Tacis

Port Network Plan and Improvement Programme: Renovation of the Ferry Terminal at Aktau Port

Initial Appraisal Report
November 1997

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1. INTRODUCTION

1.1 Background

The present project is part of the EC financed Tacis Traceca programme which concerns the development of the Transport Corridor Europe-Caucasus-Asia. This corridor is an essential transport route in the region between the Black Sea and Central Asia. A vital link of this corridor is the ferry crossing of the Caspian Sea.

In the past two main ferry routes were operated crossing the Caspian Sea, namely the link Baku-Aktau and the link Baku-Turkmenbashi, both served by the same ferry vessels. In 1992 the service to Aktau stopped operating.

In connection with an ongoing development programme for the port of Aktau financed by the EBRD, it is being considered to include the rehabilitation of the existing ferry terminal with the scope of possible re-activation of the ferry service. As a first step it has been decided to carry through a rapid initial appraisal of the ferry terminal rehabilitation possibilities.

Having prepared the renovation projects for the similar ferry terminals in both Baku port and Turkmenbashi port, a consulting group lead by Ramboll, Denmark, has been requested to conduct the appraisal. The Terms of Reference (TOR) for the consultants are attached in Appendix 1.

1.2 Scope of Appraisal

The objective of the appraisal is to provide sufficient information to decide in principle whether to renovate the ferry terminal.

1.3 Mission and Programme

The appraisal shall be based on an inspection of the ferry terminal facilities, review of available basic information and consultations with port and other parties concerned. This was the subject of a visit to Aktau from 15 September 1997 to 19 September 1997.

The visit was carried out by the port specialist, Mr. Carsten Sorensen, Ramboll - Baku office.

The detailed programme of the visit, indicating meetings held, people met and inspections undertaken, is presented in Appendix 2.

1.4 Reporting

The present appraisal report contains the findings of the port specialist outlining
- the setting of the ferry terminal
- the existing terminal facilities and their state of repair
- the terminal rehabilitation options with order-of-cost estimates

The report has been prepared by the consultant and does not necessarily reflect the policies or opinions of the European Commission or the EBRD or the concerned authorities of Kazakhstan.

1.5 Acknowledgments

The consultant would like to express his thanks to all officials and individuals met, for their kind support and valuable information received which highly facilitated the work of the consultant.

2. SETTING OF FERRY TERMINAL AND OPERATIONS

2.1 History of terminal

The sea port of Aktau was constructed in the early 1960'ties. At the request of 'The Pre-Caspian Mining and Metallurgical Enterprise' (Cascor) design was carried out and construction began of the ferry berth in 1966. Due to reasons unknown to the consultant the construction of the ferry berth was completed ten years later in 1976. One reason reported was that Cascor was not in urgent need for the facility.

The terminal was basically designed to receive rail ferries to match with the transport policy of the former Soviet Union, which prescribed railway transportation for long distance haulage. Similar ferry terminals were constructed at the early 1960'ties in other ports around the Caspian Sea, like Baku, Turkmenbashi (former Krasnovodsk) and Bektash.

The terminal in Aktau has only been in use for ferry traffic operations between 1986 and 1992 and never was rail wagons transported. According to the port the ferry traffic was stopped mainly due to lack of traffic (the war situation in Azerbaijan) but also due to rising of waterlevel. The four pits for counterweights were flooded and it is reported that by 1993 the waterlevel had reached a level prohibiting ferries to use the facility (see also section 3.3 hereafter).

Due to a need for additional oil export facilities and not being used for ferry operations, the berth was converted into an oil berth in the early 80'ties by installing two oil loading arms, oil pipelines and fire fighting equipment on the central pier. Also the fender system was changed during this period when oil tankers used the berth, which lasted from 1981 to 1989. Since the opening of the two oil berths at the breakwater the ferry berth has not been needed for oil handling operations

As part of the history of the ferry berth two accidents are reported. At one occasion an oil tanker struck the ramp without serious damages reported, and in 1984 the ramp/lifting wire fell down due to accidental loading from three 'wild' rail wagons that subsequently ran into the water.

2.2 Past ferry operations

The past ferry operations were part of the ferry route net serving the cross Caspian traffic. The routes all originated in Baku and they were

- Baku - Aktau : sailing distance 253 nautic miles
- Baku - Turkmenbashi : sailing distance 165 nautic miles
- Baku - Bekdash - Turkmenbashi : sailing distance 280 nautic miles

Of these routes only Baku - Turkmenbashi is in operation today

The routes were all operated by the same shipping company, Caspian Shipping Co (CSC), who was using the same ferries or type of ferries on all these routes. At the time of design of the terminals the vessels used were of the 'Azerbaijan' type. These were replaced by new vessels of the 'Dagestan' type in 1985. CSC is operating eight ferries of the new type, six of which still are inside the Caspian Sea while two presently are operated in the Black Sea.

During the period of operation, the route Baku - Aktau was served by one sailing per week. The traffic statistics for the last years of operation, as informed by the port, are shown in the table 1 below

Table 1 Ferry Traffic Statistics, Aktau - Baku route

Year	1988	1989	1990	1991	part 1992
vehicles/cargo:					
import (ton)	6488	8219	6189	13068	244
export (ton)	8518	11187	8383	13264	44
total (ton)	15006	19406	14572	26332	288
passengers:					
import (no)	6772	6422	4941	4406	53
export (no)	7403	8127	5549	4670	26
total (no)	14175	14549	10490	9076	79

Assuming a weekly sailing the passenger figures at peak corresponded to on average 70% of the passenger capacity of the ferries. The cargo load transported was rather low comparing to this type of vessel.

2.3 Present utilization of terminal

Since the last ferry used the berth in 1992 no traditional traffic/cargo handling activities have been carried out at the ferry berth. It is reported that today the berth is only used from time to time for berthing of smaller port craft. At the time of the missions visit to the port only a navy vessel was berthing along the east side of the central pier.

The present neglect of the berth for ferry operations is most clearly expelled from the fact that the ferry berth/terminal as an independent operational unit is excluded from the organization chart of the port.

The present lack of dedicated use of the berth suggests however that the possible re-opening of the facility for ferry operations will not pose any major disturbances to the present operational situation of the port.

2.4 Port and terminal development plans

Following the preparation of a port masterplan in 1994, see ref /1/, a phased development of Aktau port is now in progress. Construction works for the phase 1 development have started in June this year and are expected to be completed by September 1999. Phase 1 concerns basically the rehabilitation of the main dry cargo quay and raising of the hinterland land areas. Phase 2 of the port development is under study and concerns presently the rehabilitation of the breakwater and causeway. In parallel to these construction projects an institutional development programme is being conducted at the port.

At first glance none of these development projects appears to be directly concerned with the ferry terminal facilities. However, the implementation of the planned phase 1 development indirectly may affect the possible re-opening of the ferry terminal for ferry operations through the planned changes to the rail track layout at the 'port railway station'. Implemented as planned these changes will eliminate the possibility of transporting rail wagons on the ferries.

From different sides it has been mentioned that the Ministry of Transport, Government of Kazakhstan, has called for Expressions of Interest from potential investors/operators of both the Ferry Berth and the Grain Berth at Aktau port. Copy of the invitation and more precise information about the plans and intentions behind this invitation have not been obtained.

2.5 Site and environmental conditions

Sea water level

The cyclic and dramatic variations in the water level of the Caspian Sea are of major concern not only to all ports around the Sea but to all concerned with the shore environment of the Caspian basin. The monthly water level measurements show that the latest steep raise in water level that started in 1977 topped (temporarily?) in late 1995, and since then it has been steadily falling (discarding the seasonal variations). For reference see, the yearly peak levels (monthly average) from the later years recorded at the port of Aktau and presented in the table 2 below. Levels are in m with Baltic Sea Level (BSL) as reference level.

Table 2 **Recorded water levels at Aktau Port (In m BSL)**

Year	1991	1992	1993	1994	1995	1996	1997
Max. level	-27.04	-26.88	-26.82	-26.62	-26.46	-26.74	-26.97
Min. level	-27.52	-27.24	-27.11	-26.91	-26.80	-27.06	?
Averag e level	-27.26	-27.07	-26.96	-26.75	-26.64	-26.87	?

Presently (summer 1997), the water level is lying between the levels of 1991 and 1992, which has eased the threat of flooding the port facilities. No garantee however can be given that the waterlevel will not start raising again.

Due to the huge economic implications many investigations have been undertaken in the past in order to forecast the variation of the Caspian Sea water level. It is generally recognized that many different factors, that can not be controlled and forecasted (climatic, tectonic, etc..), may play a role. In recognition hereof and as an integrated part of the elaboration of the project for renovation of the ferry terminals in Baku and Turkmenbashi, Ramboll has suggested to take a probabilistic approach to the problem and the result is reported in ref /2/. Based on the existing information on water levels, the geography of the Caspian basin and the processes and factors influencing the sea level variation, it is concluded (ref /2/) that

- the probability of the water level staying below -25 m until year 2050 is estimated to be 97 - 99 %

- the probability of the water level staying above -30 m until year 2050 is similarly estimated to be 97 - 99 %

- shifting the above interval (= 5 m) with 1 m in each direction, the probabilities of exceedance will become about 10 times smaller at the extended limit and about 10 times larger at the other

These estimations have been made assuming that the impact of anthropogenic climate changes on the hydrological cycle at present and during most of the next half century are negligible. It is thus assumed that the high inflow and the low evaporation prevailing these years are caused by natural variations and do not represent a permanent change in the climate

Natural site conditions

The natural site conditions of the port have been described in all of the engineering studies that have been prepared lately. Referring in general to ref /1/ the significant features of the prevailing natural conditions can be summarized as follows:

- **Winds** are prevailing from SE and E, but also from NW, N, and W, NE. Maximum wind speeds are recorded from NW and W, up to 24 m/s.

- **Waves** near Aktau are mainly wind driven. The worst wave attack on the port comes from W and NW, and some more moderate attacks from SW and S. Wave periods in extreme cases go up to 7, 8 and 9 s. Based on measured data it is reported that the significant design wave for the rubble mound breakwater appears to be Hs= 4.5 m (occurring once in 50 years)

- **Currents** in the Caspian Sea are only wind induced and are generally weak. **Tides** are negligible

- **Temperatures** are quite extreme due to the prevailing continental climate, which brings very hot summers and cold winters. Extremes may be 45 degrees C in the summer and -20 degrees C in the winter.

- **Ice** in the port basin occurs once in three years. The maximum ice layer thickness reported in the port is 15 cm. Ice conditions which seriously impede navigation occurs once in ten years.

- Annual **precipitation** is around 200 mm, and average relative **humidity** varies between 56% - 75%.

According to the Soviet standards Aktau is situated in an area with moderate **seismic activity** of intensity 5, correspondingly to the Modified Mercalli Scale. From the review of drawings it was noticed that the **soil conditions** at the site of the ferry berth mainly consist of clay but with intermittent thin layers of limestone. Protected by the main breakwater and the berths 4/5 against external wave action the ferry berth is exposed only to choppy wind wave from inside the port basin.

3. EXISTING TERMINAL FACILITIES

3.1 Terminal area arrangement

Location of the ferry berth is shown in Fig. 1, which simultaneously presents the port layout following the implementation of the planned Phase 1 development of the port. The area of the terminal is shown in more detail in Fig. 2. Completed in 1976 the terminal was constructed as a single berth facility, docking type, with access ramp for both rail traffic and road traffic. The terminal infrastructure can be divided into the following main parts:

- Marine works/berthing structures, comprising
  . central pier
  . finger pier
  . pier access road
  . central control building

- Ferry access ramp structures, comprising
  . one ramp with two link spans
  . four lifting towers
  . land base of ramp

- Land works
  . railway access tracks and shunting yard

The brief description of the terminal infrastructure with respect to layouts and state of repair following hereafter is based on the information obtained during the site visit to Port of Aktau during the month of September 1997 and the survey of facilities carried out. The detailed results of the survey are subject of a specific inspectiion report enclosedas appendix 4.

As the terminal was constructed during the period of the former Soviet Union and mainly intended for rail traffic no infrastructure and facilities for proper border control and customs handling operations as well as road traffic handling are existing at the terminal. Customs and frontier police have today their offices close to the main port entrance and will, as part of the phase 1 port development, be relocated to a new office building

planned to be placed next to a new railway line for the main quay. Temporarily during the construction works, customs and frontier police are sharing offices with the railway staff in the railway control building located at the shore end of the ferry ramp. A temporary passenger terminal building is located at the gate entrance to the port some 250 m from the terminal, but this building will be demolished as part of the Phase 1 development.

The land area of the ferry terminal is very limited, being squeezed between the dry port area to the east and oil installations, pipelines and storage tanks, to the west. The land area left over holds the railway control building and a substation and the area is being crossed by oil and water pipelines at the shore end of the ferry ramp. The surface of the land area adjacent to the ramp as well as the rail access tracks are in general at level -25.5 BSL and therefore not directly threatened by the present waterlevel.

Adjacent areas of the port are generally lying lower than the ferry terminal and according to ref /1/ underground utilities systems are deteriorated and partly out of order due to the high ground water table. This concerns drainage, sewerage, electrical power distribution, communication lines and water distribution. The ferry terminal control building is connected by underground cabling to the existing port administration building as concerns power supply, telephone and radio. Outside the port boundary these utilities systems are reported to be in good working condition and in all circumstances it is believed that necessary upgrading of the port utilities will be part of the ongoing port development project.

3.2 Marine works, berthing structures

Central pier

The central pier is 125 m long measured from the base stop fender base structure and 12.82 m wide. The substructure is composed of two parallel front walls of steel sheet piles, separated by sand fill. Toe level of the sheet piles is around -39.7 (BSL). The sheet piles are anchored to each other at level -25.7. The superstructure consists of an in-situ cast concrete front wall, extending from quay apron level -23.12 to level -28.6. This wall supports the fender system. The original wooden guiding fenders have been replaced by a continues double layer of rubber tyres (∅ 2.0 × 0.5 m industrial type). Pier surface is paved with asphalt concrete pavement. Design bottom level at the ferry berth side is -35,0.

Originally the pier is equipped with bollards and a concrete lighting tower placed at the pier end. Later two loading arms for oil export as well as oil supply pipelines and water pipelines have been installed on the pier. Also a tower for fire fighting has been added.

Corrosion of steel sheet pile walls are of concern and proper corrosion protection should be established. The concrete front wall is in need of maintenance repair. Optimally the rubber tyre fenders should be replaced by proper guiding fenders and the stop fenders should be tested. The pier surface pavement needs renewal. Auxiliary installations like loading arms, fire fighting towers etc ought to be removed.

Finger pier

Measured from the stop fender base structure the finger pier is 29 m long and width is 6.75 m. An almost rectangular box of steel sheet piles filled inside with sand fill forms the substructure. Toe level of sheet piles is around -39.7 and anchor level is -25.7. The

superstructure is composed of a concrete front wall cast on top of the sheet piles. At the berthing side the concrete stretches from quay apron level at -23.12 to level 28.6 whereas on opposite side the lower level of the concrete wall ends at -25.37. The berthing side of the finger pier is equipped with continuous wooden guiding fenders. The finger pier is surfaced by concrete pavement. On the finger pier a concrete lighting tower and a bollard are placed.

Proper corrosion protection of steel sheet piles should be established.The concrete front wall is in need of light maintenance repair and the left over scaffolding should be removed. Pier surface pavement should be repaired. The wooden fenders seem in a state to fall apart and should be replaced.

Central Control Building

The central control building (14.5 m × 4.0 m), located across the base of the central pier, is elevated from the ground supported on a concrete substructure. Free height for traffic to central pier passing underneath the building is 4.5 m. Roof and floor are concrete slabs separated by concrete columns and brick masonry walls. The building is composed of one room containing control boards and electrical installations, incl. high voltage area.

Besides the roof that is in need of immediate renovations the control building only need ordinary maintenance repair. The control equipment and panels shall be discarded and replaced with new and modern type equipment.

Pier access road

The pier access road, connecting the central pier with the shore, is constructed on 5-12 m of sand fill. To the ferry ramp side, the fill is held back by a retaining wall made from anchored steel sheet piles. The wall is cut of at level -27.6 and the embankment above the sheet piles has later been strengthened with rubble from lime stone. The surface of the road, 6 m wide and 1 m footpath, is paved by asphalt. The road holds an underground concrete duct for electrical installations.

The pavement of the road is under beginning deterioation. Duct installations shall be renewed. The steel sheet pile wall shall be protected against corrosion.

3.3 Ferry access ramp structures

Link spans

The ferry ramp consists of two spans (Fig 3), inner and outer link span. The inner span is seated upon four pivot bearings fixed to the land side concrete substructure and suspended from two spindles (via traverse beam) at the lifting towers in the inner row. The length of the span is 27 m and the width of traffic lane is 8 m with additional 1.0 wide footpath at each side. The outer span is seated upon three pivot bearings fixed to the traverse beam at inner row lifting towers, and suspended from two lifting wires at the lifting towers in the outer row. The length of the span is 33 m. Both inner and outer link spans are counterbalanced by counterweights placed in pits under the lifting towers and connected to the spans by steel wires. Presently the ramp is designed with land base at level -25.44 and maximum variation at ferry end to be between -23.10 and -27.83. These

levels correspond to the following allovable operational waterlevels (assuming 'Dagestan' type of ferry):
- max water level, empty ferry: -27.6
- max water level, loaded ferry: -25.9
- min water level, loaded ferry: -30.6

That the vessels were able to operate in 1991/92 with water levels above -27.6 is due to the fact that the vessels can be ballasted. Considering only the ramp system, the absolute max water level at which the vessels might operate at the present design, assuming that the ramp system is in proper operational condition, is probably close to -26.

The structure of the inner span is steel, the main parts being four longitudinal I-girders connection by cross bracing beams securing the stability and rigidity of the span. The rails are mounted on top of the I-girders. The span is covered by wooden deck supported by intermediate wooden cross beam on secondary steel cross beams suspended between the longitudinal main girders and auxiliary beams.

The main elements of the other span are four longitudinal steel I-girders connected by steel cross beams with intermediate timber, which supports the rail tracks. The stability of the span is secured by bracing connecting the main girders below the cross beams. The span is covered by wooden deck supported by the timber on the cross beams.

Both spans are equipped with 2 parallel rail tracks for simultaneous and balanced loading by two trains. the tracks divide into four at the ship connection point. Rails are P-50.

In general all steel structures of the ramp are in need for new corrosion protection. Parts of the structures, which have been or still are exposed to the sea water, appear to be heavily corroded and are therefore in urgent need for repair. This might include replacement of parts of the structures, which only a thorough inspection and testing can determine. Placed just above present water level, it is expected that the ramp bearings at the shore base are heavily corroded as well. The wooden deck should be replaced by hardwood type pavement.

Lifting towers, structures

Rectangular boxes of steel sheet piles forms the substructure of the towers. The inside is filled up with mass concrete, which is formed to create support for the steel super structures and a pit for counterweights. The concrete front towards ramp side is drawn back from steel pile front, and steel piles are cut at low level to allow ramp movements. The tower superstructures are composed of a lower part, consisting of a heavy steel structure which carries the weight of the spans and the counterweights and a upper part, consisting of a light weight steel structures with glass brick walls constituting the machinery house.

Being constructed from a rather heavy profile and being fully submerged the sheet piles of the substructure should be fit for continued use, but they should be protected against corrosion. The pits should be emptied from water and the tightness of the base structure against water penetration should be tested. While the roofs a missing bricks in the glass bricks wall shall be renewedthe remaining parts of the super structure only are in need of regular painting and maintenance repair.

Lifting towers, machinery

The machinery in the inner towers is composed of an electrical motor, which through a gearbox is connected to the spindle bearing and drive arrangement. The machinery in the outer towers is composed of an electrical motor, which through a gearbox is connected to a winch to which the hoisting wire is fastened. The hoisting wire is guided over a fixed sheaves in the tower, through two sheaves on the bridle beam, two heaves in the opposite tower, and fixed to the tension weight in the opposite tower. Further, the machinery is equipped with an electromagnetic brake acting upon the through-going axle from the gearbox. Also these machinery's are equipped with a control box containing the limit switches etc. for the control system. The control box is connected to the axle of the winch through a secondary gear transmission.

At first view, all components of the machinery's revealed no damages or weaknesses, except for beginning corrosion which is due to the lacking of regular use. The electrical equipment in the towers looks old fashioned with boxes standing open exposed to dust and sea air and probably not in operational condition. According to our experience from the ferry terminals in both Baku and Turkmenbashi machinery like gears, sheaves, bearings, spindles etc. may be reused while electrical equipment shall be replaced with new and modern equipment

Land base of ferry ramp

A rectangular box (10.50 m x 11.20 m) of steel sheet piles forms the substructure. The inside is filled up with mass concrete, which is formed to create support and anchorage for the main beams in the ferry ramp as well as support for rail track and road on shore side. Surface level is -25.5. Next to the box a stone revetment runs across the land base to withhold the land reclamation. Both rail tracks and pier access road are crossed by pipelines for oil and water elevated app. 5.7 m above ground level.

