Tacis

Feasibility Study of New Terminal Facilities in the Georgian Ports

Phase 3 Report

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Section 1

Civil Engineering Assessment of Present Port Facilities

1. Civil Engineering Aspects Port of Poti

1.1 Port Layout

1.1.1 Outline of the port and adjacent areas

The Harbour of Poti exists of 3 basins (see Drawing 1.1.1):

- Northern Basin:
  The North-East side of the northern basin is occupied by the military marine base, while on the south side of this basin a shipyard is located. The area around the northern basin is not port owned territory.
- The Inner Basin:
  The inner basin is the main part of the cargo port. At the northern side of this basin mainly bulk cargo is handled, while at the southern side general cargo is handled. Containers are handled at the end of the basin. This basin has 12 berths, which are all in operation.
- The Southern Basin:
  Three berths (no. 13 up to 15) are located in this basin. Berth no 13 is between the southern and inner basin and is used as ferry terminal. The remaining part of the basin is mainly used for laying up and temporarily mooring of vessels. At this basin a grain milling company is located, which area is not port property.

The cargo port of Poti is located at the Inner and Southern Basin and encloses an area of 49 ha.

The main adjacent areas are (see Drawing 1.1.2):

- Military Marine Base:
  The military marine base is not used as such anymore. The basin is silted as a result of the sediment outflow by the Rioni River. Especially the north-western part, where the soil is already above water level (see Photo P7; Annex IV.1.3). At the moment only small coast guard patrol boats are using the berths on the East side.
- Ship Yard:
  The ship yard is operational on a very low level. It used to employ 2500 people, which declined to 350 people nowadays. The shipyard used to produce small high speed vessels. The production of these vessels has stopped. Nowadays, only ship repairing activities are carried out. The total area is 12 ha, of which approximately 48000 m^2 is in use by warehouses and workshops. The depth near the existing quay is 5 m.
- Grain Milling Company:
  At the southern part of the port a grain milling company is located (berth no 15), which is operational except of the grain silo. The storage capacity of the silo is 24000 ton. Construction of a new quay 340 m long has been cancelled after driving the first concrete piles. At the moment, (fishing)vessels use the quay for mooring.
- City Centre:
  The city centre is located on the south-eastern side of the port.

1.1.2 Dimensions of quay-walls, basins and storage areas

The waterdepths at most of the quays vary between 8,0 and 12,5 m. The lengths of the berths vary between 175 and 220 m. The dimensions of the quay-walls, basins and storage areas are presented in Annex IV.1.1.

1.1.3 Port Extension Areas

In southern direction it is difficult to extend the port, since the city is located at this area. At the southern basin the grain factory is occupying a large area. This factory is not operational and is owned by the Ministry of Industry. However to use this area for other purposes then handling of grain will result in the demolition of this immense grain silo (24.000 ton storage). It is possible to extend berth no. 15 at the southern basin, however this berth will only be useful for grain handling.

At the northern side are three extension possibilities:

- Shipyard Area:
  This 12 ha area is presently used on a very low level. Actually, the berths are being used for cargo handling on a small scale. For the present shipyard operations, this area is far too large. In this respect the ship yard could be willing to cede a part of their property.
- Military Marine Base:
  The marine base at the northern basin has not its traditional function as during the period of the former Soviet Union anymore. At the moment it is being used for coast guarding purposes and housing refugees. Therefore it could partly be used for port activities.
- Rioni River Delta:
  Farther to the North an impressive area of approximately 480 ha is available for development. This area is owned by the port. It has a high potential for far future port development, however it will involve immense investments for all infrastructure to be constructed.

The areas are indicated in Drawing 1.1.2.

1.1.4 Rail and Road Connections

There is one principal inner port road. It leads from the southern port gate behind berth 11 along the port boundary to the workshops in the eastern port part. From there it proceeds behind the container terminal to a second port gate and leads at the port boundary to berth 2 and 3.

The main vehicle gate for the Port of Poti is located behind berth 11. It is a two lane gate. Outside this gate is a parking area for approximately 40 trucks. Another vehicle gate is located in the north-eastern corner of the port.

Rail and road connections are indicated in Drawing 1.1.2. An impression of the railway condition is shown on photo P10 and P11 (see Annex IV.1.3).

1.1.5 Existing Development Plans

At the moment the tender process for the design and construction of a rail ferry ramp at berth no. 2 has been closed. The construction of this ramp will be completed in 1998.

The Port of Poti has a port development plan dated 1994. The main items of this plan are (see also Annex IV.1.2):

- Development of a container terminal at berth no. 12
- Development of a general cargo berth including a refrigerated warehouse at berth no. 14
- Construction of new quay for grain terminal at berth no. 15 including handling equipment (conveyor belt) and renovation of grain silo and factory.
- Development of an oil terminal at the inside of the northern breakwater (berth no. 16).
- Development of new terminals (container, general cargo, ro/ro and ferry) at military area (berth no. 17 up to 21).

- Passenger terminal at the south side of the southern breakwater (berth no. 22).

Above mentioned extensions comprises an area of 53 ha. Furthermore, the port has in mind the Rioni River Delta area of 480 ha for further port development.

1.1.6 Urban Development Plans

The economic effects of port operations is of major importance for the city and the welfare of the citizens. Therefore, city development plans are made in co-operation with the port authority and do not interfere with the port development plans.

1.2 Technical Condition of Port Facilities

1.2.1 Description of the Basins

The main characteristics of the 3 main basins are:

- Northern Basin:
  At the shipyard area a lot of buildings are located. Those buildings have been used for warehousing and different parts of ship construction and repair. At the moment they are partly used and are in a bad condition. The quay is unsatisfactory, the water depths are limited (up to 5 m), the pavement is in a poor condition and many concrete slabs at the quay apron are broken (see Photo P8; Annex IV.1.3). A floating dock is located at the shipyard basin, but is not operational. Further, approximately 6 ship wrecks are waiting for demolition in this basin, of which some already sunk. The road at the shipyard is in a poor condition.
- Inner Basin:
  The main part of the port, the inner basin, has been constructed in the period 1900 - 1910. The Inner Basin encloses 12 berths with water depths varying between 8 and 12,5 m. The quays have been designed for direct ship/train handling. Most of the cargo is directly handled from ship into train and visa versa. Therefore the quay aprons are provided with rail tracks, which are located under the gantry cranes. Between the tracks is no pavement. This makes crossing the rail tracks with other port equipment impossible.
  The port has been designed for especially bulk and general cargo handling, transported by train from and to the hinterland. However, container cargo constitutes a substantial part of nowadays cargo throughput.
  The original quay construction exists of concrete block walls with waterdepths of approximately 8 m. The condition of those walls is still reasonably acceptable, considering the condition of other infrastructure in and outside the port. The blocks themselves are quite eroded over the years and the edges are substantially damaged. However, the lining and elevation are straight.
- Southern Basin:
  The southern part of the port is mainly used for laying up of old vessels, which are ready for demolition. A few years ago the port started with the construction of a new berth (berth no. 15). A few concrete piles have been driven in the ground. At the moment the area is used for laying up of (fishing) ships. The area behind the quay is not port property, but belongs to the grain company.

1.2.2 Condition of the Berths

The berths are numbered from 1 to 15, which are located at the inner and southern basin. The condition and characteristics are described in this section. A summary is presented in Annex IV.1.1. The cross-sections of the quay constructions are presented in Drawing 1.1.3.

Berth 1 and 2:

In 1978 berths no. 1 and 2 have been deepened up to 12.5 m and therefore enforced by sheetpiles in front of the block wall. The top part of the quay exists of a concrete beam construction. This beam in particular is in a poor condition. Especially the alignment of quay no 2 is not straight and damaged (see Photo P1; Annex IV.1.3). The fenders are in good condition. Overall the condition of these berths is satisfactory. Berth 1 is used for oil handling and berth 2 for bauxite and containers.

Berth 3, 4, 5:

The construction of these berths consists of the original concrete block walls built in 1900-1910 (see Drawing 1.1.3). Considering the age the condition of the quay itself is satisfactory. The blocks are eroded over the years and the edges are substantially damaged. However, the lining and level are straight. The fenders are old and too small, while the chains connecting the fenders to the quay are very corroded and should be replaced. These berths are mainly used for dry bulk cargo handling.

