic development of the Azerbadijan ecomomy is summarized in Table 7.7.1

Table 7-8 Azerbaijan: Projected Trends 1994 - 2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Percent Changes in Real Output										
GDP	-21.9	-8.9	-1.3	-0.8	-0.3	3.5	6.3	11.5	10.9	10.0
Oil and Gas	-8.2	-3.5	-7.1	-7.0	-7.0	6.3	13.6	29.0	23.2	17.8
Rest of Economy	-24.2	-10.0	-10.0	0.5	1.0	3.0	5.0	8.0	8.0	8.0
Balance of Payments (Mio.USS)										
Exports	637	613	464	468	512	577	891	1,412	1,982	2,552
Imports	849	839	739	919	1,139	1,365	1,800	2,434	2,863	3,384
Resource Gap	-212	-226	-275	-451	-626	-788	-908	-1010	-881	-831

Source: Azerbaijan, Economic Update, World Bank, April 24,1995

The direction of trade

The strong ties to, the transportation infrastructure and the past history of trade with the FSU countries will continue at least for the first part of the scenario planning period (i.e. to the time period 2003 - 2005) to cement their relation as the major trading partners of Azerbadjian. The close cultural ties and the geographic proximity to Turkey and Iran, will ensure that these countries will grow rapidly in importance as trading partners. In the Azerbadjiani foreign trade the Caspian Sea and Volga Don waterways will continue to be major transportation routes. The bulk of the trade growth, however, will be accounted for by Western Europe, United States and Japan, and by the end of the scenario planning period these countries will have surpassed the FSU in importance as trading partners.

Development of alternative transportation patterns and routings

The investments by the EU in the TRACECA corridor including the port of Baku and the ferry terminals in Baku and Turkmenbashi, combined with the resolution of the Nagorno Karabak and the Tchetchniya conflicts, ensure the success of the TRACECA route as a major transportation corridor of the Central Asian countries' foreign trade.

The main developments on the alternative routes that will influencing the use of the ferry service under this scenario are:

- The Volga-Don waterway is upgraded and is operational with the extended draft and improved locks ensuring minimal delays and the use of the full draft and loading capacity of the vessels. The waterway is also opened to interantional traffic. During the navigation season this route is primarily used for bulk shipments, while shippers and consignees of general cargoes will prefer to use of the TRACECA route both due to lower transportation costs and shorter transit times.
- Cargoes to and from Europe and the US are shipped on the more cost and time efficient TRACECA route, and major portions of the containerized and general cargo trades to and from Azerbadjian are shipped on this route.
- The Russian government proceeds with the development of the port of Olya near Astrakhan and start of alternative ferry services from this port to Aktau, Turkmenbashi and Iran. The opening of the Tchetchniya route causes this route to be considered a contingency in the event that the more effecient route through Tchetchniya should for any reason be closed for political or other reasons in the future. The cargo volumes on this route are therefore relatively limited.
- The Iranian connection through Bandar Abbas and overland transit through Iran continue to be developed as an important route for cargoes to and from the Far East. Improved infrastructure by the reopening of the rail connection in the previously occupied territories of Azerbadjian and improvements of the road infrastructure makes this an attractive route primarily for local and Far East cargoes. The Iranians improve the shipping services between Iranian ports and Baku, making water transportation on the Caspian Sea more attractive to shippers and consignees. The Iranian route is, however, experiencing increased competition from the rail connection via the Russian Far East ports, particularly for general cargoes to and from the Far East (primarily Japan and Korea).
- The peace agreement between Armenia and Azerbadjian enables the reopening of the Jolfa border crossing station to Iran, and this route regains its importance as a rail border crossing.
- The Tchetchniya overland connection is reopened, and rapidly regains its previous importance as an important route for transit cargoes between the Central Asian republics and Central and Northern Russia, Ukraine and the Baltic countries. Transit of cargoes via the port of Baku is as a consequence becoming an attractive and cost effective option, and this route is preferred to the considerably longer route through Khazakstan. Most of these transit cargoes are attracted to the Baku - Turkmenbashi ferry

link, while the general cargo, neobulk and dry bulk volumes of transit cargoes are increasingly handled through the port of Baku.

- The landbridge rail link between Central Asia and the Russian Far East ports is reopened and increasing volumes of general and containerized cargoes to and from the Far East markets are shipped on this route in competition with the Iran route via Bandar Abbas. Its popularilty is spurred by both being faster and more cost effective compared to the Arabian Golf route. Increasingly cargoes between Azerbadjian and the Far East are shipped on this route via the ferry. As a result container volumes through the port of Baku CFS is increased.

The expected cargo flows under this scenario is expected to experience an average annual growth of between 5 and 7 % from the baseline cargo volumes expected in the year 2000, reflecting both the general increase in the overall economy and increasing market shares of the port. (Please also refer to Sections 7.3 and 7.4 for a general discussion of the growth factors that can be expected). It should be particularly noted that the grain imports and the market share of the port of grain imports will remain constant over the forecast period. The most likely forecast volume of the port to the year 2015 is presented as Table 7-9.

Table 7-9: Recent History and Cargo Forecast to the year 2015 for the Port of Baku
Most likely scenario (thousand tons)

	Actual	Actual	Actual	Estimate	Baseline			
Commodity:	1993	1994	1995	1996	2000	2005	2010	2015
Dry bulk cargoes								
Building materials	78.9	15.1	0	0	100	134	179	240
Salt	35	34.4	111.4	80	120	161	215	288
Grains	0	34.5	4.2	60	170	170	170	170
Total	113.9	84	115.6	140	390	464	564	697
Neobulk cargoes								
Timber and lumber, transit	20.2	12.4	0.8	15	15	20	27	36
Timber and lumber, imports					30	40	54	72
Metals, import				5	50	67	90	120
Metals, transit	225.3	202.5	11.6	15	50	67	90	120
Scrap metal, exports					60	80	107	144
Project cargoes for oil industry					10	13	18	24
Cotton exports					10	13	18	24
Misc. food products, imports					50	67	90	120
Fruits and vegetables, export					35	47	63	84
Total	245.5	214.9	12.4	35	310	415	555	743
General Cargoes								
Misc. general cargoes, break bulk	107.1	111.2	9.2	120	50	27	36	48
Containerized cargoes	51.6	7.2	4.8	4	50	107	143	192
TEU, *number*					*4,167*	*8,917*	*11,917*	*16,000*
Total, tons	158.7	118.4	14	124	100	134	179	240
Total dry cargoes	518.1	417.3	142	299	800	1,013	1,298	1,680
Liquid bulk cargoes								
Crude oil, total	3,370.7	869.4	91	160	10,000	10,000	10,000	10,000
Grand total, excl. ferry traffic	**3,730.1**	**1,168.3**	**172.3**	**335.0**	**10,800.0**	**11,013.0**	**11,298.0**	**11,680.0**
CFS - Container handling								
Cargo tons					300	401	537	719
TEU, *number*					*25,000.0*	*33,417.0*	*44,750.0*	*59,917.0*
Grand total dry cargo and CFS (tons)	**518.1**	**417.3**	**142**	**299**	**1,100.0**	**1,415.0**	**1,835.0**	**2,399.0**
Thereof containerized cargo					350.0	508.0	680.0	911.0
Total TEU, Seaborne and CFS					**29,167.0**	**42,333.0**	**56,667.0**	**75,917.0**

Note: Cells with the number 0 indicate no cargo volume, while cells with no data indicate that no data was available
Import volume of grain and the market share of the port is expected to remain constant over the forecast period

7.7.2 Optimistic/High Growth Scenario

This scenario describes the the more optimistic development compared to the likely scenario, and is assessed to have a probability of occurring of appromimately 20 %. The expected developments are similar to those of the most likely scenario described in Section 7.7.1.

Macroeconomic development

Under this scenario it is expected that macroeconomic developments in Azerbadjian will be identical to that of the most likely scenario. The government is, however, expected to speed up the process of privatization and liberalization of the industrial and agricultural sectors resulting in a considerably faster growth in the private sector of the economy.

The direction of trade

The development will in the main follow the trends of the "Most likely scenario" described above. The privatization and liberalization of economic policies of the government will tend to redirect the trade more in favor of Europe and the United States, which will imply more cargoes via the TRACECA route.

Development of alternative transportation patterns and routings

The investments by the EU in the TRACECA corridor including the port of Baku and the ferry terminals in Baku and Turkmenbashi, combined with the resolution of the Nagorno Karabak and the Tchetchniya conflicts, ensure the success of the TRACECA route as a major transportation corridor of the Central Asian countries' foreign trade.

The main developments on the alternative routes that will influencing the use of the port of Baku under this scenario are:

- The peace agreement between Armenia and Azerbadjian enables the reopening of the Jolfa border crossing station to Iran, and this route regains its importance as a rail border crossing.
- The Tchetchniya overland connection is reopened, and rapidly regains its previous importance as an important route for cargoes between the Central Asian republics and Central and Northern Russia, Ukraine and the Baltic countries. This route is preferred to the considerably longer route through Khazakstan. Cargoes from Ukraine are also shipped in increasing quantities through the prot of Baku via this rail link.
- The Volga-Don waterway is opened by the Russian authorities as an international waterway with unlimited access for ships of all nations. Safe passage is assured for ships of all natoinalities, and the traffic on the waterway increases.
- The planned developments of the Alia port near Astrahan is postponed by Russian authorities, and resources are redirected to rebuild and upgrade the transportation infrastructure destroyed during the Tchetchniya conflict. Priority is given by the Russian authorities to use this route for cargoes both to and from Cental Asia and Iran. The port of Baku is reemerging as a major transshipment port for both Ukrainian and Russian cargoes.
- The landbridge rail link between Central Asia and the Russian Far East ports is reopened, and increasing volumes of general and containerized cargoes to and from the Far East markets are shipped on this route. This route is preferred by shippers and consignees for cargoes between Azerbadjian and the Far East both due to lower costs and faster transit times compared to shipment via Arabian Gulf ports. The port of Baku CFS is benefiting by receiving increasing volumes of containerized cargoes to and from the Far East via this route.
- The Iranian connection through Bandar Abbas and the combination overland transit through Iran and by

water via Iranian ports continue to be developed. The Iranian route is, however, experiencing increased competition from the rail connection via the Russian Far East ports, particularly for general cargoes to and from the Far East (primarily Japan and Korea).

- Containerized general cargoes to and from Europe and the US are almost exclusively shipped on the more cost and time efficient TRACECA route and are handled at the Baku port CFS. The port of Baku and the ferry terminal is the major transshipment port for cargoes to and from ports on the Caspian Sea and the Central Asian republics.

Under this scenario an average cargo growth of between 10 to 12 % per year is expected. The cargo flow and modal split is expected as described in Table 7-10 overleaf.

Table 7-10: Recent History and Cargo Forecast to the Year 2015 for the Port of Baku
Optimistic/ high growth scenario (in thousand tons)

	Actual	Actual	Actual	Estimate	Baseline			
Commodity	1993	1994	1995	1996	2000	2005	2010	2015
Dry bulk cargoes								
Building materials	78.9	15.1	0.0	0	100	169	284	478
Salt	35.0	34.4	111.4	80	120	202	341	574
Grains	0.0	34.5	4.2	60	170	170	170	170
Total	113.9	84.0	115.6	140	390	541	795	1,223
Neobulk cargoes								
Timber and lumber, transit	20.2	12.4	0.8	15	15	25	43	72
Timber and lumber, import					30	51	85	144
Metals, import				5	50	84	142	239
Metals, transit	225.3	202.5	11.6	15	50	84	142	239
Scrap metal, export					60	101	170	287
Project cargoes for oil industry					10	17	28	48
Cotton, export					10	17	28	48
Misc. food products, import					50	84	142	239
Fruits and vegetables, export					35	59	99	167
Total	245.5	214.9	12.4	35	310	522	880	1,483
General Cargoes								
Misc. general cargoes, break bulk	107.1	111.2	9.2	120	50	34	57	96
Containerized cargoes	51.6	7.2	4.8	4	50	135	227	383
TEU, number					*4,167*	*11,250*	*18,917*	*31,917*
Total	158.7	118.4	14.0	124	100	169	284	478
Total dry cargoes	**518.1**	**417.3**	**142.0**	**299**	**800**	**1,232**	**1,959**	**3,184**
Liquid bulk cargoes								
Crude oil, total	3,370.7	869.4	91.0	160	10,000	10,000	10,000	10,000
Grand total, excl. ferry traffic	3,730.1	1,168.3	172.3	335	10,800	11,232	11,959	13,184
CFS - Container handling								
Cargo tons					300	506	852	1435
TEU, number					*25,000*	*42,126*	*71,000*	*119,615*
Grand total dry cargo and CFS (tons)	**518.1**	**417.3**	**142**	**299**	**1,100**	**1,737**	**2,811**	**4,620**
Thereof containerized cargo					350	641	1,079	1,818
Total TEU, Seaborne and CFS					***29,167***	***53,417***	***89,917***	***151,500***

Note: Cells with the number 0 indicate no cargo volume, while cells with no data indicate that no data was available
Import Volume of grain and the market share of the port is expected to remain constant over the forecast period

7.7.3 Pessimistic/Low Growth Scenario

The pressimistic/low growth scenario presumes failure to reach a lasting peace agreement with Armenia with respect to the Nagorno Karabak area. At the same time the Russian government fails to create a lasting peace in Tchetchniya, and continued guerilla fighting prevents efforts to restart the peace negotiations. The probability of this scenario happening is evaluated to be approximately 30 %.

Macroeconomic developments

The macroeconomic development of Azerbadjian and the other Central Asian republics is negatively affected by the failure to reach peace and political stability in the region:

- Under the pretext of the unstable political situation brought about tby the failure to reach an agreement with the Armenian over Nagorno Karabak and the continued fighting in the neighboring Tchetchniya, the Azerbadjani government slows down the democratization process, the privatization of government enterprises and overall liberalization of the economy.
- The consortium of oil companies having committed themselves at developing the oil reserves of Azerbadiyan continue to honor their commitment, but the rate of development is slowed down compared to the original plans. Plans for the construction of new pipelines are postponed pending a peaceful resolution of the conflicts in the region.
- The international banks are becoming more restrictive with funding investment projects in Azerbadjian and the Central Asian republics, and Western government grants and aid funds are reduced considerably. Foreign investment activity in all the Central Asian economies slows down both in the important oil and gas industry as well as in other industries.

Although the downward trend of the economic development of the Azerbadjan and other Central Asian republic economies is stopped by the year 2000, the overall economic growth of the region from the year 2000 measured by the GDP is maintained at a level between 0-3 % per year.

The direction of trade

The development under this scenario will in the main follow the trends of the "Most likely scenario" described above. The more restrictive political and economic policies of both the Azerbadjian and other Central Asian republic governments will tend to redirect their trade more in favor of Iran, the Peoples Republic of China and the FSU, which will imply less cargoes via the TRACECA route and on all other trade routes.

Development of alternative transportation patterns and routings

The investments by the EU in the TRACECA corridor including the port and ferry terminals of Baku ensure the success of the TRACECA route. As a result the TRACECA route maintains its position as an important transportation corridor of the Central Asian countries' foreign trade, despite the lack of a lasting resolution of the Nagorno Karabak and the Tchetchniya conflicts. The main developments on the alternative routes that will influencing the use of the port of Baku under this scenario are:

- The continuation of hostilities between Armenia and Azerbadjian casts shadows over the stability of the TRACECA route through Azerbadjian and Georgia, and possible sabotage and terrorist attacks reduce the cargo flows on this route.
- The Russian government takes advantage of the unstable political situation and allocates the necessary funds to upgrade and improve the navigability of the Volga-Don waterway with the extended draft and improved locks ensuring minimal delays and the use of the full draft and loading capacity of the vessels.

The waterway is also actively marketed to and cargoes are solicited from both local and international liner and bulk operators, and the cargo volumes of both general cargoes and bulk cargoes are shipped on this waterway. The cargo volumes are, however, low due to the slowdown of economic activity in the region.

- As a result of the continued conflict in Tchetchnija, the Russian government speeds up the development of the port of Alia near Astrakhan followed by the establishment of alternative ferry services from this port to Aktau, Turkmenbashi and Iranian ports. The cargo volumes on this route are growing rapidly following the opening of the port of Alia, and the volume of Russian and Ukrainian transit transit cargoes through the port of Baku is reduced dramatically.
- The reopening of landbridge rail link between Central Asia and the Russian Far East ports is followed by upgrading of the handling capacity of the border crossings with the Peoples Republic of China. Increasing volumes of both imports and exports are carried on these routes to compensate for the lowered trade volumes to and from the Europe and the United States.
- The Iranian and Turkmenistan governments allocates additional resources to upgrade both rail and road links to Bandar Abbas, and overland transit through Iran is becoming a serious challenge to the TRACECA route.
- The reduced cargo volumes to and from Europe and the US continue to be shipped on the more cost and time efficient TRACECA route, although some shippers and consignees also select alternative routes due to the uncertainties surrounding the security situation on the route.

Under this scenario the cargo volumes are expected to grow at a low rate of 2 to 3 % per year as presented in Table 7-11.

Table 7-11 **Recent History and Cargo Forecast to the Year 2015 for the Port of Baku**
Pestimistic/ low growth scenario (in thousand tons)

	Actual	Actual	Actual	Esti-mate	Baseline			
Commodity:	1993	1994	1995	1996	2000	2005	2010	2015
Dry bulk cargoes								
Building materials	78.9	15.1	0.0	0	100	113	128	145
Salt	35.0	34.4	111.4	80	120	136	154	174
Grains	0.0	34.5	4.2	60	170	170	170	170
Total	113.9	84.0	115.6	140	390	419	452	489
Neobulk cargoes								
Timber and lumber, transit	20.2	12.4	0.8	15	15	17	19	22
Timber and lumber, import					30	34	38	43
Metals, import				5	50	57	64	72
Metals, transit	225.3	202.5	11.6	15	50	57	64	72
Scrap metal, export					60	68	77	87
Project cargoes for oil industry					10	11	13	14
Cotton, export					10	11	13	14
Misc. food products, import					50	57	64	72
Fruits and vegetables, export					35	40	45	51
Total	245.5	214.9	12.4	35	310	351	397	449
General Cargoes, Seaborne								
Misc. general cargoes, break bulk	107.1	111.2	9.2	120	50	23	26	29
Containerized cargoes	51.6	7.2	4.8	4	50	91	102	116
TEU, number					4167	7583	8500	9667
Total	158.7	118.4	14.0	124	100	113	128	145
Total dry cargoes	**518.1**	**417.3**	**142.0**	**299**	**800**	**883**	**976**	**1,082**
Liquid bulk cargoes								
Crude oil, total	3,370.7	869.4	91.0	160	10,000	10,000	10,000	10,000
Grand total, excl. ferry traffic	**3,730.1**	**1,168.3**	**172.3**	**335**	**10,800**	**10,883**	**10,976**	**11,082**
CFS - Container handling								
Cargo tons					300	339	384	434
TEU, number					*25,000*	*28,285*	*32,002*	*36,207*
Grand total dry cargo and CFS (tons)	**518.1**	**417.3**	**142**	**299**	**1,100**	**1,222**	**1,360**	**1,517**
Thereof containerized cargo					350	430	456	550
Total TEU, Seaborne and CFS					***29,167***	***35,833***	***40,500***	***45,834***

Note: Cells with the number 0 indicate no cargo volume, while cells with no data indicate that n data was available
Import volume of grain and the market share of the port is expected to remain constant over the forecast period

Volume III

Port Masterplan

Table of Contents

Part A - Introduction

Volume III, the "Port Master Plan", covers all operational issues of the Port of Baku. Detailed descriptions as well as evaluation and first recommendations are given in the following Parts:

B - Organisational Structure of the Port
C - Port Operations
D - Cargo Handling Equipment
E - Port Marine Crafts

Considering the projected cargo volume, the existing port facilities and the development plans for the ferry terminal, a first framework for a port development concept is outlined in Part F - Preliminary Port Development Concept. Also first budget estimates are given for the urgent required measures for rehabilitation and modernisation of the general cargo complex.

Part B - Organisational Structure of the Port

Until 1994 the International Sea Port of Baku was a department of the Caspian Shipping Company. With Resolution N° 407 of 28 November 1994 the government of Azerbaijan put 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

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

(For further details see Vol. III, Annex 1.)

The port's existing organisational structure as well as the proposed new one is shown on the next pages. The existing structure was found to be inadequate in view of the forthcoming commercialisation of the port. It is something like a "military central command" structure. The consultants of the "Management Assistance and Training" project elaborated a new organisational setup, which is of de-centralised commercial nature, delegating responsibilities down the hierarchy and is business unit oriented. It aims at introducing "Management by Objectives". Not only in view of the forthcoming commercialisation of the port, but also in view of the introduction of a new computer-based accountancy system it was found necessary to develop a new structure.

The proposed new organisational structure is still in discussion and implementation is planned for January 1997.

The existing organisation is divided into four departments under the port director, i.e.

- Technical Department
- Personnel Department
- Navigations Department (port captain)
- Operations Department

The Port Director is head of the Financial and the Economical Departments and some engineering divisions. He has got two Deputy Directors which are:

- the director of the Technical Department (the Chief Engineer)
- the director of Operations Department

The port has at present a total staff of 794 employees.

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

2.1.4 Shift System

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

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

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

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

2.2 Absheron Bulk Complex (Oil Terminal)

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

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

2.2.1 Existing Infrastructure

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

For further details see table below.