Top of the steel sheet pile wall is reaching above water and is heavily corroded, but no holes were observed. The steel sheet pile wall shall be corrosion protected. The bearings for the I-girders of the link span are expected to be heavily corroded and should be repaired. During the survey it was noticed that the rails on the land side are out of level with the rails on the ramp. This difference should be eliminated before any trains are allowed to pass.

3.4 Railway works and access

Rail access tracks

Two parallel connection rail tracks lead from the ferry ramp into the railway yard area, distance being 60 m. The yard area is presently composed of 4 parallel tracks each app. 750 m long. These tracks reach into what today is called the "port railway station", which belongs to CASCOR. Rails in the yard are type P 50 (and P 65) and sleepers are from wood.

It was observed that only rail tracks inside the yard to the last shift before the access tracks to the ferry berth showed sign of wear from regular use. The access track connection to the ramp has never been used and the rails are slightly corroded which will not hamper future use. The wooden sleepers appeared in good condition. The rail track

connections to the ferry ramp have been blocked by an earth dam which has to be removed before any possible future operation can take place.

3.5 Road works and access

The only road access to the existing ferry berth is through the territory of the main port. Except for the last 60 m closest to the ramp, the road connection between the ferry berth area and the main gate will be renovated as part of the Phase 1 development project.

4. TERMINAL REHABILITATION OPTIONS

4.1 Terminal operations and requirements

To prepare for a discussion of alternative options for the re-opening of the ferry services and their implications with respect to need of infrastructure and facilities, this section presents an outline of ferry terminal operations and requirements and compares with facilities already existing in the port.

The nature and type of terminal infrastructure, facilities and cargo handling equipment needed depend on the functions to be carried out in the ferry terminal.

The terminal functions may be determined from the following key areas:

- Traffic handling
- Border crossing
- Customer services
- Technical port services/maintenance

Traffic Handling

The principal function of the ferry terminal is to ensure the smooth and safe transfer of the various traffic categories between the ferry and the respective land traffic connections.

In the optimal case, the traffic categories to be envisaged making use of the ferry terminal in the future will comprise:

- Vessel traffic - for cargo and passenger transportation
- Rail traffic - for cargo transportation
- Trucks/trailers traffic - for cargo transportation
- Car/bus traffic - for passenger transportation
- Passenger traffic
- Inter-modal transportation of containers

The traffic handling activities will generally consist of

- Reception at/departure from terminal area
- Waiting/parking in terminal area
- Intermodal handling in terminal area
- Embarkation on/disembarkation from the ferry

In addition hereto the terminal shall service the ferries calling at the terminal.

Border Crossing

In the case of a ferry link between Aktau and Baku (or any other port around the Caspian Sea) the ferry terminal will function as border crossing point.

In this respect, border crossing activities will have to be undertaken, being

- Custom clearance procedures
- Border police and immigration control procedures

Another Traceca project is dealing with the legal framework and customs procedures with the purpose of facilitating the trade and transport on the corridor. The consultant for that project is at the same time in charge of the institutional development programme for Aktau port.

Customers Services

Various facilities and services directed towards the through passing customers may be provided. Among the most frequent met in sea link transit terminal like the present may be mentioned:

- Ticketing and travel information services
- Waiting and public utilities/toilets
- Communication and telephone
- Restaurant, bank and small shops

To which extent these services shall be provided in a particular terminal may depend on the location of the terminal. Also certain of these facilities are well adapted for private investments and may as such be left out from the project.

In the case of Aktau, the ferry terminal (and port) is located remotely some 10? km from the town and this supports that as many of these service facilities as possible are provided at the terminal.

Technical Port Activities/Maintenance

Under normal conditions the daily management and operation of the ferry terminal should be the responsibility of a Ferry Terminal Manager, who together with his staff of controllers and tallymen? should be located in the terminal area. Also mechanics with specific knowledge of the complicated lifting equipment and controls of the ramp movements normally should be part of this staff. General maintenance and repair of facilities may be the responsibility of the maintenance staff of the port.

According to the port, no staff with experience in operation of the installations in the ferry terminal are available in the port today. This means that before possible re-opening of the ferry services staff has to be selected and trained in the specialised skills of management and operations of the terminal. As regards maintenance it is believed that proper maintenance staff and workshops are part of the ongoing development projects in the port.

Terminal Shore Operations

To ensure the terminal functions, as described above, in a proper way, the facilities as presented in Table 3 below may be required, when speaking about the shore-based operations:

Table 3 Requirements of Shore Operation Facilities

Subject	Operation	Facility	Observation Aktau	
Railway traffic	. Access to/from hinterland	. Railway link line	+	
	. Shunting	. Railway shunting area	+	1)
	. Waiting for embarkation	. Railway marshaling area	+L	1)
	. Embarkation/disembar-kation	. Railway ferry access ramp	+R	
Trucks/trailers	. Access to/from hinterland	. Access road	+	
	. Ticketing	. Reception area, traffic lane	-N	
		. Ticketing shed	+R	1)
	. Waiting for embarkation	. Truck marshaling area	-N	
		. Waiting, utilities building	+R	1)
		. Trailer holding area	-N	2)
		. Area reserved for dangerous goods	-N	
		. Ferry access ramp	+R	
	Embarkation/dis embarkation	. Tractors for moving trailers	-N	2)
	. Customs, immigration	. Area for disembarkation of trucks	-N	
		. Covered drive through area with customs, immigration shed	-N	
Cars/buses	. Access to/from hinterland	. Access road	+	
	. Ticketing	. Reception area, traffic lane	-N	
		. Ticketing shed	+R	1)
	. Waiting for embarkation	. Vehicle marshaling area	-N	
		. Waiting, utilities building	+R	1)
		. Ferry access ramp	+R	
	Embarkation/dis embarkation			
	. Customs, immigration	. Area for disembarkation of vehicles	-N	
		. Covered drive through area with customs, immigration shed	-N	
Passengers	. Ticketing	. Ticketing shed	+R	1)
	. Waiting for embarkation	. Waiting, utilities building	+R	1)
	. Embarkation/disembar-kation	. Covered gangway from waiting building to ferry access point	-N	
	. Customs, immigration	. Covered waiting area with customs, immigration shed	-N	
	. Departure from port	. Covered departure area	+R	1)

Subject	Operation	Facility	Observation Aktau
Intermodal container traffic	. Reception and registration	. Reception area with rail and road access	-N 2)
	. Unloading and stacking	. Unloading and stacking area	-N 2)
		. Mobile toplift unloaders	-N 2)
	. Embarkation/dis embarkation	. Mobile toplift loaders with spreaders (20', 40')	-N 2)
		. Trailers/container mover	-N 2)
		. Loadmasters/tractor	-N 2)
Port Administration	. Traffic operators	. Administration building	+R
	. Maintenance	. Workshop	(+R)

+: exist
-: non exist
L: Level raise
N: New
R: Renovation
1): will be removed as part of Phase 1 development
2): will be provided in main port

Terminal Marine Operations

Considering the sea side operations, the related facilities that may be required are listed in Table 4 hereafter.

Table 4 Requirements of Marine Operation Facilities

Subject	Operation	Facility	Observation Aktau
Vessel traffic	. Approach/departure	. Approach channel	+
		. Manoeuvring port basin	+
	. Docking/undocking	. Berthing structures	+R
	. Operation/suppliers	. Oil/waste reception facilities	+R
		. Bunkering facilities	+

4.2 Option 1: road/passenger traffic (minimum rehabilitation)

According to the TOR, this option describes the case of minimum rehabilitation of existing facilities allowing only road traffic to embarque/disembarque the vessels. As described earlier it should be considered a basic requirement that operations and traffic flows of the terminal are executed independent of the main port activities. This entails that the terminal shall be established occupying a dedicated area with own access independent of the main port. Under this assumption minimum rehabilitation demands will correspond to

option 3 described hereafter excluding the railway yard works (app. implementation costs USD 13.8 million).

However, accepting the experiment of neglecting basic operational requirements and assuming the approval by the port, the absolute minimum rehabilitation is described hereafter. This might be considered acceptable as a temporary situation in order to test the need of the ferry service and only in the case of limited traffic, say one vessel call per week.

Main assumptions

Traffic handling
- Vessel traffic is cared for inside the terminal
- No railway traffic
- Other traffic categories (road, passenger, intermodal containers) are handled through the main port area
- Passengers are carried by bus between the ferry berth and a temporary terminal building outside the main gate of the port

Border crossing
- All border crossing operations, except intermodal containers, are cared for at a temporary shed to be located at the shore end of the ferry access ramp, with the negative implication with respect to waiting this may imply (excessive ferry loading/unloading times).

Customers services
- No services except a combined ticket and passenger waiting shed of temporary nature to be located outside the main gate of the port.

Administration
- Ferry terminal management located inside the main port administration
- Maintenance cared for by main port workshops

Facilities
- Phase 1 port development project is implemented as planned
- Land areas outside the present ownership of the port may be made available for the parking of waiting vehicles and temporary shed outside the main gate of the port

Main project components

With reference to the proposed terminal layout, Fig. 4, the main project components of this option will be:

Terminal area arrangement
- Development of parking area (gravel pavement) outside the main gate to port

Marine works/berthing
- renovation of central pier (sheet wall protection, new pavement, concrete surfacing)
- Renovation of finger pier (new fender system, sheet wall protection, new pavement)
- Renovation of pier access road (underground piping, raising of land end, pavement)
- Renovation of ramp/tower supports (raising of concrete base, sheet wall protection)

Ferry ramp	- Renovation of linkspans (2) (new timber deck, review of structure, replacement of damaged parts, new surface protection, omission of railway switches) - Renovation of machinery (spindles, wires, counterweights) - New control system for lifting operations - Renovation of tower superstructures (roofs, walls, surface protection)
Building/equipment	- Temporary sheds(passenger pavilion/ticketing, border control) - Procurement of medium size passenger bus

Costs estimate

Based on detailed costs estimates for similar renovation works planned for the Ferry Terminals in Baku and Turkmenbashi, a cost estimate for the option 1 renovation works, as outlined above, is presented in the table 5 below.

Table 5 Option 1, Implementation Costs Estimate

Designation	Implementation costs (1000 USD)
Project Civil Works	
Terminal area arrangement	80
Marine works	1090
Ferry ramp rehabilitation	1530
Building/equipment	160
Total, works	**2860**
Additional Activities	
Site surveys, topo, bathy	5
Site survey, soil investigation	10
Supervision of works, 10 months	300
Total, additional activities	**315**
Contingencies, 20%	635
Grand Total, Implementation	3810

Remarks to cost estimate, table 5:
- costs are price level 1997
- assumed maximum use of local manpower/workers
- cost estimate exclude works associated with relocation of installations
- cost estimate exclude activities associated with possible cleaning of site for pollutants, spills, etc.
- cost estimate exclude engineering design of works

An alternative, Option 1.A, to the solution described above, would be to establish the shore - vessel connection as a traditional Ro-Ro ramp. The costs of a Ro-Ro ramp are app. 0.5 million USD and assuming that the east/south side of the central pier is used for

berthing, costs for a fender system and shoreside landworks/pavements (app. 0.4 million USD) should be added together with possible cost for deepening alongside the berth. The additional costs for Option 1.A would sum up to around 1.0 million USD while the savings compared to Option 1 would include renovation of the ferry ramp (USD 1.53 million), renovation of finger pier (0.3 million USD) and tower supports (0.5 million USD) totalling around 2.3 million USD. The implementation costs of Option 1.A therefore represents a saving of approximate 1.3 million USD, compared to Option 1. The operational difference would be that the facility could be used by other vessels than the ferries.

Yet another alternative, Option 1.B, might be considered by establishing a Ro-Ro ramp at the far end of the main port quay (beyond berth no. 3). Berthing might be either alongside berth no. 3 or perpendicular to the quay side. In the first case only costs would be for the ramp (0.5 million USD) while in the second case costs for a berthing dolphin (0.3 million USD) should be added. This alternative would be particular interesting if a paved area (app. 6000 m2) inside the renovated port temporarely could be fenced off to be used for vehicle marshalling. The total saving in implementation costs for this Option 1.B would therefore be around 1.5 - 1.8 million USD, compared to Option 1.

Both Option 1.A and Option 1.B investments concentrate on alternative shore-vessel connections than the existing the ferry berth ramp and they would therefore not represent a modular step forward in the development of the ferry terminal.

4.3 Option 2: Road/passenger + railway traffic (minimum rehabilitation)

As requested by the TOR, this option describes the case of minimum rehabilitation of existing facilities allowing both road and railway traffic to embarque/disembarque the ferry vessels. As described earlier it should be considered a basic requirement that operations and traffic flows of the terminal are executed independent of the main port activities. This entails that the terminal shall be established occupying a dedicated area with own access independent of the main port. Under this assumption minimum rehabilitation demands will correspond to option 3 described hereafter.

However, accepting the experiment of neglecting basic operational requirements and assuming the approval by the port, the absolute minimum rehabilitation is described hereafter. This might be considered acceptable as a temporary situation in order to test the need of the ferry service and only in the case of limited traffic, say one vessel call per week.

Main assumptions

Traffic handling
- Vessel traffic is cared for inside the terminal
- Railway traffic is cared for making part time use of the existing yard at the 'Port Railway Station' (2 tracks)
- Other traffic categories (road, passenger, intermodal containers) are handled through the main port area
- Passengers are carried by bus between the ferry berth and a temporary terminal building outside the main gate of the port

Border crossing
- All border crossing operations, except intermodal containers, are cared for at a temporary shed to be located at the shore end of the ferry access ramp, with the negative implication with respect to waiting this may imply (excessive ferry loading/unloading times).

Customers services- No services except a combined ticket and passenger waiting shed of temporary nature to be located outside the main gate of the port.

Administration
- Ferry terminal management located inside the main port administration
- Maintenance cared for by main port workshops

Facilities
- Phase 1 port development project is implemented as planned
- Land areas outside the present ownership of the port may be made available for the parking of waiting vehicles and temporary shed outside the main gate of the port
- Existing installations (pipelines) in the area of proposed new rail tracks can be removed or relocated.

Main project components

With reference to the proposed terminal layout, Fig. 4, the main project components of this option will be:

Terminal area arrangement
- Removal of installations out of use and relocation of the rest (pipelines)
- Development of parking area (gravel pavement) outside the main gate to port

Marine works/berthing
- renovation of central pier (sheet wall protection, new pavement, concrete surfacing)
- Renovation of finger pier (new fender system, sheet wall protection, new pavement)
- Renovation of pier access road (underground piping, raising of land end, pavement)
- Renovation of ramp/tower supports (raising of concrete base, sheet wall protection)

Ferry ramp
- Renovation of linkspans (2) (new timber deck, review of structure, replacement of damaged parts, new surface protection, omission of railway switches)
- Renovation of machinery (spindles, wires, counterweights)
- New control system for lifting operations
- Renovation of tower superstructures (roofs, walls, surface protection)

Railway yard
- Dismantling of remaining rail tracks
- Raising of rail yard area to level app. -24.0
- Establishment of access tracks (2) and rail shunting tracks (2), including switches, signals etc.

Building/equipment
- Temporary sheds(passenger pavilion/ticketing, border control)
- Procurement of medium size passenger bus

Costs estimate

Based on detailed costs estimates for similar renovation works planned for the Ferry Terminals in Baku and Turkmenbashi, a cost estimate for the option 2 renovation works, as outlined above, is presented in the table 6 below.

Table 6 Option 2, Implementation Costs Estimate

Designation	Implementation costs (1000 USD)
Project Civil Works	
Terminal area arrangement	80
Marine works	1090
Ferry ramp rehabilitation	1530
Railway yard works	647
Building/equipment	160
Total, works	**3507**
Additional Activities	
Site surveys, topo, bathy	5
Site survey, soil investigation	10
Supervision of works, 10 months	300
Total, additional activities	**315**
Contingencies, 20%	**768**
Grand Total, Implementation	**4590**

Remarks to cost estimate, table 6:
- costs are price level 1997
- assumed maximum use of local manpower/workers
- cost estimate exclude works associated with relocation of installations
- cost estimate exclude activities associated with possible cleaning of site for pollutants, spills, etc.
- cost estimate exclude engineering design of works

4.4 Option 3: Full shoreside terminal rehabilitation

In line with the TOR, this option describes the case in which optimal shoreside facilities are developed within the terminal itself for both traffic handling operations, border crossing operations, customers services and terminal administration.

Main assumptions

Traffic handling
- All traffic categories (vessel, rail, road, passenger), except intermodal container handling operations, are cared for inside the terminal
- Intermodal containers are handled through the main port

	- Capacities of vehicle waiting areas for both embarkation and disembarkation correspond to one vessel load (one berth)
Border crossing	- All border crossing operations, except intermodal containers, are cared for inside the terminal
Customers services	- All services, except hotel, are cared for inside the terminal
Administration	- Ferry terminal management located inside terminal - Maintenance cared for by main port workshops
Facilities	- Phase 1 port development project is implemented as planned - Land areas outside the present ownership of the port may be made available for the terminal - Existing installations (pipelines, water storage tanks, substation, etc.) in the area proposed can be removed or relocated. Pipelines in use may possibly be relocated in dedicated pipeway corridor along the railyard

Main project components

With reference to the proposed terminal layout, Fig. 5, the main project components of this option will be:

Terminal area arrangement	- Removal of installations out of use and relocation of rest (pipelines, water storage tanks, substation, possibly railway adm. building) - Reclamation of sea area and raising of land area to level app.-23.5 - Development of area with internal roads, lighting, fencing and utilities
Access road	- reconstruction of partly existing road, including lighting, drainage etc. - Establishment of two road/railway crossings (signaling)
Marine works/berthing	- renovation of central pier (new fender system, sheet wall protection, new pavement, concrete surfacing) - Renovation of finger pier (new fender system, sheet wall protection, new pavement) - Renovation of pier access road (underground piping, raising of land end, pavement) - Renovation of ramp/tower supports (raising of concrete base, sheet wall protection) - New coastal protection/embankment (rubble mound type)
Ferry ramp	- Renovation of linkspans (2) (new timber deck, review of structure, replacement of damaged parts, new surface protection, omission of railway switches) - Renovation of machinery (spindles, wires, counterweights) - New control system for lifting operations

	- Renovation of tower superstructures (roofs, walls, surface protection)
Railway yard	- Dismantling of remaining rail tracks - Raising of rail yard area to level app. -24.0 - Establishment of access tracks (2) and rail shunting tracks (4), including switches, signals etc.
Building/structural works	- New buildings and sheds (ticketing, border control, public services, passenger terminal/administration) - New passenger bridge connecting passenger terminal with central pier

Costs estimate

Based on detailed costs estimates for similar renovation works planned for the Ferry Terminals in Baku and Turkmenbashi, a cost estimate for the option 3 renovation works, as outlined above, is presented in the table 7 below.

Table 7 Option 3, Implementation Costs Estimate

Designation	Implementation costs (1000 USD)
Project Civil Works	
Terminal area arrangement	4100
Access road	430
Marine works	3160
Ferry ramp rehabilitation	1530
Railway yard works	1257
Building/structural works	1009
Total, works	**11486**
Additional Activities	
Site surveys, topo, bathy	30
Site survey, soil investigation	100
Supervision of works, 20 months	890
Total, additional activities	**1020**
Contingencies, 20%	**2500**
Grand Total, Implementation	**15006**

Remarks to cost estimate, table 7:
- costs are price level 1997
- assumed that building works are constructed according to local tradition and with maximum use of local materials
- assumed maximum use of local manpower/workers
- cost estimate exclude works associated with relocation of installations

- cost estimate exclude activities associated with possible cleaning of site for pollutants, spills, etc.
- cost estimate exclude engineering design of works

5. CONCLUDING REMARKS

5.1 Rehabilitation and Options

The site survey has revealed that in order to bring the existing ferry berth into operation again, rehabilitation of the central pier, the finger pier, and the ferry ramp structure including lifting towers, machinery and controls will be needed. In addition an upgrading of the shore side facilities is required to account for the new political reality, the terminal being a border crossing point.

In line with the TOR, three different options for rehabilitation of the terminal are considered

- option 1: minimum rehabilitation for road/passenger traffic only
- option 2: minimum rehabilitation for both railway and road/passenger traffic
- option 3: full shoreside rehabilitation for all traffic categories

It is shown to be a basic requirement that operations and traffic flows of the terminal are executed independent of the main port activities. This entails that the terminal shall be established occupying a dedicated area with own access independent of the main port. Under this assumption minimum rehabilitation demands of options 1 and 2 in principle will correspond to option 3.

However, accepting the experiment of neglecting basic operational requirements and assuming the approval by the port, the absolute minimum rehabilitation measures for options 1 and 2 may be estimated to approximately 3.8 million USD and 4.6 million USD respectively. These options might be considered acceptable as temporary measures in order to test the need of the ferry service and only in the case of limited traffic, say one vessel call per week.

Alternatives, Option 1.A and Option 1.B, to the solution described above, substituting the renovation of the ferry ramp with the establishment of a new and independent Ro-Ro ramp may represent savings in the implementation costs inthe order of 1.3-1.8 million USD compared to Option 1. The operational advantage is the flexibility with respect to choice of vessel size. Both Option 1.A and Option 1.B however, concentrate on alternative shore-vessel connections than the existing the ferry berth ramp and they would therefore not represent a modular step forward in the development of the ferry terminal.