Berth 6:

The berth is constructed on concrete piles (L 22,5 m; 450 x 450 mm) and were built in 1968. On top of these piles a concrete construction supports the pavement and rail tracks. The condition of the concrete slabs at the quay side is very poor (see Photo P9; Annex IV.1.3). The fenders are old and too small, while the chains connecting the fenders to the quay are very corroded (see Photo P2; Annex IV.1.3). Berth 6 is mainly used for container handling and ro-ro, using berth 7 as ro-ro ramp.

In 1996 a Greek consultancy has investigated the underwater construction using scuba divers. The condition of the prefab concrete piles and deck is satisfactory given their long period in service. Only few of the pile caps appear to be fractured. These are mainly concentrated along the 3rd row counting from the water front. This row is apparently the most critical due to the static geometry of the structure in combination with the directly overlaid railway loading.

Berth 7:

This berth is the newest of the port and consists of a concrete construction on piles (L 22,5 m; 450 x 450 mm), built in 1984. The condition of the construction is satisfactory. However, some concrete damage at the waterside is noticeable. The fenders are very small. This berth is used for container handling.

Berth 8:

Same as Berth 6. It is used for container and general cargo handling.

Berth 9, 10 and 11:

Same as Berth 3, 4 and 5. These berths are used for general cargo and grain handling.

Berth 12:

The construction of these berths consists of concrete block walls built in 1900. The waterdepth is 6,5 m. The berth is used for the handling of the rail ferry. However, there is no rail ferry ramp existing. The rail wagons are discharged on the ship itself and loaded on trucks. By lack of a ro/ro ramp, the side ramp is used. Therefore a temporary ramp construction is made on the quay. The remaining of the quay exists of grass and

footpath pavement, since this area has been developed as ferry terminal with a touristy look. Near berth 13 a ferry terminal building is located. The top edge of the quay is substantially damaged at one location. Large rubber fender roles are used of which one is broken.

Berth 13:

The construction of these berths consists of concrete block walls built in 1910. The waterdepth is 6,5 m. This berth is used by the car ferry. Special facilities (ramps, dolphins) are not existing. Instead the ferry uses its anchor (Mediterranean berthing).

Berth 14 and 15:

Same as Berth 3,4 and 5. These berths are presently used for laying up of old vessels and as mooring facility for fishing vessels.

1.2.3 Condition of Pavement

The pavement at the port consists of concrete, asphalt or gravel. The condition of the roads in general is satisfactory, with the exception of the road behind berth 7 and the railway crossings. However, if the port cargo volume will increase with a substantial portion of truck traffic the road system will not withstand heavy truck traffic. The condition of the concrete slabs at the open storage area of berth 7 is very poor. A substantial number of concrete slabs are subsided and there are a few holes up to 0,5 m^2 (see Photo P4; Annex IV.1.3). It is important to have good pavement at this area to make ro/ro and container handling operations faster and more efficient at this location (corner berth 6 and 7). The asphalt pavement of the storage / operations area at the general cargo berths (no. 9 and 10) is in good condition.

Except of berth 1,2 and 4, the storage areas at the northern side of the basin are mainly not paved, but consist of sand/gravel. The storage areas of berth no 1 and 2 are paved with concrete slabs. Berth 1 is used for iron ore storage. At berth 4 a new storage area made of concrete is presently under construction (see Photo P6; Annex IV.1.3).

The rail tracks on the quays are not provided with pavement between the tracks and therefore the area can not be crossed by other port equipment.

At the north side of the basin is an access road to berth 1 and 2, which is in a good condition. The asphalt road at the south side of the inner basin is in good condition.

1.2.4 Warehouses

There are two warehouses at the Inner Basin of Poti, since mainly all cargo is directly handled from ship into train. One warehouse (WH no. 4) is located at berth 10/11. This warehouse is very old, has small gates (4 x 4 m) and most of the glass is broken. The roof is not leaking. A second small warehouse (WH no. 22) is located at berth 10, which is in a unsatisfactory condition. Furthermore, the access is unsatisfactory, because of its location.

1.2.5 Breakwater

The Port of Poti is protected by 2 breakwaters, a small one (250 m) at the North and the main breakwater (1800 m) on the western and southern side. The first part of this breakwater was constructed at the end of the 19th century. It is made of a blockwall construction protected by concrete blocks up to 40 tonnes (slope

1:1.5) at the sea side. The condition of the breakwater is unsatisfactory. The toe of the breakwater is being eroded, which results in subsidence of concrete blocks and the breakwater blockwall itself. The filter construction of the toe is insufficient to prevent erosion. As a result a section of approximately 100 m length has been subsided up to 1 meter (see Photo P3; Annex IV.1.3). A number of times, new concrete blocks have enforced the breakwater. However this will not prevent further erosion.

A number of holes in the breakwater were caused by the subsidence. This has been confirmed by an underwater investigation made in 1990.

After 100 years of operation the southern breakwater still serves the port. However, taking into account the physical situation and the ongoing intensive erosion, the condition of the breakwater forms a serious area of concern. A comprehensive survey above and under water is required to determine the physical processes, which cause the deformation.

1.2.6 Soil Condition

The soil of the port consists mainly of loamy silt up to approximately 20 - 30 m depth. At this level a sand layer exists. Boreholes are available of some locations at the port. CPT (Cone Penetration Tests) are not available.

1.3 Topographical Survey

Topographical survey (scale 1:500) of the port area exists. This survey was updated in 1996. The layout of the port area is presented in Drawing 1.1.1 (scale 1:2500).

1.4 Port Utilities

1.4.1 Electrical Supply

Normally electric power is provided from the city network. The capacity of this network is 5 to 10 MW for the whole city area (40.000 inhabitants). In the past it used to have 25 MW. This results in frequent power cuts, specifically in winter time. To overcome the problems of power cuts the port has diesel generators with a total capacity of 3.5 MW. Currently 60% to 70% of the power is supplied by the city network and 30% to 40% by its own generators. The switch over from city network power supply to the emergency power generator takes approximately 20 minutes.

1.4.2 Fresh Water Supply

Fresh water supply is directly connected to the city network. The port has an own water storage facility with a storage capacity of 300 m3, however a capacity of 2000 m3 is required.

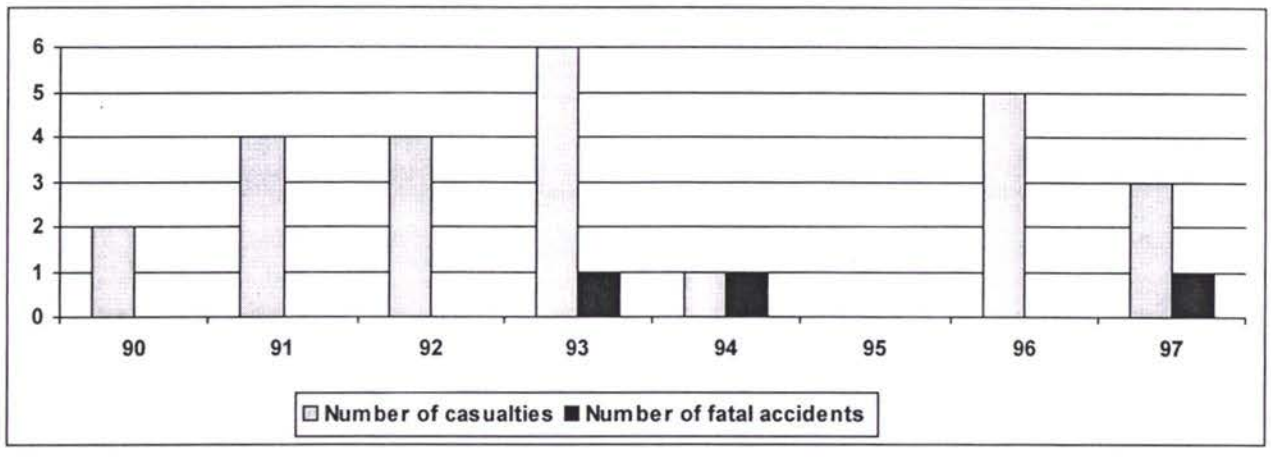
1.4.3 Sewage Water Treatment

The port sewage system is connected to the city network, which is connected to a sewage treatment plant. This plant provides physical treatment and has a capacity of 15000 m3 per day. The drainage system is partly connected to the sewage system and part of the rain flows straight in the sea.