Table 2-4: Berths at Absheron Bulk Terminal

Jetty No.	No. of Berths	Under Jurisdiction of	Purpose
1	2	Baku International Seaport	Import of crude oil
2	2	Government Oil Company	Import of crude oil[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.

---

[3] Leased from Azerbaijan Oil Company.

[4] Being Dismantled

[5] Dismantled

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

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

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

Floating Crafts
At the service berth (jetty no.4) the following floating crafts are moored:
- 1 floating crane of 25 tons lifting capacity
- 2 tugboats of different size
- 1 oil sweeping launch.

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

2.2.3 Manpower & Qualifications

The Oil Terminal is manned by 36 staff members in total, consisting of the following grades/functions:
- 1 chief of the terminal
- 4 dispatchers
- 8 tallymen
- 7 technicians (incl. 3 electricians)
- 16 labourers.

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

2.2.4 Computer / EDI-System

There is absolutely no EDP-system available. Even 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.

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

Hinterland

The terminal covers a total area of approx. 182,000 sqm which is divided into

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

Terminal Access and Aids to Navigation

Sea Access

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

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

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

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.

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

Open Storage Areas

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

Table 2-10: Declared Open Storage Areas

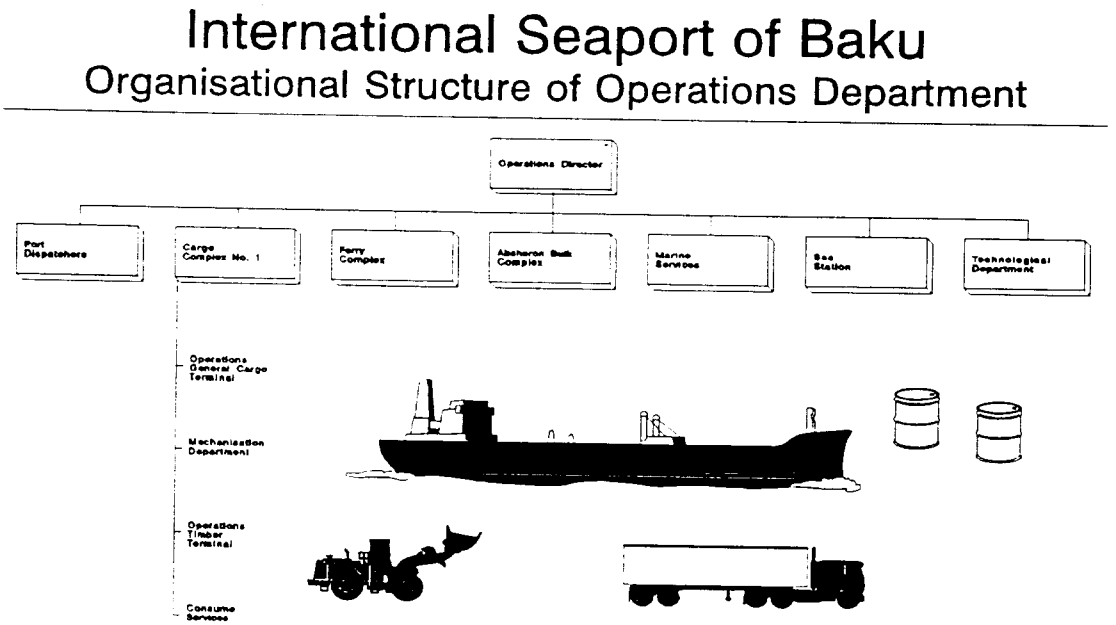
Area No.	Dimensions (m)	Area (sqm)	Used for	Remarks
1	195x25	5,000	general cargo/Ro/Ro	pavement almost in very poor condition
4	270x15	4,000	general cargo	
5	393x61	24,000	bulk cargo	
6	224x61	11,328	timber	

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.

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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.

Cargo Units

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

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

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

Commodity	Unit	Layers 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.

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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

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

3.2.2 Equipment Capacity

Ship / Shore Cranes

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

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

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

Source: UNCTAD Monographs on Port Management, Volume 9

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

- 4 x 16/32 t - cranes plus 1 x 10/20 t - crane at berths nos. 4 - 6
- 1 x 10/20 t - crane plus 1 x 6 t - crane at berth no. 7
- 2 x 6 t - cranes at berths nos. 8 - 10
- 2 x 10/20 t - cranes in the 2nd line at berths nos. 4 - 6

which means in total

- 4 x 16/32 t - cranes
- 4 x 10/20 t - cranes
- 3 x 6 t - cranes.

If it is assumed that

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

the calculation will be as follows:

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

which leads to a total theoretical crane capacity of

≈ 3.6 million tons p.a.

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

≈ 3.0 million tons p.a.

Capacity of Yard Handling Equipment

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

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

3.2.3 Storage Capacity

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

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

For container terminals some indicators for land 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.

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

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.

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

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.

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

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.

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

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:

$$2 \text{ trains} \times 3{,}000 \text{ tons} \times 360 \text{ working days} =$$
$$\underline{2.16 \text{ million tons p.a.}}$$

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.

Part D - Cargo Handling Equipment Engineering

1. Introduction

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

The following equipment and workshops were inspected:

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

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

2. Port Handling Equipment

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

2.1 Available Equipment

Ship-to-Shore Cranes

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

Forklifts

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

Terminal Trucks and Trailers

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

Container Handling Equipment

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

2.2 Analysis and Recommendations

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

The Consultant's port operation and engineering expert inspected the cranes, identifying and recording weak

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

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

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

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

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

Recommendation:

Out of eighteen (18) cranes available in the port, 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:

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 nos 16, 18 and 28.

The remaining three cranes (asset nos 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 nos 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.

Ship-to-Shore Cranes (SSC)

No	Item No	Asset Registration No	Manufacturer	Capacity	Year of Construction	In Operation	Recommended Actions		
							To be scrapped	To be repaired	Maintenance
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[2]		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[3]		x	
18	57	21	Takraf/Albatros	10/20 t	1988	yes		x	

[2] crane is not used at present

[3] 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 nos 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.

Forklifts

No	Item No	Asset No	Manufacturer	Capacity	Year of Construction	In Operation	Recommended Actions		
							To be scrapped	To be repaired	Maintenance
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		
							To be scrapped	To be repaired	Maintenance
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 inoperational terminal tractors

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

are partly cannibalized 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.

Tractors

No	Item No	Asset Registration No	Description	Manufacturer	Year of Construction	In Operation	Recommended Actions		
							To be scrapped	To be repaired	Maintenance
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
- 36-t 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 recognized 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 unorganized, 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.

ELECTRIC 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	-	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. Cost estimates for these measures are currently under preparation and will be submitted in the next project phase.

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 inoperational), 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 organized, 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 - Port Marine Crafts

1. Present Situation

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

Table 1-1: 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"	Firefighting 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 Crafts

Table 1-2 shows the condition of the marine craft as it was during a survey carried out by the Consultants in October, 1996.

Table 1-2: Condition of the Marine Crafts

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

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

3. Summary and Recommendations

As stated before (2), some marine craft are not in working condition and must have a general rehabilitation or must be replaced. However, all vessels need dry docking for sandblasting, some steelworks and painting. Most engines are outdated and not economical. The firefighting boat is obsolete. The capacity of the firepump 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 oilskimming 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 sisterships, two built in 1961 in Baku and one, "N.SHIRINOV", built in 1971 in Astrakhan, could not be inspected as they were not presented with the argument that they are identical to "ELKHAN KAZIMOV". As the design of these three other tugs is identical to the one inspected and described, also these three units should be taken out of service as soon as possible.
- The floating crane`s structure is in an advanced state of corrosion as can be soon from the photographs (Annex 4). The same applies for the hull. Due to the limited capacity of the crane (25 t), its operational versatility is very limited.
- Because of the very bad condition of the crane immediate repairs would be required. If the condition deteriorates further, it will not be justifiable to spend any money on it. For these reasons the rehabilitation of this crane can not be recommended.

For more details see Annex 3 "Condition Survey Report" and Annex 4 Photos.

Part F - Preliminary Port Development Concept

The following preliminary concept was developed in view of the demands deriving from the traffic forecast and in line with an economical way to cope with the necessary rehabilitation needs as stated in this report.

Taking also in account the function of Baku Sea Port for the TRACECA route, in addition to the currently planned rehabilitation and upgrading of the ferry terminal, the following requirements for cargo handling at the Port of Baku are as follows:

- The main complex of Baku Port should be maintained as a "Multi Purpose Intermodal Cargo Terminal" for the handling of general cargoes, bulk cargoes, and multimodal containers. The advantage of this concept is utilisation of existing port facilities and estabilshment of a central container terminal. The future container traffic will remain close to the business centre of Baku and its main customers.

- For container operation folowing facilities are required:
  - Facilities for loading and discharging containers for road transport including marshalling areas for trucks and trailers. Limited equipment for ship/shore container handling.
  - For stuffing and stripping of LCL containers and transit cargo for break bulk oncarriage a CFS (Container Freight Station) with sufficient warehouse capacity.
  - A stacking yard for import, export and transit containers.
  - An empty container depots for servicing the customers and shippinglines.

- The container terminal should include facilities and equipment for railway container operations. Loading and discharging of the future container blocktrain serving between Poti and Baku can be centralised at the Port.

- For extension of the container stacking capacity in the Port, the empty container depot can be relocated from the Port to outside areas when needed.

- The existing break bulk cargo handling facilities need to be upgraded and rehabilitated and the road infrastructure should be improved.

- A Free Port in Baku should include the upgraded multipurpose cargo terminal, the ferry terminal and, if possible, all other port cargo terminals in order to ease the customs procedures for import and export as well as for the transit traffic. This would extend the range of services of the Port in order to attract more cargo.

- Container handling for the ferry terminal should be carried out by the container terminal in order to minimise investments for specialised equipment an operations cost.

- The timber terminal should remain as a reserve area for future port extension. Location and existing infrastructure of this terminal are sufficient for establishing a bulk and break bulk cargo terminal, when the volume this type of cargo exceeds the current capacity of the main complex.

- The Absheron Oil Terminal should not be included in the present rehabilitation programme as its capacity is well above handling demands. If the demand will rise and extension and rehabilitation will be necessary, for construction and oprations users like the oil companies should be involved on a commercial base.

Preliminary Order of Magnitude estimates for the first Stage of Development

As far as it is possible at this stage of the project a budget estimation for necessary investments is given in the table below below:

Rehabilitation of Quay Wall	6.0 mio US $
Pavement	1.0 mio US $
Roads, Buildings etc.	1.0 mio US $
Equipment	2.0 mio US $
Workshops and Equipment Rehabilitation	1.0 mio US $
Aids to Navigation and Environmental Protection	0.5 mio US $
Total	**11.5 mio US $**

These first steps for necessary rehabilitation will enable the Port of Baku to carry on cargo handling operations, modernise the handling equipment and facilities for the urgent needs for servicing the freight industry in the changing transport market.

Volume IV:

Civil Engineering Assessment

Table of Content

Volume IV: Civil Engineering Assessment

Civil Engineering Assessment

1. Introduction - Former and ongoing Studies and Surveys

The bulk of the infrastructure of International Sea Port of Baku has been constructed between 1960 and 1970. Since 1970 virtually no new investment in infrastructure has been made in the port. As a result, many hydro-technical constructions show wear and tear.

In the period of design and construction of the facilities the sea level dropped year after year. This was going on since the beginning of the century. Since 1977 however, the sea level is rising every year. Due to this raised sea level part of the port facilities have been either abandoned, because they are flooded or are threatened seriously if the trend continues. The sea level measurements of the last year seem to indicate that the trend of rising is slowing down, if not reversing.

In the last years, several studies have been undertaken, aiming to trigger investments for improvement of the infrastructure.

Just before independence, in 1990 / 1991, the KASPMORNIIPROJECT institute of Baku assessed the rising of the sea level, produced a forecast for the development of the sea level for the next 20 years and made preliminary designs that corresponded to the then forecasted sea levels. The preliminary designs and budget estimates include phased renovation of all the hydro-technical constructions in the ports of Baku, Turkmenbashi, Makhachkala, Aktau, Oil terminal Apsheron, and the facilities at Bekdash, Alaja and Bautino. This programme is ambitious and includes at least for the Port of Baku the renovation of all existing facilities.

Within the TRACECA programme, Tacis financed a study on the Caspian Sea water level. This study was done by Sofremer, HPC and Deti, consulting engineers and was executed in 1994; It treated four aspects:

- Updating the forecast of sea level evolution
- A survey of the harbour installations in Baku and Turkmenbashi and the influence of the sea level rise on the operational fitness of these facilities
- Traffic prediction for both ports
- Phased action plan and rough budget estimate for the renovation works.

Two studies aiming at the preparation of tender documents for improvement works are ongoing at the moment. These studies are financed by Tacis within the TRACECA programme.

- The redesign of the ferry terminals in Baku and Turkmenbashi (Ramboll).
- The renovation of the general cargo facilities in Baku (The present addendum to the HPTI Management Assistance and Training Project).

The previous work done in the above mentioned studies has been used extensively for preparing this chapter. Field inspections, discussions with the port engineers as well as the screening of the port documentation have completed the data collection.

The need for an up to date overall mapping of the main port area was felt by the Ramboll team as well as by our team. For that purpose a topographical survey was set up jointly. This survey covers the area of the main complex, the ferry terminal and the adjacent areas. The survey has not been extended to other port areas because it seems at this moment unlikely that these other areas will be subject to renovation works in the short term.

2. hereafter treats the review of the existing structures.
3. gives an engineering evaluation of the existing structures and facilities.
4. reports on the topographical survey.
5. deals with the impact of the risen sea water level.
6. discusses the existing designs for renovation of the waterfront structures.

2. Review of the existing Structures

At the moment, the Baku Sea Port has three locations on the Apsheron peninsula:

- The main harbour location in the Baku bay, east of the town centre, near the government building
- The Timber Terminal, on the east side of Baku town and bay, in the industrial area
- The oil terminal, north-west of the town, on the north shore of the peninsula.

Fig.4.1 of the Apsheron peninsula and Baku bay shows these locations.

2.1 The Main Harbour Location

Fig 4.2 gives an overview of this area. Hereafter, the waterfront structures are described from West to East. Most of the cross sections given hereafter have been copied from the Kaspmorniiproject plan for reconstruction of 1991, mentioned in 1. For that reason, most of the sketches show in dotted lines the rehabilitation proposed by Kaspmorniiproject.

2.1.1 Platforms on Piles near the Sea Station (Passengers Terminal Building) (A)

Fig 4.3 gives a typical cross section. It consists of a concrete platform on concrete piles. Under the platform, the slope is ballasted with stone. At the top of the slope, a grid of concrete beams, filled with stone, forms the barrier between shore and structure. According to the Kaspmorniiproject report, the structure was build in 1969. The waterfront beam has been raised by some 50 cm over nearly the complete length. This was for coping with over topping water caused by sea set-up and wave generation basically from winds from the South. This structure consists of three perpendicular sections with a length of respectively 60 m, 200 m and 45 m. At

the first section an old ferry boat is berthed on semi-permanent basis. The middle part is not used as berthing facility. The last part of 45 m is sometimes used as berth for small harbour vessels. The fendering vanished and was replaced here and there by old tires. The surface is asphalted.

2.1.2 Passengers Pier (B)

Fig 4.4 gives a typical cross section of this concrete platform on concrete piles. The pier is 16 m wide and 131 m long. The structure is reported to date from 1969. The fendering system has not survived and has been replaced mainly by old tires. The waterfront beam has been raised with different heights according to the local sea attack. The passenger vessels other than the mixed ferries berth at this pier. The pier is not equipped with handling gear and no crane rails are installed. The surface is asphalted.

The waterfront between the berth for harbour vessels and the main complex belongs to a company that processes fish products and that has cold stores. It is not part of the port.

2.1.3 The Main Complex, Western and Southern Quays (C)

Fig 4.5 gives a typical cross section of these quay walls. They consist of an old block wall construction, completely enveloped by an anchored sheet pile construction. The sheet piles are of the Larsen type. The block wall construction is reported to date from 1939. The upgrading with the sheet pile construction is, according to the Kaspmorniiproject report, from 1969-1970. The West side of the main complex is 403.5 m long and the South side is some 215 m long.

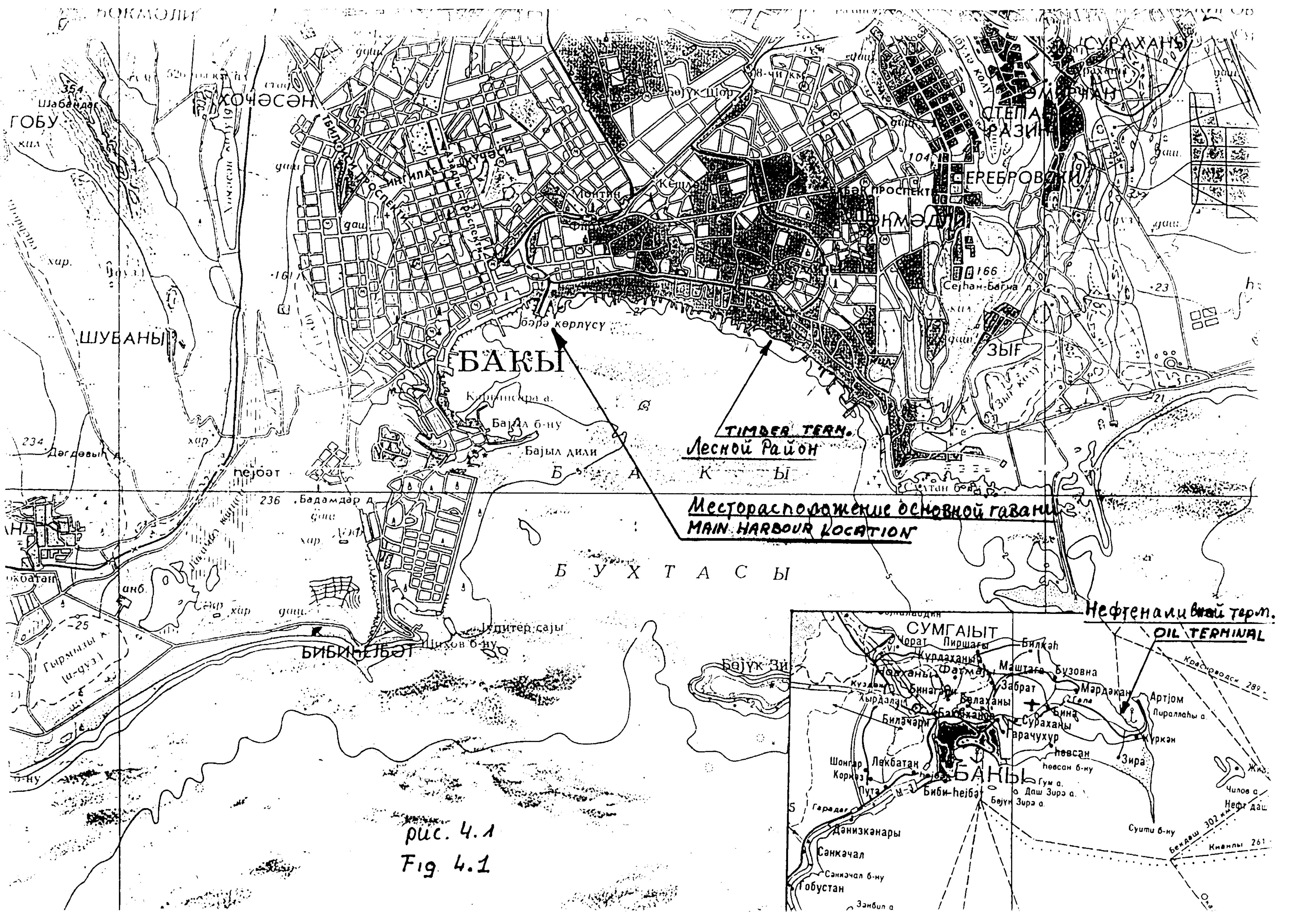
The topping beam has been raised at several places, mainly by placing on top concrete piles or other loose structures.

The apron is equipped with crane rails, train rails, a drainage system and culverts for water supply, power distribution, etc. Fig 4.6 shows typical cross sections of the quay top, as designed by Kaspmorniiproject. The drainage system and the waterside culvert for power distribution and water supply are not in good shape. The fendering system is not any more in good shape. At places old steel structures protrude at the waterfront. On the south side of the main complex, a Ro-Ro ramp has been installed later. Fig 4.7 has been copied from a renovation project of the East quay of the complex. It shows were the ramp is located, and that it is intended for Ro-Ro ships with side flaps.

The surface of the main complex consist partly of asphalted area, of covers of the culverts, of concrete pavement and of unpaved sections. In general the pavement is not in good shape.