Implementation costs for the Full Shoreside Facility development, Option 3, are estimated at 15.0 million USD, including the new railway shunting yard.

5.2 Further Analysis

The present appraisal is purely a technical analysis and it has been requested as an initial step allowing the port and the donor agencies to decide whether to proceed in the

process of rehabilitation of the Aktau ferry berth. A more detailed feasibility study will be required to determine the technical, financial and environmental viability of the rehabilitation. The present appraisal has revealed a need for analysing in more detail issues like:

- traffic forecast with modal split
- verification of ferry vessel capacity
- more detailed bathymetric and topographic information also on areas of proposed reclamation
- detailed information on installations in the area proposed for the terminal and state of repair/present exploitation of these installations
- exploitation of 'Port railway station' envisaged for main port railway operations (operational procedures)
- verification of capacity of the rail link between the port and the Mangyslak railway station (Cascor operated link)
- verification of availability of territory north of port reclamation and environmental implications
-

As basis for the possible rehabilitation of the ferry berth and development of a proper ferry terminal, a detailed engineering design project is required similar to those prepared by the Ramboll for the rehabilitation of the terminals in Baku and Turkmenbashi ports.

APPENDIX 1. TOR

(Ref: j /przeloms/jul97/akfertor)

REPUBLIC OF KAZAKHSTAN

AKTAU COMMERCIAL SEAPORT

Initial Appraisal of Ferry Terminal Rehabilitation Possibilities: Terms of Reference

1. BACKGROUND

The Port of Aktau on the Caspian Sea is being rehabilitated under the provisions of a loan from the European Bank for Reconstruction and Development (the Bank). The rehabilitation has been necessitated both by the deteriorated state of the present port installations and the rise in level of the Caspian Sea. Phase I construction work is expected to start in 1997 and will comprise reconstruction of the four principal general cargo berths together with their backup areas and port utilities, and the provision of handling equipment.

Because of the decline in port activity in recent years, there is relatively little base traffic to support the scale of the proposed reconstruction. The success of the initial development therefore depends on a combination of substantial improvement in Port services and gradual capture of new traffic. Equally, this development must be appropriately cost constrained and its scope has been reduced to the minimum necessary to achieve continued viability of the Port. The Bank is now considering a second phase of the project which could include the rehabilitation of the presently disused ferry terminal.

The ferry terminal is shown as Berth No.8 on the attached plan. It was constructed in 1976 and ferry services operated to Baku until 1991. The design of the terminal is similar to that of the terminal in Turkmenbashi Port, except that there is only one set of ramps and berthing is alongside a single finger pier. The ferry side of the finger pier is currently used for berthing port craft while the other (south) side is regularly used for movements of oil products.

The consultant should be familiar with the design and operation of Caspian Sea ferry terminals and the associated ferries to conduct a rapid initial appraisal to define the possibilities for rehabilitation, together with order-of-cost estimates.

2. OBJECTIVES

The objective of the appraisal is to provide the Port and the Bank with sufficient information to decide in principle whether to renovate the ferry terminal. Should the results of this appraisal be positive, there would be a further more detailed feasibility study to establish the viability of the investment.

3. OTHER STUDIES

The following consultancy studies are currently in progress at the port.

(i) Design, tender preparation and contract supervision of Phase I construction works by Messrs Posford Duvivier, UK.

(ii) Institutional Development Project, by Antwerp Port Engineering and Consulting/Scott Wilson Kirkpatrick.

(iii) Design and tender preparation for Breakwater and Causeway Rehabilitation (a Phase II component) by Mouchel Consulting Ltd, UK.

4. SCOPE OF WORK

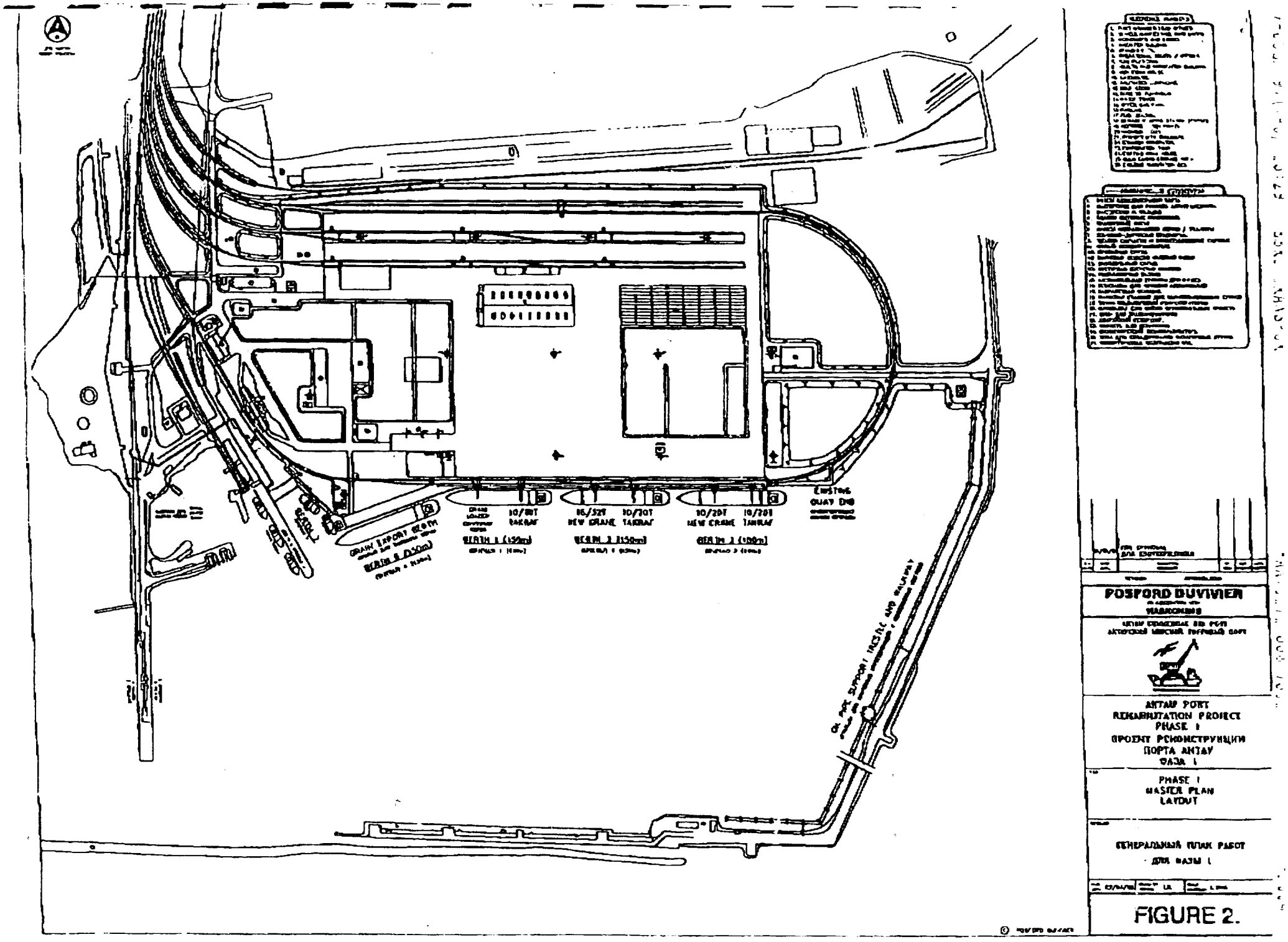
The consultant should make contact with the consultants listed in section 3, above and obtain from them any information that they possess which he considers relevant to his task. He should then visit the port and make an inspection of the ferry terminal with the co-operation of the Port Authority. It should be noted that no work related to the ferry terminal is included in the Phase I reconstruction, so that any requirements, for example, rehabilitation of utilities or general surface works would have to be included with the terminal renovation.

The appraisal for rehabilitation of the terminal should be considered on a modular basis. For example, the basic minimum requirement would be to get the terminal into operation again - at least to the extent that the Caspian Sea Shipping Company (CSC) would be willing to make regular calls. It is presumed that this would be for road traffic only in the first instance. A higher level of renovation would be to restore the terminal for rail traffic and the highest would, for example, include full shoreside terminal facilities. Cost estimates should be made for each module of the investment, qualified if necessary as to their probable level of accuracy. Comments should be included, in the light of the consultant's experience, on CSC's likely reaction to each of the proposals, if this would be relevant to the traffic handling capacity.

5 CONTRACTUAL ARRANGEMENTS

It is envisaged that the appraisal would be completed within four calendar weeks with a total time input of two man weeks.

A final report should be submitted - 6 copies in Russian and 4 copies in English.



APPENDIX 2. MISSION PROGRAMME AND PEOPLE MET

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MINUTES OF MEETING

Job: Rehabilitation of Ferry Terminal in Aktau
Initial appraisal

Subject: Minutes of site visit to Aktau Sea Trade Port

Date and location: 15.09 97 to 19.09.1997, Aktau Sea Trade Port

Meeting No.:

Participants:

Absent:

Copy to: Tacis, EBRD, Aktau Port, Ramboll

Next meeting:

Date 1997-09-20
Taken by CS/
Job 963324
Ref.No. baku929e.cs

1. SUBJECT OF VISIT

The Consortium lead by Ramboll, presently carrying out the design of renovation of the ferry terminals in respectively Baku port and Turkmenbashi port, has been requested to carry out an initial appraisal of the rehabilitation possibilities of the ferry terminal in Aktau. The visit, subject of the present mission report, constitutes the opening activity of this appraisal.

The purpose of the visit is to get acquainted with the project site and collect available information necessary to carry through the appraisal. This is obtained through a combination of meetings with the responsible staff of the port and other parties concerned and surveys of the ferry terminal areas and adjacent sites concerned.

The present Minutes of Meetings summarises the main events of the visit

2. MISSION TEAM AND PERIOD

The site visit was carried out by Mr. Carsten Sorensen (CS), Ramboll - Baku office.

The visit took place with Mr. Sorensen arriving in Aktau on 15 September 1997 in the afternoon and departing again on 19 September in the morning

During the whole of the visit Mr. Sorensen was assisted by the local interpreters of the port Ms. Oseichuk and Ms. Nurzhamal. In setting up the programme and arranging meetings on site valuable assistance was also received from the Chief Engineer of the port, Mr. V. Konstantinov. Mr. Sorensen is very thankful for this assistance without which it would not have been possible to carry through the tight programme of the visit in this short time.

3. PROGRAMME UNDERTAKEN - MEETINGS HELD AND PEOPLE MET

Monday 15 September, Afternoon

Arrival of Team to Aktau

Meeting with Aktau Port, - Mr. V. Konstantinov (VK), Chief Engineer

Summary of discussion:
After an introductionary welcome, CS explained about the purpose of the visit and the plan of programme intended.
During this short meeting VK gave an outline of the history of the ferry terminal, explaining that it was constructed on the request of 'The Pre-Caspian Mining and

Metallurgical Enterprise', later changed to 'Caspian Corporation' (Cascor). The design started in 1966 and construction was completed ten years after in 1976. The terminal has only been in use for ferry traffic between 1986 and 1992 and never carrying railwagons. Traffic was stopped mainly due to war in Azerbaijan but also due to rising of waterlevel. The four pits for counterweights are flooded and by 1993 the waterlevel had reached a level prohibiting ferries to use the facility.

Meeting with Aktau Port, - Mr. Volkov, Port Director

Summary of discussion:
Brief meeting which allowed a presentation of team and purpose of visit. Mr. Volkov expressed his expectations of a fruitful outcome of the mission and extended the coorporation of the port in this respect

Meeting with Bechtel/Enka joint venture, - Mr. Burak Erkassar, Project Manager
- Mr. Bernard Brigel, Deputy Project Man.

Summary of discussion:
The contractor Bechtel/Enka is carrying out the phase 1 port development works. It was explained that this basically consists in raising the port quay areas level with about 2 m to 4 m above port reference level (-28 m BSL). The construction works contract runs from 02.06.97 to 09.09.99. The contractor mentioned that 50 % of the working staff are local and the remaining part are Turkish. Presently about 250 people are mobilised and the peak staff on site will be around 500. No costs of works could be informed

Tuesday 16 September, Morning

Meeting at Aktau Port, Construction Department

Search for and review of documentation regarding the ferry terminal facility available in the port files.
At the handing over of the ferry terminal facility to the port from Cascor also various documentation had been received. A list of these documents is attached this Mission report. Each of these documents contain either numerous drawings and/or design and testing reports. These documents had never been reviewed by the port. In addition the port files included several other documents and drawings concerned with the ferry terminal infrastructure. Copies of a few representative details from these drawings were prepared.
Generally the files were in working order and the staff was able to extract e.g. topographic survey maps of the port. Prints of the ferry terminal area were obtained by copying in the city.

Tuesday 16 September, Afternoon

Meeting at Aktau Port, Construction Department (continued)

Search for and review of documentation regarding the ferry terminal facility available in the port files.

Site visit to Ferry Terminal area

The site visit comprised a survey and inspection of the Ferry Terminal facilities and adjacent areas. The result of the survey is subject of a separate inspection report.

Wednesday 17 September, Morning

Meeting with Aktau Port, - Mr. V. Konstantinov, Chief Engineer

Summary of discussion:
CS gave a short summary of the findings during search in the files and during the inspection of the facilities. With reference hereto it was mentioned by VK that
- due to lack of funds, in general no regular maintenance of port facilities are carried out, which results in urgency repair works from time to time. No repair works have been carried out in the ferry terminal in the later years because it is out of use
- diver survey of facilities has not been carried out in the later years
- at ramp shore base it is the railtrack on land side that has moved up (loosened ?)
- timber pavement on ferry ramp should be replaced
- timber fender replaced by rubber tyres about ten years ago, - the timber was rotten and rubber was welcomed by ferries
- settlements of surfaces of piers seem to be due to bad compaction of sandfil as no additional settlements have been observed for a long time
- loading arms on central pier are intended for export of crude oil and was used from 1981 to 1986 - not needed any longer
- no cathodic protection of sheetpile walls are being applied today
- raising of tower supports with pits filled with water shall be considered
- renewal of cabling and wiring for electrical installations shall be considered. These are most probably spoiled during additional shore protection works along access road to central pier
- railtracks leading to ramp are blocked by way of earth dam to avoid accidental movement of railwagons to the ramp
- railway tracks between the port and the main railway station (including port railway station) belong to Cascor railway branch. Tracks inside the port has recently been taken over (bought, but price not yet agreed) by the port
- ferry railway access tracks (except one) will be cut off as part of the ongoing phase 1 development
- port has no other development plans than those already known to the EBRD
- according to port master plan, phase 3 development involves the territory to the north of the port. No plan was available

- Min of Transport in Almaty has made a public announcement (June 1997), calling for potential investors interested in developing both the Grain Berth and the Ferry Terminal. Port has no information/comments hereto
- limit of port area was explained and copy of a land transfer plan was handed over
- absence of ferry terminal in the port organisation chart was discussed and a copy of the chart was handed over

Meetings with other relevant parties in the port were then arranged

Meeting with Customs and Frontier Police, - Mr. Sevastyanov (S), Chief of Frontier Police

- Mr. Atambajev (A), Chief of Customs

Summary of discussion:
CS explained about the possible re-opening of the ferry operations and gave in this connection an outline of operations and facilities planned for similar terminals in Baku and Turkmenbashi. Both S and A expressed acceptance of the outlined operational procedures and satisfaction with the facilities suggested. S and A mentioned that a new building holding the head quarters for both customs and frontier police was envisaged in the phase 1 port construction works. Customs mentioned that transit cargo according to TIR was accepted and that a dedicated warehouse close to the port was necessary for temporary storage of non authorised cargo.

Wednesday 17 September, Afternoon

Meeting with Aktau Port, - Mr. Lamzin, Harbour Master

Summary of discussion:
At the harbour masters office issues related to the navigational access to the port and ferry terminal and experiences from past ferry operations were discussed. According to the harbour master the following characterises the ferry terminal and its use:
- marked entrance channel to port is 1.5 km long, 110 m wide with a natural depth of min 6.6 m (below -28 BSL), average depth is more than 7 m
- last bathymetric survey dates back to Dec. 1987 - this is still valid as no siltation takes place in the port. No copy of this survey could be provided.
- navigational access to port and ferry berth poses no particular difficulties
- only two accidents are reported at ferry berth - tanker struck the ramp, but no serious damage (but maybe lifting of railtracks at shore end of ramp), - in 1984 ramp/wire fell down due to loading from three loose railwagons that ran into the water.
- timber fenders at terminal were damaged by tankers and replaced by rubber tyre fender which is considered better for the tankers. Timber is considered better for the ferries
- last tanker used the berth in 1989
- last ferry that has used the berth was 'Azerbaijan' in April 1992. From Aktau it left

for Bektazh
- today only port vessels are berthing at the ferry berth and no cargo handling operations are taking place
- construction of the terminal started in Dec 1966 and was then suspended from time to time, to be finally completed in 1976
- not being used the lifting mechanism of the facility is reported in bad condition
- official marine chart of the port has no. 38.011

Meeting with Aktau Port, - Mr. V. Konstantinov, Chief Engineer

Summary of discussion:
In follow-up of the previous meetings a summary of the ferry traffic statistics was presented. VK expressed the view that he could not see any present need to re-open the ferry service and that the interests mentioned from different sides were not very concrete. CS mentioned that traffic forecasting and economical justification for re-activation of the ferry service was outside the scope of the present investigation, which was purely aimed at identifying the needs of rehabilitation in case operations should be reactivated.

Thursday 18 September, Morning

Meeting at Aktau Port,

Internal session for review, planning and copying

Meeting with APEC/SWK, - Mr. G. De Baes (GDB), Project Manager

Summary of discussion:
APEC/SWK is presently in charge of a project providing Institutional Development of the port of Aktau. In parallel, SWK is carrying out a study on trade facilitation procedures financed under the Tacis/Traceca programme. During the meeting the following views were expressed by GDB:
- SWK/APEC believes in the need for a ferry - Ro Ro type operation. This is based on the facts that
  . rules and regulations for transport through Russia changes all the time
  . import transport from Iran to Kazakstan by road constitute about 1000 contain/month which much cheaper and faster could be carried by vessel through Aktau
  . trial cargo transports have been carried out with success from Poti via Baku to Aktau and the company expected 150 containers/month
  . shipping companies have expressed the need for link between Aktau and Baku

for both imports and exports
- railway access inland is in working condition although the co-ordination of operations between the State railways and Cascor railway branch, controlling the link between the main railway station at Mangghyshlak and the port, is difficult
- road access to central Kazakstan is difficult

Regarding border crossing facilities SWK had not proposed anything specific in Aktau and GDB referred to SWK office in Almaty. Likewise was referred to Almaty regarding further information on the call for investors in ferry terminal traffic facilities, which had been announced by the Ministry of Transport.

Thursday 18 September, Afternoon

Meeting with Posford Duvivier, - Mr. R. Hennessy,
- Mr. J. Laird, Project Manager
- Mr. B. Deacon, Deputy Project Manager

Summary of discussion:
Posford/Duvivier is in charge of the supervision of the construction works of the phase 1 development. Generally the site supervision team refers to the head office in UK regarding information on the background and basis of the project. This concerns plans for reuse, demolition and/or change of facilities. Likewise for bathymetric and geotechnical design basis. A construction period of 28 months for the phase 1 port development works was confirmed and it was informed that no maintenance dredging works were envisaged.

Meeting with Aktau Port, - Mr. V. Konstantinov, Chief Engineer

Summary of discussion:
The concluding meeting was used to recapitulate the findings of the mission and the information obtained. It was agreed that the establishment of a Ro Ro facility might be considered as a step on the development of the ferry terminal as this could use the same shore based facilities. On the issue of railway access VK expressed the view that the port would like to an independent access but this had not yet been possible. CS finished by expressing his thanks for the assistance the port had extended to the mission.

Site visit to adjacent areas north and west of port

The site visit comprised a survey of areas located to the north and west of the ferry terminal outside the port. Purpose of the survey was to identify the availability of areas which possibly may be used for future expansion of the ferry terminal area.

Friday 19 September, Morning

Departure of Team from Aktau

4. DOCUMENTATION OBTAINED

During the meetings and the visit to the files the following written information was extracted:

- Updated Caspian Sea water level records
- Summary of past ferry traffic statistics
- Aktau Port Organisation Chart (transition period)
- Topographic survey maps of ferry terminal area
- Aktau Port rehabilitation project, Plan Phase 1 development
- Aktau Port land transfer plan
- Copies from dwgs of various structural details of ferry terminal infrastructure

5. ADDITIONAL INFORMATION REQUIRED

The following issues of expected importance to the possible ferry terminal renovation were identified/discussed during the meetings but not fully documented. Information on these issues will be looked for as explained below.