1.4.4 Safety Installations

Number of casualties as a result of accident over the last 8 years is presented in Figure 7.1.1.

Figure 7.1.1 Number of casualties and fatal accidents



The port does not have fire fighting vessels. The three tugboats do have fire fighting equipment, however the condition is very poor (only one out of three is operational). Inside the port area 3 fire fighting cars are available, while five cars from the city can be used in case of emergency. This fire control station is located at a distance of 2 km. The oil terminal is provided with a fire fighting system, which is in a good condition. Furthermore, a floating oil shield of 200 m and a oil waste skimmer is available to prevent dispersion of oil. Facilities for chemical rescue is available.

1.5 Navigational Conditions

1.5.1 Wave Conditions and Water Levels

The characteristic wave heights are presented in Table 7.1.1.

Table 7.1.1 Wave conditions

Wind Direction	S	SW	W	NW
H-sign.	2.0	4.0	4.1	2.2
H-max			7.0	

In general, above mentioned waves occur during spring and autumn. Hydrologic calculations indicate that a wave height of 4 m occur during a 12 hour storm of 6 Bft (11 - 14 m/s). The maximum wave height is limited by the waterdepth in front of the breakwater, which is 10 to 15 m. The 7.0 m maximum wave height occurs during a 12 hour storm of 8 Bft (17 - 21 m/s).

The Black Sea has no tidal variation. The water level can rise by 0.2 m caused by wind set-up. The water level rise is very limited, because of the deep water conditions of the Black See.

1.5.2 Siltation and Waterdepths

The Port of Poti suffers of severe siltation, which is caused by the Rioni river outlet 3 km north of the port entrance. The total discharge of sediment is estimated at 4 to 5 mln. ton per year. Before 1939 the river

flowed through the city and entered the sea south of the port, resulting in beach formation at this location. After 1939 the flow of the river has been changed to the northern side of the port. By doing so the river sediment outflow was shifted from the southern side of the port to the northern side. As a result, on the southern side of the port coast erosion started and on the northern side the dynamic balance has been disturbed. De delta of the river was growing quickly in western direction, while port operations were hindered as a result of the substantial siltation of approach channel and basins.

Over the last 6 years an average of 700.000 m3 of silt has been dredged at the port basins and approach channel (see Table 7.1.2). However, the yearly amount of maintenance dredging should be approximately 1 million m3. The silt is dumped just south-west of the breakwater to reduce erosion. However, this amount is not enough to prevent further erosion.

Table 7.1.2 Maintenance Dredging of Basins and Approach Channel at Port of Poti

Year	Amount (m^3)
1992	1.188.260
1993	618.650
1994	0
1995	1.005.700
1996	0
1997	700.000 (up to Sep.)

The erosion on the south side of the port is a serious matter of concern for stabilisation of the breakwater. Only 400 m out of the breakwater the waterdepth is up to 60 m, which means an average slope of only 1:7.

The waterdepths of port basins are presented in Drawing 1.1.1. These waterdepths have been measured by echo soundings in May - June 1997.

The design depth of the approach channel is 13,0 m, the actual depth is 12,0 m. The width of the channel varies between 80m and 100 m. The depth at the quays varies between 6,5 up to 10,0 m.

1.5.3 Navigational Aids

The entrance of the port is provided with navigation lights. 2,5 km south of the port is a lighthouse constructed in 1864. Further the centre line of the approach channel is indicated by leading lights on the land side. The condition of the lights is satisfactory.

A governmental department (Hydrologic Services) is responsible for maintenance and operation of the lights. Maintenance of the lights is financed out of port call dues.

The port is not provided with a radar system.

2. Civil Engineering Aspects Port Batumi

2.1 Port Layout

2.1.1 Outline of the port and adjacent areas

The Port of Batumi (founded in 1878) is located in the bay at the northern side of the city. This bay provides the port with a natural protection to western winds and waves. The port has one basin with 11 berths and one off-shore buoy mooring facility. The total port area encloses 13,7 ha. The layout of the port is presented in Drawing 1.2.1.

The main adjacent areas are (see Drawing 1.2.2):

- Oil company:
  The oil company is located at various places around the port. The main area is South of the railway shunting yard. Furthermore, on the eastern side of the port a number of tanks are located. The total area encloses approximately 40 ha.
- Fishery Port:
  At the eastern side of the port is the fishery Port. This area encloses 3 ha.
- Furniture factory:
  East of the port at the other side of the road is a furniture factory. This factory is operational. This area encloses 7 ha. On this area are large production halls and warehouses. The factory is facilitated with a railway connection.
- Railway:
  A large shunting yard of the railways is located South of the port, between the city and the port.
- City:
  The city of Batumi is situated on the southern and western side of the port.

2.1.2 Dimensions of quay-walls, basins and storage areas

The waterdepths at most of the quays vary between 8,0 and 12,5 m. The lengths of the berths vary between 175 and 220 m. The dimensions of the quay-walls, basins and storage areas are presented in Annex IV.1.1.

2.1.3 Port Extension Areas

The directions the port is able to extend are:

- To the North-East:
  Extension of sea fronted areas is only possible in this direction. Nevertheless, at this area the water treatment plant and fishery port are situated.
- Off-shore:
  The other option is to construct berthing facilities in north-eastern direction. However, this will involve immense investments.

2.1.4 Rail and Road Connections

There is one inner port road leading from berth 1 to berth 8. This road is mainly designed for port vehicles. Berth 10 and 11 are directly connected to the city roads.

The only road gate is an electrically driven one-lane gate located at the southern side of the port. Special waiting lanes outside the gate are not available. As a result incoming trucks may block the main road. The gate keeper stands inside the gate and is forced to look through small inspection openings in the steel sheet gate to see vehicles waiting outside.

Rail and road connections are indicated in Drawing 1.2.2.

2.1.5 Existing Development Plans

The under mentioned development plans made by the port exist (see also Annex IV.1.2):

1. Development container terminal:
   The port of Batumi wants to develop a container terminal at berth no. 4 and 5. Therefore, a new quay has to be constructed and furthermore the area of the formerly ship yard has to be prepared for open storage of the containers. The existing buildings are not really being used at the moment and therefore can be demolished. However, development of this area will involve cleaning of the soil which is oil polluted.
2. New grain elevators:
   Installation of 2 new grain elevators to replace the existing two Hartmann elevators.
3. Development of ro/ro ramp:
   In March 1998 construction of a railway ferry ramp in the corner of berth no. 5 and 6 has started. The ramp is located near the railway gate. The design for the connection of the railway tracks to the existing shunting yard has not been finalised yet. To realise this connection the road bridge has to be reconstructed. The ramp is planned to be operational by the end of the year.
4. Improve hinterland railway connection:
   The port of Batumi has only one railway track connection on the eastern side of the port. Plans are made to extent this connection with two tracks and a new shunting yard. Therefore it is required to use almost the whole area of the furniture factory. An alternative is to extent only the rail tracks, which requires only a small part of that area. Another shunting yard is planned farther to the North.
   The railway extension will be combined with the construction of a new road bridge crossing the railway.

2.2 Technical Condition of Port Facilities

2.2.1 Description of the Basins

The port has one basin with 9 berths (no. 1 - 9). Berth 1 - 5 are dedicated for oil handling. However berth 4 and 5 are not operational anymore. Berth 6 - 9 are used for mainly general cargo and dry bulk cargo handling. Outside the basin the passenger terminal is located with 2 berths (no 10 and 11) for ferry and ro/ro vessels. An offshore mooring facility for tankers is located outside the basin.

2.2.2 Condition of the Berths

In this section the technical condition of the berths is described. A summary is presented in Annex IV.1.1. The cross-sections of the quay constructions are presented in Drawing 1.2.3.