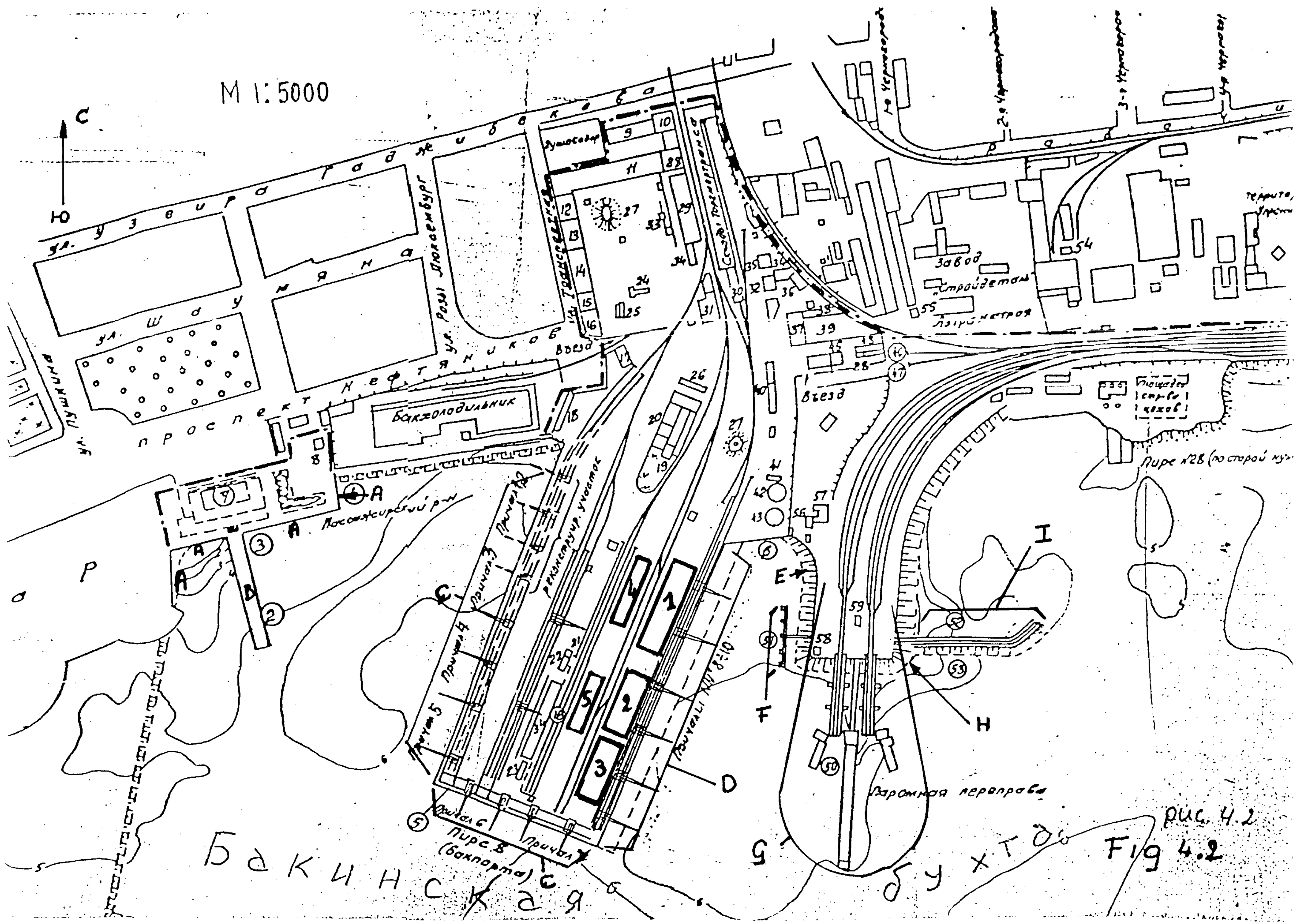
2.1.4 The Main Complex, Eastern Quay (D)

As shown on fig 4.8, the East side of the complex has not been rehabilitated but has simply been raised during the renovations of 1969-1970. This quay wall is some 360 m long. The block wall is raised by masonry, executed with the local natural stone, a kind of porous limestone or coral



ГОБУ
ХОЧӘСӘН
ШУБАНЫ
БАКЫ
СУРАХАНЫ
СТЕПАН РАЗИН
СЕРЕБРОВКИ
ЗЫГ
БИБИҺЕЈБӘТ
Б А К Ы
Б У Х Т А С Ы
TIMBER TERM.
Лесной Район
Месторасположение основной гавани
MAIN HARBOUR LOCATION
Нефтеналивной терм.
OIL TERMINAL
СУМГАІЫТ
Бузовна
Мардакан
Артјом
Зира
Сураханы
Забрат
Маштаға
Биби-heјбат
Гобустан
Сангачал

рис. 4.1
Fig 4.1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С
Ю
ул. Узеира Гаджибекова
ул. Шаумяна
ул. Розы Люксембург
ул. Пушкина
проспект Нефтяников
Бакхолодильник
Въезд
Завод "Стройдеталь"
Пирс №28 (по старой ну
Паромная переправа
Пирс 8 (бакпорта)
Причал 5
Причал 6
Причал 4
Причал 3
Причалы №№ 8÷10
реконструир. участок
Пассажирский р-н
Бакинская бухта
A
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C
D
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F
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H
I

рис. 4.2

Fig 4.2

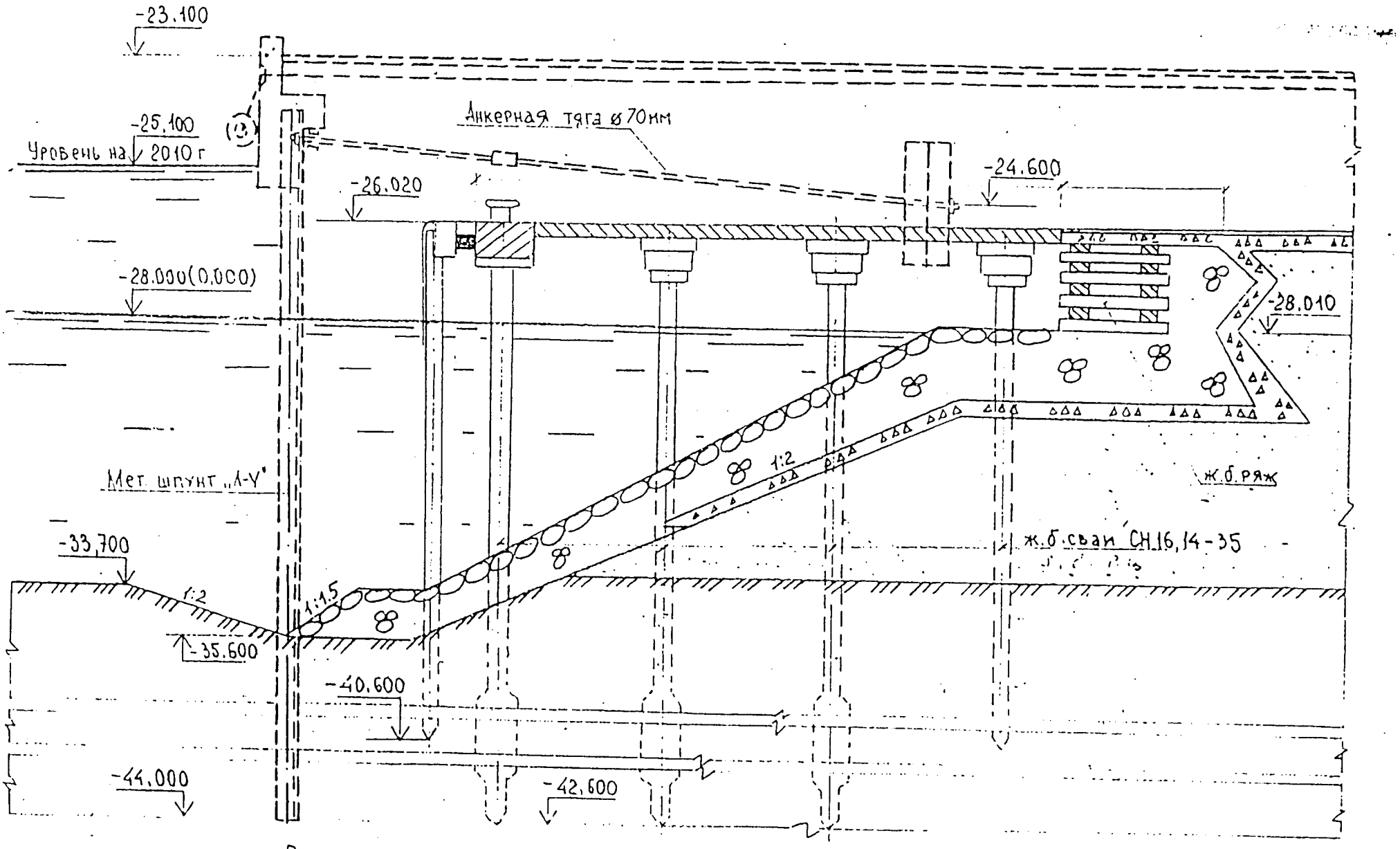


Рис. 4.3 Платформа у морского вокзала

Fig 4.3 PLATFORMS NEAR SEA STATION

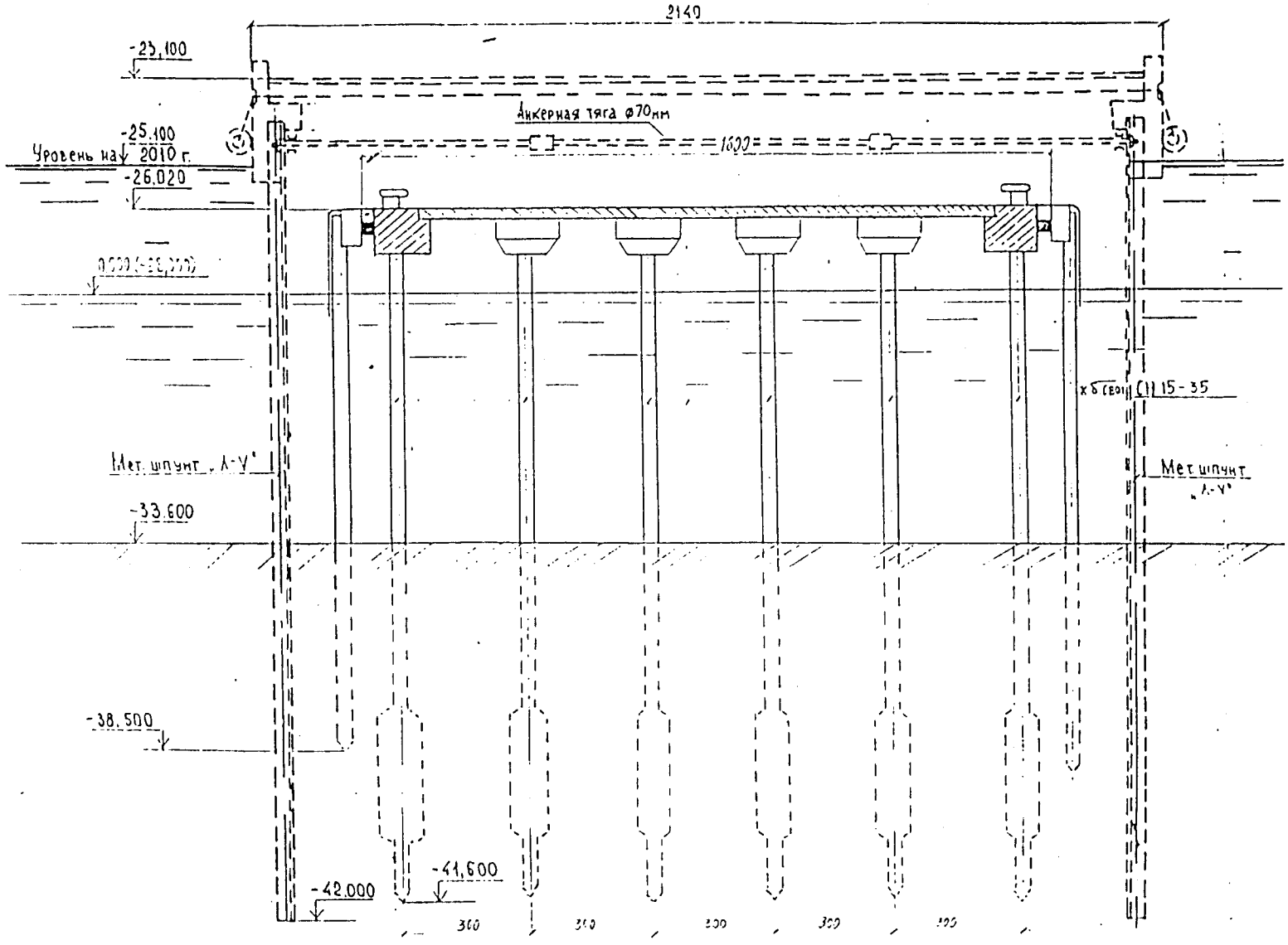


Рис. 4.4 Пассажирский пирс

Fig 4.4 PASSENGERS PIER

stone. On top of the masonry is a concrete beam. The fendering system has vanished but its steel anchors protrude at the waterfront.

Kaspmorniiproject made the detailed design for the renovation of the first stretch of 150m of this quay. The location of this renovation project is indicated on fig. 4.9. Fig. 4.10 gives a cross section of this design. It consists of a concrete platform on concrete piles. Work started and a substantial amount of piles have been placed. Work stopped some time ago so that berth NR. 10 is out of use since. The design documents date from 1982. The design differs considerably from the pre-design shown in dotted lines on fig. 4.8. The latter dates from 1991.

2.1.5 Shore Defence between the Main Complex and the Ferry Terminal (E)

This shore has been reinforced by the port at regular intervals as the water level went up year after year. No specific cross section is available. The rehabilitation of this shore protection, if needed, is part of the redesign of the ferry terminal, presently undertaken by Ramboll.

2.1.6 The Mooring Facility for Water Tankers (F)

This facility is mainly used for loading the tankers that supply the town of Turkmenbashi with fresh water. The facility consists of 5 concrete mooring blocks on steel piles. Metal bridges are placed between the blocks. According to the Kaspmorniiproject report, it was constructed in 1967. Fig 4.11 gives cross sections of the mooring points. The fendering system seems satisfactory.

2.1.7 The Ferry Terminal Complex (G)

For this part of the port facilities is referred to the reporting done by Ramboll. Its construction was ready in 1963.

2.1.8 Shore Defence between the Ferry Terminal and the Port Fleet Terminal (H)

This shore has been reinforced by the port at regular intervals as the water level went up year after year. No specific cross section is available. The rehabilitation of this shore protection, if needed, is part of the redesign of the ferry terminal, presently undertaken by Ramboll.

2.1.9 Quay for the Port Fleet (I)

Fig 4.12 gives a typical cross section of this quay construction, as incorporated in the Kaspmorniiproject rehabilitation report of 1991. The quay is build in two straight sections. They are some 100 m and 30 m long. The earth platform between the berth and the sea is less wide than fig 4.12 might suggest. It is reported to be constructed in 1968. No cross section of the seawards slope protection could be traced. As elsewhere, the fendering has vanished and has been replaced by old tires. The earth platform and slope protection form a break-water structure that protects the enclosed water area against the waves coming from the South.

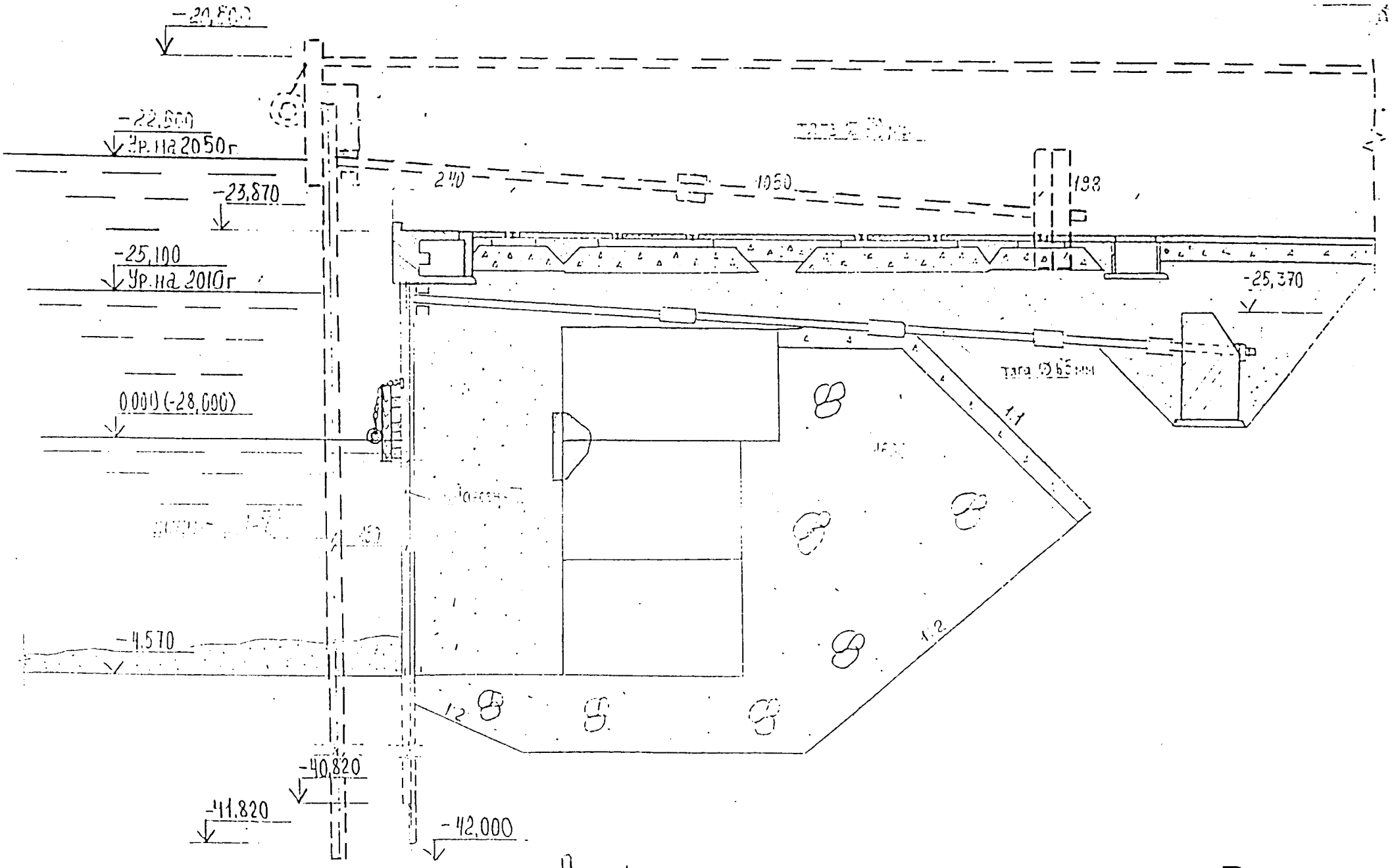
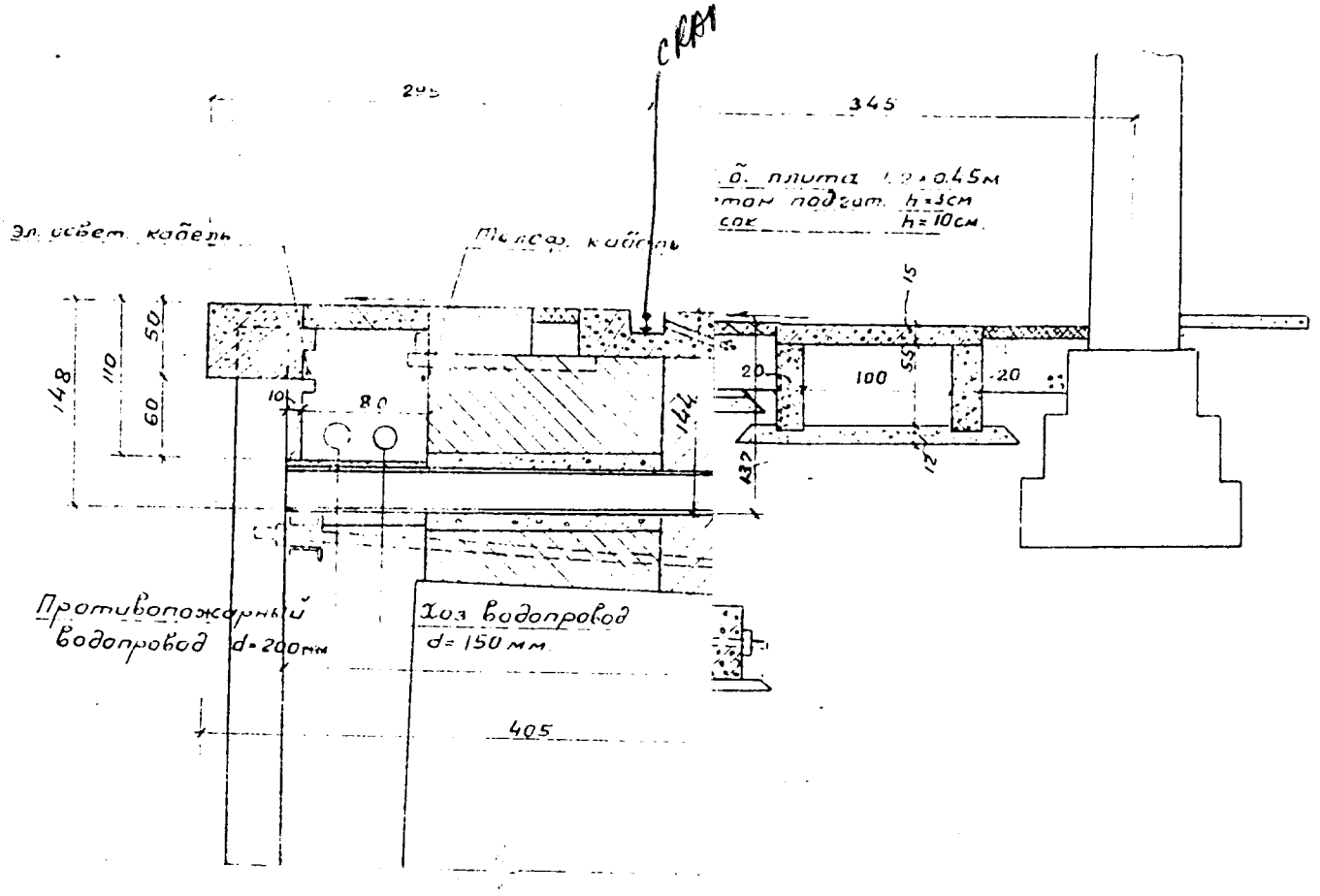
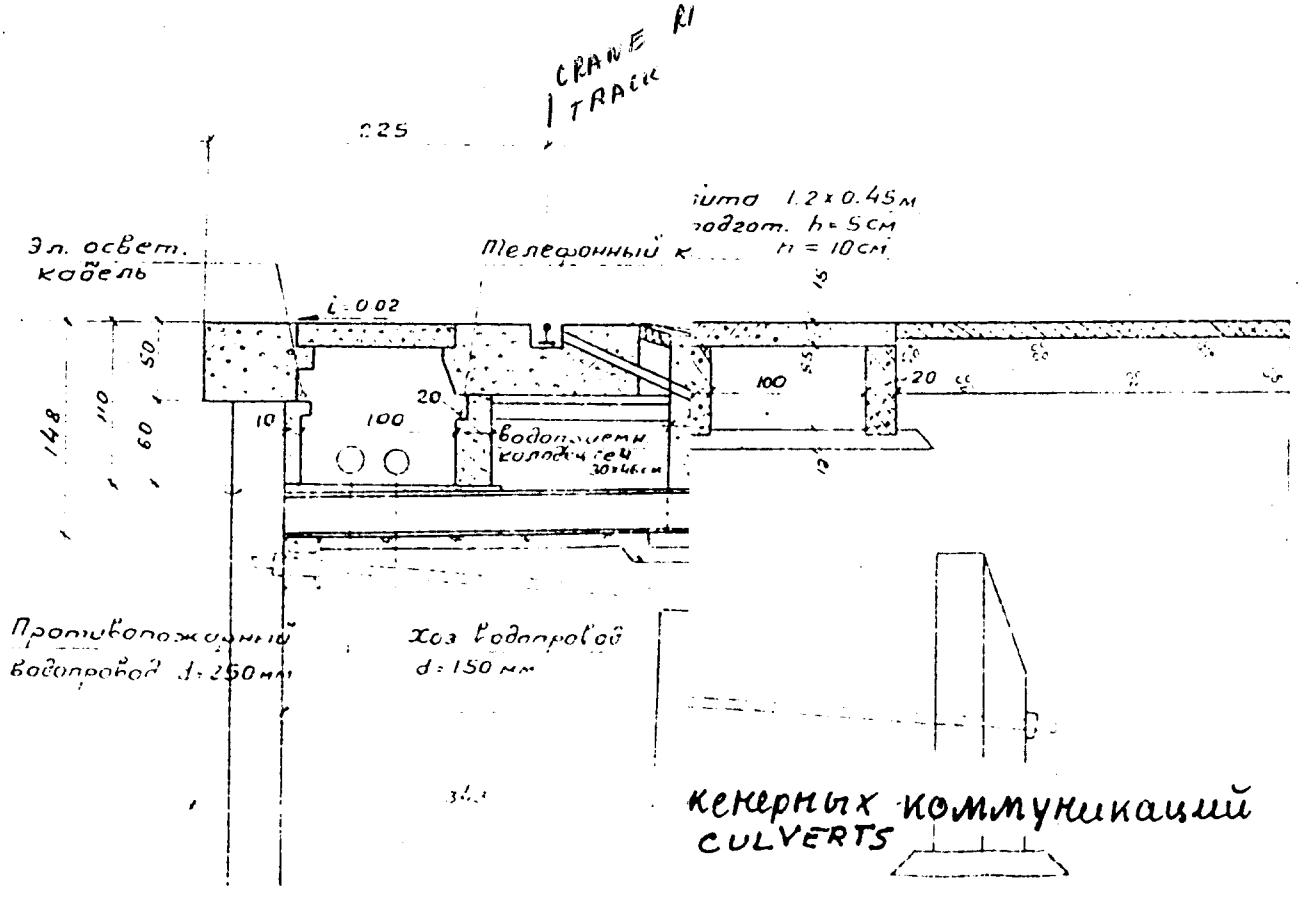