- Copy of call for potential investors in ferry terminal, which apparently has been launched by the Ministry of Transport, Almaty - (by SWK in Almaty)
- Aktau Port Master Plan, area allocation plans for phases 0, 1, 2, and 3 - (by Posford Duvivier in Newcastle)
- Updated bathymetric surveys of ferry terminal basin and approaches - (by Contractor ?)
- Planned operational concept of future port railway operations (use of port railway station) - (by Posford Duvivier in Newcastle)

APPENDIX 1. Port documents received from Cascor

Control machinery for arrow (-head) 1/9 part of the ferry bridge

I7. Гарнитуры привода СП-2р для стрелок Р-50м. I/9 моста паромной переправы. Рабочие чертежи. Working drawings

I8. Установка выключателей. Installation of the control panel

I9. Паромный причал. Рабочие чертежи, часть Ш.(Электрическая). Том У задание монтажно-заготовительному участку. Ferryboat Working drawings, part III (electric), Vol. V. Deliverables.

20. Рабочие чертежи, часть Ш электрическая. Том УI электроснабжение, электроосвещение, телефонизация, радификация. Working drawings, part III, electric, Vol. VI power supply; light, radio, telephone, etc.

21. Часть Ш(электрическая). Том I. Пояснительная записка, кинематическая схема, спецификации. Part III (electric), Vol. I, Comments, kinematic scheme, specifications.

22. Часть Ш(электрическая). Part III (electric).
Том П принципиальные и элементные схемы. Vol II (schemes; principal & element)

23. Часть Ш. Том Ш. Схемы внешних соединений, кабельный журнал.
Part III Vol. III Outer connections schemes, cable record.

Главный инженер АМТП
Chief Engineer, ACSP

В.Л.Константинов

№ 2/362 от 25.04.97.

Rambell

Documents Port has received from KAScor

Gone through by CS at Port Construction Department.

Директору Департамента
водного транспорта
г-ну Коваленко П.Д.

Касательно ПСД паромной
переправы АМТП

Уважаемый Петр Данилович!

Согласно Вашего запроса направляем в Ваш адрес имеющуюся у нас проектно-сметную документацию по строительству паромной переправы согласно реестра.

Ввиду того, что данная документация имеется у нас в одном экземпляре просим по изучению возвратить в порт.

Реестр: The List of Documents.

I. Береговые и промежуточные устои. Папка 3. Beach supports
2. Крайний морской устой. Папка № 4. outer marine supports
3. Крайний морской устой. Папка № 4а. —"—
4. Крайний морской устой. Папка № 2. —"—
5. Паромная переправа. Механизмы подъема пролётных строений. Папка № 5. Ferryboat. Machinery used to lift the span structures.
6. Башни подъёма механизмов. Папка № 7. lifting machinery
7. Крайний морской устой. Папка № II outer marine support.
8. Механизм подъёма пролетных строений, папка № I. machinery used to lift the span structures
9. Механизм подъёма пролетных строений. Папка № 3 —"—
I0. Механизм подъема пролетных строений. Папка № 4. —"—
II. Механизм подъема пролетных строений. Папка № 7а —"—
I2. Подъемные механизмы пролетных строений. Папка № I0. machinery used to lift the span str.
I3. Мосты, пути. Bridges & ways
I4. Паромная переправа. Центральный пульт управления. Папка № 9. Ferryboat. Central control point. File 9
I5. Металлические башни опор. Рабочие чертежи. Пояснительная записка. Чертежи, том II. Metal tower support towers. Working drawings. Comments. Drawings, volume II
I6. Часть 2. Паромные строения подъемно-опускного моста. Рабочие чертежи. Пояснительная записка, том I. Part 2. Ferryboat structures of the lifting bridge. Working drawings. Comments, volume I.

APPENDIX 3. LIST OF REFERENCES

Appendix 3 - List of references

/1/ Port of Aktau Masterplan Study, Final Report, 1994 - MERC ROTTERDAM

/2/ Note on design water levels for Baku and Turkmenbashi Ferry Terminals, August 1996 - DHI / RAMBOLL

APPENDIX 4. INSPECTION REPORT

FERRY BERTH IN THE PORT OF AKTAU

REPORT FROM SITE INSPECTION SEPTEMBER 1997

Job	: 963324		
Ref.No.	: BAKU947E.CS	Prep.	: CS
Edn.No.	: Cont.	:	
Date	: 1997-11-01	App.	:

RAMBOLL GAJIBEKOV STR.33/35, Apt 93 AZ-370010 BAKU TEL.: +994-12 933114 FAX: +994-12 933114

Table of contents

Enclosures

PLANS

PHOTOS

1. Introduction

The present report is the result of a survey and inspection of the ferry berth structures at the port of Aktau. It is intended to describe the present state of repair of these structures to such detail that possible reuse of facilities in connection with the possible re-activation of the ferry operations may be determined.

Inspection of the structures and machinery, as well as taking photos of the same, was carried out on 16th and 18th of September 1997. The water level was reported to be ?. The location of the ferry berth is shown in Fig 1.

Deputy chief electrician of the port assisted in the inspection. No machinery and installation was tested in operation as no staff with knowledge of operation was available. Former operational staff of the ferry terminal is reported to no longer be in the port. All inspections were done from the land side as no appropriate vessel was readily available for inspection from sea side. A possible sea side inspection is not believed to alter the main results of the inspection.

2. Structures Surveyed

Enclosed Fig 2 is a plan of the ferry berth area in Aktau and Fig 3 shows various ferry berth structures. With reference to these figures, the following structures were surveyed :

- Central pier
- Finger pier
- Ferry ramp structure, outer and inner link span
- Lifting towers, outer and inner incl. machinery
- Central control building, incl. controls
- Pier access road
- Land base ramp (and road)
- Rail access tracks

2.1 Central pier

The central pier is 125 m long measured from the base stop fender base structure and 12.82 m wide. It has rounded corners at the outer end. The substructure is composed of two parallel front walls of steel sheet piles, separated by sand fill. Toe level of the sheet piles is around -39.7 (BSL). The sheet piles are anchored to each other at level -25.7.

The superstructure consists of an in-situ cast concrete front wall, extending from quay apron level -23.12 to level -28.6. This wall supports the fender system.

Originally the pier was equipped with wooden guiding fenders supported by a concrete toe, being part of the superstructure. Only fenders at the ferry side of the

pier were installed. Today these fenders have been replaced by a continuous double layer of rubber tyres (∅ 2.0 × 0.5 m industrial type) fixed by steel chains to the superstructure.

Pier surface is paved with asphalt concrete pavement.

Originally the pier is equipped with bollards along both sides and a concrete lighting tower placed at the pier end. Later two loading arms for oil export as well as oil supply pipelines and water pipelines have been installed on the pier, the oil pipelines underground and the water pipelines on top along the east side of the pier.

Also a tower for fire fighting has been added.

Design bottom level at the ferry berth side is -35,0, and at the opposite side natural bottom level according to old bathymetric survey is varying between -32 and -34.

The land base structure of the pier is constructed from an irregular but almost rectangular box (16 m × 7-9 m) of steel sheet piles. The inside is apparently filled up with mass concrete, which is formed to create support for the tower steel structures, the stop fender, a guiding fender and a pit for the counterweight.

2.2 Finger pier

Measured from the stop fender base structure the finger pier is 29 m long and width is 6.75 m. It is rounded at the outer end. An almost rectangular box of steel sheet piles filled inside with sand fill forms the substructure. Toe level of sheet piles is around -39.7 and anchor level is -25.7. The superstructure is composed of a concrete front wall cast on top of the sheet piles. At the berthing side the concrete stretches from quay apron level at -23.12 to level 28.6 whereas on opposite side the lower level of the concrete wall ends at -25.37.

The berthing side of the finger pier is equipped with continuous wooden guiding fenders supported by a concrete toe, being part of the superstructure wall.

The finger pier is surfaced by concrete pavement. On the finger pier a concrete lighting tower and a bollard are placed.

The stop fender base structure, constituting the land end of the finger pier as well, is formed from an almost rectangular box (15 m × 14 m) of steel sheet piles. The inside is apparently filled with mass concrete to create support for stop fenders, tower structure and pit for counterweights.

2.3 Ferry ramp structure

The ferry ramp consists of two spans (Fig 3), inner and outer link span.

The inner span is seated upon four pivot bearings fixed to the land side concrete substructure (Dwgs no. 1 and 2) and suspended from two spindles (via traverse beam composed of two girders) at the lifting towers at the inner row. The length of the span is 27 m and the width of traffic lane is 8 m with additional 1.0 wide footpath at each side.

The span is equipped with 2 parallel rail tracks for simultaneous and balanced loading by two trains.

The outer span is seated upon three pivot bearings fixed to the traverse beam at inner row lifting towers (Dwgs no. 1 and 2), and suspended from two lifting wires at the lifting towers in the outer row. The length of the span is 33 m.

Width at ship end of this span increases to 15 m as the two rail tracks divide into four at the ship connection. The ferries presently used by CSC only use the two central tracks at ship connection.

Both inner and outer link spans are counterbalanced by counterweights placed in pits under the lifting towers and connected to the spans by steel wires (Dwg. no. 2).

The structure of the inner span is steel, the main parts being four longitudinal I-girders connection by cross bracing beams securing the stability and rigidity of the span. The rails, being P-50, are mounted on top of the I-girders.

The span is covered by wooden deck supported by intermediate wooden cross beams on secondary steel cross beams suspended between the longitudinal main girders and auxiliary beams.

The structure of the outer span differ from that of the inner span, due to the greater length, the requirement for a more flexible structure, the required adaptation to the ferry structure.

The main parts of the other span are four longitudinal steel I-girders connected by steel cross beams with intermediate timber, which supports the rail tracks. The stability of the span is secured by bracing connecting the main girders below the cross beams.

The span is covered by wooden deck supported by the timber on the cross beams.

2.4 Lifting towers

2.4.1 Structures

A rectangular box (10.4 m x 5.4 m) of steel sheet piles forms the substructure of the inner towers. The inside is filled up with mass concrete, which is formed to create support for the steel structures and a pit for counterweights. The concrete front towards ramp side is drawn back from steel pile front, and steel piles are cut at low level to allow ramp movements.

As mentioned in section 2.1 and section 2.2, the substructures of lifting towers at outer row also consist of sheet pile boxes filled inside with mass concrete.

The lower superstructures are composed of two parts, lower part and upper part.

The lower part consists of a heavy steel structure (K- lattice type), which carries the weight of the spans and the counterweights and, as regards the towers in the inner row, also the traffic load.

The upper part of the towers are light weight steel structures with glass brick walls constituting the machinery houses.

2.4.2 Machinery

The machinery in the inner towers is composed of an electrical motor, which through a gearbox is connected to the spindle bearing and drive arrangement.

Future, a secondary output shaft from the gearbox is, through a secondary transmission gear train, connected to the control box containing the limit switches etc. for the control system.

The machinery in the outer towers are almost identical, and is composed of an electrical motor, which through a gearbox is connected to a winch to which the hoisting wire is fastened (Photo no. ?).

The hoisting wire is guided over a fixed sheaves in the tower, through two sheaves on the bridle beam, two heaves in the opposite tower, and fixed to the tension weight in the opposite tower.

Further, the machinery is equipped with an electromagnetic brake acting upon the through-going axle from the gearbox.

Also these machinery's are equipped with a control box containing the limit switches etc. for the control system. The control box is connected to the axle of the winch through a secondary gear transmission.

Two of the machinery's are further equipped with crank handle, which through a gear transmission and manual clutch is connected to the through-going axle of the motor.

2.5 Central Control Building

The central control building is located across the base of the central pier. The building (14.5 m × 4.0 m) is elevated from the ground supported on a concrete substructure. Free height for traffic to central pier passing underneath the building

is 4.5 m. Roof and floor are concrete slabs separated by concrete columns and brick masonry walls. The building is composed of one room containing control boards and electrical installations, incl. high voltage area.

2.6 Pier access road

The pier access road, connecting the central pier with the shore, is constructed on 5-12 m of sand fill. To the ferry ramp side, the fill is held back by a retaining wall made from anchored steel sheet piles. The wall is cut of at level -27.6. The embankment above the sheet piles has later been strengthened with rubble from lime stone. The surface of the road, 6 m wide and 1 m footpath, is paved by asphalt. At the road side an underground concrete duct for electrical installations is placed.

2.7 Land base ferry ramp (and road)

A rectangular box (10.50 m x 11.20 m) of steel sheet piles forms the substructure. The inside is filled up with mass concrete, which is formed to create support and anchorage for the main beams in the ferry ramp as well as support for rail track and road on shore side. Surface level is -25.5. Next to the box a stone revetment runs across the land base to withhold the land reclamation.

Both rail tracks and access road are crossed by pipelines for oil and water elevated app. 5.7 m above ground level.

2.8 Rail access tracks

Two parallel connection rail tracks lead from the ferry ramp into the railway yard area, distance being 60 m. The yard area is presently composed of 4 parallel tracks each app. 750 m long. These tracks reach into what today is called the "port railway station", which belongs to CASCOR.

Rails in the yard are type P 50 (and P 65) and sleepers are from wood.

3. State of Repair (and remedial measures)

3.1 General

The following description of the state of repair of the facilities is based purely on a visual inspection and shall not be considered as an in depth survey due to the following reasons

- no machinery and installation were inspected during operation

- no dismantling of any installation was carried out

- no under water survey was carried out

- no cleaning and testing of any structures were carried out

In connection with the description of structural deficiencies obvious immediate remedial measures are mentioned.

3.2 Central pier

Steel sheet pile wall on west side is fully covered by water and could not be inspected. It is assumed however to be in satisfactory condition. Top of steel sheet pile wall on east side free of water is heavily corroded, but holes could not be observed from shore (photo no. 5). Corrosion at this level is particular dangerous for the present structure, because stability anchors are installed at this level. Sheet piles above water and in the splash zone should be cleaned and protected by paint or asphalt, sheet piles under water shall be protected by sacrificial anodes.

The concrete front wall on the east side has been subject of repair by concreting by projection. This concrete layer has started to fall of (photo no.5) and should be repaired. The same in the case of surfaces with visual reinforcement. The concrete front wall on west side was difficult to inspect due to the complete cover by rubber tyre fenders, but it seems not to have been repaired. No major damages were observed.

The cover by rubber tyre fenders is almost intact (photos 1 and 3). Although not considered ideal as guiding fenders (high friction and high wear) for the ferries, they may be used as a temporary installation if the missing and damaged tyres are replaced.

Corner of pier at another end is not fully protected by fenders.

Pavement on top of the pier is generally in poor condition and parts are missing (photo no. 2). At outer end of pier a settlement has occurred with a hole as a result. Accordingly to port this settlement in due to bad compaction and not drainage of fill through possible hole in the under water quay wall. Following repair of various holes etc., the pier should receive a new surface pavement.

The two loading arms have not been used for a long time (since 1989?) and look very rusty. They should be removed together with the pipelines as they are not expected to be used any more.

The light mast looks all right, but function of the lighting should be tested.

The function of the low block wall constructed at the quay side is unknown and it should be removed (photo no. 4) or aligned with renewed pavement. The stop fender looks in working order but the missing part of the fender shield should be repaired (photo no 10) and the fender tested. Timber parts might be rotten.

3.3 Finger pier

For sheet pile walls the same applies as mentioned under 3.2.

The concrete front wall which could be seen on the west side of finger pier shows signs of repair by projected concrete. Parts without repair are covered with traces of rust looking like rust probably from reinforcement (insufficient cover layer ?), but no major damages were observed. One piece of scaffolding was left behind (photo no 8) and should be removed. The degree of corrosion of the reinforcement should be determined and a possible new cover layer of concrete should be added.

Even without use, the wooden fenders seem in a state to fall apart (photos no. 6, 7 and 9) and should be replaced.

Fender protection at the outer corner is not satisfactory (photo no 6). The stop fender looks in working order, but should be tested.

The concrete slab pavement shows signs of settlements towards the middle of the pier and a big hole has appeared at the outer end (photo no 7). Like in the case of the central pier, it is considered by the port to be due to bad compaction of fill. It should be repaired however.

The light mast looks all right but the lighting fixtures should be tested.

3.4 Ferry Ramp structure

In general all steel structures of the ramp are in need for new corrosion protection. Parts of the structures, which have been or still are exposed to the sea water, appear to be heavily corroded and are therefore in urgent need for repair. At the time of the inspection (calm water) the traverse lifting beam between inner and outer spans is still partly submerged (photo no. 17) and lower flanges of the I-girders of the inner span are at water level (photo no. 13). Waves will wash the bottom part of the I-girders.

Corrosion of the I-girders of inner span shows clearly traces of the previous high water levels (photo no. 14) of the Caspian Sea, with the shore end being mostly corroded.

Placed just above present water level, it is expected that the ramp bearings at the shore base are heavily corroded as well.

It can not be excluded that both parts of the steel structures most corroded and the

bearings will have to be replaced, which only a thorough inspection (including cleaning) can decide.

The traverse lifting beam supporting both inner and outer span is heavily corroded and is still partly submerged (photo no. 17).

Steel structures of the outer link span are less corroded than the inner link span although the bottom flange and the end of I- girders closest to the shore show signs of corrosion from sea water too (photo no. 15). In general, the surface protection of steel of the outer span is in a bad state of repair and is in parts missing (photo no. 18).

Minor damages to cross beam at the sea end of the link span were observed. This is probably due to collision between ramp and vessel and could have been caused either by the ferries or the reported accidental collision by the tanker.

Some planks of the wooden deck on the inner span were missing and in general the many planks were loose. The wooden planks are made from soft wood spaced 30 mm from each other (photos 9 and 12), which is unfortunate from a wear and tear point of view. The wooden deck should be replaced by hardwood type pavement, fitted well together and fixed properly to the supports.

3.5 Lifting towers

3.5.1 Structures

The steel sheet piles are below water level and have in the absence of diver not been inspected. However, being constructed from a rather heavy profile and being fully submerged the sheet piles should be fit for continued use, but they should be protected from corrosion by sacrificial anodes. The concrete base structure looks intact but all the pits for counterweights are filled with water. According to the port the water has entered over the top of the concrete base (waves at high water level). The pits should be emptied from water and the tightness of the base structure against water penetration should be tested.

Generally the lower part of the superstructure (heavy steel structure) seems to be in a rather good condition with painting mostly intact.

At the upper part of the towers the roofs show signs of leaking and should be renewed together with missing bricks in the glass bricks wall. Also the bottom slab needs maintenance and painting.

3.5.2 Machinery

It was not possible to thoroughly inspect the machinery as it would require an extensive dismantling of the gearboxes, spindle drives etc. Also no operation of

ramps was tested as operational staff could not be made available. According to the port this staff is no longer in the port.

The layer of dust revealed that the machinery has been out of use for a long time and no maintenance has been carried out (photo no. 19).

However, a first view of all components of the machinery's revealed no damages or weaknesses, except for beginning corrosion which is due to the lacking of regular use. While lacking at the western tower, bearings and spindles at the eastern inner tower were covered by canvas for protection against the environment.

The electrical equipment in the towers, however, looks old fashioned with boxes standing open exposed to dust and sea air and probably not in operational condition.

According to our experience from the ferry terminals in both Baku and Turkmenbashi, machinery like gears, sheaves, bearings, spindles etc. may be reused while electrical equipment shall be replaced with new and modern equipment.

3.6 Central Control Building

The roof of the control building is leaking and needs repair (photo no. 21). Otherwise the building can be re-used.

The control equipment and boards generally appear to be out of date with open access to hazardous high voltage areas and a rather simple control desk.

3.7 Pier access road

The pavement of the road is in reasonable condition although grass is beginning to grow into the pavement from both sides (photo no 22). The embankment has been strengthened by adding rubble of lime stone blocks, but the work is done in a rather disorderly way and it was reported by the port that electrical cables and connections placed at the road side have been damaged. These connections link the towers, the central building and the shore.

The sheet pile wall is presently completely submerged and could not be inspected, but like other steel sheet piles the underwater part should be corrosion protected by sacrificial anodes.

3.8 Land base ramp

Top of the steel sheet pile wall is reaching above water and is heavily corroded (photo no. 13) , but no holes were observed. As indicated for central pier, the sheet pile wall above water and in the splash zone should be cleaned and painted while

under water part should be protected by anodes.

As mentioned in section 3.4, the bearings for the I-girders of the link span are expected to be heavily corroded.

During the survey it was noticed that the rails on the land side lie about 15 mm higher than the rails on the ramp. The difference was biggest for the rail track to the western side. This difference should be eliminated before any trains are allowed to pass. According to the port the difference in level of rails is due to lifting of the land part. How this has happened is difficult to understand, if it is not caused by the accidental collision of the tanker. If this is the case, also the bearings at the land base should be checked for damages caused at the same time.

3.9 Rail access tracks

No thorough inspection of the rail yard was allowed for but it was observed that only rail tracks inside the yard to the last shift before the access tracks to the ferry berth showed sign of wear from regular use. The access track connection to the ramp has never been used and the rails are slightly corroded which will not hamper future use. The wooden sleepers appeared in good condition.

The rail track connections to the ferry ramp have been blocked by an earth dam which has to be removed before any possible future operation can take place.