Berth 1:

Berth 1 is located at the end of the breakwater. This berth is used for oil handling. The construction exists of concrete block walls built in 1892. In 1972 the berth was reconstructed to enable mooring of tankers up to 25.000 DWT. Therefore in front of the existing blockwall sheetpiles were driven up to 20 m depth. On top a

monolith concrete beam has been constructed. The fenders consists of round rubber fenders diameter 1 m connected with chains to the quay. The fenders and the quay construction are in a good condition (see Photo B1; Annex IV.1.3).

Berth 2 and 3:

Berth 2 and 3 are constructed simultaneously with berth 1 and the breakwater. Originally it consisted of a block wall quay with 6 m waterdepth. In 1928 the berth was reconstructed to enable mooring of larger vessels. Therefore two small pier constructions with a length of 30 m each has been constructed in front of the existing quay. This construction exists of a concrete block wall with concrete superstructure. The condition of the superstructure in particular is very poor. The concrete edges are damaged and the steel bridge construction between the 2 piers is severely corroded. The timber on this bridge construction is in a very poor condition (see Photo B2; Annex IV.1.3).

Berth 4 and 5:

Berth 4 and 5 were built for oil handling like berth 2 and 3. However, these berths are not operational anymore. The condition is very poor and the waterdepth has not been maintained.

Berth 6 and 7:

The original construction of berth 6 and 7 exists of concrete block wall built in 1892. These berths have been used for dry bulk cargo and general cargo. In 1902 the quay wall of berth 6 broke and was replaced by a block wall with a wider base (6,0 m instead of 4,0 m). In 1958 the berths were reconstructed by driving concrete piles (450 x 450 mm) in front of the existing quay. The superstructure existed of a monolith concrete constructing. The condition of the quay is satisfactory with exception of the water side of the superstructure. At many locations the concrete has been damaged severely. The fenders are small and in a very poor condition (see Photo B4; Annex IV.1.3). The first rail track has been renewed last year and is in good condition. However, the rail track level is not equal to the pavement level. Therefore it is not possible to cross the railway lines with other port equipment.

Berth 8 and 9:

The original construction of these berths exists of concrete block wall built in 1892. These berths have been used for handling of dry bulk cargo and general cargo. In 1962 the berths were reconstructed by driving sheet piles in front of the existing quay. The condition of the quay is satisfactory. However the pavement on the quay apron is in very bad condition. The fenders are in good condition.

Berth 10:

This berth is located at the western side of the port and therefore not directly connected with the other port areas. The berth is freely accessible by public. It is constructed on concrete piles (450 x 450 mm) and built in 1978. This berth is used for passenger and tourist boats. However, it is also used for handling of small cargo vessels. The quay apron is used as parking lane for the ferry terminal of the adjacent berth 11. Berth 10 is not provided with a ro-ro ramp. The condition is satisfactory.

Berth 11:

The passenger berth was built in two stages. The first part (127 m long) consists of 2 rows of concrete piles (∅ 1.60 m) at a distance of 8 m. The surface is constructed of concrete with asphalt pavement. The

maximum load is only 1 ton/m^2. In 1967 the berth has been enlarged by 68 m. The berth and fenders are in a poor condition.

Off shore mooring facility:

Outside the breakwater is a buoy mooring facility for off shore loading of oil tankers with draughts more then 11,0 m. It is operational since 1966. It consists of mooring equipment, underwater pipeline and navigational devices. The depth of this anchorage is 15 to 30 m. The mooring equipment exists of two 25 m3 buoys and one of 16 m3.

2.2.3 Condition of Pavement

The pavement at the port consists mainly of asphalt and some parts are constructed of concrete. With exception of some potholes, the present condition of the roads is satisfactory for the present traffic volume. However, the roads will not withstand heavy truck traffic. The crossing with the railway line near the railway gate is in a very poor condition (see Photo B6; Annex IV.1.3). The drainage of the pavement is fairly good, which is necessary because of the severe rainfall.

The rail tracks on the berth 6, 7 and 9 are provided with pavement between the tracks . However the level is below track level, which makes railway crossing at the quay apron impossible for other port equipment. The waterside rail track of berth 6 and 7 has been renewed last year. Between the tracks the pavement exists of concrete (see Photo B5; Annex IV.1.3), which is in a good condition.

2.2.4 Warehouses

In general the roofs of the warehouses are in a good condition. Because of the severe rainfall (approximately 4000 mm/year) in this region, the port of Batumi puts a lot of effort in maintaining the roofs. During the raining periods the warehouses are checked at the inside. Leakage's are registered to be repaired. Every two years all warehouses are fully inspected and repaired during the summer period.

Warehouse 1 (Port Building Number 3):
This warehouse is located at berth 9 and is presently used for general cargo storage. This warehouse is the largest of the port. The construction exists of stone walls, concrete floor and asphalt roof covered by iron plates. The outside of the building looks very poor, however the roof is in good condition. This warehouse is located closely to the quay and the railway tracks and cranes are just in front of the warehouse. Cargo handling operations are hampered because of the lack of free operational area in front of the warehouse. The doors are in a very poor condition (see Photo B3; Annex IV.1.3). On the back side doors are provided to load trains. A small roof cover above the doors at the back protects cargo handling from the rain.

Warehouse 2 (Port Building Number 4):
This warehouse is located adjacent to warehouse 1 and is in the same condition. This warehouse is very small and therefore not suitable for cargo storage. The doors are very small (3 x 4 m)

Warehouse 3 (Port Building Number 5):
Same as Warehouse 2. The roof is older.

Warehouse 4 (Port Building Number 13):
Warehouse 4 is constructed of aluminium plate walls and roof and concrete floor. It has separated areas. This warehouse is presently used for equipment and spare parts. The condition is satisfactory.

Warehouse 5 (Port Building Number 6):
This warehouse is in use by the shipyard as storage facility. However, the shipyard is not operational anymore. It is constructed of aluminium plate walls and roof and concrete floor. It is located behind warehouse 1 and therefore not accessible from the quay. The condition is good and it could be used as storage facility for materials which have not to be stored near the quays (e.g. spare parts) or as workshop.

Warehouse 6 (Port Building Number 15):
Warehouse 6 is the second largest warehouse of the port. It is constructed of stone walls and a steel plate roof, which has been renewed in 1996. The condition is satisfactory. It is presently used for storage of spare parts and equipment. It can be used for storage of general cargo, however the doors are small (3 x 4 m).

Warehouse 7 (Port Building Number 14):
This warehouse is located adjacent to warehouse 6 and is used for general cargo. It is constructed of steel plate walls, the concrete floor is 30 cm higher than terminal area. The condition is satisfactory.

2.2.5 Breakwater

The breakwater is constructed simultaneously with berth 1 to 3 during 1889 - 1892. It consists of a concrete block wall construction. The superstructure consists of limestone blocks. On the port basin side berth 1 - 3 were constructed. In 1927 - 1930 the head part of the breakwater was prolonged and widened in order to enable mooring of larger vessels at berth 1. The condition of the berth is satisfactory. No relevant subsidence has been noticed.

2.2.6 Soil Condition

At the location of the breakwater boreholes up to 17 m have been taken, which indicates silted sand with layers of gravel and sand. At the location of berth 6 the soil beneath 5 - 6 m consists of sand with layers of gravel.

2.3 Topographical Survey

A detailed map of the port area (scale 1:2500) is presented in Drawing 1.2.1. This map is derived from a topographical survey (scale 1:500), which has been updated in 1996.

2.4 Port Utilities

2.4.1 Electrical Supply

Electric power for the port is normally provided from the city network. To overcome the problems of power cuts the port has three diesel generator sets available with a total capacity of 4 MW. After a power cut it takes 40 minutes to start the power generators.

Connection boxes for the cranes are installed every 40 m roughly between crane rail and quay wall edge. Each connection box can serve two cranes. The electric cable system is generally very old and in poor condition.

2.4.2 Fresh Water Supply

The port's water supply system is connected to the city system. Sometimes there is a cut in water supply. This is a problem for toilets and washing rooms, but does not significantly affect port operations. At part of the berths a water line for ship supply is installed.