Рис. 4.5 Основной комплекс Западной и Южный Причалы

Fig 4.5 MAIN COMPLEX WESTERN AND SOUTHERN QUAYS





кекерных коммуникаций
CULVERTS

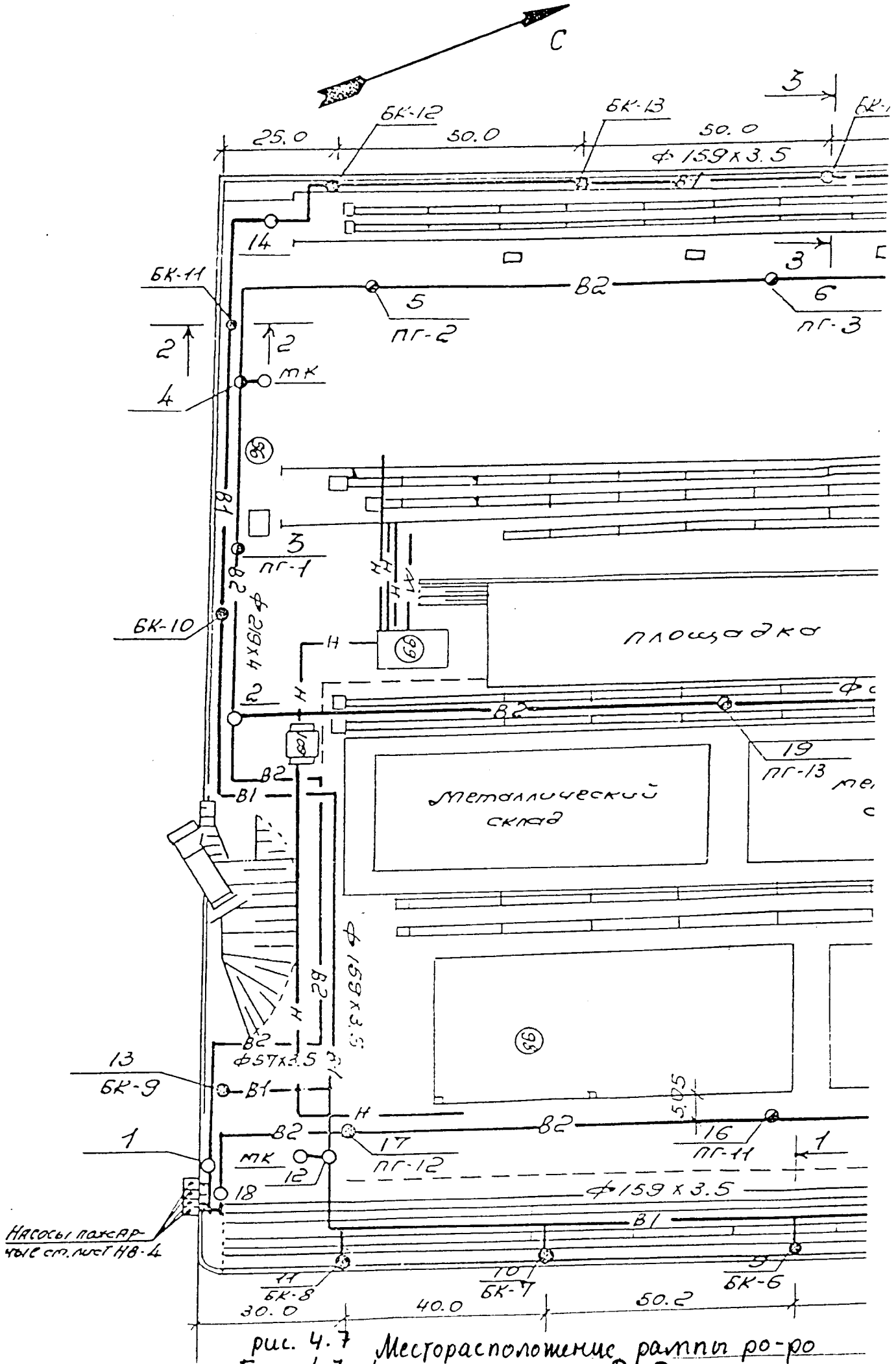


рис. 4.7 Месторасположение рампы ро-ро

Fig 4.7 LOCATION OF THE Ro-Ro RAMP

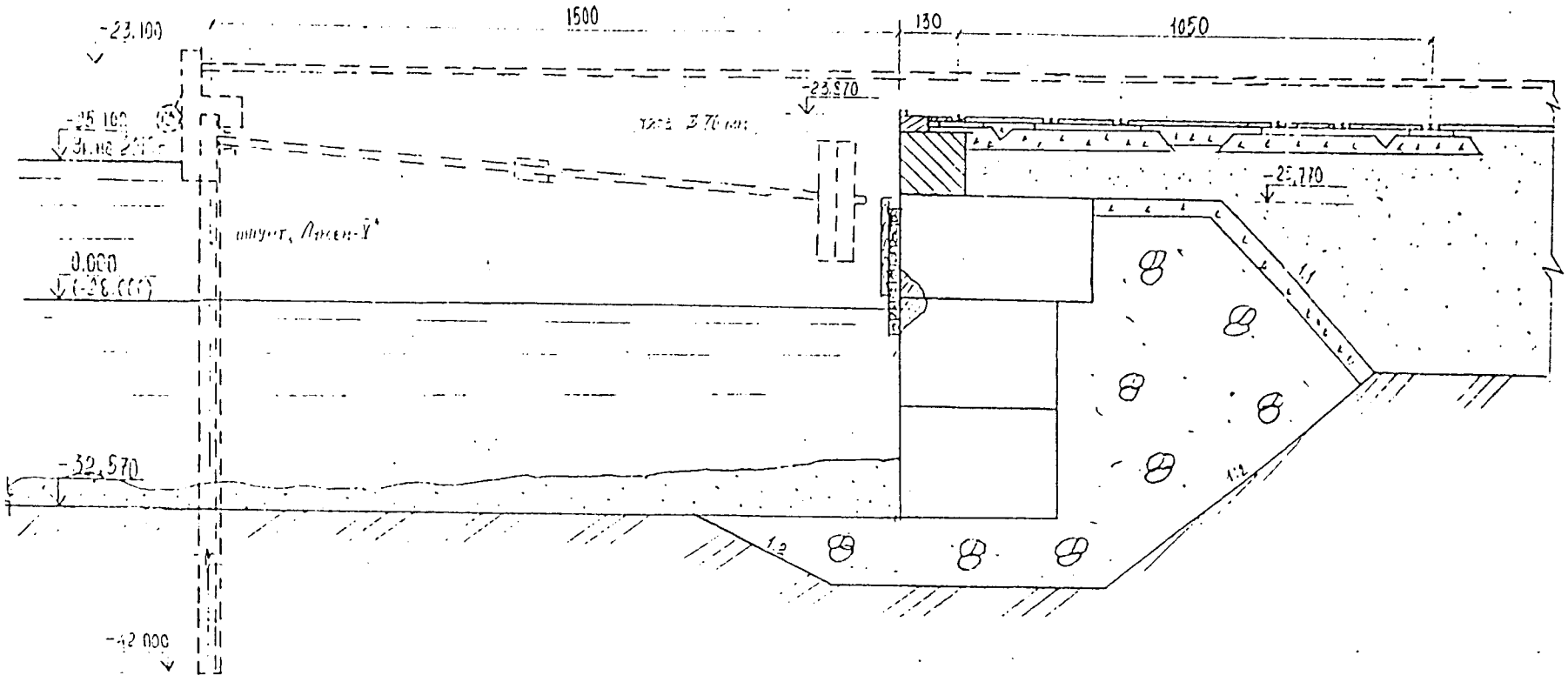


Рис. 4.8 Основной комплекс, Восточный пригал

Fig 4.8 MAIN COMPLEX EASTERN QUAY

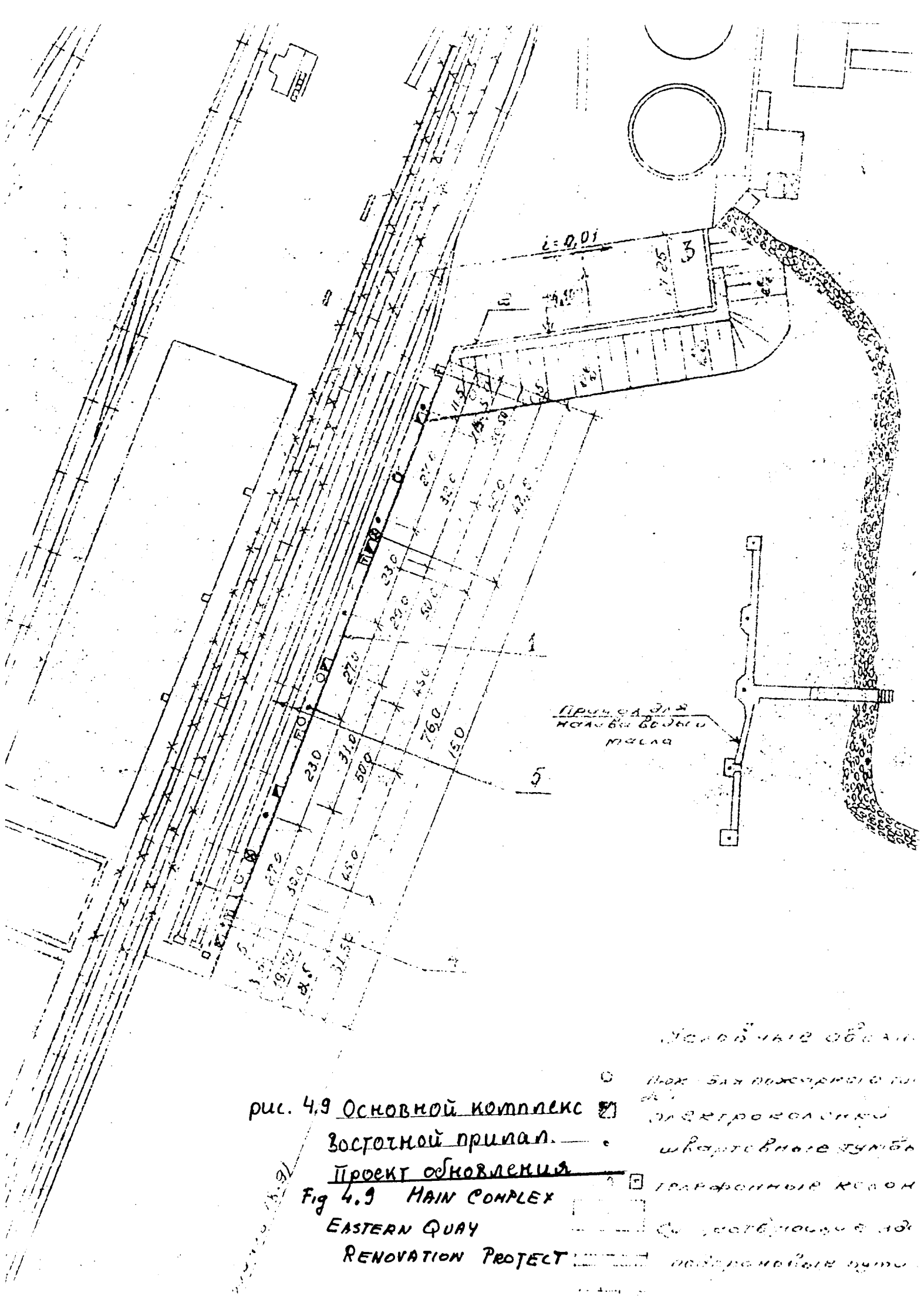


рис. 4.9 Основной комплекс Восточной пристан. Проект обновления

Fig 4.9 MAIN COMPLEX EASTERN QUAY RENOVATION PROJECT

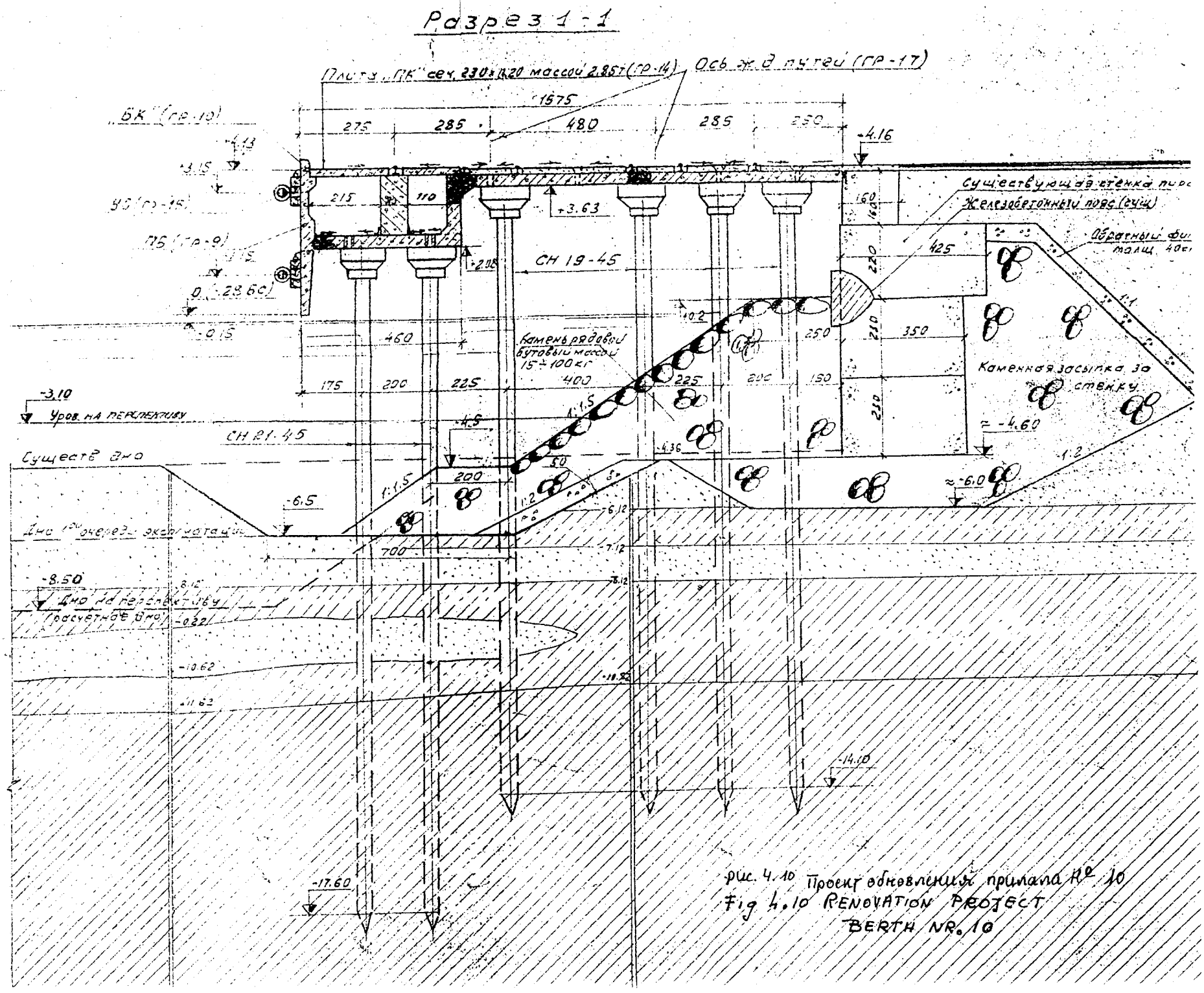


рис. 4.10 Проект обновления причала № 10
Fig 4.10 RENOVATION PROJECT
BERTH NR. 10

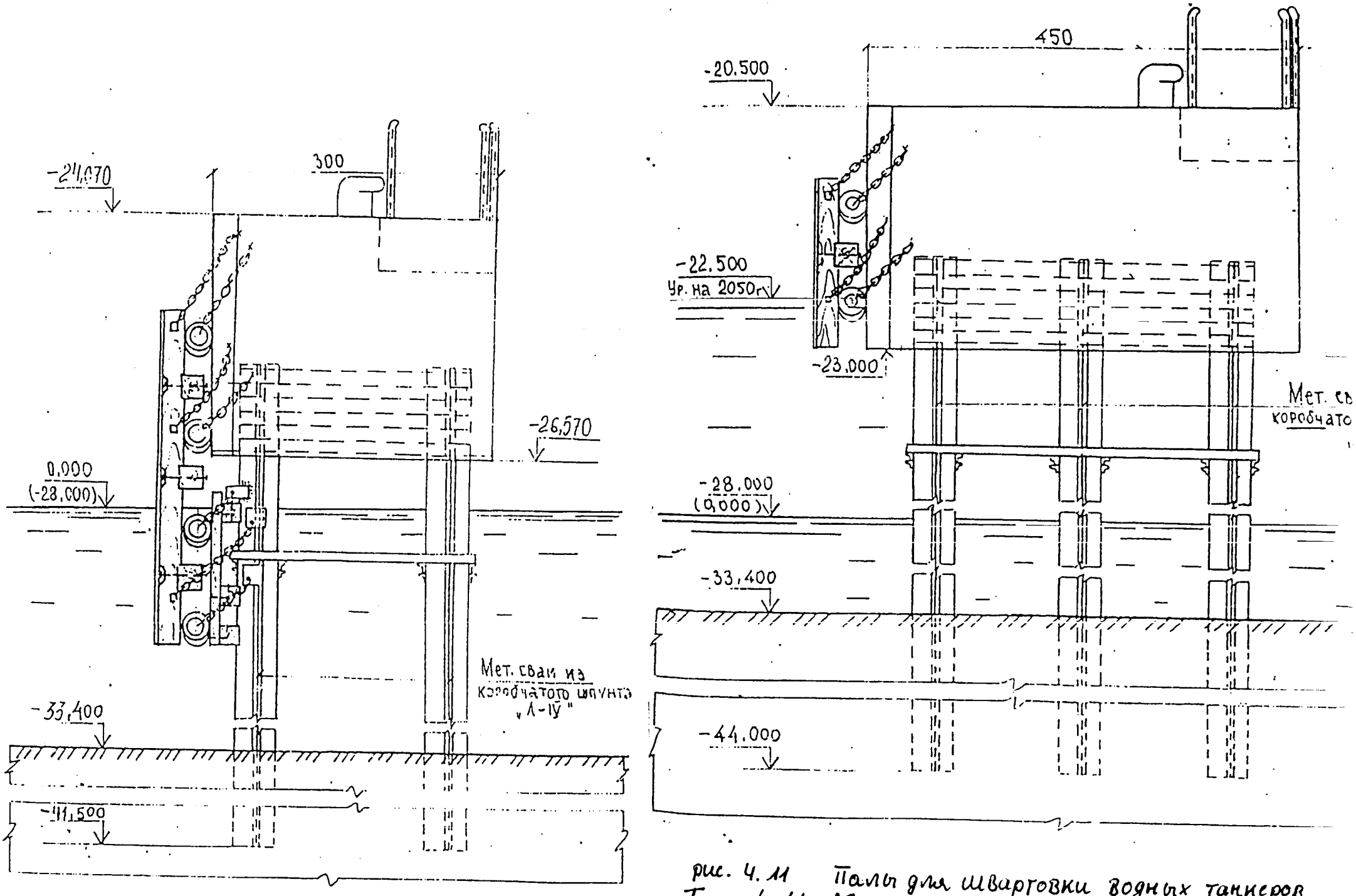


рис. 4.11 Пали для швартовки водных танкеров

Fig 4.11 MOORING BLOCKS FOR WATER TANKERS

2.2 The Timber Terminal

The timber terminal consists of three different construction phases. Due to the high water level, the terminal was flooded until very recently. At the time of writing (October 1996), the water level had dropped so that the apron was just above the water. To the West of the terminal, a construction company has a quay with a platform 1 m above that of the timber terminal.