APPENDIX 5. PORT AND TERMINAL LAYOUTS

PLANS

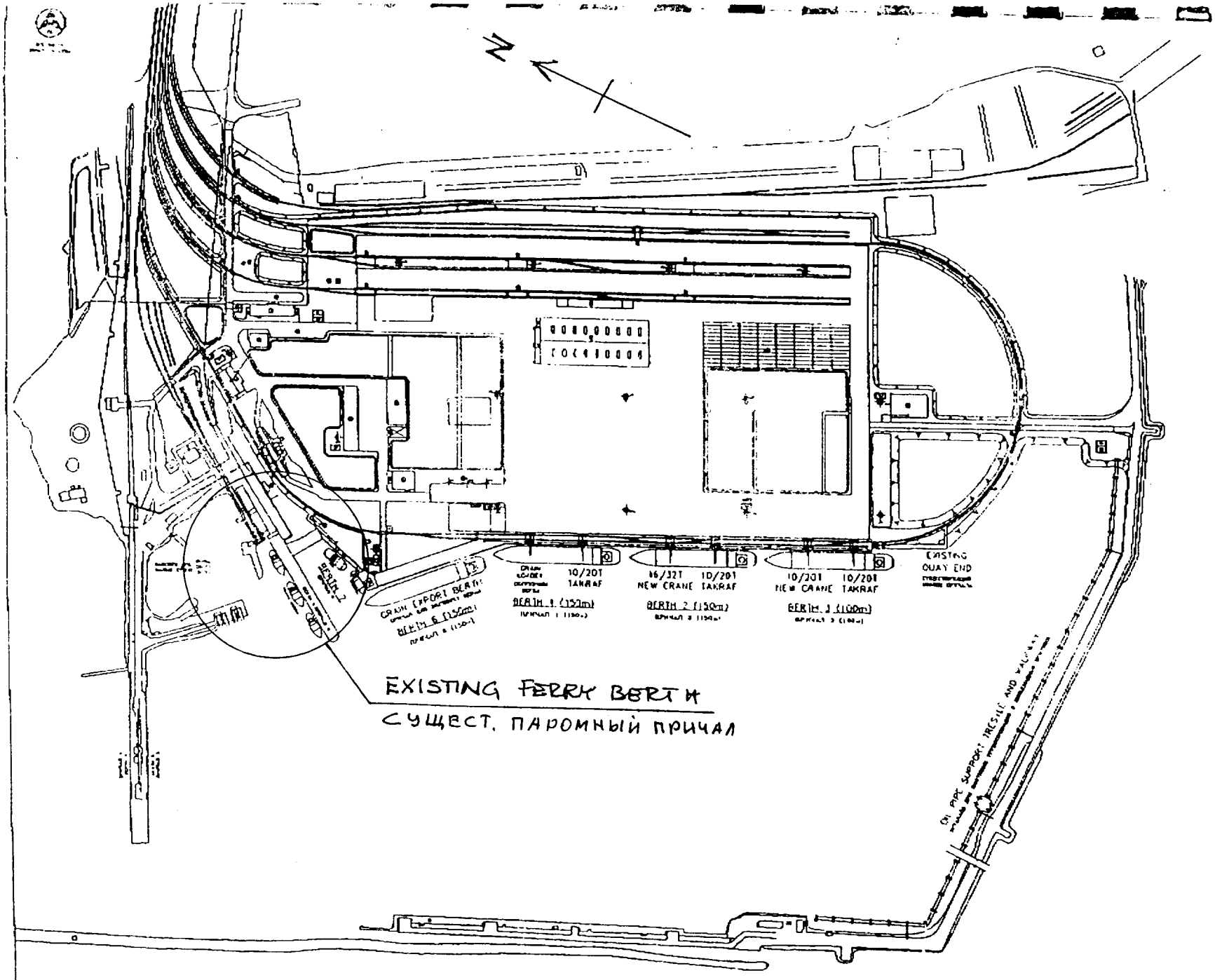


FIG. 1 – GENERAL LAYOUT OF PORT, FOLLOWING PHASE 1 DEVELOPMENT

ПЛАН 1 – ГЕН. ПЛАН ПОРТА ПОСЛЕ ФАЗЫ 1 РАЗВИТИЯ

POSFORD DUVIVIER

HASKONING

AKTAU COMMERCIAL SEA PORT
АКТАУСКИЙ МОРСКОЙ ТОРГОВЫЙ ПОРТ

AKTAU PORT
REHABILITATION PROJECT
PHASE 1
ПРОЕКТ РЕКОНСТРУКЦИИ
ПОРТА АКТАУ
ФАЗА 1

PHASE 1
MASTER PLAN
LAYOUT

ГЕНЕРАЛЬНЫЙ ПЛАН РАБОТ
ДЛЯ ФАЗЫ 1

FIGURE 2.

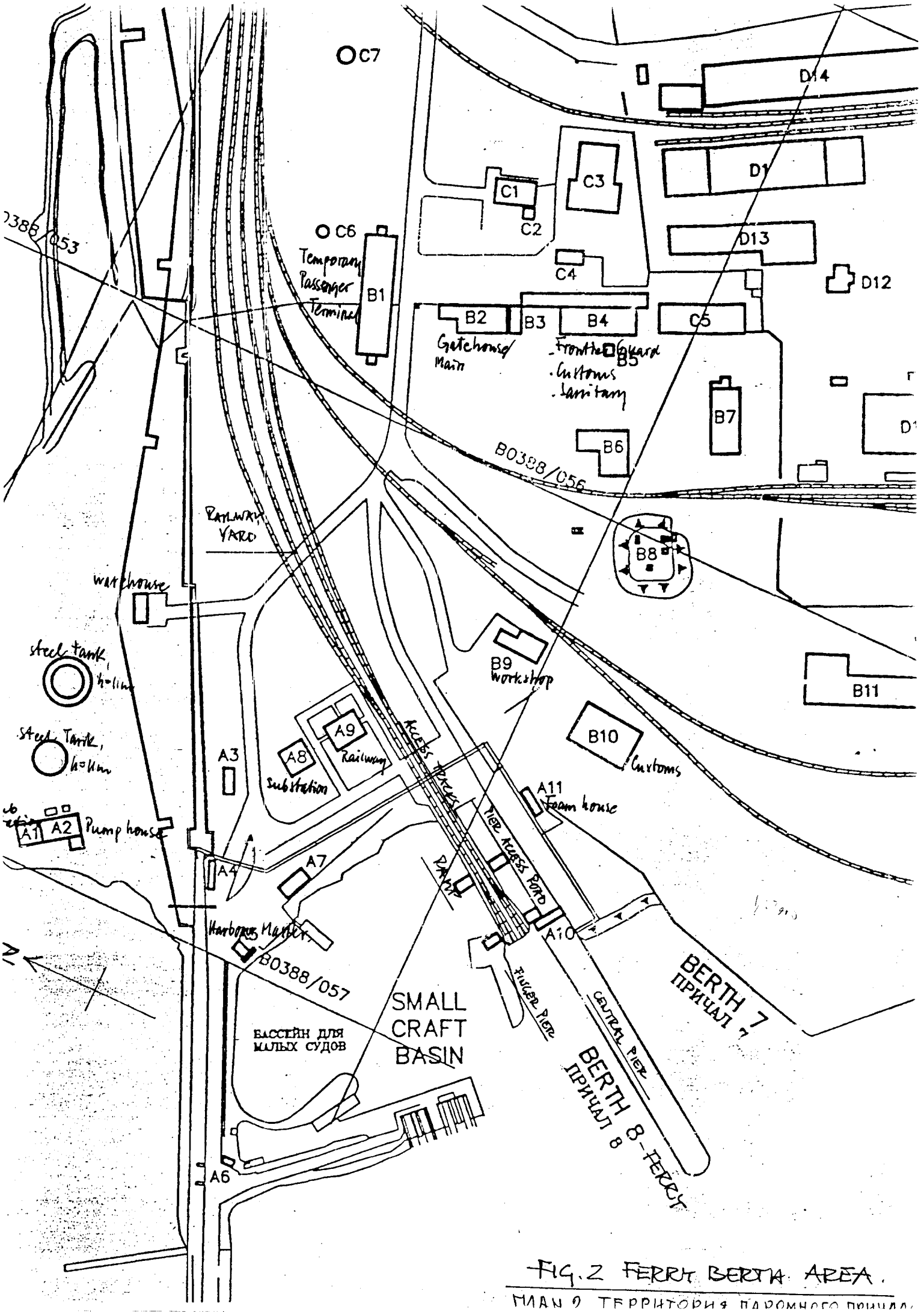


FIG. 2 FERRY BERTH AREA.

ПЛАН 2 ТЕРРИТОРИЯ ПАРОМНОГО ПРИЧАЛА

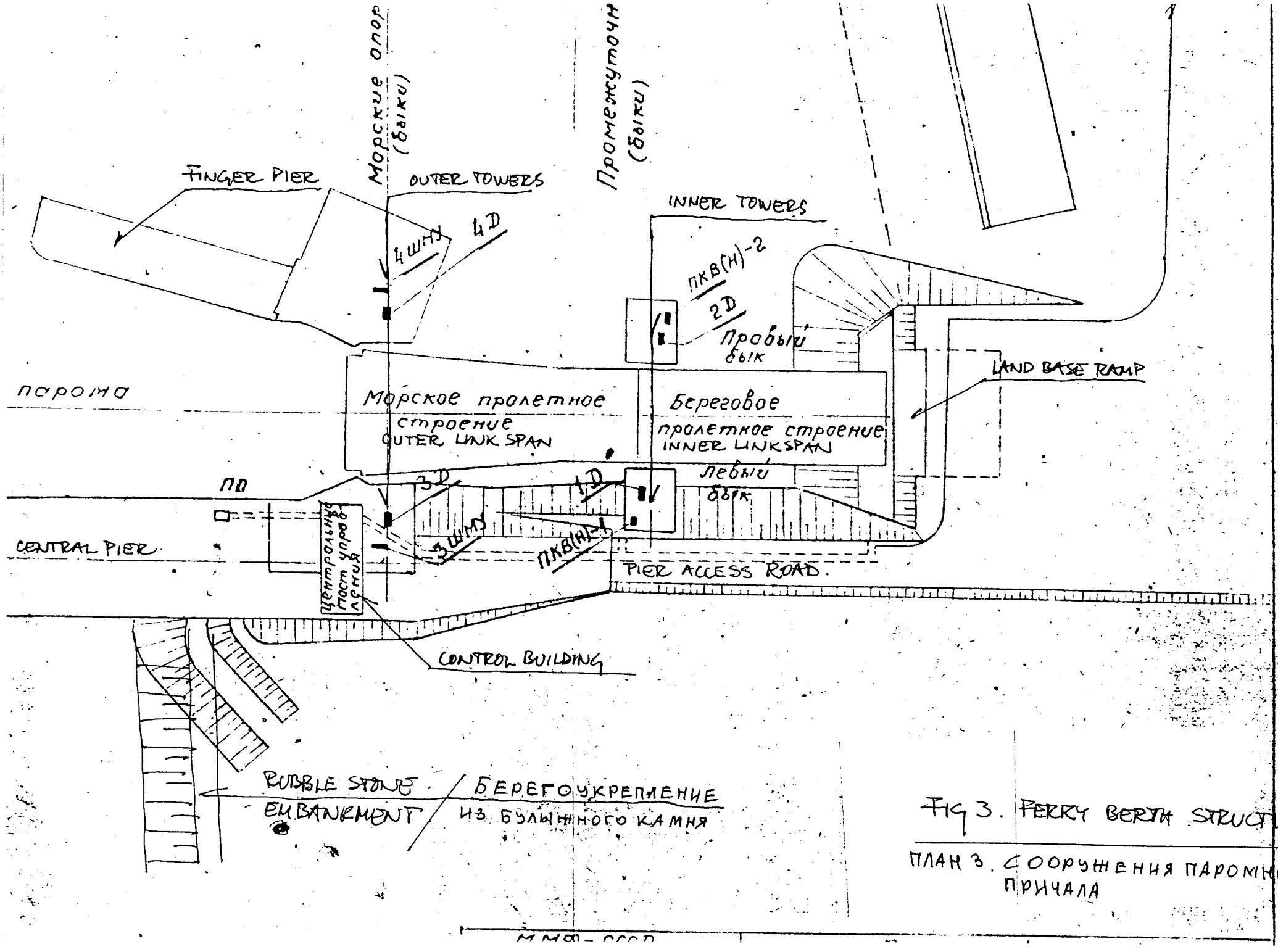
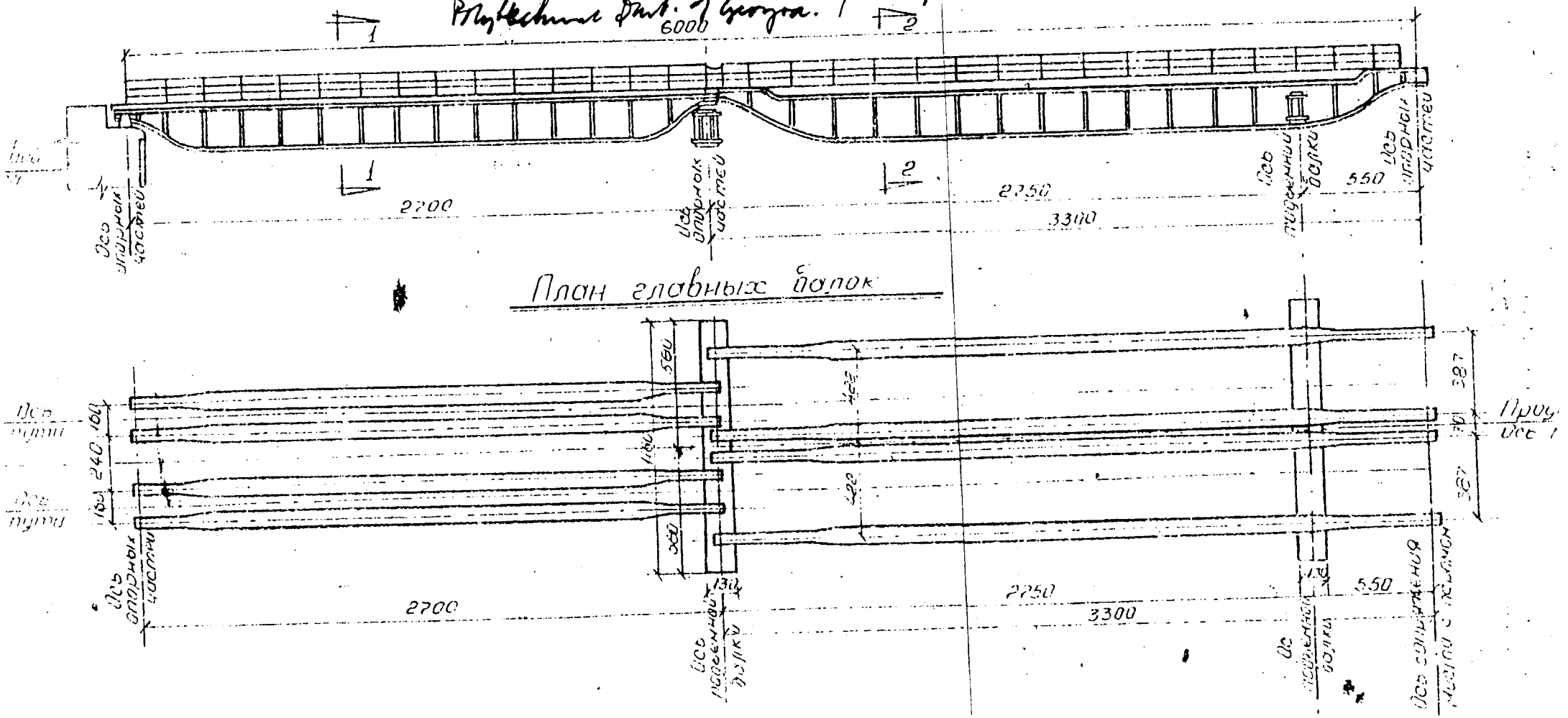


FIG 3. FERRY BERTH STRUCTURES

ПЛАН 3. СООРУЖЕНИЯ ПАРОМНОГО ПРИЧАЛА

Dimensioned working drawing for
Polytechnic Inst. of Georgia.

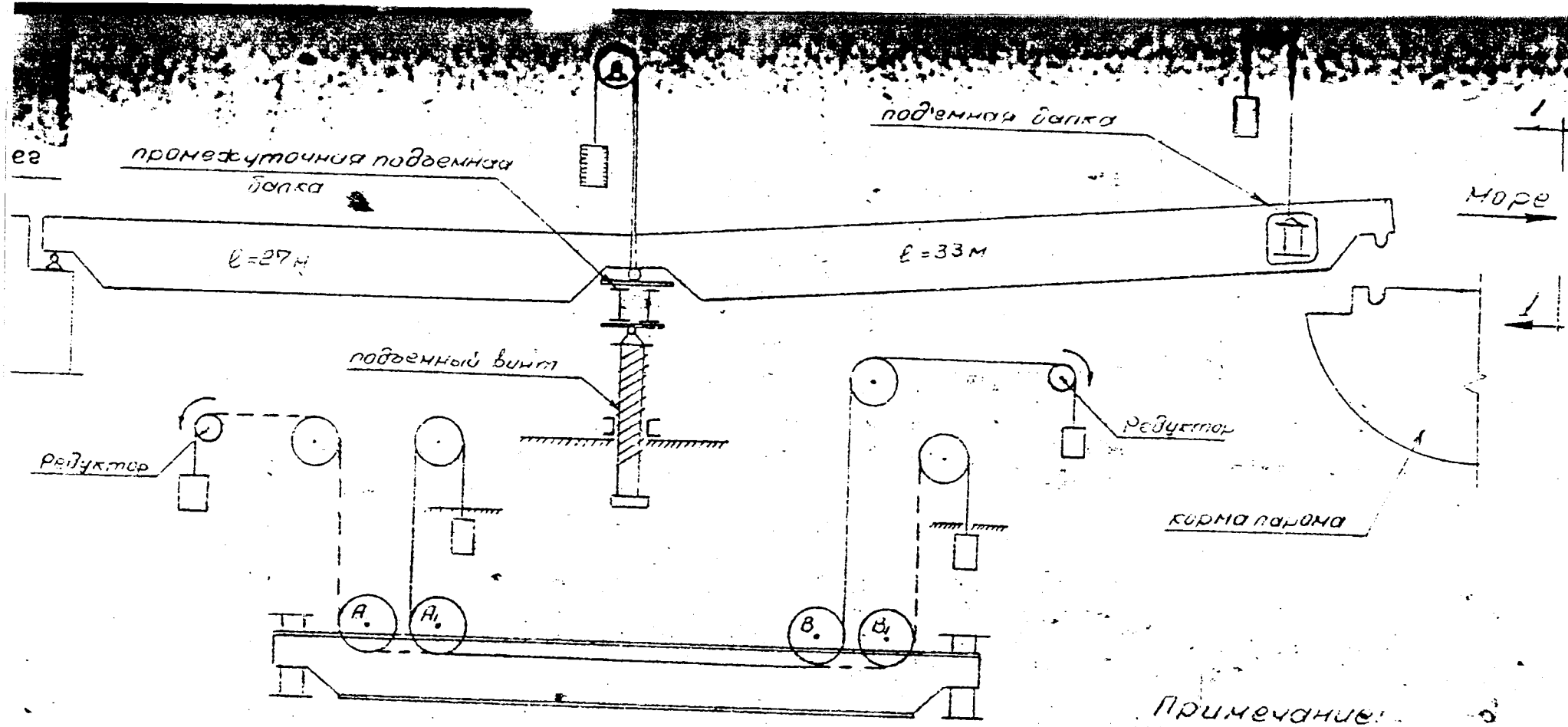


ЧЕРТЕЖ. №. 1.

DWG. NO. 1:

LINK SPAN, MAIN STRUCTURE

ПРОЛЕТ, ОСНОВНОЕ СООРУЖЕНИ



Вид по 1-1

Примечание:

1. На рисунке показанные точки A и A1; B и B1, в действительности совмещены

Рис. 22 Упрощенная кинематическая схема пересадочного мостов.

DWG. NO. 2:

DIAGRAM - LIFTING SYSTEM

ЧЕРТЕЖ № 2.