2.4.3 Sewage Water Treatment

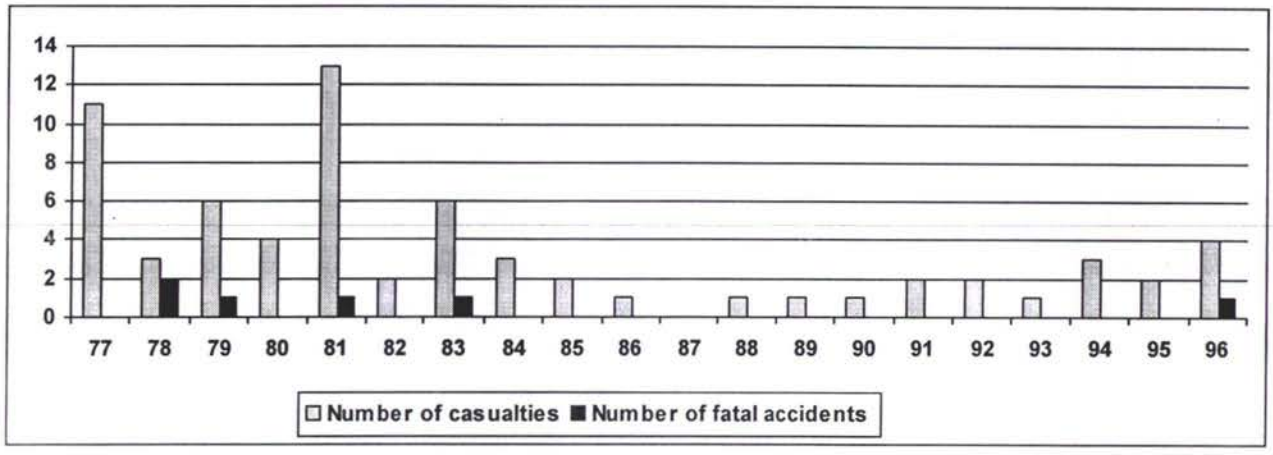
The waste water system is connected to the town system.

2.4.4 Safety Installations

The safety of the port is under control of the fire fighting officers. 24 hours a day at least one officer is on duty. They are responsible for fire control and the handling and storage of hazardous cargo.

The port has an emergency plan, which is not set up according to IMO standards. The foremen, fire fighting officers and the safety manager have yearly a safety examination. However, no port representative attends the yearly IMO conference. Number of casualties as a result of accident over the last 20 years is presented in Figure 7.2.1.

Figure 7.2.1 Number of casualties and fatal accidents



The port has the following safety facilities:

- 1 Fire fighting vessel.
- 3 Tugboats with fire fighting equipment.
- Fire fighting equipment on each oil berth.

All fire fighting equipment is very old (most equipment more then 20 years) and in a very poor condition. This equipment should be replaced. The port has not own fire fighting cars. However, in case of fire the city fire fighting cars can be used. The nearest city fire fighting station is 300 m outside the port. This station has 2 fire fighting cars.

Further, the warehouses have no smoke detectors. There are no special facilities and locations for handling and storage of hazardous cargo, with exception of the oil handling.

To prevent oil pollution, the port has two oil waste skimmers and a floating oil shield. However, the floating oil shield is in such a poor condition that it is not operational.

2.5 Navigational Conditions

2.5.1 Wave Conditions and Water Levels

The Port of Batumi is protected from western wave attack by the natural layout of the harbour bay. The outside berths of the port (berth 10 to 12) are not protected from waves from the North. However, this is vary rarely and the length for wave set up is limited. Therefore the port is well protected from wave attack.

However, more dangerous is the situation during the south-western storm (locally called Tjagun). It creates an underwater current, which circles anti clockwise inside the port basin. This current makes ship manoeuvres unsafe even with tug boats. Furthermore, the ships moored at the quays (especially berth 9 and 8) have to leave the port, because of the dangerous ship movements (up to 10 m) the current can cause. This storm occurs mainly in the period February - March and has a wind velocity up to 20 m/s. The frequency of appearance is normally 2 to 3 times a year up to 15 times in extreme situations.

The Black Sea has no tidal variation. The water level can rise by 0.2 m caused by wind set-up.

2.5.2 Siltation and Waterdepths

The Port of Batumi has in general no substantial problems with siltation. The last maintenance dredging was 6 years ago. It consisted of dredging works along the quays. The last update of the waterdepth chart was in 1993, which showed some siltation up to 1,0 m above the design depth of the berths. At berth 4 and 5 siltation is more severe, however these berths are not used as such anymore. Nowadays, it is used for mooring of small fishing vessels. These waterdepths are presented in Drawing 1.2.1.

The depth of approach channel to the port basin is far enough, because of the natural geometry. The depth at the quays varies between 6,5 up to 10,0 m.

2.5.3 Navigational Aids

The port of Batumi is indicated from the sea by the under mentioned lights:

- Two flashing lights at the northern side of the city.
- Three sets of leading lights indicating the approach channel.
- One section light at the head of the breakwater.
- A buoy flash light indicating the off shore oil mooring.

Maintenance of the lights is financed out of port call dues. Maintenance of the lights is under responsibility of the Hydrologic Service. The condition of the lights is satisfactory.

The port is not provided with a radar system, because of financial reasons. The communication facilities are poor. There is a urgent need for portable VHF radio stations. The port is facilitated with a mist horn.

Section 2

Civil Engineering Aspects of Planned Port Development

1. Investment Projects Port of Poti

1.1 Introduction

In this section the investment projects are described, which involve civil engineering (re)construction in the Port of Poti. The investment projects are in order of priority:

- Extension Existing Container Terminal.
- Reconstruction of Handling and Storage Facilities at Berth 9 - 11.
- Reconstruction Aprons and Storage Areas.
- Viability Study Grain Handling Facilities
- Development New Container Terminal.

A description of the proposals including preliminary designs and cost estimates are presented in the following paragraphs. The investment projects are presented in Drawing 2.1.1 and 2.1.2.

All construction activities at the existing port operational areas will be phased, so that continuation of handling operations is guaranteed. However, the construction activities will have a negative effect on handling capacities (see Volume 3).

1.2 Extension Existing Container Terminal

1.2.1 Description

At the present containers are mainly handled at Berth no. 7. However, the available storage area is not sufficient. As a result, containers are stored all over the port and ship handling is hindered by the lack of storage area and suitable crane facilities. The cargo throughput forecast indicates a high increase of containers to be shipped via the Port of Poti. Therefore, Consultants advise to extend the container handling facilities as much as possible on short notice.

1.2.2 Requirements

The requirements to extend the Container Terminal at Berth 7 are based on the actual operational demands and the forecast cargo throughput volumes for the upcoming years:

- Three quays to handle first generation (feeder) container vessels (waterdepth up to 10 m and a length of 175 m).
- An operational area at the quay apron with a minimum width of 30 m.
- Open storage area of minimum 11.800 m^2.
- Load and unload facilities for rail wagons.
- Office building and gate.

1.2.3 Construction

To extend the existing container terminal the area of Berth 6 may be used. However, Berth 6 is dedicated for handling of iron scrap and is leased for a period of 5 years to the company "Dock Transhipment Poti Ltd.". Nevertheless, this company has no principal objections to move the handling to Berth 4.

Berth 5 will also be used for handling of general cargo and therefore can only partly be used for container handling.

The area behind Berth 7 can partly be used for container storage area and the train loading area, presently located at Beth 7, can be removed to this location.

Furthermore, Berth 12 to 14 has to be used for container handling considering the existing operational demands up to 2002.

The city of Poti does not allow port generated traffic to pass long distances through the city. Therefore, road traffic from and to Berth 12 - 14 has to leave and enter the port through a new gate at the city side near the easterly border of the port and crossing the rail tracks leading to the west. In this way it will also be possible to minimise road traffic at the internal port road behind Berth 7, which hinders container operations.

The construction activities to extend the existing Container Terminal at Berth 7 to Berth 6 (and optional to Berth 5) and areas behind Berth 7 encloses (see Drawing 2.1.2):

- Demolition of buildings (2300 m^2) and rail tracks (Track 3 and 4 behind Berth 4 - 6: 650 m).
- Preparation of the total area including construction of sewage and drainage (Berth 7: 23.000 m^2; behind Berth 7: 18.000 m^2; Berth 5+6: 22.000 m^2).
- Removal of fuel station.
- New rail tracks in the area behind Berth 7: 250 m.
- Reconstruction of 200 m quay apron at Berth 6 to rectify subsidence of shore side crane rail. According to the Chief Engineer of the port the anchor system is damaged.
- 60.000 m^2 new pavement
- A (temporary) office building (500 m^2)
- A new gate at the SE-side of the port.