The location of berths 1,2 and 3 are indicated on fig 4.13. The first berth is 105 m long and was constructed in 1960. It consists of an anchored sheet pile construction. Fig 4.14 gives a typical cross section. At places, the topping beam is completely destroyed. Only the surface is visible now. It looks like that considerable repair works will be needed to restore this berth into operational condition.

The chief engineer's department reports that berth nr.2 was constructed in 1971. It consists of a concrete platform in piles. The slope under the platform is protected with stones. Fig 4.15 gives a cross-section of this berth 2 and of berth 3. Both are of the same design. Only the surface is visible now. It looks like that considerable repair works will be needed to restore nr.2 berth into operational condition.

Berth nr.3 has the same design as berth nr.2, but has for one or another raison been constructed about 1 m further into the sea. According to the chief engineer's department, this last berth was constructed in 1982. Berths nr.2 and 3 are together 250 m long.

2.3 Oil Terminal

Fig. 4.16 gives an overview of the oil terminal area. It indicates also the position of the different piers.

The terminal consists of:

- The Northern breakwater
- The three identical jetties for crude oil imports (nr. 1, 2 and 5)
- One jetty for export of refined products (nr. 3)
- A quay for the service boats.

Only jetties nr. 1 and 3 belong to Baku Sea Port. It is not clear who owns the breakwater and who is responsible for its maintenance. Only jetty 1 and 3 are operational today. Jetties 2 and 5 are abandoned by now.

The director of the oil terminal reports that no dredging is needed in this facility.

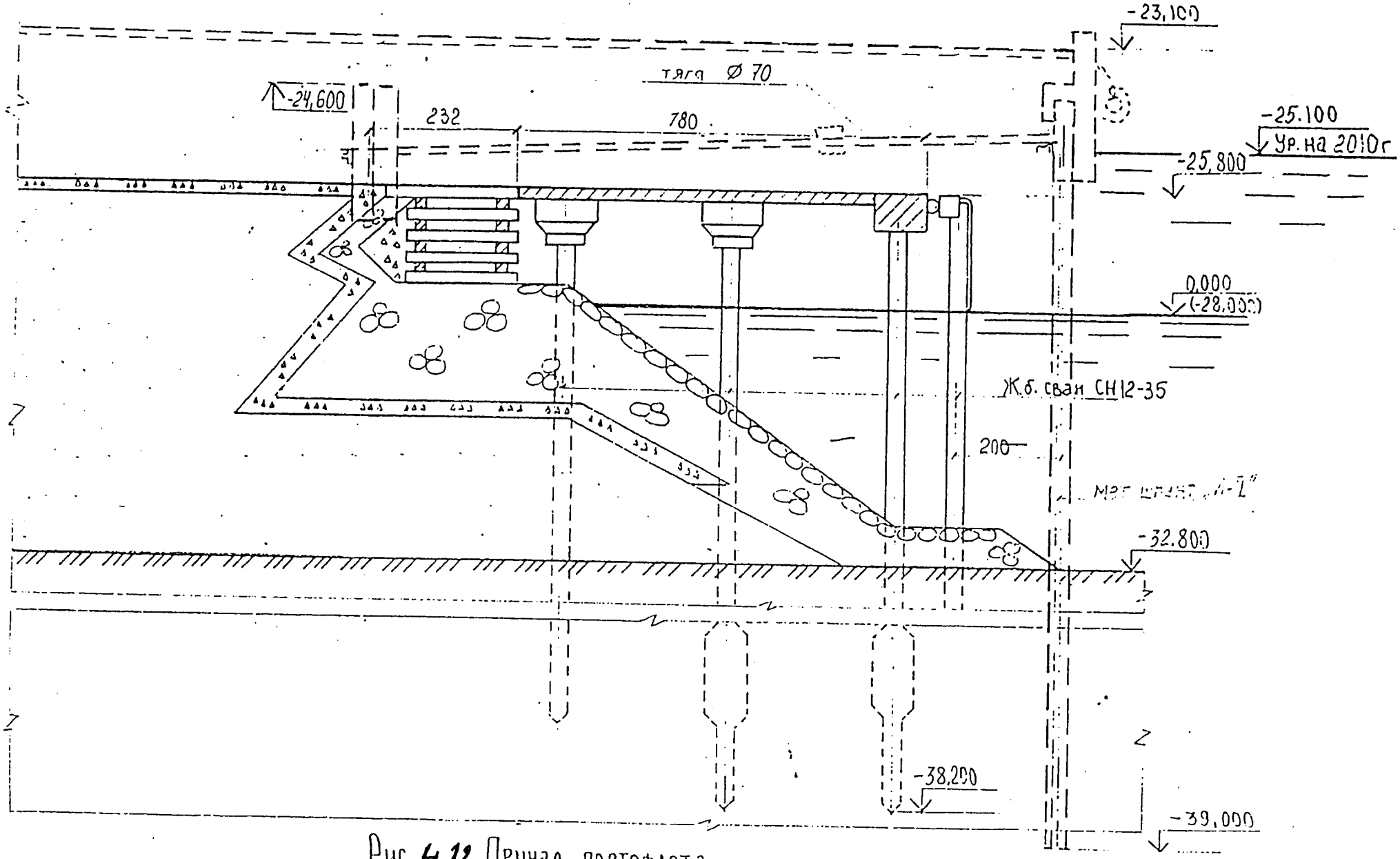
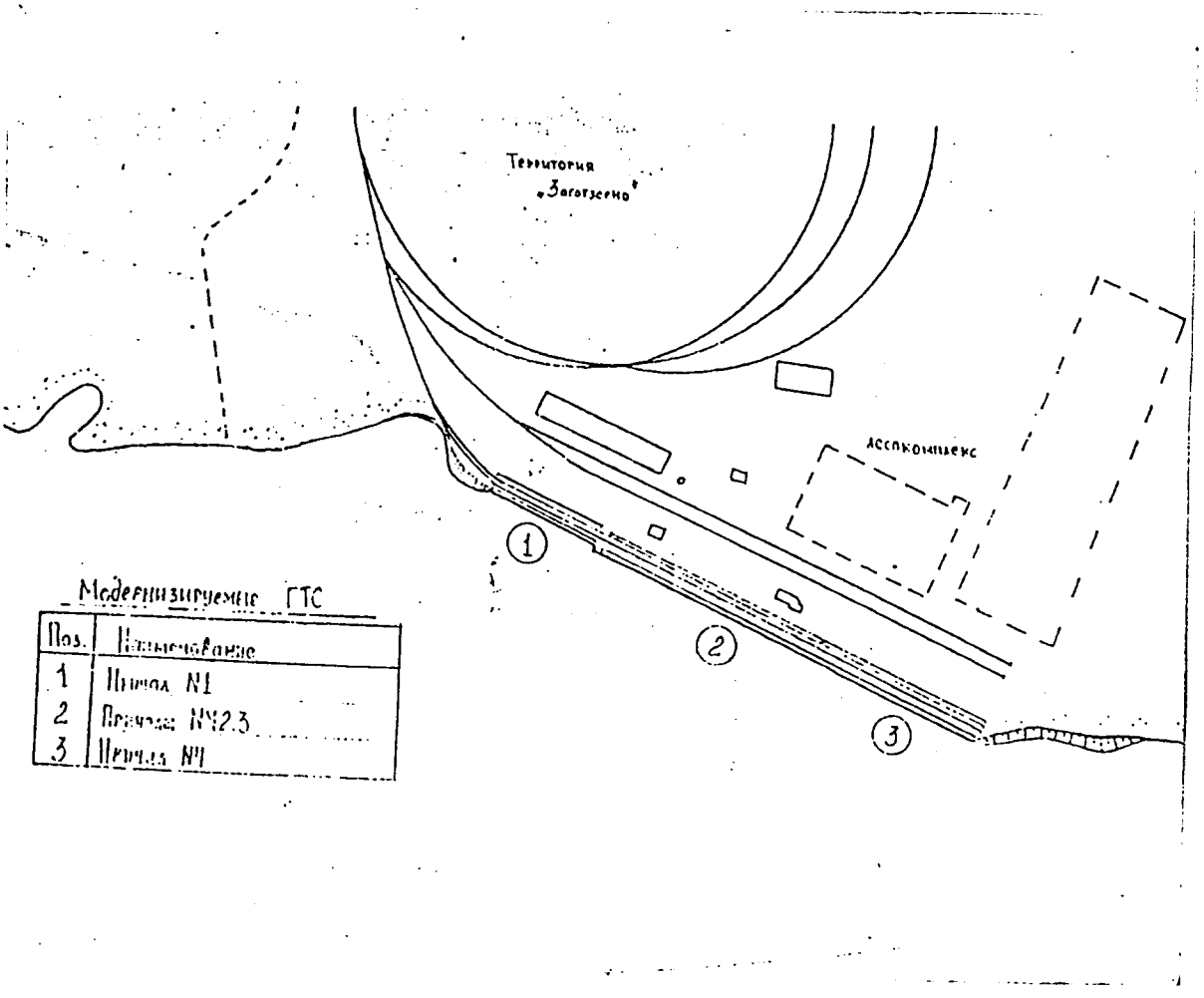


Рис. 4.12 Причал портофлота

Fig 4.12 QUAY FOR PORT FLEET



Модернизируемые ГТС

Поз.	Наименование
1	Причал N1
2	Причал N2.3
3	Причал N1

рис. 4.13 Лесной участок
Fig. 4.13 TIMBER TERMINAL

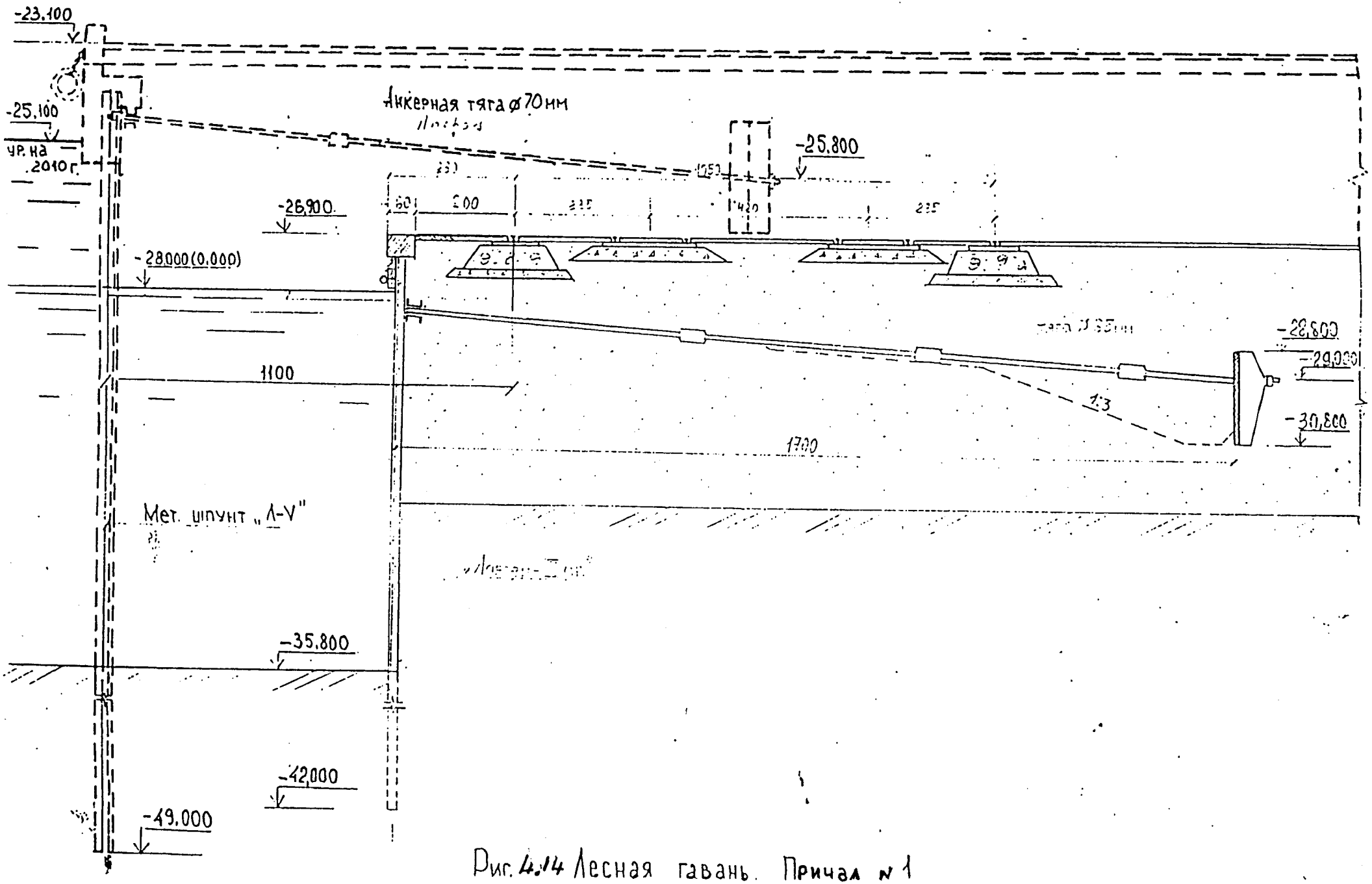


Рис. 4.14 Лесная гавань. Причал № 1

Fig 4.14 TIMBER TERMINAL BERTH NR 1

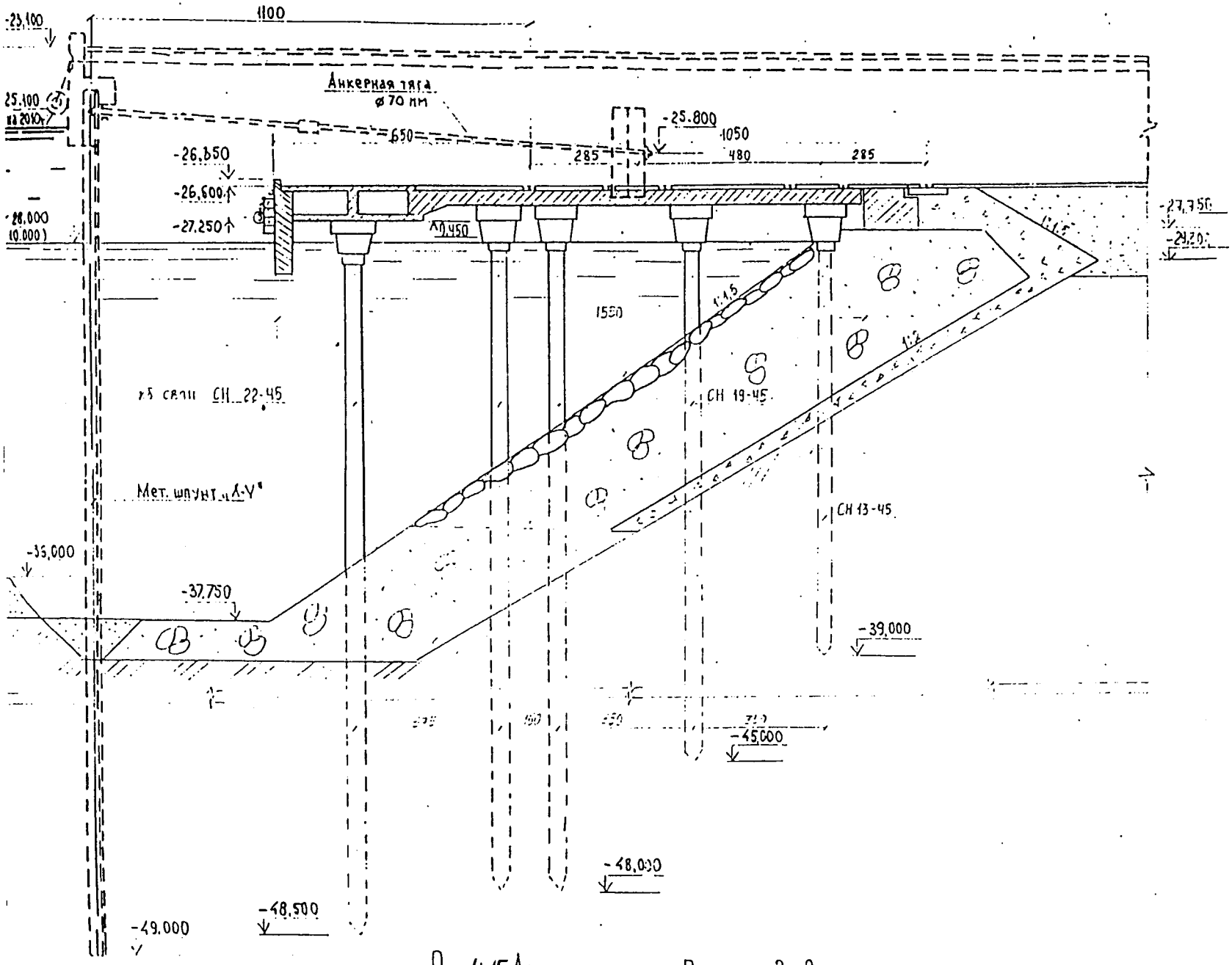
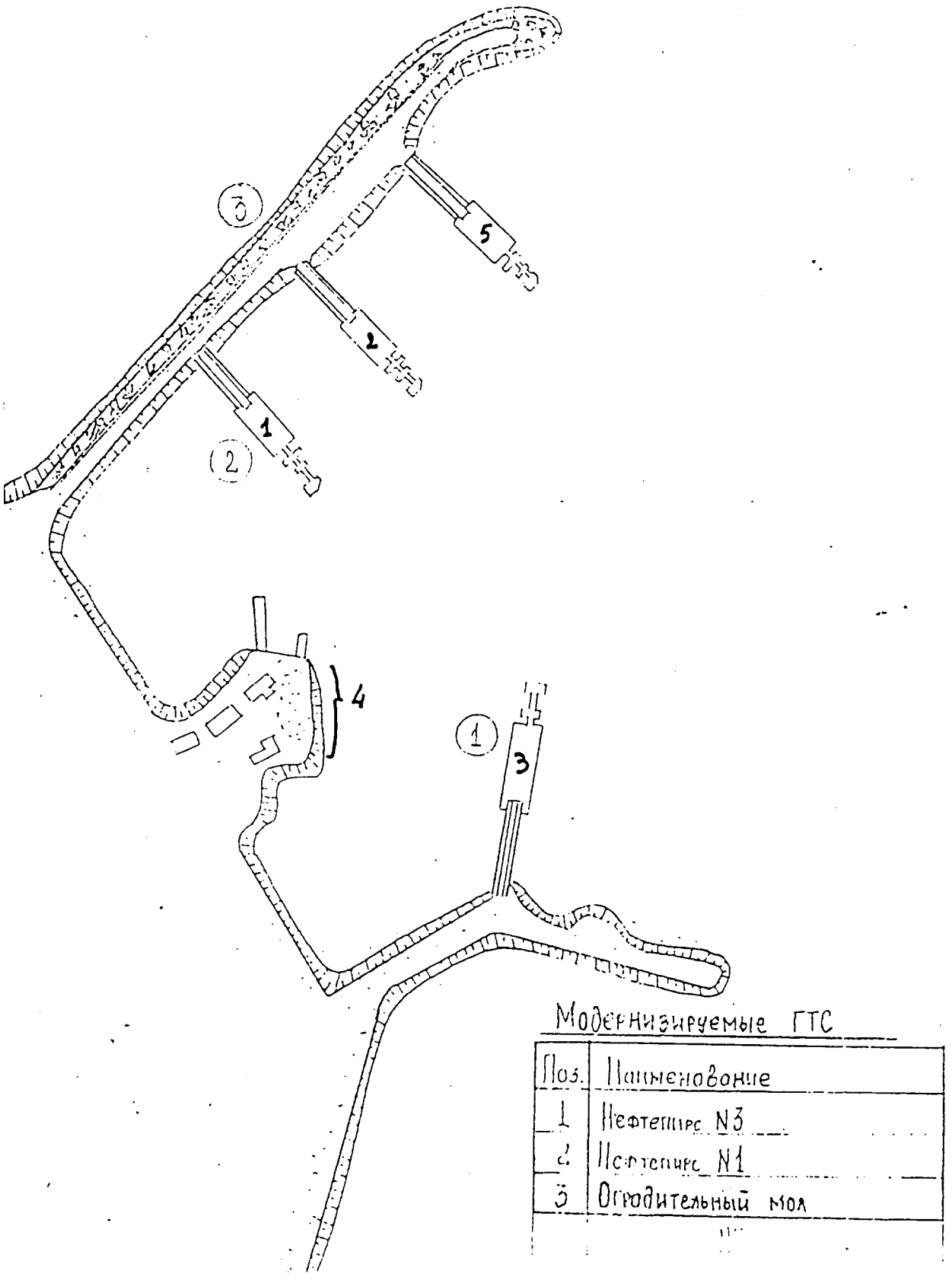


Рис. 4.15 Лесная гавань. Причалы № 2, 3

Fig 4.15 TIMBER TERMINAL BERTHS 2 and 3



Модернизируемые ГТС

Поз.	Наименование
1	Нефтепирс N3
2	Нефтепирс N1
3	Оградительный мол

Fig. 4.16 Oil Terminal Area 1/2000

Рис. 4.16 П/п Аншерон М 1:2000

2.3.1 The Northern Breakwater

Fig. 4.17, 4.18 and 4.19 give cross sections of the existing breakwater and of the reinforcements proposed by Kaspmorniiproject in 1991. It has been built in 1965. The deepest stretch was reinforced in 1989 with concrete blocks of 14.6 tons each (see fig. 4.19). The reinforced section runs from jetty 5 till the end of the breakwater.