СХЕМА - СИСТЕМ ПОДЪЕМНОГО МЕХАНИЗМ

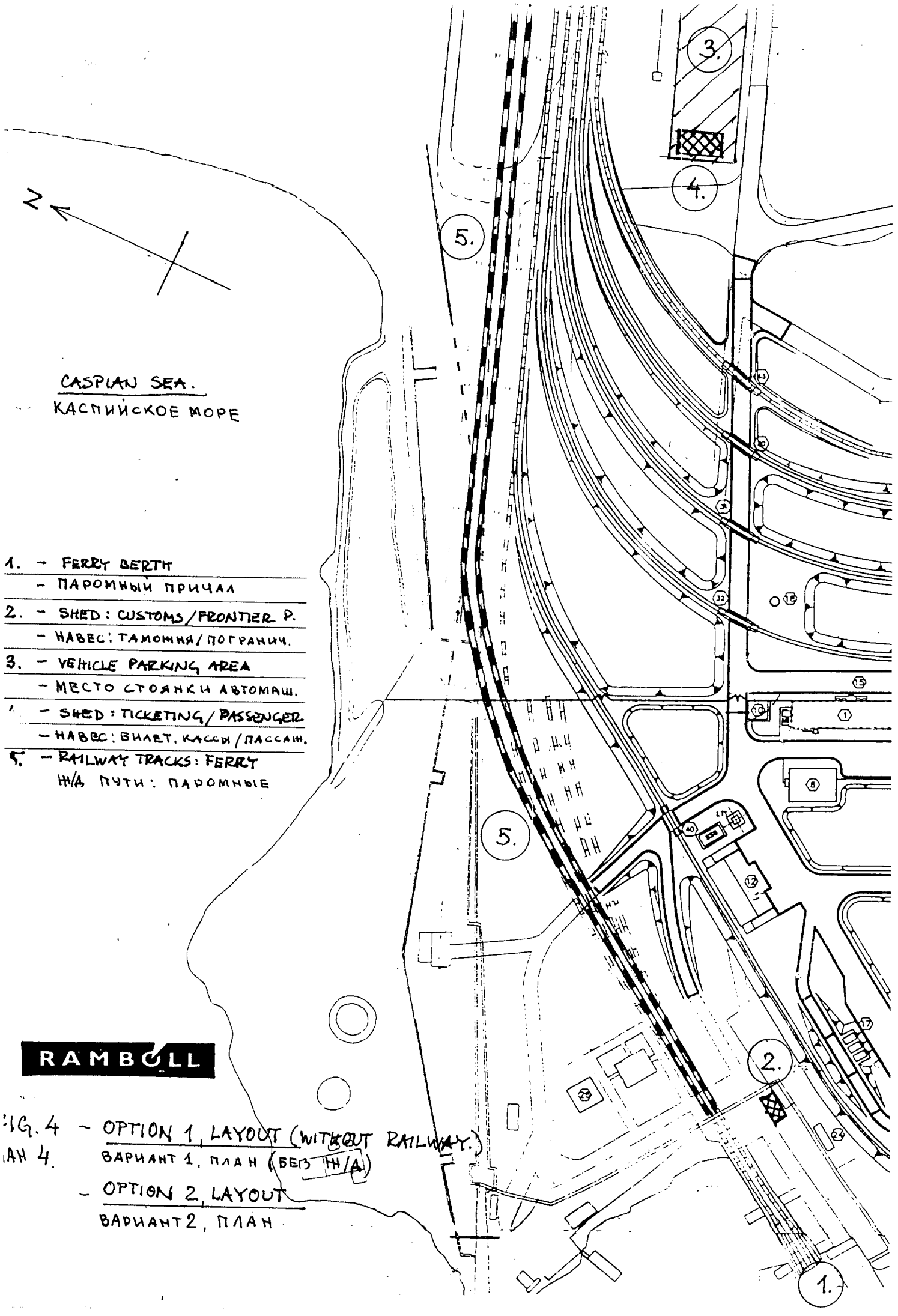


FIG. 4 – OPTION 1, LAYOUT (WITHOUT RAILWAY.)

ПЛАН 4. ВАРИАНТ 1, ПЛАН (БЕЗ Ж/Д)

– OPTION 2, LAYOUT

ВАРИАНТ 2, ПЛАН

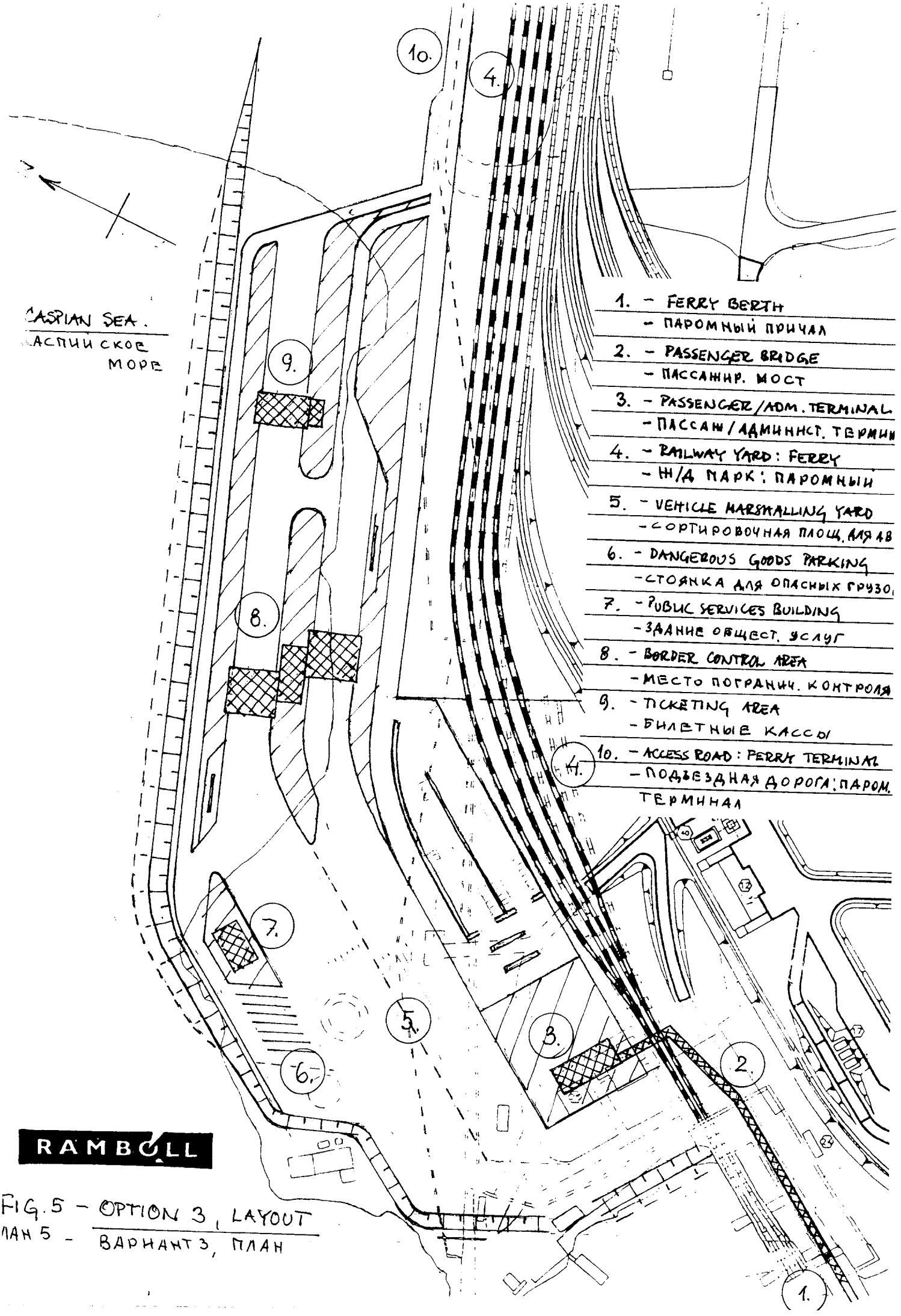
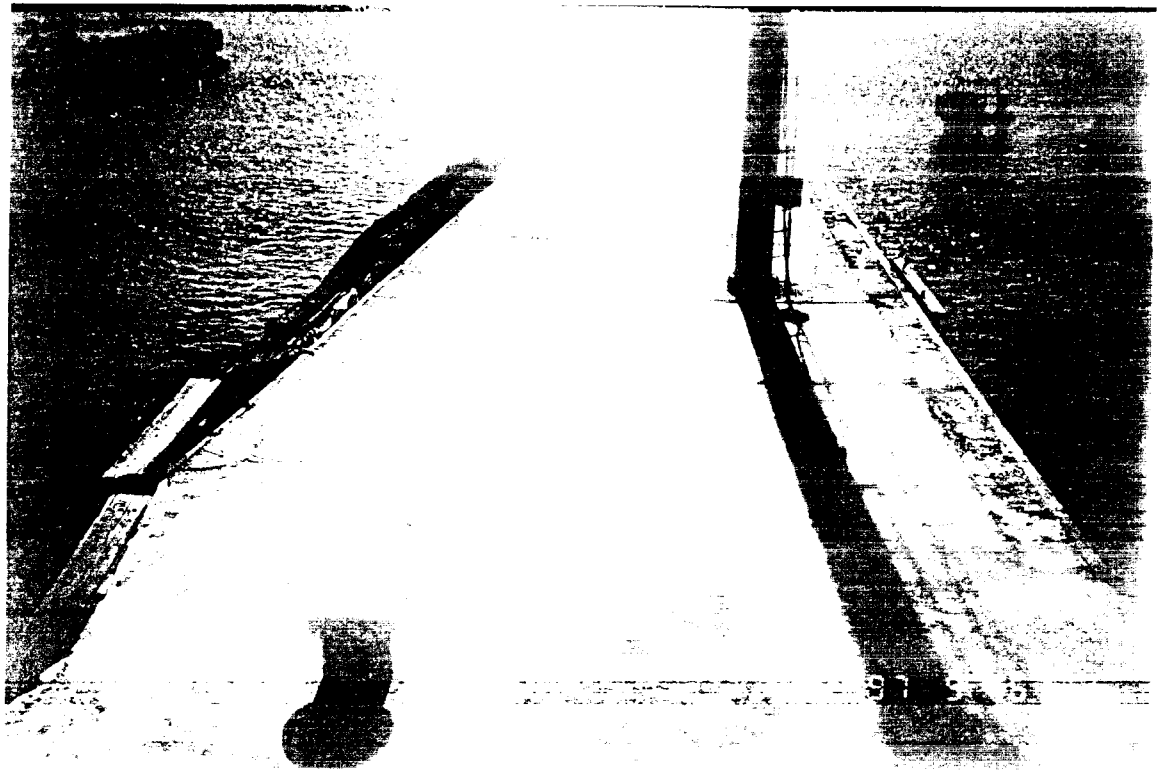
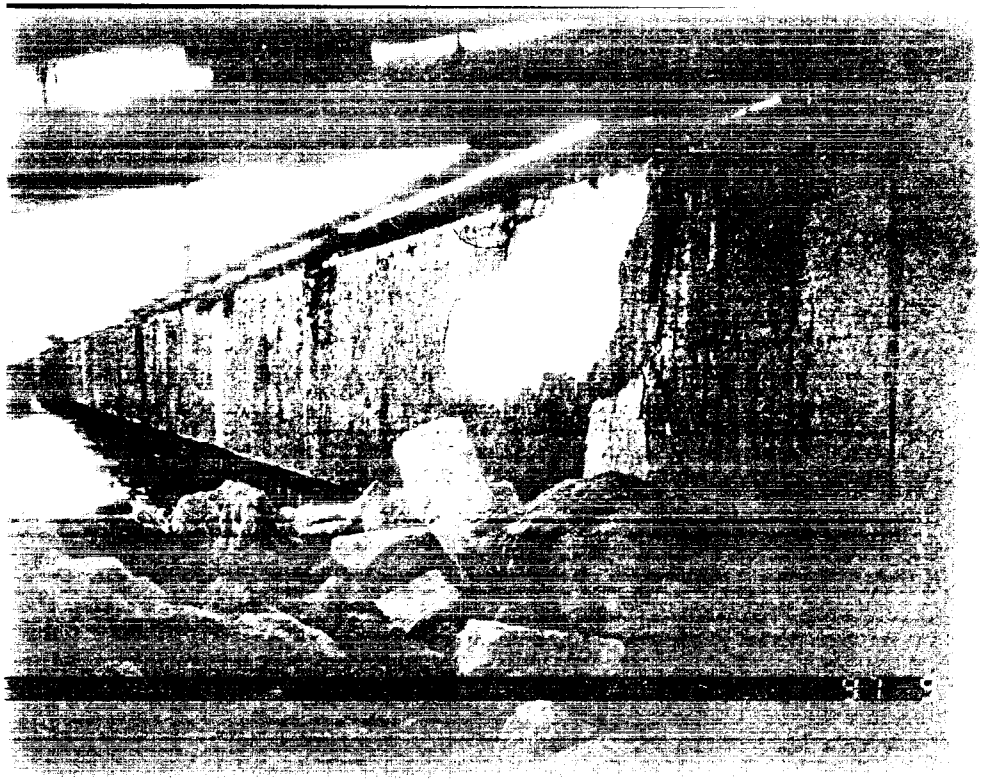
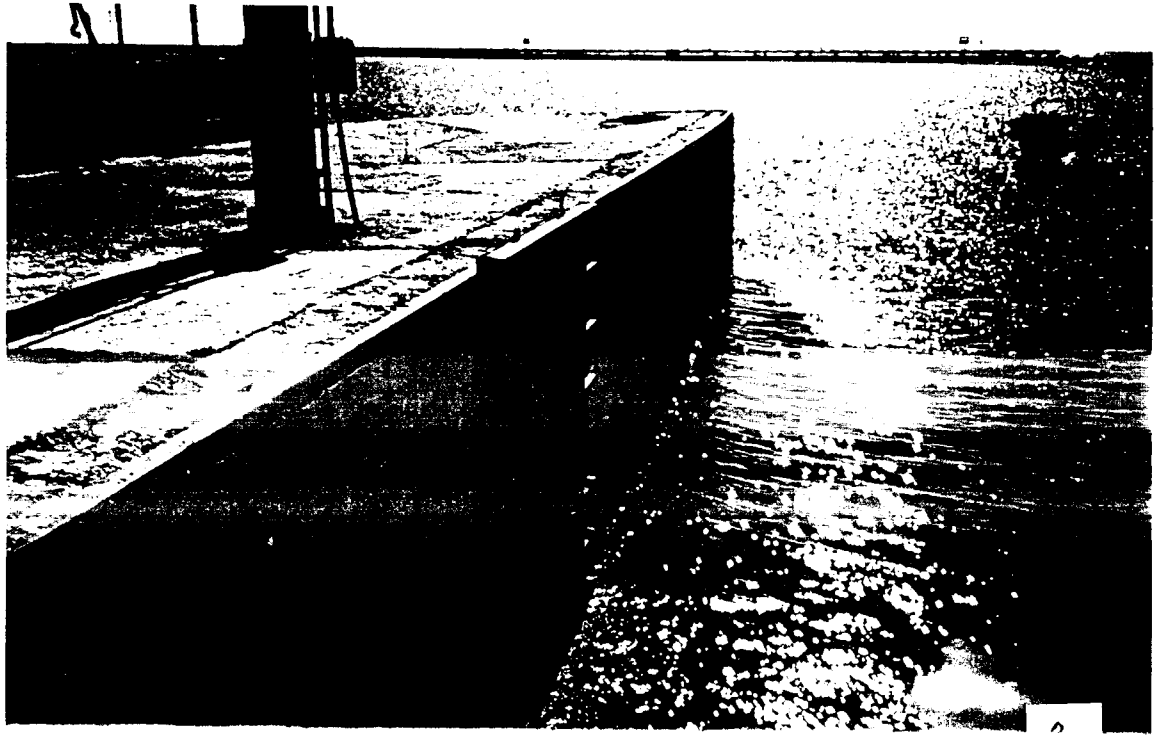


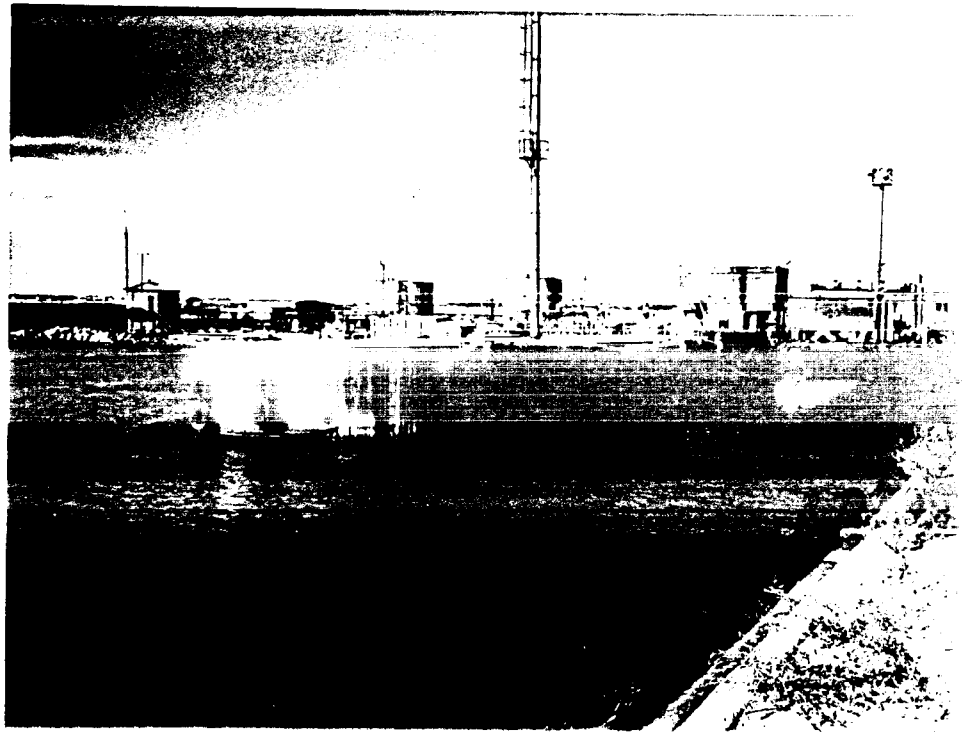
FIG. 5 - OPTION 3, LAYOUT
ПАН 5 - ВАРИАНТ 3, ПЛАН