The construction activities to reconstruct Berth 12 and 14 encloses:

- Removal of laid up vessels at Berth 14.
- Dredging of basin up to design waterdepth (Berth 12: 8.00 m; Berth 14: 8.50 m).
- Preparation of the total area including construction of sewage and drainage (25.000 m^2).
- Construction of 2 new railway lines (2 x 400 m).
- 25.000 m^2 new pavement .

1.2.4 Investment Costs

A detailed cost estimate is presented in Annex IV.2.1. The main results are presented in the following table.

Table 0.1 Investment Costs Container Terminal Extension

Description	Extension Berth 5 - 7 (in 1000 USD)	Extension Berth 12 - 14 (in 1000 USD)	Cont. Term. Ext. Total (in 1000 USD)
Site Preparation	1.945	825	2.770
Environmental	50	0	50
Civil Works	3.323	1.588	4.911
Buildings	200	0	200
Utilities	1.661	125	1.786
Other	195	0	195
Total	7.374	2.538	9.912

1.3 Reconstruction of Handling and Storage Facilities at Berth 9 - 11

1.3.1 Description

Berths 9 to 11 are facilitated for direct handling of general cargo and grain. A limited amount of open storage is available. An apron to load train wagons is located at Berth 9. Construction of a new warehouse at Berth 10 has been stopped. At berth 11 a warehouse is located very close to the quay apron, so that rail wagons block the entrance. The railway tracks at the apron are not paved in and therefore not accessible by rolling equipment accept of rail wagons.

Consultants advise to create operational handling area and a new warehouse to enable indirect cargo handling. Therefore the existing warehouses, buildings and the loading apron, which do not meet nowadays handling requirements, should be demolished and replaced by paved open storage and one warehouse.

1.3.2 Requirements

The requirements for the development of this area are based on the operational demands for the year 2012:

- An operational area at the quay apron with a minimum width of 30 m.
- A warehouse of minimum 16.500 m^2, for cotton and other general cargo storage.
- A railway track behind the warehouse.
- Access of rolling equipment at the entire quay apron area and the shunting yard area.

1.3.3 Construction

Warehouse 4 is the only usable warehouse at this location. Therefore, it should remain operational until construction of a new warehouse has been finalised. At Berth 10 the construction of a new warehouse has been stopped a number of years ago, because of insufficient financial funds. The design of this warehouse does not meet nowadays operational requirements (total storage area and dimensions of the doors are too small). The Port of Poti does not agree with Consultants' proposal to demolish the construction and intend to complete construction of this warehouse. Nevertheless, within proposed investment project the demolition of the existing warehouse is included.

The activities to reconstruct handling and storage facilities at Berth 9 - 11 encloses (see Drawing 2.2.2):

- Demolition of Warehouse 4 (7500 m^2) and 22 (3000 m^2), the buildings at Berth 9 and 10 (2700 m^2), rail tracks (225 m) and the rail wagon apron (1400 m^2).
- Demolition of existing pavement and levelling of the area.
- Construction of 1500 m new railway tracks at the quay apron, including pavement between the tracks.
- Construction of new warehouse (19.000 m^2).
- Construction of new pavement at quay apron, operational area and storage areas.

1.3.4 Investment Costs

A detailed cost estimate is presented in Annex IV.2.1. The main results are presented in the following table.

Table 0.2 Investment Costs Reconstruction of Handling and Storage Facilities at Berth 9 - 11

Description	Reconstruction Facilities B 9 - 11 (in 1000 USD)
Site Preparation	1.735
Environmental	0
Civil Works	2.867
Buildings	1.635
Utilities	298
Other	50
Total	6.585

1.4 Reconstruction of Aprons and Storage Areas

1.4.1 Description

As a result of the direct ship - train handling it was not required to allow rolling equipment, other then trains and wagons, at the quay aprons. As a result, the railway tracks at the quay aprons are not paved in and therefore not accessible by rolling equipment. For indirect handling it is required to enable forklift movements at the quay apron and the operational areas. Furthermore the storage areas at these berths have to be paved.

Consultants advise to level the entire terminal area, especially at the quay aprons, the operational areas and storage areas. The space between railway tracks have to be paved in to enable access to rolling equipment.

Reconstruction of aprons and storage areas of Berth 5 to 7 and 9 to 11 is included within the development plans as described in Section 1.2 and 1.3.

1.4.2 Requirements

The requirements for the operational and storage areas are:

- Access of rolling equipment at all aprons, operational areas and storage areas.
- Sufficient drainage of storage and operational areas.

- Equalise the level of rail tracks, open storage areas and warehouses taking into account a minimum slope to drain the paved areas.

1.4.3 Construction

The construction encloses:

- Demolition of existing railway tracks at quay aprons (B1 + B2: 2 x 400 m; B3: 2 x 550 m; B4: 2 x 200 m; B8: 3 x 200 m) and other railway tracks at the terminal (500 m).
- Levelling of the storage areas (56.000 m^2) and aprons (14.000 m^2) and construction of drainage.
- Construction of 3400 m new railway tracks, including pavement between the tracks.
- Construction of new pavement at storage areas (56.000 m^2) and aprons (14.000 m^2)

1.4.4 Investment Costs

A detailed cost estimate is presented in Annex IV.2.1. The main results are presented in the following table.

Table 0.3 Investment Costs Reconstruction of Aprons and Storage Areas

Description	Reconstruction Aprons and Storage Areas (in 1000 USD)
Site Preparation	1.836
Environmental	0
Civil Works	5.095
Buildings	0
Utilities	366
Other	0
Total	7.297

1.5 Viability Study Grain Handling Facilities

1.5.1 Description

At the present, grain is directly handled into rail wagons at Berth 9. To improve direct handling a storage buffer is required. Therefore, a new silo buffer can be constructed at Berth 8 or the old grain silo at Berth 15 can be renovated. Furthermore, a grain milling company is located at Berth 15, which makes reconstruction of the existing silo logical for the domestic market.

Consultants recommend to undertake a feasibility study to construct a new silo buffer at Berth 8 or alternatively renovate the existing grain silo at Berth 15 including a new quay construction and a conveyor belt.

1.6 Development New Container Terminal

1.6.1 Description

The Port of Poti will not be able to handle the forecast container throughput around 2002 just by realisation of proposed extension of the present facilities. Despite proposed extension, the existing container terminal might reach its capacity (60.000 TEU/yr) around 2000. Considering the forecast of 2007 (150.000 TEU/yr) and 2012 (290.000 TEU/yr) it is clear that a new container terminal is required.

Within the present port perimeters, the only location to accommodate a container terminal with a capacity of 200.000 to 300.000 TEU is at the Southern Basin (Berth 14 and 15). Therefore, the basin has to be filled up to create storage area. The total area will be 200.000 m^2, which will be sufficient for a capacity of approximately 200.000 TEU/yr. However, further extension will not be possible. Furthermore, this area would be the approach to the grain silo at Berth 15. Therefore, a new container terminal at this location can not be combined with reconstruction of the grain facilities ate Berth 15.

The second option is North of the existing port outside the breakwater. This area is allocated for future port development and offers sufficient space (400 ha). Development of this area involves substantial investment costs to construct infrastructure connections (approximately 8 km rail and road connections) and a breakwater of approximately 2 km. However, the breakwater and infrastructure is not only in the benefit of the container terminal. This new port area creates good opportunities for the development of dedicated terminals for other commodities (e.g. bulk cargo)

Considering long term development, Consultants advise the terminal development at the northern side, under the condition that it is feasible. The investments for both terminal options have been worked out in the next paragraphs.

1.6.2 Requirements

The requirements for the development of a new Container Terminal are based on the operational demands for the year 2007:

- total terminal area of 200.000 m^2.
- A quay with waterdepth up to 12.5 m and a length of 500 m to accommodate second generation container vessels.
- A Ro-Ro berth.
- An operational area at the quay apron with a minimum width of 50 m.
- A CFS (Container Freight Station) of approximately 5.000 m^2.
- A container stacking area of 75.000 m^2.
- Two railway lines to load and unload rail wagons.
- Workshop, office building and gate.