According to the director of the oil terminal the present situation is satisfactory. Over topping of the Northerly waves is not excessive. At the non reinforced sections, the limited water depth moderates the waves sufficiently. During our site visit, the sea was to calm to judge the efficiency of the breakwater. Regular maintenance is needed by replacing moved blocks after stormy periods.

2.3.2 Jetties Nr. 1, 2, 3 and 5

The jetties are of the same type. They have been constructed in 1970. They consist of three parts:

- The access bridges between the shore and the middle part of the jetty. One side houses the pipe bridge, the other side contains a ramp for cars and trucks.
- The middle part is used for berthing the vessels. This part houses the loading or unloading arms. For unloading, the ships' pumps are used. There is a facility at both sides of the jetty.
- The last part consists of mooring points and fender blocks.

Fig 4.20 gives a cross section of the middle part of the jetties and the proposed renovation proposed by Kaspmorniiproject in 1991.

The jetties are founded on concrete piles and covered with concrete decks. The fender system is still in place.

2.3.3 Quay for the Service Boats

This quay is not documented in the Kaspmorniiproject report of 1991. The level of the deck is not far above the sea level.

2.4 Warehouses

Inspection of buildings has been limited to the warehouses on the main complex. These warehouses are the only ones that are fit for efficient cargo handling and storage. Fig 4.2 shows the location of these warehouses.

Warehouse 1,2 and 3 are of similar construction. These warehouses are located at the rear of the quay cranes of the Eastern quay. They consist of masonry walls and a roof supported by a steel structure. The span is some 30 m without any column in between. The warehouses are divided in sections by transversal separation walls in masonry.

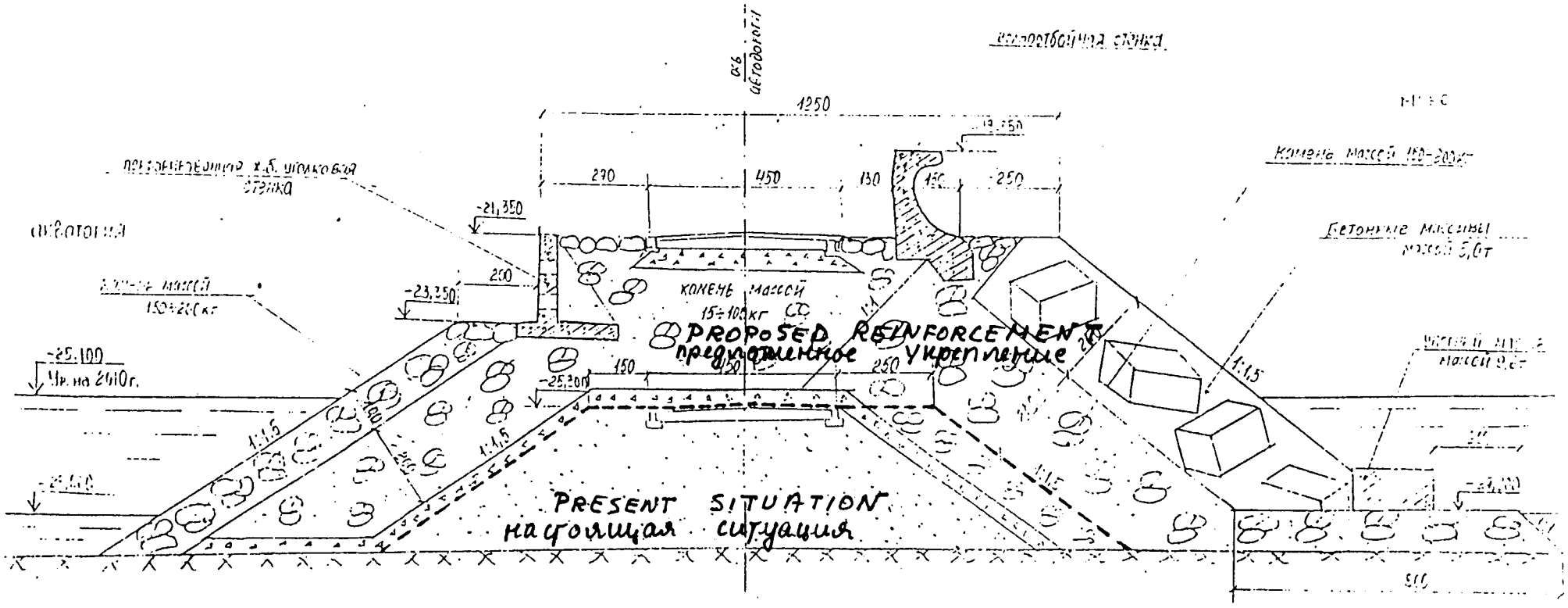


рис. 4.17 Мол у набережной

Fig. 4.17 BREAKWATER NEAR THE SHORE

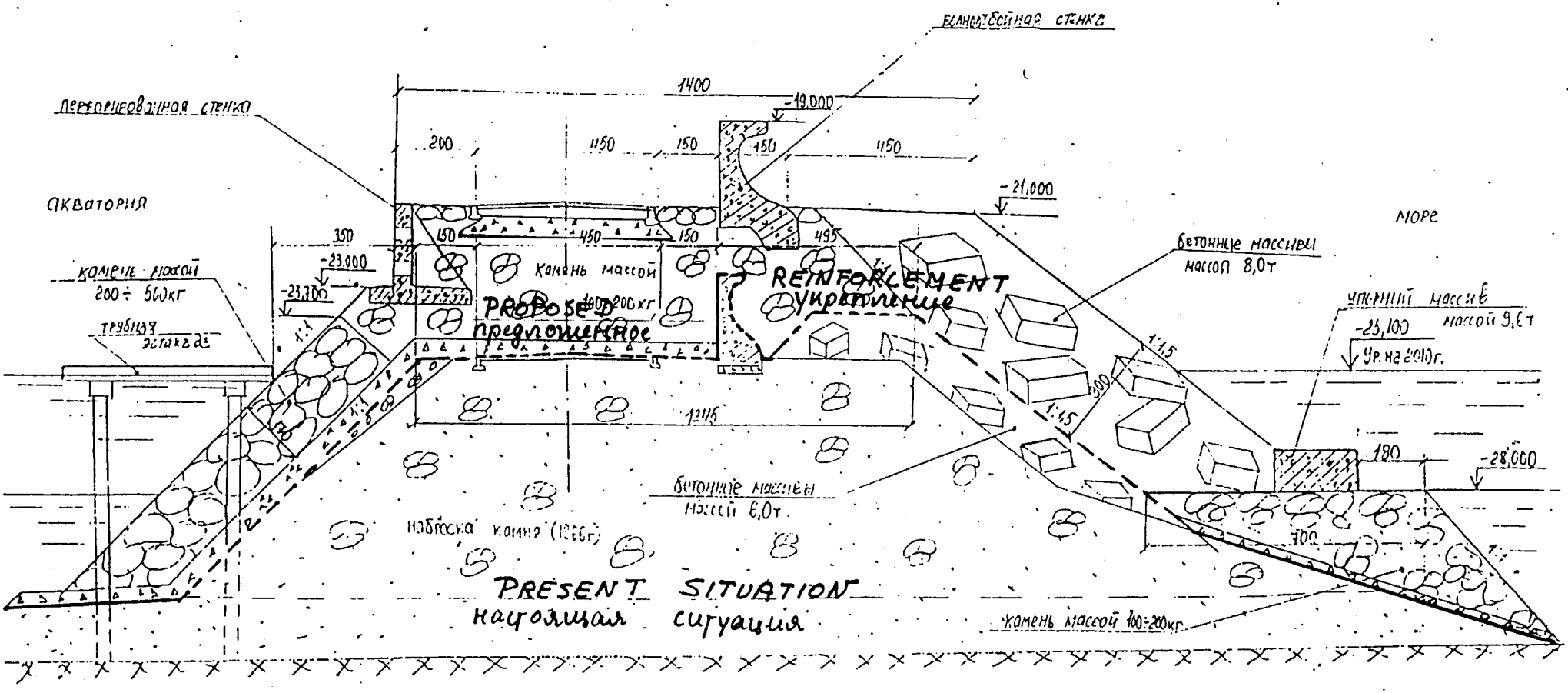


рис. 4.18 Мол, средняя секция

Fig. 4.18 BREAKWATER MIDDLE SECTION

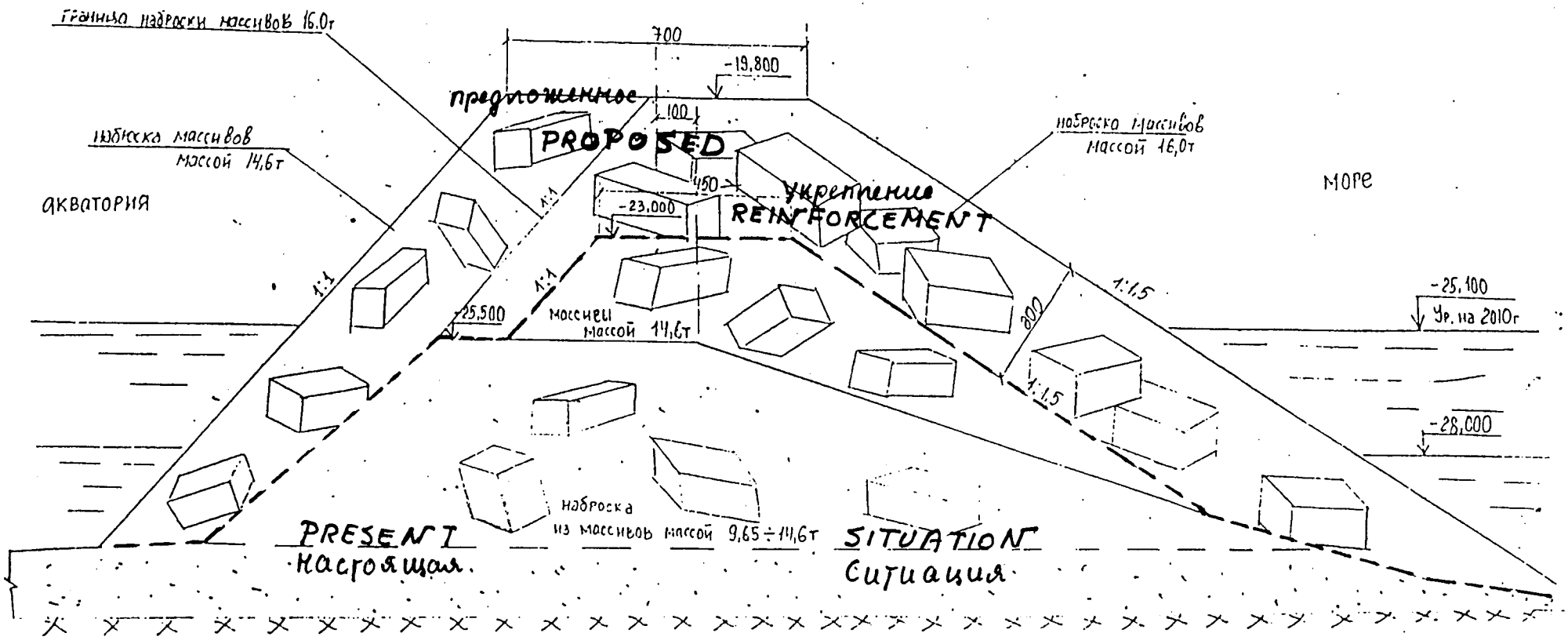
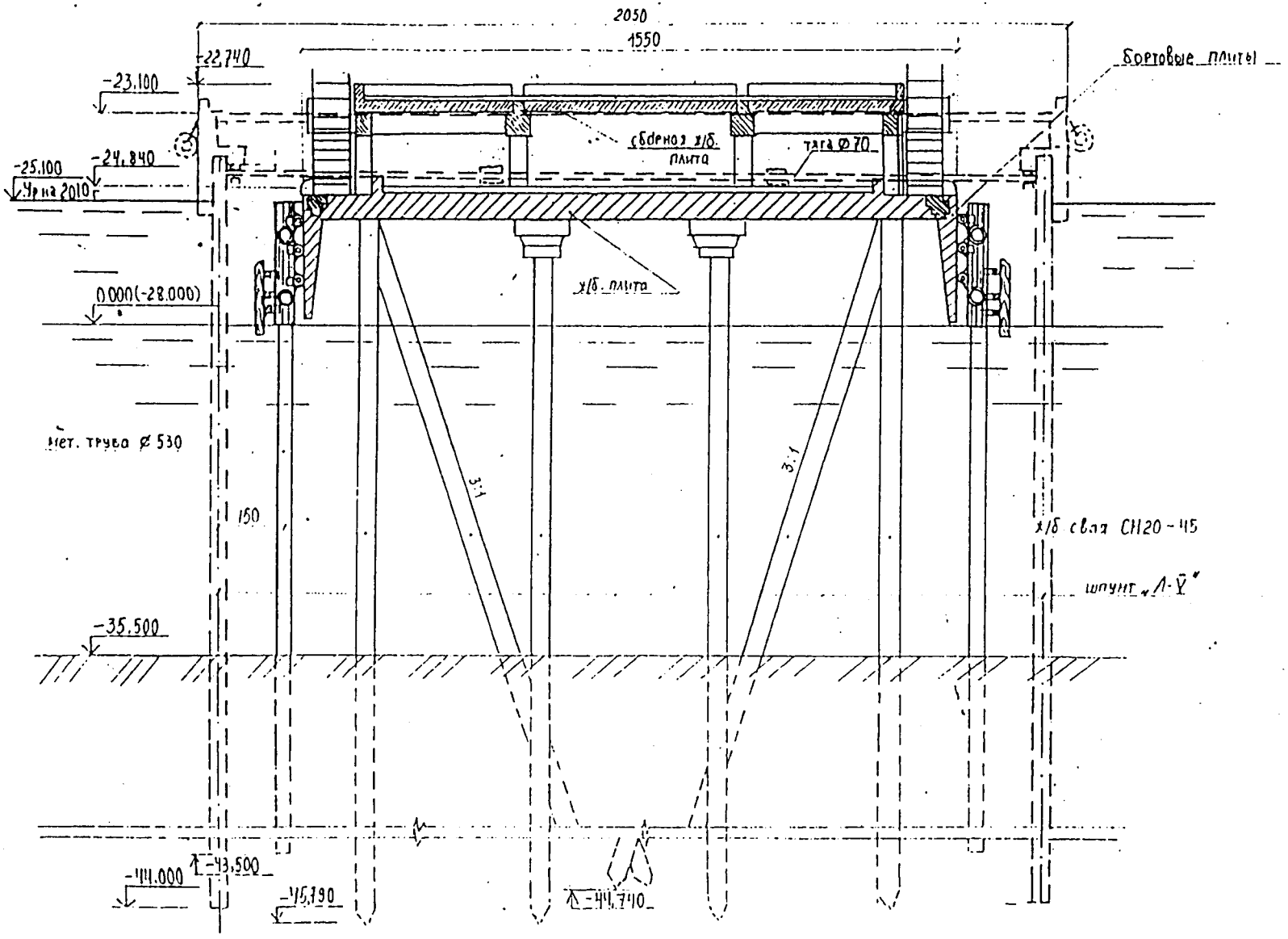


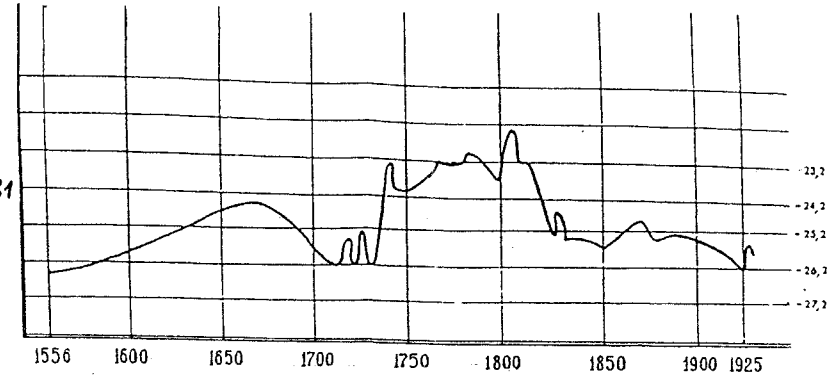
Рис. 4.19 Мол - последняя секция
Fig 4.19 BREAKWATER LAST SECTION

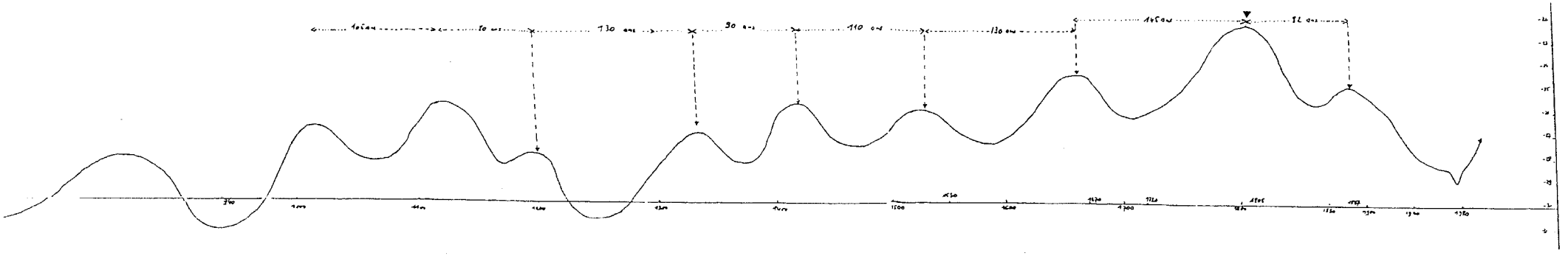


Поперечный разрез средней части пирсов 1, 2, 3 и 5

Fig. 4.20 CROSS SECTION OF THE MIDDLE PART OF JETTIES 1, 2, 3 and 5

VARIATION OF THE CASPIAN SEA LEVEL FROM 1958 TO 1931
Колебание уровня воды Каспийского моря 1958-1931





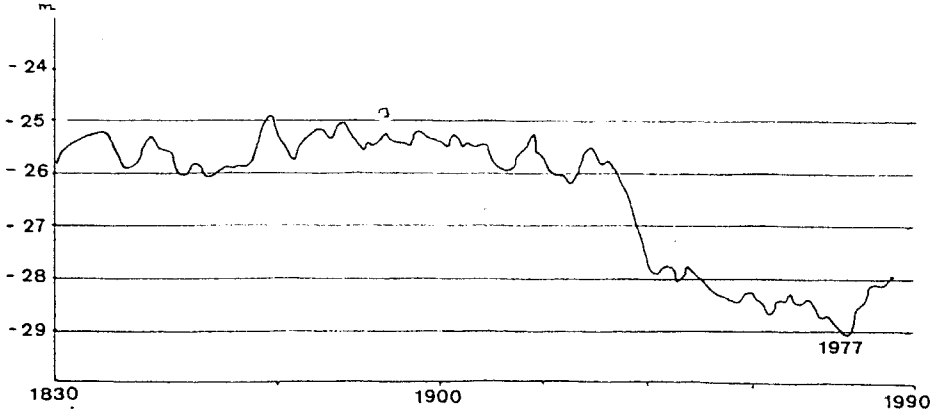


рис. / Fig. 4.21

VARIATION OF THE CASPIAN SEA LEVEL SINCE THE MIDDLE AGE
Колебания уровня воды Каспийского Моря с средних веков

Warehouse 1 is 108.6 m long and is divided in three sections;
Warehouse 2 is 66 m long and is divided in two sections;
Warehouse 3 is 72.6 m long and is divided in two sections.