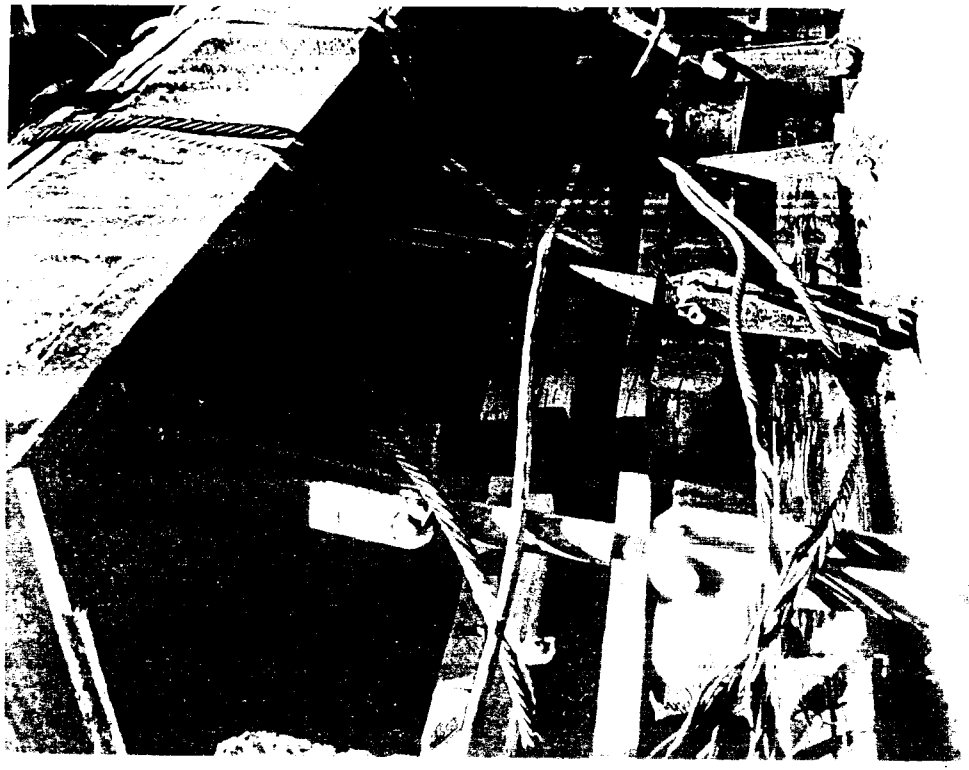
PHOTOS

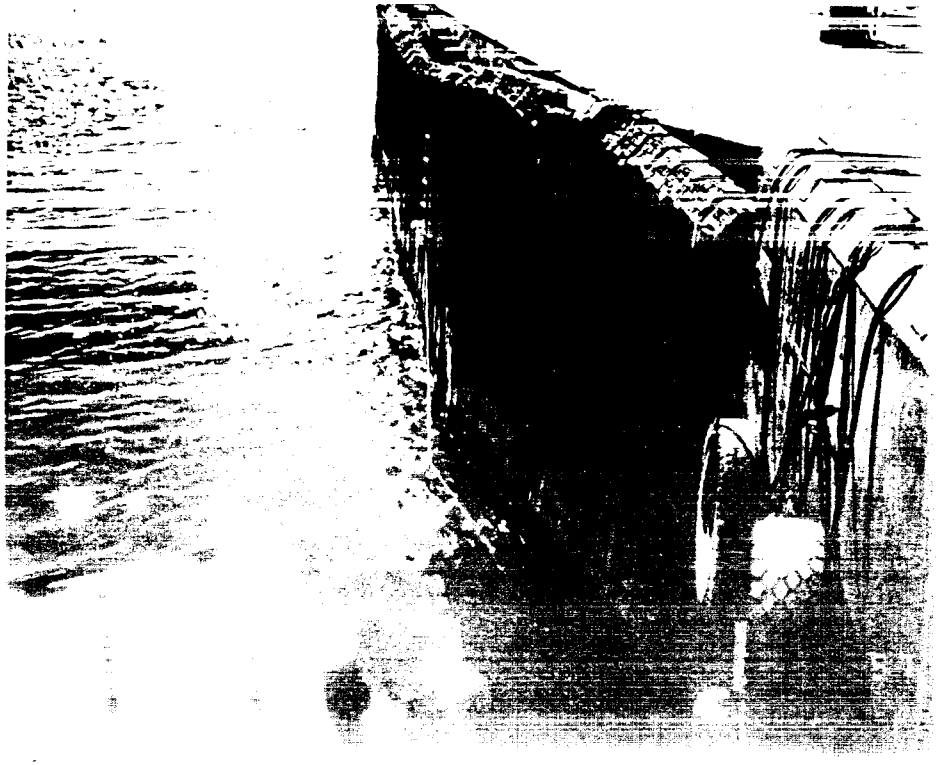


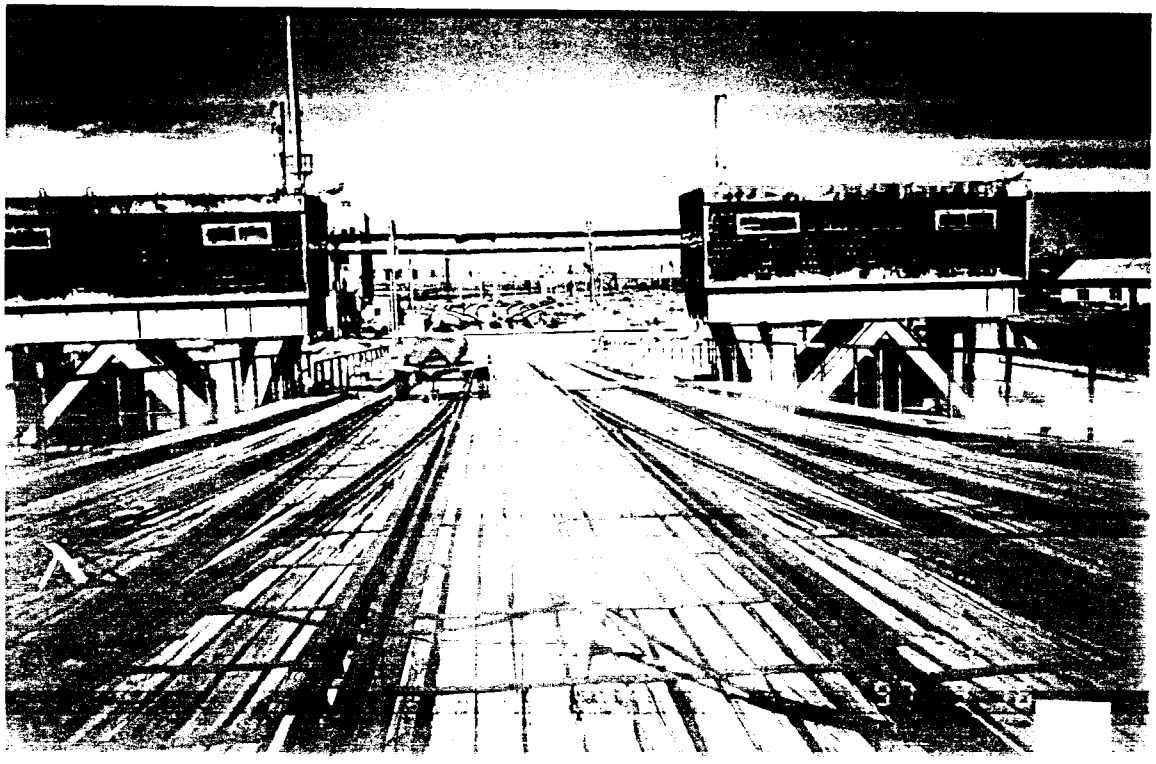


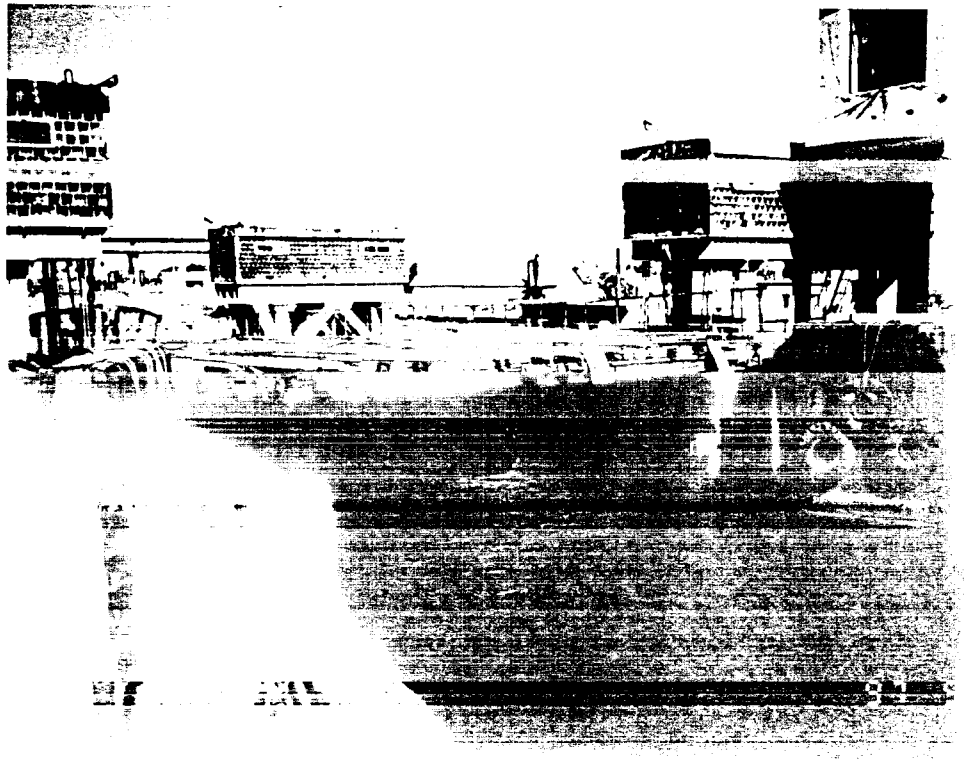


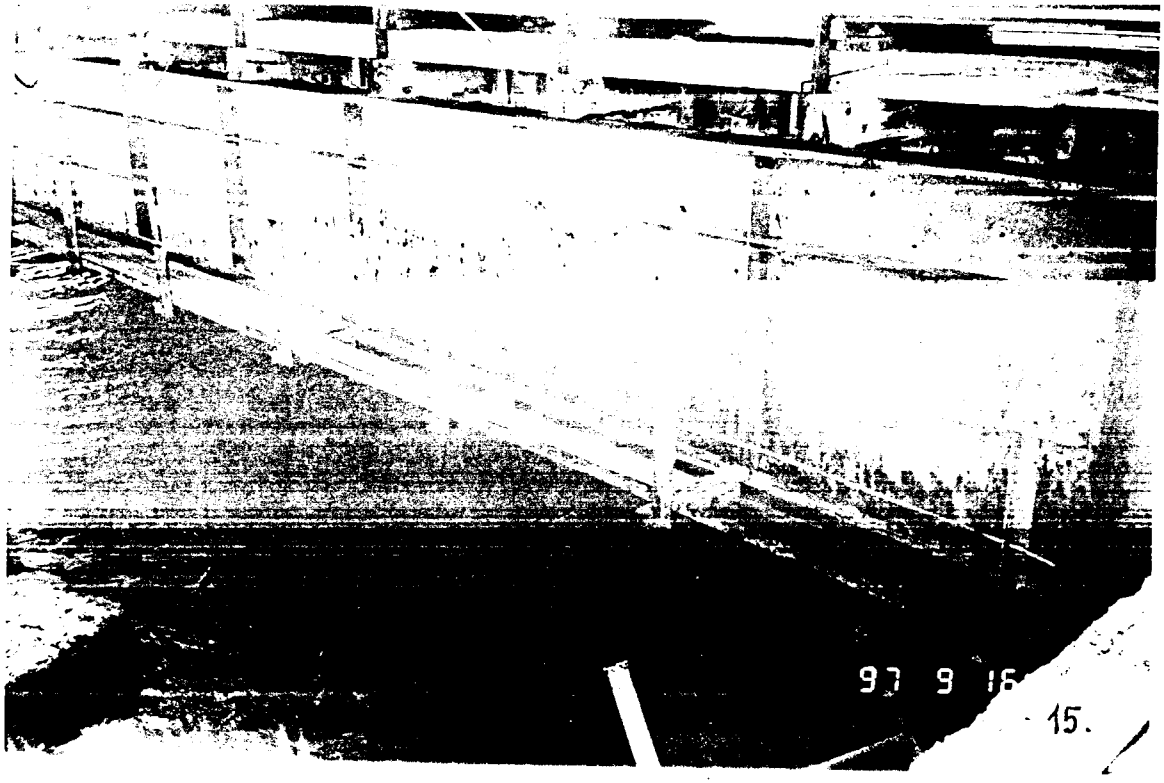








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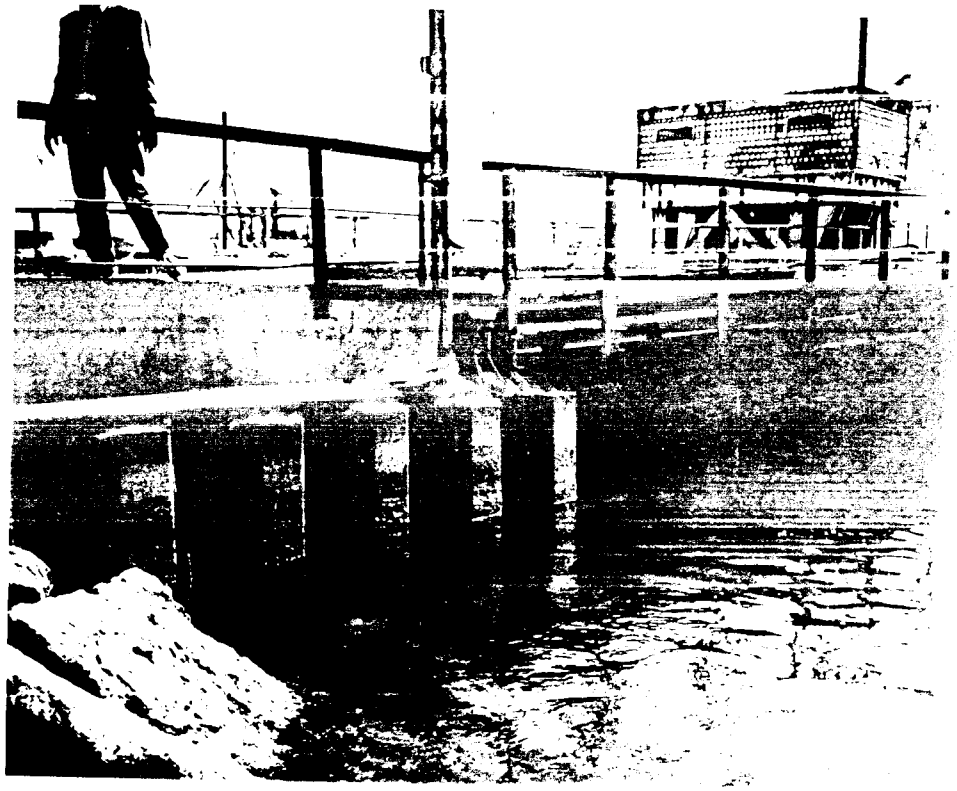


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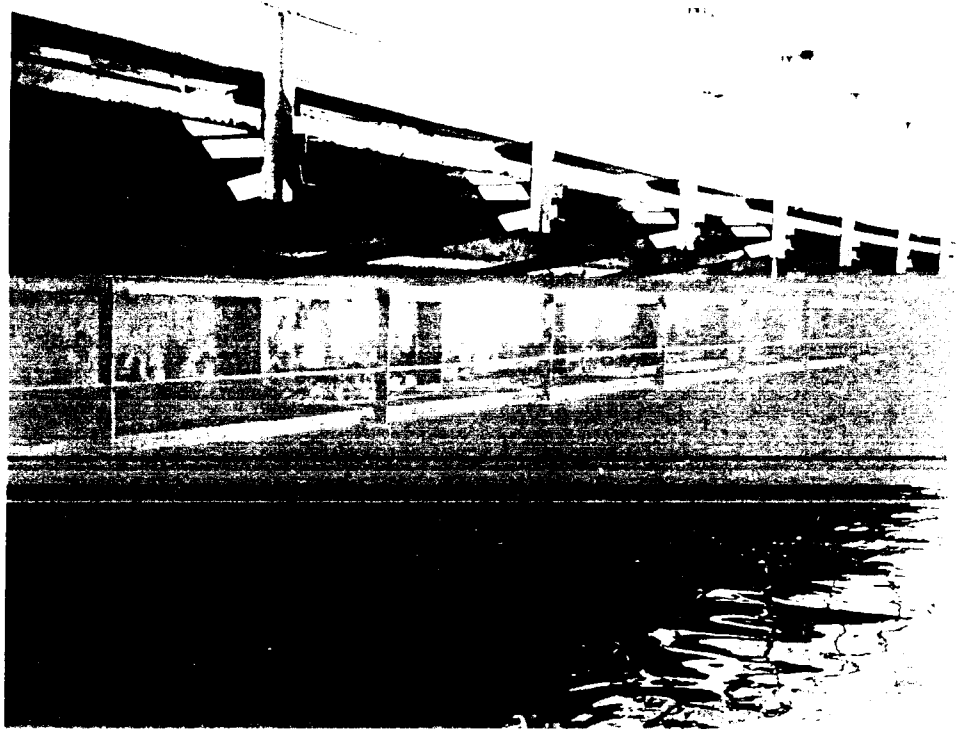

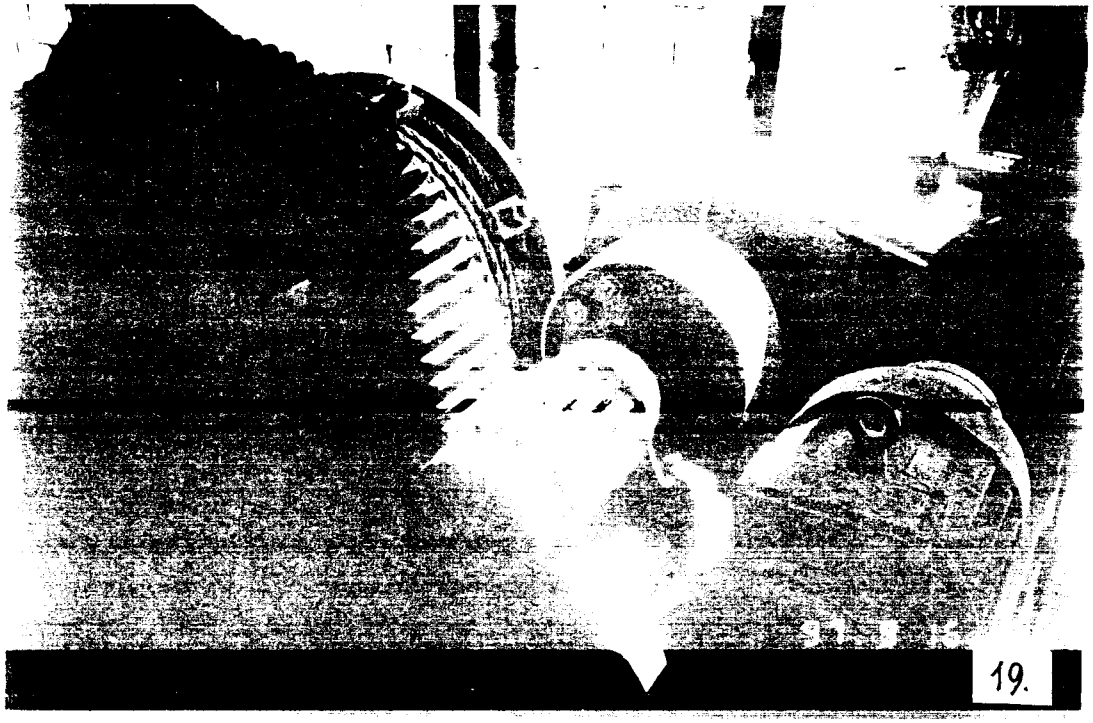

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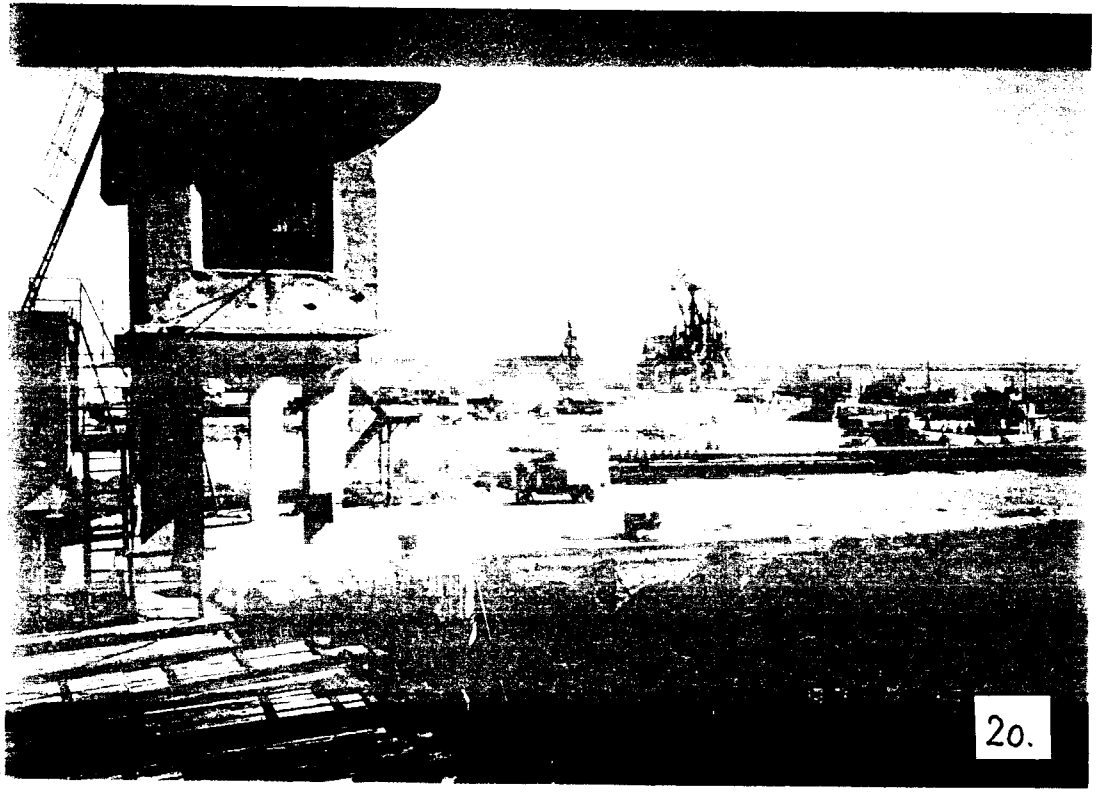

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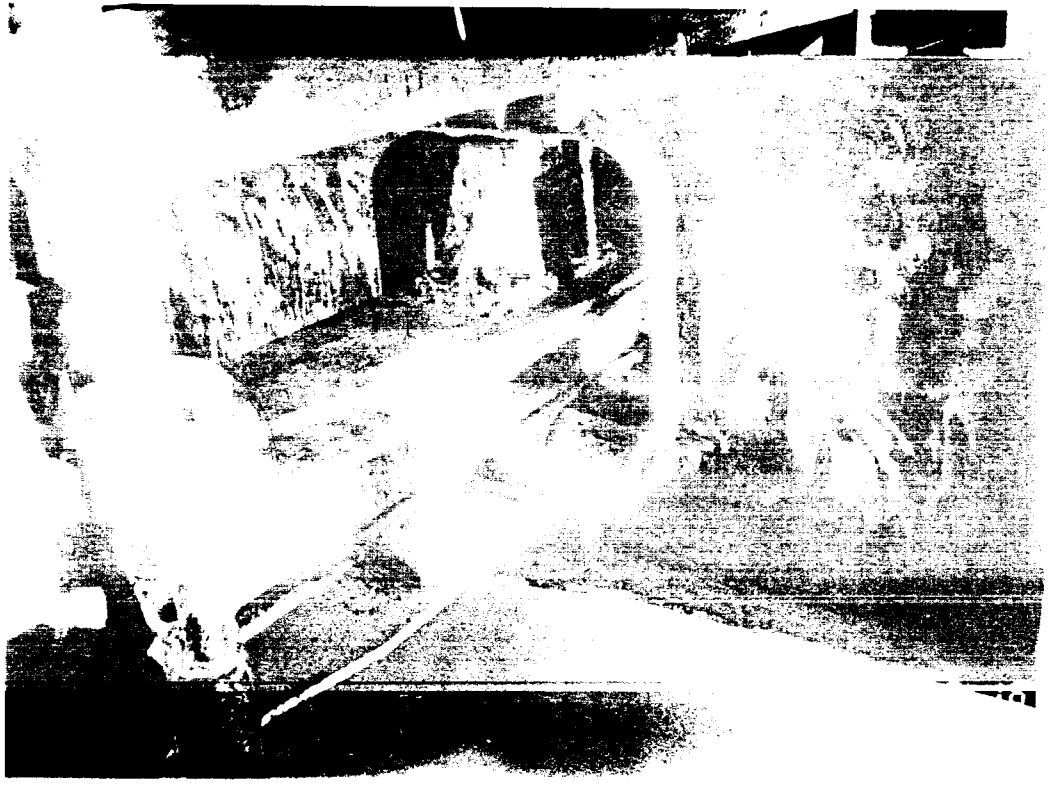