1.6.3 Construction

For development at the southern side the construction encloses:

- 175.000 m^2 land reclamation (average depth 5 m).
- Preparation of the total area including construction of sewage and drainage (200.000 m^2).
- Demolition vessels and installations.
- 550 m quay wall (design depth 12.5 m) including 30 m apron accessible for container cranes.

- 170.000 m^2 new pavement
- 1100 m new railway tracks.
- One new CFS (5000 m^2), a workshop (500 m^2) and an office building (500 m^2).

For development at the northern side the construction encloses (see Drawing 2.2.3):

- 200.000 m^2 land reclamation and levelling (average 4 m sand supply).
- Preparation of the total area including construction of sewage and drainage (200.000 m^2).
- Demolition vessels and installations.
- 500 m quay wall (design depth 12.5 m) including 30 m apron accessible for container cranes.
- 170.000 m^2 new pavement
- 1100 m new railway tracks.
- One new CFS (5000 m^2), a workshop (500 m^2) and an office building (500 m^2).

In case of the northern alternative it is required to construct:

- 2.5 km breakwater.
- 8 km railway (double track).
- Railway shunting yard.
- 8 km road (2 * 2 lanes).

1.6.4 Investment Costs

For both alternatives and the required infrastructure, a detailed cost estimate is presented in Annex IV.2.1. The main results are presented in the following table.

Table 0.4 Investment Costs Development New Container Terminal

Description	New Cont. Term. South in 1000 USD)	New Cont. Term. North (in 1000 USD)	Infrastructure (in 1000 USD)
Site Preparation	12.570	7.720	0
Environmental	0	0	0
Civil Works	20.369	19.404	37.000
Buildings	1.950	1.950	0
Utilities	2.376	2.360	0
Other	170	215	0
Total	37.435	31.649	37.000

2. Investment Projects Port of Batumi

2.1 Introduction

In this section the investment projects are described, which involve civil engineering (re)construction in the Port of Batumi. The investment projects are in order of priority:

- Construction of multi-purpose Terminal.
- Reconstruction of handling facilities at berth 9.
- Reconstruction aprons and storage areas.
- Construction of new bridge.

A description of the proposals including preliminary designs and cost estimates are presented in the following paragraphs. The investment projects are presented in Drawing 2.2.1.

All construction activities at the existing port operational areas will be phased, so that continuation of handling operations is guaranteed. However, the construction activities will have a negative effect on handling capacities (see Volume 3).

2.2 Reconstruction of Handling and Storage Facilities at Berth 9

2.2.1 Description

The present handling facilities at berth 9 consist of:

- 15 m quay apron provided with 2 railway lines without pavement between the rails, which makes it not accessible by rolling handling equipment.
- A warehouse of 21 m x 139 m, without any operational area between quay apron and warehouse.
- A railway shunting yard of 3 to 4 lines.
- Some buildings and a storage shed used by the former Georgian Shipping Company and a military bunker. These facilities are presently not in use.

Consultants advise to create operational handling area and a new warehouse to enable indirect cargo handling. Therefore the warehouse and railway tracks should be located as much to the South as possible.

2.2.2 Requirements

The requirements for the development of this area are based on the operational demands for the year 2012:

- An operational area at the quay apron with a minimum width of 27.5 m.
- A warehouse of 35 m x 200 m.
- A shunting yard area width 5 railway tracks with a total length of 1100 m. The track adjacent to the warehouse will be used for (un)loading of cargo.
- Access of rolling equipment at the entire quay apron area and the shunting yard area.

2.2.3 Construction

The construction encloses (see Drawing 2.2.2):

- Demolition of existing railway tracks (840 m + 2 x 200 m) and Warehouse 1, 2 and 3 (3750 m^2).
- Demolition of Warehouse 5 (960 m^2), the buildings West of it (765 m^2) and the military bunker (500 m^2).
- Excavation of the ground and levelling of the area.
- Construction of cover for water outlet.
- Construction of 1100 m new railway tracks at shunting yard and 2x200 m at the quay apron, including pavement between the rails.
- Construction of new warehouse (7000 m^2).
- Levelling and construction of new pavement at quay apron and operational area.

2.2.4 Investment Costs

A detailed cost estimate is presented in Annex IV.2.2. The main results are presented in the following table.

Table 2.1 Investment Costs Reconstruction of Handling and Storage Facilities at Berth 9

Description	Rec. Fac. B 9 (in 1000 USD)
Site Preparation	911
Environmental	0
Civil Works	1.588
Buildings	2.100
Utilities	140
Other	100
Total	4.839

2.3 Reconstruction of Aprons and Storage Areas

2.3.1 Description

As a result of the direct ship - train handling it was not necessary required to allow rolling equipment, other than trains and wagons, at the quay aprons. As a result, the railway tracks at the quay aprons are not paved in and therefore not accessible by rolling equipment. For indirect handling it is required to enable forklift movements at the quay apron and the operational areas.

Furthermore the whole terminal area is not levelled, which limits the flexibility of using storage areas.

Consultants advise to level the entire terminal area, especially at the quay aprons, the operational areas and storage areas. The space between railway tracks have to be paved in to enable access to rolling equipment.

2.3.2 Requirements

The requirements for these areas are:

- Access of rolling equipment at all aprons, operational areas and storage areas.
- Sufficient drainage of storage and operational areas.
- Equalise the level of rail tracks, open storage areas and warehouses taking into account a minimum slope to drain the paved areas.

2.3.3 Construction

The construction encloses:

- Demolition of existing railway tracks at quay aprons (2 x 200 m + 3 x 260 m + 2 x 175 m) and other railway tracks at the terminal (900 m).
- Demolition of pavement at storage areas (13.000 m^2).
- Levelling of the aprons (14.000 m^2) and storage areas (13.000 m^2).
- Construction of drainage (27.000 m^2).
- Construction of 2800 m new railway tracks, including pavement between the tracks.
- Construction of new pavement at storage areas (13.000 m^2).

2.3.4 Investment Costs

A detailed cost estimate is presented in Annex IV.2.2. The main results are presented in the following table.

Table 2.2 Investment Costs Reconstruction of Aprons and Storage Areas

Description	Rec. Aprons and Storage Areas (in 1000 USD)
Site Preparation	496
Environmental	0
Civil Works	2.352
Buildings	0
Utilities	0
Other	0
Total	2.848

2.4 Construction of Multi-purpose Terminal

2.4.1 Description

The Port of Batumi is not facilitated to handle containers, which is recommended by the Consultants. However, the cargo throughput forecast does not justify the development of a dedicated container terminal. Considering the potential Ro-Ro developments at the Black Sea, Consultants advise to develop a multi-purpose Terminal. The best location is considered to be at the existing berth no. 5.

In March 1998 construction of a railway ferry ramp is started. The new ramp is included within proposed development plans.

2.4.2 Requirements

The requirements for the development of a multi-purpose Terminal at berth no 5 are based on the operational demands for the year 2012:

- A quay with waterdepth up to 12 m and a length of 225 m.
- A Ro-Ro ramp .
- An operational area at the quay apron with a minimum width of 30 m.
- A warehouse of approximately 3000 m^2.
- Parking area for 100 truck units (8500 m^2).
- Open storage area of 6400 m^2.
- Two railway lines to load and unload rail wagons.
- Workshop, office building and gate.

Furthermore, a parking area outside the port gate has to be foreseen including facilities for truck drivers such as food supply, toilet and washing accommodation.

2.4.3 Construction

The available port owned area at berth no 5 is not sufficient to accommodate all required facilities. To maximise the area Consultants advise to:

- Construct the new quay wall up to 30 m farther to the West, which result in an additional area of 5000 m^2.
- To use not port owned areas at the eastern side of the perimeter wall. A part is used by the fishery company and another part is not being used. According to the Chief Engineer of the port it should be possible to buy these assets of the present owners. These areas encloses approximately 10.000 m^2.