At the rear of these 3 warehouses, two warehouses have been build at the level of the rail wagon floors (i.e. 1.20 m above the surrounding area. There are rail tracks on both sides of the warehouses. The two warehouses consist of a steel structure with light weight plated walls and roofs. They are of different design. There are no columns or division walls inside.
Warehouse 4 is 93.3 m long and has a span of 21.7 m.
Warehouse 5 is 62.3 m long and has a span of 24.5 m.

3. Engineering Evaluation of the existing Structures and Facilities

Hereafter, the quay walls and warehouses as described under 2. are evaluated on their operational condition. For their general description is referred to 2.

3.1 The Main Harbour Location

3.1.1 Platforms on Piles near the Sea Station (Passengers Terminal Building) (A)

Fig 4.3 gives a typical cross section. The level of the platform is at -26, which is only 65 cm above the present water level. In the medium to long term, problems can arise when the sea level rises above the maximum level of 1995.

The concrete beam at the waterfront shows deteriorated concrete and uncovered reinforcing steel at several places. The fendering vanished and was replaced here and there by old tires at the places where ships are berthed.

The asphalted surface is satisfactory and has been repaired when needed.

There is no superstructure. The sea station building is spacious and has been designed for a much bigger passengers traffic than is the case today. The building is in good shape and can be adapted if needed when the passengers traffic grows.

As this part of the port is not used for the core activities, the only real threat can come from future sea level rising.

3.1.2 Passengers Pier (B)

Fig 4.4 shows a typical cross section of this concrete platform on concrete piles. The surface of the pier is at level -26, hence some 65 cm above the present water level.

The fendering system has not survived and has been replaced mainly by old tires.

The limited distance between the water level and the waterfront beam does not allow easy berthing. Some vessels that berth here have a ship's fender at the level of the main deck or just below. In normal berthing conditions, this beam should thrust against the fendering system of the pier. However, presently, the ship's fender is well above the platform of the pier and above its topping beam. As a result of the vessel's movement the ship's fender collides with the top of the concrete beam, resulting in the deterioration of the latter. The concrete beam at the waterfront shows deteriorated concrete and unprotected reinforcing steel at several places.

The surface of the pier is in satisfactory condition. It consists of an asphalted cover above the concrete deck.

If used intensively, the passenger terminal should be equipped with a decent fendering system.

Future sea level rising is a constant threat, as there is only some 65 cm between the sea level and the pier platform.

3.1.3 The Main Complex, Western and Southern quays (C)

Fig 4.5 gives a typical cross section of these quay walls.

An inspection of the water side of the quays showed that difficulties have been encountered in keeping the long stretches of sheet pile vertical during placing. This resulted in the need to insert at certain places wedge shaped piles or other devices for redressing the verticality. These places prove to be problematic. At these places backfill has washed out, creating craters in the apron. The port tries to repair these weak spots when they become visible. Also the connection of the sheet pile structure with the block wall has given problems and has given rise to mayor repairs.

Apart from these structural weaknesses, the port engineer reports that the unprotected sheet piles have corroded significantly over a height of several meters. During the last 20 years, the splash zone was situated over a height of several meters due to the variation of the water level. The splash zone is known to be the favoured zone for fast corrosion, especially when no protection devices are in place. The Chief engineer reports that at regular times, backfill has washed out through corrosion holes that are located well under the present water level. Regular interventions are needed to keep the quays operational.

The fendering system is not any more in good shape. At places old steel structures protrude at the waterfront.

The concrete beam above the sheet piles shows considerable deterioration and unprotected reinforcing steel. This can partly be explained by the absence of an adequate fendering system and partly by unsatisfactory quality of the reinforced concrete and care and quality control during execution.

The apron is equipped with crane rails, train rails, a drainage system and culverts for water supply, power distribution, etc. The drainage system and the culvert at the waterfront are not in very good condition. This can be explained by the **weakness of the sheet pile structure and the regular repairs it needs.** The apron level is at -23.87, the bottom of the culvert at -24.97 and the drainage system at -25.35. Hence, these facilities have not been below the sea level since there construction.

In general, the surface of the platform is too irregular to allow easy horizontal transport. The crane and train rails need to be at the same level as the surface, as was originally designed (fig. 4.6). This is not the case at the moment at many places where horizontal transport should be allowed.

The surface in the vicinity of the Ro-Ro ramp is satisfactory.

The surface of the main complex is some 2.80 m above the present sea level. Hence this facility is not threatened by sea level rise (see also 5.).

The sheet pile structure is not in good condition. At regular intervals repairs are needed. A major renovation of the quays is needed in order to upgrade them to reliable berths. This renovation should include the construction of a good fendering system that can be adapted according to variations of the sea level.

Nearly the complete area of the main complex needs new surfacing.

3.1.4 The Main Complex, Eastern Quay (D)

Fig 4.8 gives a cross-section of that quay construction.

Part of this quay cannot be used any more due to the half finished renovation work.

The remaining part of the quay needs a decent fendering system that can be adapted according to the variation of the sea level.

The quay itself seems to be in better condition then the sheet pile quays. However, by raising the block wall quay, the overall stability is reduced. An analyses of the general stability of this raised quay will determine, if the present situation provides satisfactory stability or not. This analysis has been done in the past by Kaspmorniiproject and the stability found unsatisfactory. This would explain the renovation projects that the institute has prepared and the work that started along berth no.10.

3.1.5 Shore Defence between the Main Complex and the Ferry Terminal (E)

P.M. This is part of the renovation project of the ferry terminal.

3.1.6 The Mooring Facility for Water Tankers (F)

Fig 4.11 gives cross sections of the mooring points.

The fendering system is satisfactory, as are the concrete blocks on top of the piles.
According to Kaspmorniiproject the top level of the mooring blocks is at -24;07. Hence well above the present sea level. The steel pipes of the mooring blocks might have corroded as the sheet piles of the main complex did. The splash zone was also here during two decades extended over a height of several meters.

3.1.7 The Ferry Terminal Complex (G)

P.M. This is part of the renovation project of the ferry terminal.

3.1.8 Shore Defence between the Ferry Terminal and the Port Fleet Terminal (H)

P.M. This is part of the renovation project of the ferry terminal.

3.1.9 Quay for the Port Fleet (I)

Fig 4.12 gives a typical cross section of this quay construction.

This quay has been damaged at places by ship collisions. Some major repair work to the concrete structure is needed.

There is room for improving the fendering system.

The surface of the platform is asphalted and is in a reasonably good condition.

3.2 The Timber Terminal

The timber terminal can only be transformed into a facility that is reliable in the long term if the quays and the port area are raised by at least 2 m. However, the location seems good for harbour activity, as rail access is available and as the main road is nearby. The access to the timber terminal is narrow and hardly paved.

3.3 The Oil Terminal

3.3.1 The Northern Breakwater

Presently, the water level is at about -26.60 and the crest of the highest part of the breakwater is at about -22. Hence its crest is only some 3.40 m above the sea. There is no road on this last stretch of the breakwater so that maintenance is only possible from the sea.

Today, only jetties 1 and 3 are operational. These two jetties are located near the shore. The breakwater is mainly needed for jetty 5 and 2, and to a lesser extend for jetty 3.

If jetties 5 and 2 are planned to become operational, a proper reinforcement of the breakwater must be included in any renovation project.

3.3.2 Jetties Nr. 1, 2, 3 and 5

The main deck of the jetties is at -24.84, which is well above the present water level. There is no direct threat of the sea level.

The concrete parts of the jetties are in very poor condition, although it dates only from 1970. During construction, the basic rules of good workmanship have been neglected. No spacers between reinforcing bars and shuttering have been used. At places, it is visible that the reinforcement had no concrete cover from the very beginning. Some pile caps have not been placed vertically above the piles. Concrete quality is poor. At many places the concrete cracked and show the location of the reinforcement.

Apart from jetty 1, the pipes need de-rusting and painting. The pipe system of jetty 5 has been dismantled completely and the pipes of jetty 2 are partially dismantled.

If the oil terminal has a vocation for major activity over a longer period, it seem the best solution to dismantle the existing jetties and to construct new facilities.

3.3.3 Quay for the Service Boats

If the oil terminal has a vocation for major activity over a longer period, the quay should be raised and renovated.

3.4 Warehouses

The warehouses 1, 2 and 3 with masonry walls are generally in good condition. Minor repairs and regular maintenance can keep these warehouses in good condition.

The steel structures of warehouses 4 and 5 also seems to be in good condition. However, the sheeting needs some repair and doors need to be repaired.

4 Topographical Survey

On October 8th the topographical surveyors started their work on the main complex and adjacent areas. They will cover the main complex, the entrance and yard to it, the ferry terminal the accesses to this terminal and adjacent areas to both harbour facilities.

The Ramboll team is taken care of the survey of the ferry terminal and related areas while our team sponsors the survey of the main complex and related areas.

The surveys will than be incorporated into one general map of the core area of the port. This map will be the basis for the masterplan development in the second phase of this feasibility study.

The survey itself will take some two weeks and processing of the results will require about the same time. Hence, no results can be incorporated to this report as yet. They will be given in the second phase report.

5. Impact of the rising Sea Level

As the Caspian Sea has no outlet, the water level is established by the balance of the water inflow and the evaporation.

Hence, fluctuation of the sea level over longer periods is a normal natural phenomena. It causes problems with berthing facilities, as quays have fixed levels. Presently, the Sea Port of Baku is suffering from the high sea level in relation to the platform level of some of its facilities.

From 1900 till 1977, the Caspian Sea level dropped considerably. In that period, all existing infrastructures in Baku Port have been designed and constructed. Since 1977, the level raised by some 2.70 m. Hence it is not surprising that problems are encountered today.

Table 5-1

Year	Sea Level
1900	-25.60
1977	-29.12
Nov. 1994	-26.64
1995	-26.45
Aug. 1996	-26.64

The Tacis study on the Caspian Sea Water Level summarises the work done by Kaspmorniiproject and others on forecasting probable sea levels. Forecasts appear to be rather intelligent guess work than scientifically fully justified predictions. This is an element we have to live with.

However, major renovation works and for new developments, we cannot do without defining the maximum and minimum design level over the live period of the structure. Fig.4.16 has been borrowed from Sofremer and Co report and gives an overview of the available historical data. During the last 165 years the sea level remained between -25 and -29. This would be a first set of limits.

Sofremer and Co have analysed the predictions Kaspmorniiproject did since 1976 and concluded with the institute that predictions are nearly impossible as the factors involved are not fully understood. The prediction is as difficult as is the prediction of the climate in the large catchment basin of the Caspian Sea and the effect of regulation works on the Volga river.

In an attempt to increase the evaporation of the Sea, the Kara-Bogaz-Gol lagoon in Turkmenistan has been reconnected with the Caspian recently. This measure may partially explain the fall of the Sea level during the last year.

In the renovation study of Kaspmorniiproject of 1991, the following sea levels are used:

Table 5-2

Year	Sea Level
1995	-26.00
2000	-26.30
2005	-25.70
2010	-25.10

Taking into consideration many factors involved and having analysed the available studies of Kaspmorniiproject and of Moscow based scientists, Sofremer and Co "hopes" in 1995 that the level of the Caspian should lie in 2030/2040 between -24 if the level continues to rise and -28 if there should shortly be a reversal of the trend.

The EBRD study team for the renovation of the port of Aktau also deepened out the question of what should be the design sea levels for future investment projects. The present quay level is -26.25. The design top level for the new quay is fixed at -24 with allowance to raise the quay with another 2 m if needed (i.e. level -22). The forecasted level range (in 1993) was -28 and "up to 1 m above the present level" (about -26) over the period to 2010.

The project team for the renovation of the ferry terminals in Baku and Turkmenbashi (Ramboll team), proposes in their phase 1 report, for the time being, as design sea levels, -24 and -29. These design levels are those suggested on the TOR. However further investigation, based on statistical analysis, is ongoing and final design sea water levels will be proposed. The design levels should cover a period of 50 years.

The EBRD study team for the renovation of the port of Turkmenbashi (Louis Berger International) produced its Phase 1 Report in march 1996. The team takes into account the maximum level predicted for Aktau (-24) Sofremer's forecast for 2010 (between -25.30 and -25.70) and the forecast of the Turkmen Scientific-Research Project Institute for 2015 (-24.45). They concluded that there is no need to raise the present quay level (-24.00)

Hence, the different forecasts give the following design levels:

Table 5-3

Forecaster	Period	Max. level	Min. level
Last 165 years		-25.00	-29.00
Kaspmorniiproject	1991 - 2010	-25.10	-26.30
Sofremer & Co	2030/2040	-24.00	-28.00
Aktau Team	1993 - 2010	-26.00	-28.00
Ramboll Team (first guess)	1996 - 2045	-24.00	-29.00
Turkmenbashi Team	1996 - 2015	-24.45	-25.70

It is proposed to adapt as maximum design level -25 and as minimum level -28. In the design of quay walls it should be taken into account that erosion from ships' propellers can deepen the bottom by one meter. If the level should drop under the proposed minimum level, the bottom can be stabilised by stone or mattresses, preventing erosion, at the design bottom level after erosion. This measure allows then for an extra meter of sea level drop.

The structures of the main harbour location, discussed in 2 and 3, have the following top levels and design sea bottom levels:

Table 5-4

Structure	Top Level	Bottom Level
Platforms - Sea Station	-26.02	-33.70
Passenger Pier	-26.02	-33.60
Main Complex West & South	-23.87	-32.57
Main Complex East	-23.87	-32.57
Berth for Water Tankers	-24.07	-33.40
Quay for Port Fleet	-25.80	-32.80

The minimum distance between the water level and the quay level and the minimum draft, taking into consideration minimum and maximum design levels are the following:

Table 5-5

Structure	Min. to Quay Level (m)	Min. Draft (m)
Platforms - Sea Station	-1.02	5.70
Passenger Pier	-1.02	5.60
Main Complex West & South	0.97	4.57
Main Complex East	0.87	4.57
Berth for Water Tankers	1.07	5.40
Quay for Port Fleet	-0.80	4.80

Under the above assumptions, the major port facilities remain operational with a minimum water depth of 4.5 m. The auxiliary facilities however will be flooded when the maximum design level occurs.

6 Existing Designs for the Renovation of the Waterfront Structures

Three types of designs for renovation works are discussed hereafter. They are all prepared by Kaspmorniiproject.

- Detailed designs of parts of the main complex, mainly of the Eastern quay.
- The general pre-design of all harbour quays and jetties prepared in 1991.
- The general pre-design of shore protections prepared in 1991.

6.1 Detailed Designs of Parts of the Main Complex, mainly of the Eastern Quay

The chief engineer made the following documents, prepared by Kaspmorniiproject, available:

- Renovation of the Western and Southern quays of the main complex. This project has been completed in 1969-1970. Detailed description is given in 2.1.3 and 3.1.3. Fig. 4.6 has been borrowed from this document. The Ro-Ro ramp is also part of this design. The renovation brought the platform level to the present level of -23.87.

- A detailed design document dating from 1977. This project contains the complete renovation of the Eastern quay of the main complex. This design is basically the same as shown on fig. 4.10, except that the front plates and fendering system are designed according to the very low sea level of 1977. The designers wanted to extend the apron by .75 m and shift the quay cranes and rail tracks onto the front platform on piles. The level of the quay platform is -23.87. The designed structure has not been built. Probably, the

poor stability of the old block quay was the principal reason for preparing this design. Berths 2 and 3 of the timber terminal that have also been designed in the seventies have comparable design (fig.4.15).

- Detailed design documents for the first 150 m of the Eastern quay of the main complex and of the shore protection near that area. These documents date from 1982. The design of the quay is the same as the design of 1977 except that the front plates and fendering have been adapted to the water level and their forecasts of that moment. Work started and was stopped later, as has been reported in 2.1.4. Fig 4.10 has been borrowed from this file.

- A last detailed design file dates from 1991. It equally concerns the renovation of the Eastern quay and adjacent shore. The design consists mainly of an anchored sheet pile construction. A vertical fendering system is foreseen. The sheet pile construction is also proposed for first 50 m of shore, adjacent to the Eastern quay. Fig 4.22 gives the design cross section. Here also the design level of the quay platform is kept at -23.87. Part of the design file is the renovation of the water supply system of the main complex.

6.2 The general Pre-design of all Harbour Quays and Jetties prepared in 1991

Fig. 4.3, 4.4, 4.5, 4.8, 4.12, 4.14, 4.15 and 4.20 give cross sections of these pre-designs. The pre-design of all quays and jetties consist of anchored sheet piles. The platform level of the renovated structures is at -23.10 except for the Western and Southern quay of the main complex, that is foreseen at -20.80. The design water level for most the structures is -25.10 (forecast 2010) and for the Western and Southern quay at -22.50 (forecast 2050).

6.3 The general Pre-design of Shore Protections prepared in 1991

Fig 4.17, 4.18 and 4.19 show cross sections of the pre-designs of the breakwater of the oil terminal. Fig. 4.23 gives the cross section of the pre-designed shore protection foreseen for the Baku port, main location. The designs take into account a sea level of -25.10 in the year 2010.

6.4 Comments about the Designs

The detailed designs have been worked out in great detail. In concrete constructions prefabricated elements are used extensively. In the sixties, sheet pile constructions were used. In the seventies concrete platforms on piles were preferred while in the late eighties sheet pile constructions re-gained popularity. The design documents give a professional impression.

The proposed design levels (see 5 above) of the sea are -25 and -28. If needed, dredging of a extra meter and stabilisation of the bottom would allow a minimum sea level of -29. Most of the pre-designs of 1991 take into account a maximum level -25.10 which seems adequate.