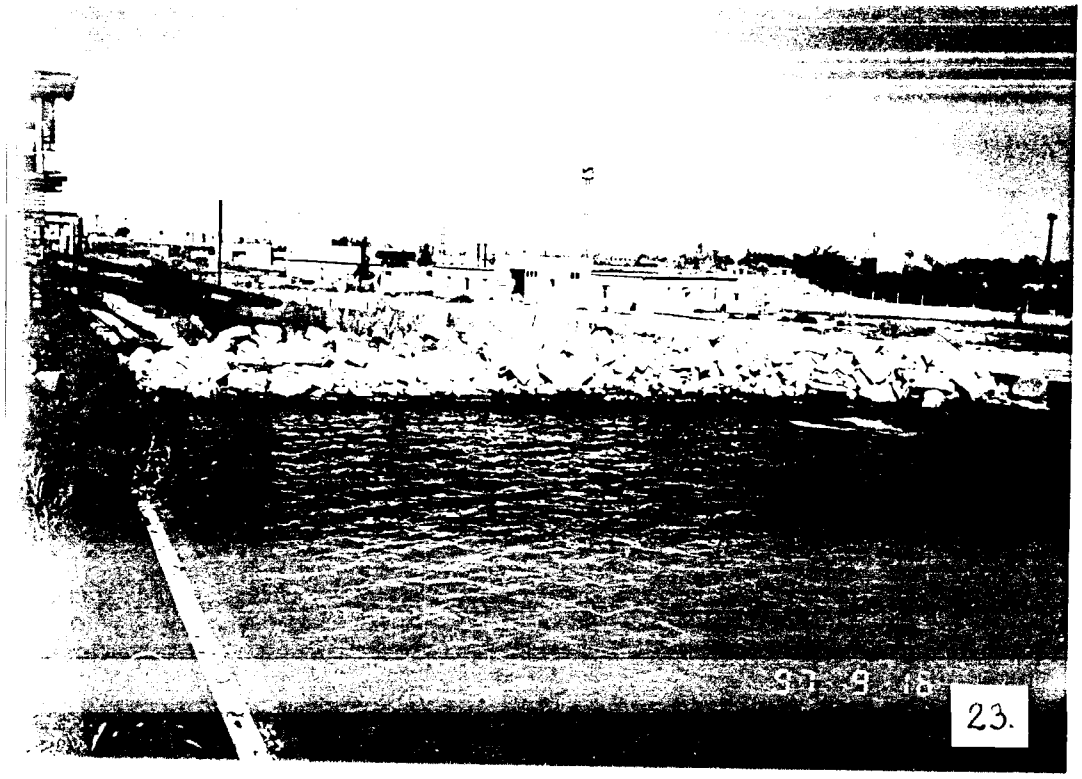
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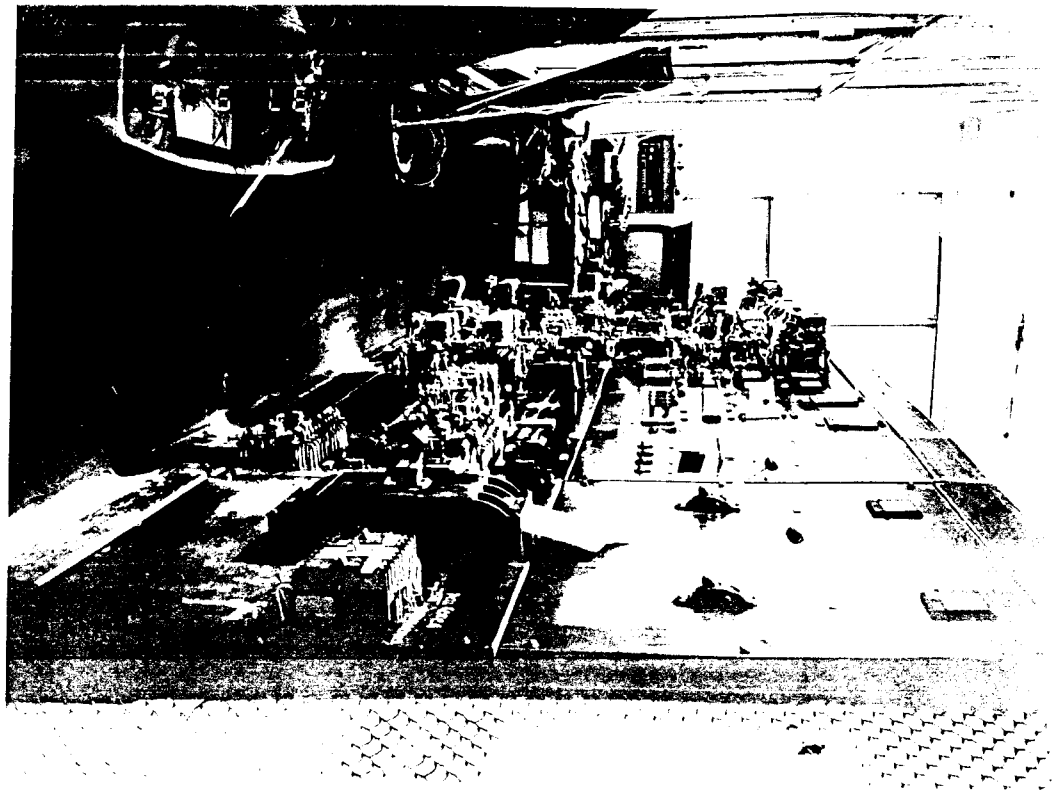

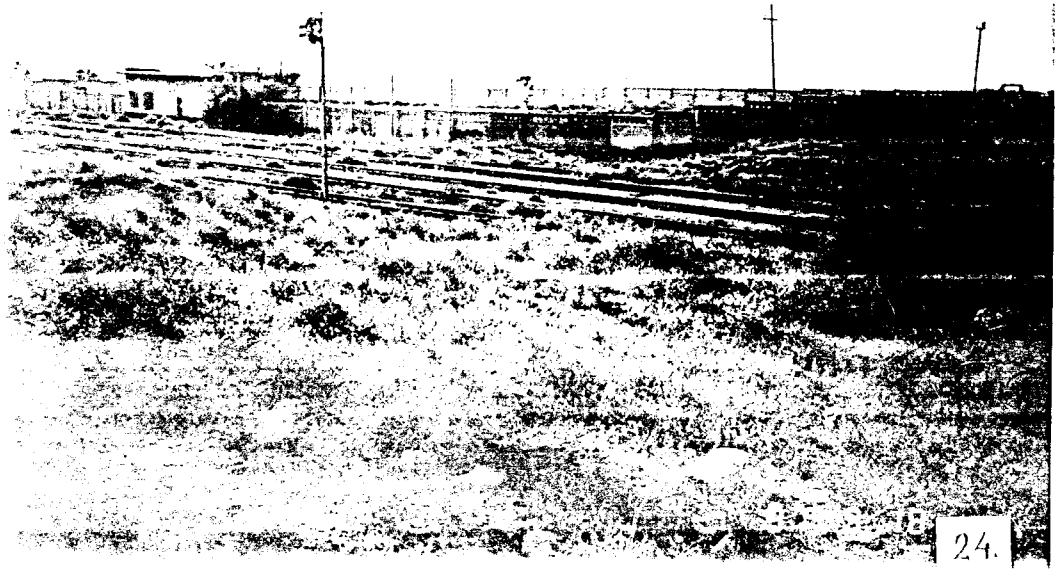
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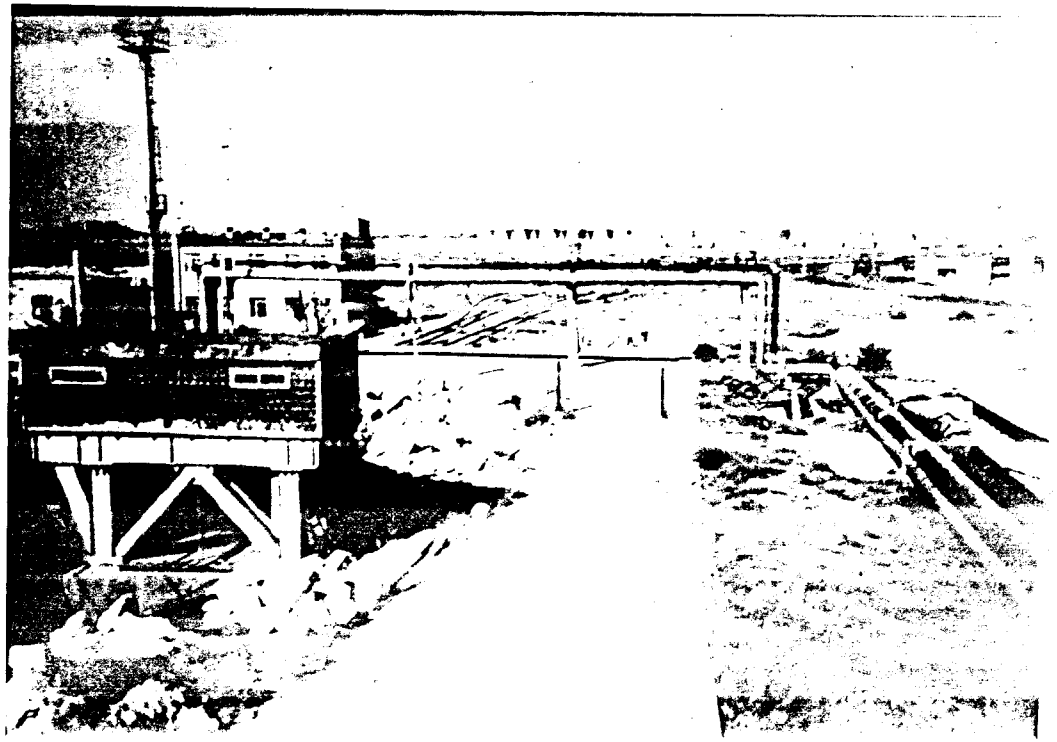

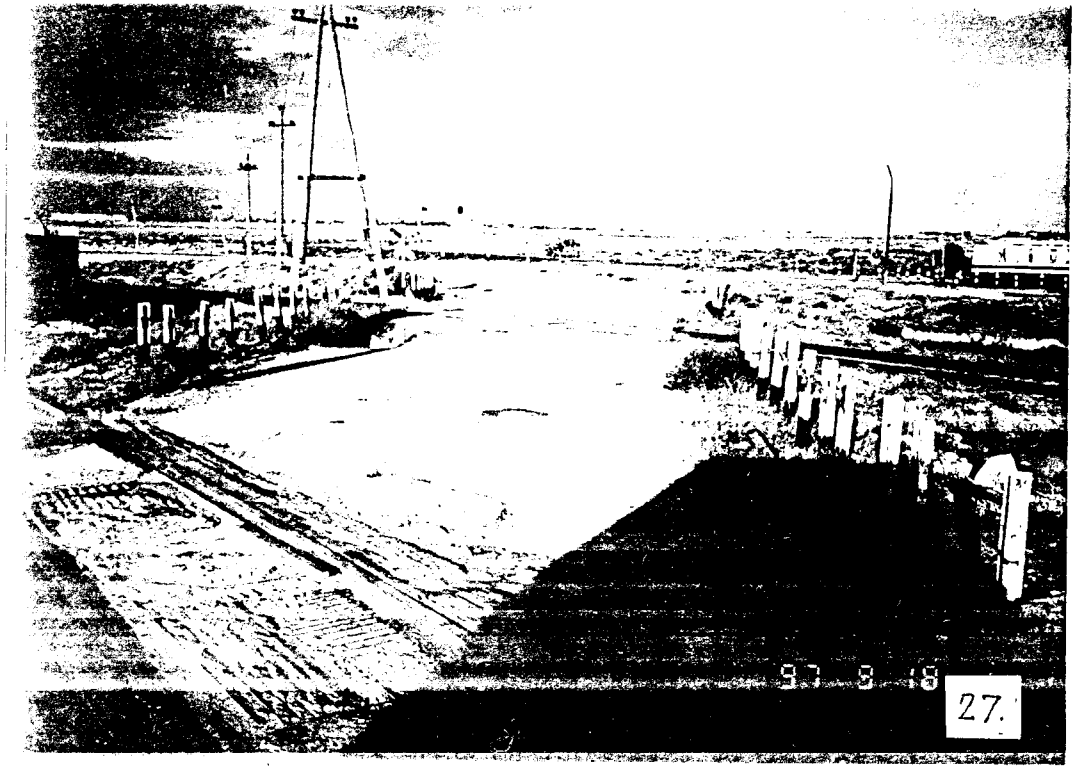
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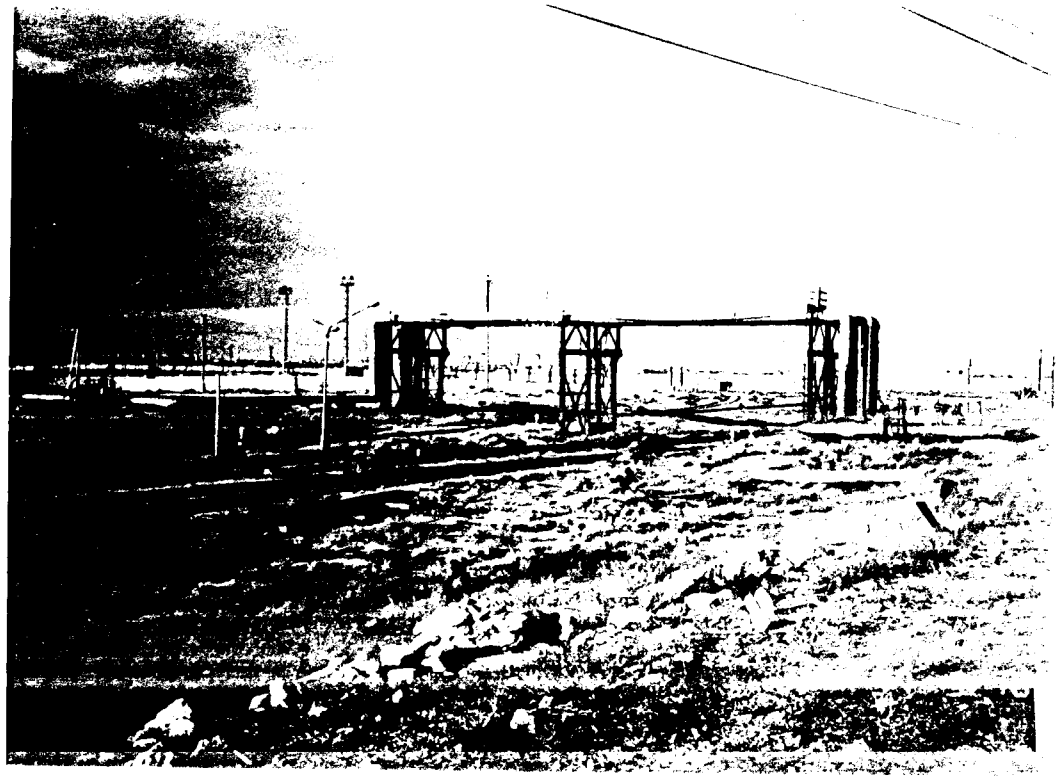

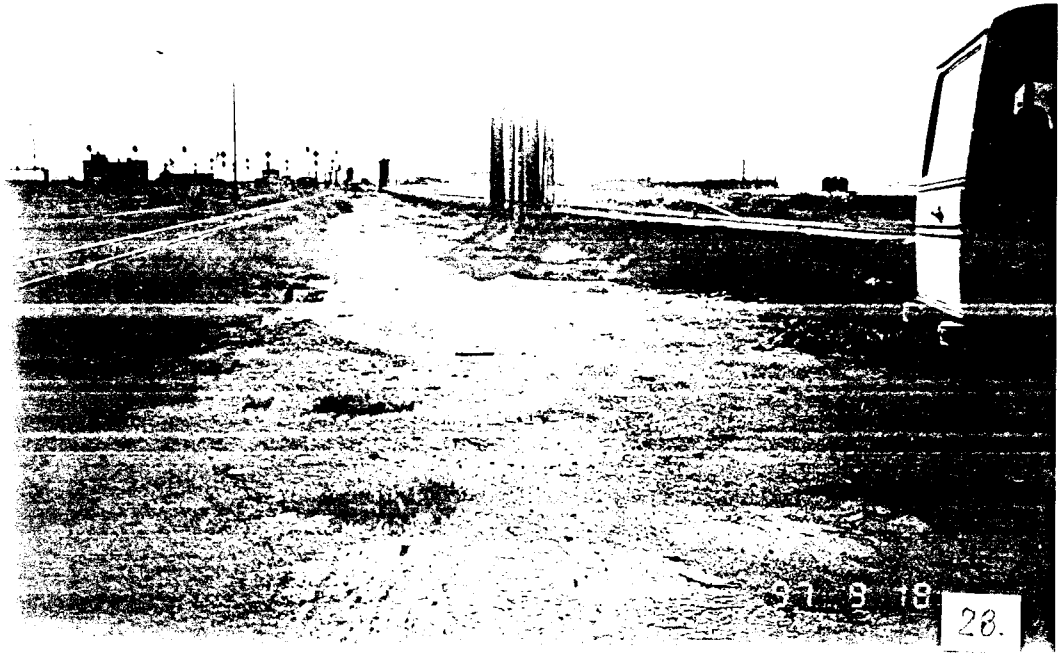
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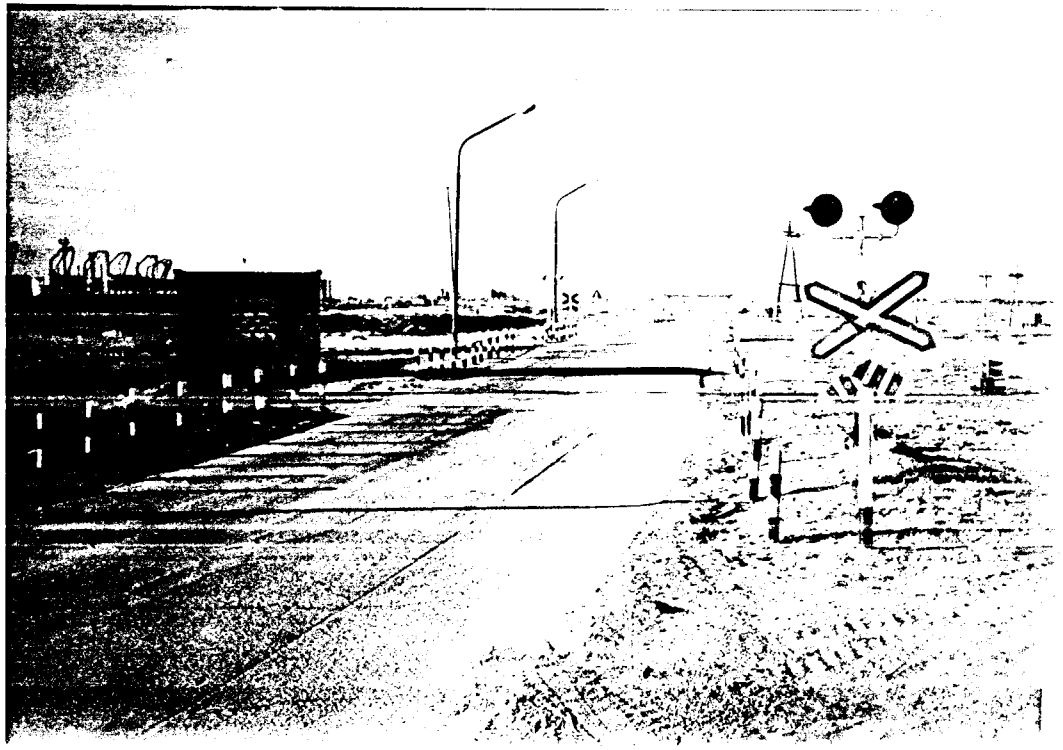

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