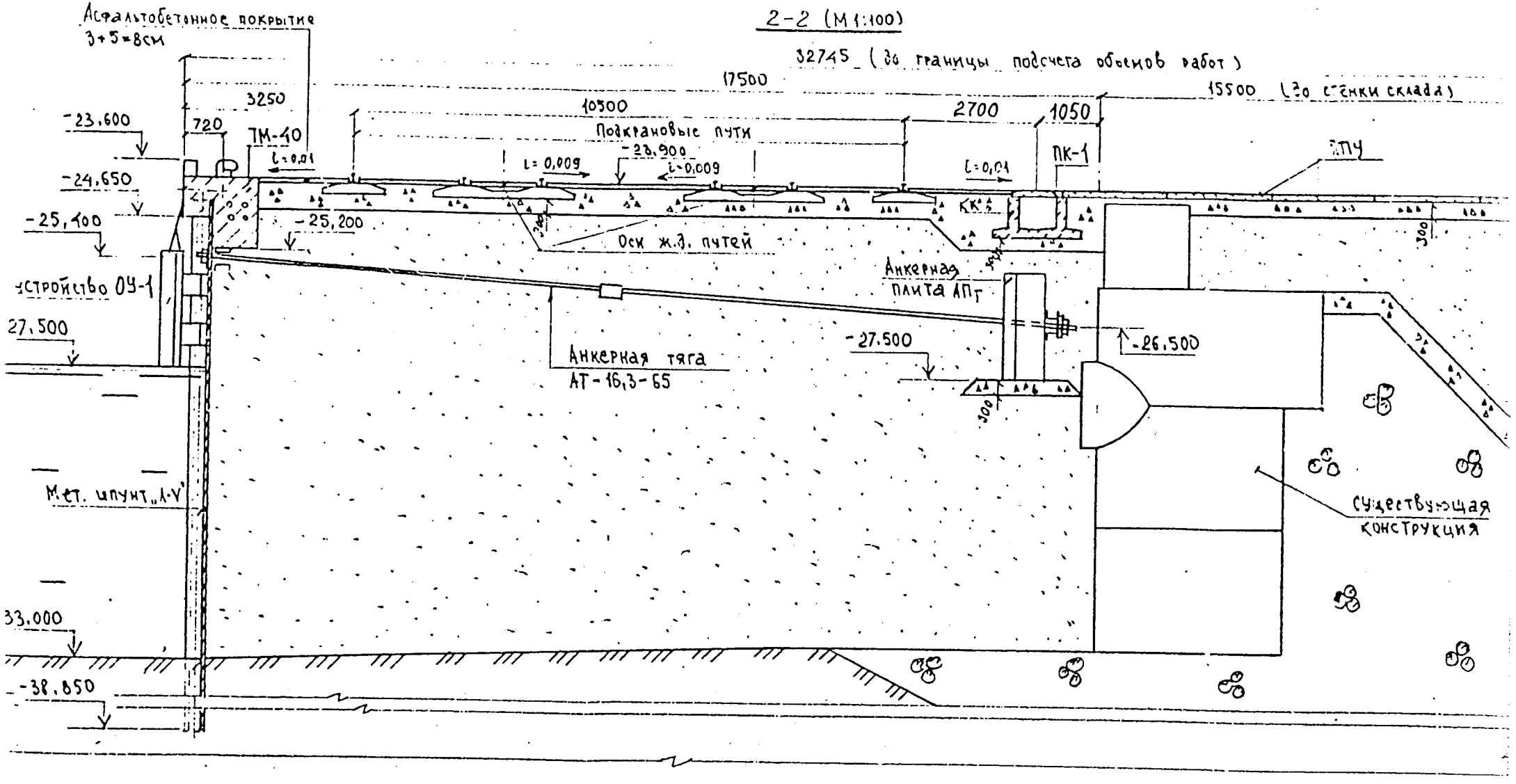


рис. 4.22 Основной комплекс, Восточный причал - подробный дизайн 1991
Fig. 4.22 MAIN COMPLEX EASTERN QUAY - DETAILED DESIGN 1991

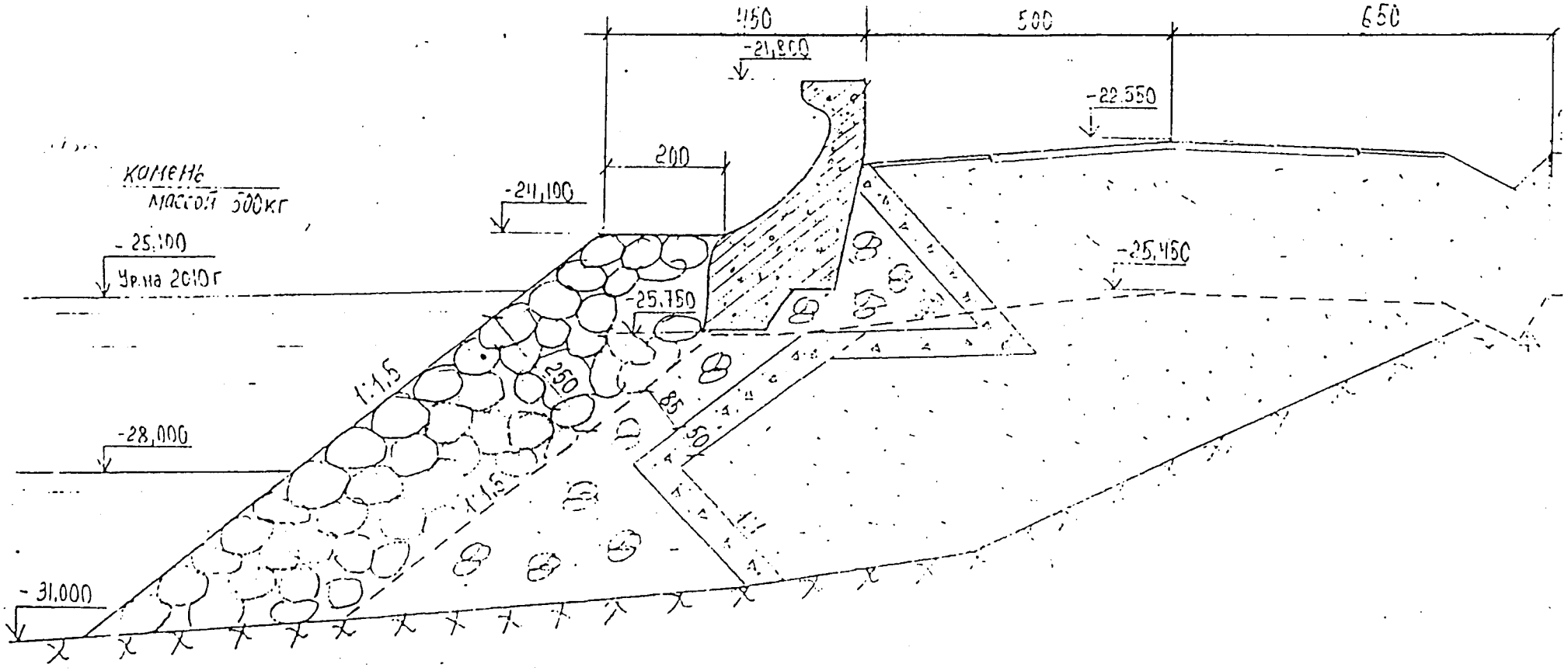


рис. 4.23 Основное месторположение порта. Предварительный дизайн защиты набережной.

Fig 4.23 MAIN LOCATION OF THE PORT PRE-DESIGN OF SHORE PROTECTION

The variations of the sea level, combined with the aggressively of a sea water environment makes the use of sheet piles troublesome if no measures against corrosion are incorporated in the design. However such measures are delicate and costly (coating in the splash zone and sacrificial anodes).

The sea environment requires a carefully designed concrete mix and the use of appropriate cement.

From the experiences of the past, the need for strict quality control of the contractor's work has proven overwhelmingly. Future tender documents and site control should focus on quality.

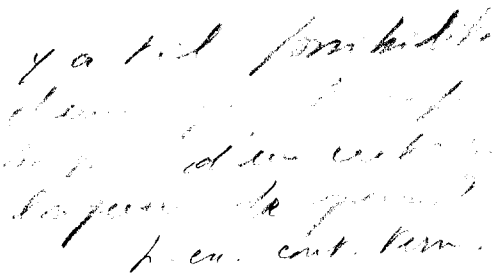
6.5 Cost Estimate of a renovated Main Complex Area

As discussed before, the quays of the main complex need renovation in order to keep the facility reliable and operational over a longer period. Based on the existing designs, an order of magnitude of needed budget for renovation is given below.

Table 6-1

		Low Estimate	Medium Estimate	High Estimate
Quay Walls 1000 m	7,500 US$/m 10,000 US$/m 12,500 US$/m	7,500,000 US$	10,000,000 US$	12,500,000 US$
Surface 100.000 m^2	30 US$/$m^2$ 45 US$/$m^2$ 60 US$/$m^2$	3,000,000 US$	4,500,000 US$	6,000,000 US$
Other Facilities	+20%	2,100,000 US$	2,900,000 US$	3,700,000 US$
Cost estimate of renovation of the main complex		12,600,000 US$	17,400,000 US$	22,200,000 US$

It should be stressed that the above estimate is limited to the renovation of the main complex and does not include other parts of the port.



Volume V:

Environmental Assessment

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Volume V: Preliminary Environmental Assessment

Preliminary Environmental Assessment

1. General

In order to ensure the environmental soundness of the proposed port development project the European Bank for Reconstruction & Development (EBRD) requires an environmental analysis of all construction activities and the subsequent port operations. Whether the proposed rehabilitation of the multi purpose terminal will need a full or a partial Environmental Impact Assessment will be decided by the EBRD after an internal screening.

The scope of the environmental investigation of phase 1 of the port development and rehabilitation study is to provide, as a first step, background information and an analysis of the present environmental situation as well as to collect preliminary baseline data for the Environmental Impact Assessment. This assessment will be carried out in phase 2 of the study and will be up-dated in phases 3 and 4 in accordance with the development of the engineering design.

In order to identify all possible environmental impacts of the project and to focus on the significant ones, a first "scoping"-meeting has been conducted that was attended by official of the EBRD, staff of the Consultants, and representatives of competent authorities and other relevant agencies. The results of this meeting is attached as Annex 1 to this report.

2. Environmental Regulations

2.1 National Environmental Regulations

The legislation and regulations relevant to environmental aspects of the port project are the following:

- The **Law on Nature Protection and Nature Utilisation in the Azerbaijan Republic 1992**, which requires that the nature of the Azerbaijan Republic and its resources are obliged to be protected. This law is at present under revision.

- **Environmental Impact Assessment:** Just recently, the Azerbaijan State Committee on Ecology and Control of Natural Resources Utilization (ASCE) has worked out together with the UNDP an EIA directive and approved it on April 27, 1996. It provides specific regulations to ensure that all possible consequences of proposed activities are considered before the activities are started, with the aim to identify and to avoid or minimize negative impacts of any development proposal.

- **Public participation - "scoping"**. According to the "EIA Handbook for Azerbaijan" public involvement is required in any EIA process. It must be made sure that the public is entirely informed about the proposed projects. A scoping meeting has to be convened which must be attended by experts and by representatives of groups (i.e. NGOs, community groups) that are considered to have a genuine interest in the proposed project.

- **The National Ecological Plan of Actions (NEPA)** has been developed by the ASCE with the participation of World Bank specialists as an instrument to combine the nature protection objectives with the economic and social development of the country.

2.2 International Agreements

Up to now there does not exist any international law or convention for the protection of the Caspian Sea. The reason for this is said to be the fact that the Russian Federation and Iran wish to define the legal status of the Caspian Sea first.

At present, consultants from UNEP and representatives of the five states bordering the Caspian Sea are working out an international convention. The first meeting has been held recently in Switzerland, the second on the 17th of September in Almati.

For the time being all coastal states are acting according to their own national legislation.

In 1995, the parliament of Azerbaijan ratified the framework convention of the UNO on Change of the Global Climate.

3. Existing Set-Up and Institutions Concerned

3.1 Governmental Institutions

The Ministry of Environment has the overall responsibility for the implementation of the environmental legislation in Azerbaijan. It consists of different committees dealing with different ecological aspects, like air, water, waste management etc.

Authorities and institutions in charge of ecological matters are:

- State Committee of Azerbaijan on Ecology and Nature Utilization
- Ecological Expertise Administration
- State Inspection of Caspian Sea Protection
- Caspian Marine Scientific Research Institute
- Hydrometeorological Institute
- Academy of Sciences

- Caspian Agency
- Ecological Institute of the Azerbaijan Aerospace Agency

These institutes act independently. Most of them are equipped with laboratories for various kinds of investigations and analysis. It has been decided that environmental policy shall be based on information from all institutes. As a first step a conference on the ecological state of the Caspian Sea was held by these institutes in 1994, during which it was agreed that all institutes dealing with environmental matters should be combined to a "State Ecological Monitoring", which is likely to be realized next year.

3.2 Non-Governmental Organisations

The following non-governmental organisations are active in the Republic:

- Environmental Society
- The Green Movement of Azerbaijan
- The Environmental Union of Azerbaijan
- The Green Party of Azerbaijan

At present, only the "Green Movement of Azerbaijan" is officially registered (since 1989).

4. Present Environmental Quality

4.1 Water- and Sediment-related Impacts

According to the Law of Protection of the Environment of the Azerbaijan Republic from May 21, 1992 the discharge of any kind of waste into the Caspian Sea is strictly forbidden. But despite this requirement the port area as well as Baku Bay are subject to a number of sources of severe pollution.

The disastrous condition of Baku Bay is directly connected with the state of sewage economy and the absence of proper treatment of the drained urban waste water as well as of industrial sewage.

More than 30 % of the population and 50 % of the industrial potential of Azerbaijan are concentrated in the city area of Baku. The industrial enterprises are in general old and far from state of the art, i.e. the Baku Refinery, which is said to be the biggest refinery of Azerbaijan, is in part nearly 100 years old. Industrial as well as urban effluent is discharged directly into the harbour. The quality of the discharge is not exactly known but according to estimations of the ASCE and "Bakusewerage" PC, in 1993 alone, 2,000 tonnes of oil products, 225,000 tonnes of dry sediment, 35,000 tonnes of sulphates, 56,000 tonnes of chlorides, 5 tons of phenol, 88 tons of iron and other polluting substances were discharged into the bay with the untreated drained water. The concentration of oil products in the drained water of oil refineries was exceeding the norm by 11 times, that of phenol by 6-8 times, and that of iron and copper by 3 times.

As a result Baku Bay, which is a natural shallow basin protected from the prevailing northern winds by the Apsheron peninsula, can be considered as biologically severely damaged, the harbour area even as dead. Samples of benthos taken by the Institute of Ecology, Azerbaijan National Aerospace Agency, have underlined this.

The most visible and possibly also most adverse form of pollution in the Port of Baku is oil pollution generated mainly by the off-shore oil drilling industry and drifting ashore in sometimes thick layers.

4.2 Municipal Waste Management

The garbage of the city of Baku is said to be collected daily and brought to a garbage dump near Balakhani where it is partly burnt and partly buried. Obviously, the collecting system can not cope with the amount of garbage produced by the city, parts of the coast line and the bay itself are used as dump sites for municipal waste.

The streets of the city are swept every day, garbage and dirt is piled up on open places in parks and once the pile is big enough it is burnt there.

4.3 Environmental Management in the Port of Baku

The Environmental Law of the Republic of Azerbaijan states that all bigger enterprises and governmental organisations must have an Ecological Department. In the Port of Baku this department is at present occupied by the Deputy Chief Engineer of the port. In former (Soviet) times, a similar department in the port consisted of 5 - 6 people, the same number of members one considers for the future. The duties of this department include all aspects of ecological concern, like:

Waste reception from ships

Since the Law of Protection of the Environment of the Azerbaijan Republic strictly forbids dumping any kind of waste into the Caspian Sea (see 5.4.1), All ships calling at the Port of Baku have to give their waste ashore (oily waste as: bilge water, oily ballast water, fuel residues, but also ship's sewage and solid waste).

Oily waste is collected from the ships by two barges, one of which is presently not in operation, and taken to a refinery for further treatment.

Sewage is said to be collected in a tank at the ferry terminal and added to the municipal sewage system. Another tank for waste water at the Sea Station (passenger terminal) is out of order due to the sea level rise.

Solid waste and garbage is collected at the Sea Station and the ferry terminal and as well added to the municipal waste.

Documentation

The vessels receive an "Akt" (a receipt, copy attached) stating the exact amount of the disposed waste. The vessels also have to keep two different record books, one for garbage and sewage, one for oily waste. Two different types of oil record books exist, one for oil tankers and one for other vessels. They are printed in Russian and English language and are similar to the oil record books according to the international MARPOL-Convention.

The discharge of waste is not free of charge for the vessels. In former times it was 8 Rubel per ton for Soviet ships, 20 Rubel for foreign vessels. The prices are now flexible, following the inflation rate. No exact amount could be given.

Inspection and Control

The record books as well as the machinery space and the tanks are said to be checked regularly. The Ecological Department of the port checks the port owned vessels, other vessels are controlled by the State Inspection of Caspian Sea Protection. The water in and around the port between the ships laying at anchor is visually controlled by the pilots.

Sampling of water does not take place any more. In times, when the department was bigger, samples were taken daily and analysed in the Sanitation Lab (Ministry of Health) and in the lab of the Caspian Shipping Company for determination of the oil contents.

Both institutions, the Ecological Department and the State Inspections, fine violations of Environmental Law. The Ecological Department punishes crew members of port owned vessels simply by deducting the fine from their salary.

Oil Spill Fighting Equipment - Contingency Planning

A contingency plan exists but there is no way of implementing it. The port's oil spill fighting equipment is in a poor condition. Two small oil sweeping vessels are placed on shore, three are said to be in an operational condition. The plan for repairing the sweeping vessels has been confirmed by the port, but up to now it has not been realized.

A complete list of the present oil spill fighting equipment as well as of new equipment that is urgently needed will be worked out by the Ecological Department.

No emergency exercises have been carried out since 1995.

The importance of well-functioning oil removing equipment can be underlined by the fact that until 1991, when all sweeping vessels were in operation, 2,000 tonnes of oil had been collected from the water surface in the port between the Sea Station and the Timber Terminal (appr. 2 nms) per year. Now the sweeping vessels collect about one ton per month.

Workers Safety - Occupational Health

The Environmental Department is also in charge of the safety of the workers in the port. There is only limited or no personal protection against dust.

The Sanitation Inspection has closed the port workshop twice because of poor ventilation and unsafe conditions of the equipment.

Dangerous Cargo

At present, only very few dangerous goods are handled in the port. A safety inspector is responsible for the safe handling of these goods. Goods are loaded and unloaded according to the Azerbaijan rules which have been taken over from the Soviet rules. They are similar to the international IMDG-Code.

Two fire fighting boats exist in the port, one of which is written off.

5. Environmental Impact of Construction and Subsequent Port Operation

5.1 Water Quality

Construction Phase

Since the rehabilitation of the multi-purpose terminal does not include any construction on the water side (dredging or reclamation) no significant impacts on the water quality are expected. Any kind of dredging activities or movement of the substrate should be avoided to prevent the polluted sediment from resuspension - i.e. remobilisation of the pollutants - in the water. Due to the low siltation rate in the port and the risen sea level no dredging operations seem to be necessary so far.

If pile driving or the construction of a new quay wall should become necessary, adequate methods have to be selected. These activities might cause localized damage to the substrate, but the area that will be affected will be small. Since the marine life has more or less been destroyed by severe pollution, no impact on any aquatic resource in the direct vicinity of the terminal is expected.

Operational Phase

The rehabilitation plan includes the construction of a new pavement. At present the floor is uneven and broken which makes it very difficult to clean any accidental spill. Improving the pavement of the terminal - including providing a sloped floor and an emergency containment sump to hold at least the contents of a 40-foot container in case of damage or spillage - provides a significant environmental benefit, because it reduces the risk of a run-off of any harmful substance into the water.

The expected increase of ships traffic may contain the risk of possible discharges from ships (bilge water, ballast water, oily wastes, sewage, garbage) as a source of water pollution. The provision of reception facilities is said to be given in the Port of Baku (see 4.3). The strict control of the regulations of ship discharges is indispensable to avoid adverse impacts. Since accidental spills are unavoidable, equipment for the removal of oil and other pollutants (recovery vessels, oil booms and skimmers) has to be on stand by. The impact of the infloating oil generated by the offshore oil drilling industry is obviously much higher than possible discharges from ships. The

recovery vessels and skimming systems should be used for regular clean-up of the coastline. Of course, this is no solution to the problem itself, but it will be a contribution to the improvement of the water quality of the port and the bay.

Adverse impacts in the operational phase may result from cargo handling. The main cargoes expected to be handled on the multi purpose terminal will be cotton, building materials, chemicals, containerised cargo (consumer goods and food), equipment for the oil and gas exploiting industry, metals and fertilizer. Of these cargoes mainly chemicals and fertilizer are of environmental concern, when handled inappropriately .

5.2 Air Quality and Noise

During both the construction and the operational phase no impact on the air quality is expected, even if the flow of cargo increases significantly. The on- transportation of cargo from the vessels will be mainly by train, i.e. a means of transportation with a low emission rate, and to a lesser extend by trucks

The handling and storage of bulk might be resulting in air pollution depending on the dust generating properties of the materials as well as the chosen methods of handling these goods. Dust emitting materials requires applied technical measures as sprinkling devices, sparing vehicles, sheds to protect these goods from the wind, etc.

During the construction period noise will be generated at a relatively low magnitude compared to the noise level of the city itself. However, this effect is not considered to be significant since it is of short term and temporary.

5.3 Socio-Economic Impact

The port is located near to the city centre. At present, the turn-over of cargo is very low. The preliminary results of the traffic and cargo forecasts indicate that an increase of cargo turn-over to former (Soviet) figures will not happen. The port area is limited, but sufficient space is available to handle the predicted traffic and cargo.

Therefore the rehabilitation project does not include any extension of the port area and no adverse effects in the sense of relocation etc. are expected.

The official unemployment rate in Azerbaijan is 1 %, according to inofficial estimations it is much higher (10 %, EBRD Country Profile). Considering the high number of "underemployed" people, e.g. people running small private business like selling sunflower seeds or newspapers, and also considering the overstaffed port, a beneficial impact on the population of Baku during construction phase and operational phase is expected by offering temporary and permanent employment.

6. Conclusions / Recommendations

The majority of information conveyed in this report originated from verbal communication with officials. Since very few written material has been handed out it was not possible to positively verify all information given.

As this pase 1 report is a planning document in a very early stage of the project, several of the recommendations mentioned below may need to be revised based on the final engineering design that will be selected.

6.1 Conclusions

With respect to the present environmental situation in the Port of Baku, in the city itself and Baku Bay, which has been described as "disastrous" by nearly all institutions concerned, negative impacts of the planned rehabilitation project of the multi purpose terminal can be considered as negligible, if the construction is carried out correctly, taking all environmental precautions into account.

Beneficial impacts on water quality are to be expected due to new surfacing of the multi purpose terminal which will result in better containment of spilled materials preventing run-off of material into the harbour water.

The expected increase of cargo turn-over in the port will positively impact the socio-economic situation in Baku by providing temporary and long term employment.

6.2 Recommendations

As stated in 4. the main negative environmental impacts in the port area are not directly related to port construction and port operations but in the very poor municipal waste management - despite the strict national environmental legislation. Since environmentally sound port operations, e.g. the safe disposal of ship's waste is only possible in connection with a municipal waste management measures should be taken into consideration to assist in the implementation of the National Law on Nature Protection..

Considering the increasing ship traffic, the Port of Baku should be prepared to respond to any kind of spillages, with updated equipment, an emergency response plan and regular training of personnel.

An upgrading and staffing of the Ecological Department of the Port of Baku to an efficient centre for environmental protection should be aspired to in due time.

The environmental awareness in the port is rather low. Measures to develop a strategy (education, training) for increasing awareness of environmental issues should be considered.