Consultants have considered a new gate at the south-eastern side of the terminal area, near the main access road. However, the internal traffic flows can not be organised in a efficient way when a gate is planned at this location. Outgoing Ro-Ro traffic can not be parked without crossing sea-going Ro-Ro traffic. The limited available terminal area enlarges this logistic problem.

A solution is to construct the gate at the north-eastern side of the terminal together with a new access road crossing fishing company territory. Another solution could be to create an access road under the bridge and to use the territory of the furniture company (SE of the bridge) as parking area. Realisation of these solutions requires co-operation and agreement of involved companies, which has not been investigated at this moment. In the proposed layout of the terminal the first solution is presented.

Considering above described adjacent areas can be used, the construction encloses (see Drawing 2.2.3):

- Demolition of warehouse (2200 m^2), installations (mainly oil pipes), foundations (2900 m^2), and open sheds (1600 m^2).
- Preparation of the total area including construction of sewage and drainage (40.000 m^2 existing plus 5000 m^2 land reclamation).
- Excavation and cleaning of the polluted soil, assuming 2 m has to be excavated.
- Removal and reconstruction of oil separation basin.
- 250 m quay wall (design depth 12 m) including 30 m apron accessible for mobile cranes.

- 33.000 m^2 new pavement
- 500 m new railway tracks.
- One new warehouse (3000 m^2) a workshop (250 m^2) and an office (500 m^2)

At the allocated area, old oil pipelines are situated in the ground. These pipelines are not being used anymore and are replaced by a new system farther to the North. Because of the bad condition of the pipelines oil has been leaking in the ground (see also Volume 5: Environmental Assessment). This oil pollution is an area of concern.

2.4.4 Investment Costs

The oil company, who has caused the oil pollution in the ground, is officially responsible for the consequences. However, it will be difficult to get the cleaning of the soil be financed by the oil company. A very rough estimate to clean this area is taken into account. However, a comprehensive cleaning will result in substantial higher costs. To present a realistic cost estimate to clean the contaminated soil, more information about the level of pollution is required.

A detailed cost estimate of both options (excluding and including use of adjacent areas) is presented in Annex IV.2.2. The main results of both options are presented in the following table.

Table 2.3 Investment Costs Construction of Multi-purpose Terminal

Description	Excl. Adj. Areas (in 1000 USD)	Incl. Adj. Areas (in 1000 USD)
Site Preparation	1.677	2.570
Environmental	5.348	5.347
Civil Works	6.336	7.261
Buildings	1.850	1.250
Utilities	786	869
Other	150	160
Total	25.253	17.458

2.5 Construction of New Bridge.

2.5.1 Description

Out of a railway shunting operational point of view it is required to double the railway line at the railway gate. However, the columns supporting the bridge above the railway gate makes extension of the railway tracks impossible. Furthermore, the bridge is in a technical bad condition and has a maximum allowed axle load of 3 tonnes.

Consultants recommend to undertake a feasibility study to renew this bridge.

2.5.2 Requirements

The requirements for the new bridge are:

- A 2 x 1 lane bridge with an option to extend to 2 x 2.
- Access for trucks with axle load up to 15 t.
- Possibility to double existing rail tracks

2.5.3 Construction

The construction encloses:

- Demolition of existing bridge after construction (10 x 40 m).
- Demolition of pavement (600 m^2).
- Earthworks
- Construction of bridge (400 m^2).
- Construction of new pavement (12.000 m^2).

2.5.4 Investment Costs

A detailed cost estimate is presented in Annex IV.2.2. The main results are presented in the following table.

Table 2.4 Investment Costs Construction New Bridge

Description	Construction New Bridge (in 1000 USD)
Site Preparation	143
Environmental	0
Civil Works	535
Buildings	0
Utilities	0
Other	0
Total	678

Section 3

Preliminary Design

1. Introduction

1.1 Results of Port Master Plan

In previous sections and Volume III the results of the Port Master Plan are described. The main investment to be developed shortly for the Port of Poti is the "Extension Existing Container Terminal" at Berth 7 and for the Port of Batumi the "Development of Multi-Purpose Terminal" at Berth 5. Both investment projects have been worked out during Phase 3 of the project. A preliminary design has been made and is presented in this section.

The extension of the existing container terminal in the Port of Poti includes:

- rehabilitation of the existing facilities at Berth 7;
- extension to the areas of Berth 5 and 6 (the storage area at Berth 5 has been paved in 1997);
- extension to the area behind Berth 7.

The development of a multi-purpose terminal in the Port of Batumi includes:

- construction of new quay wall at Berth 5;
- construction of storage area at Berth 5.

1.2 Existing Situation

A comprehensive description of the existing situation has been given in Section 1 and 2 of this volume.

Drawings:

- Drawing 1.1.1 Port of Poti; Layout Existing Situation
- Drawing 1.2.1 Port of Batumi; Layout Existing Situation
- Drawing 3.1.1 Extension Container Terminal Poti; Existing Layout
- Drawing 3.2.1 Multi-Purpose Terminal Batumi; Existing Layout

1.3 Design Criteria

1.3.1 Vessels

The berths shall be designed to handle vessels with the following characteristics:

	Poti			Batumi
	Berth 5	Berth 6	Berth 7	Berth 5
Dead weight	10.000 mt	15.000 mt	10.000 mt	15.000 mt
Length o.a.	160 m	180 m	160 m	180 m
Draught	8.0 m	9.0 m	8.0 m	9.0 m

1.3.2 Lifetime

The general design lifetime of the new terminal infrastructure shall be 50 years as regards corrosion, fatigue of materials, etc. This does not apply to equipment, with normal economic lifetime much shorter.

1.3.3 Design Loads

- Buildings : 2.0 kN/m2
- Traffic areas road traffic : equal to storage areas (10 mt/m2)
- Storage areas : 10 mt/m2
- Quay apron : 4 mt/m2
- Mobile crane (only Batumi) : 160 mt

Berthing loads:

- Fender energy and forces : 540 kN/m (berthing speed 0.3 m/s)
- Bolder forces : 750 kN

1.3.4 Natural Design Conditions

Extreme air temperatures	:	Max. 40°C Min. -15°C	
Average relative humidity	:	68 %	
Average yearly precipitation	:	1650 mm 2418 mm	(Poti) (Batumi)
Design rainfall for surface drainage	:	60 l/sec/ha	
Wind pressure	:	0.55 kN/m2	
Snow pressure	:	0.5 kN/m2	
Ice loads	:	considered of minor importance	
Seismic loads	:	force 8 (scale of Richter)	

1.4 Drawings

The Consultants have prepared an outline design for the Extension of Existing Container Terminal at Poti and the Development of Multi-Purpose Terminal at Batumi. These designs are illustrated on drawings as mentioned in the Drawing List.

These drawings indicate the existing site and planned development. Drawings of the existing layout are based on maps (scale 1:500) provided by both port authorities. The levels indicated on the drawings refer to Baltic Co-ordination System (BCS). Mean Sea Level equals –0.861 m BCS.

2. Extension Container Terminal Port of Poti

2.1 Introduction

The functional requirements of the Container Terminal Extension in Poti are based on the results as presented in Phase 2 Report, Volume III Port Master Plan, Section 5.

The container terminal is designed to handle:

- Container vessels at all berths.
- Ro-Ro vessels at Berth 6.
- General cargo vessels at Berth 5.

The present container terminal is located at Berth 7. The extension encloses the area farther behind Berth 7, and the area of Berth 6. The storage area behind Berth 5 has been paved in 1997 and is therefore not included within the scope of works.

The present internal road located behind Berth 7 shall be relocated to realise rectangular storage areas. A number of buildings shall be demolished to enable construction of storage areas. Utilities such as electricity, water supply and sewerage shall be relocated and installed. Facilities such as office building and gates shall be constructed.

2.2 Scope of Works

The Scope of Works for the Extension of Existing Container Terminal at Port of Poti include:

a) Demolition of buildings, pavement and utilities.
b) Extension of container terminal, including storage area, parking areas, driving lanes, etc.
c) Reconstruction of berths.
d) Construction of facilities, such as gates, office building, custom facilities, etc.
e) Installation of utilities, such as water supply, electricity, communications, sewerage.

During construction the port has to remain operational. Maximum one berth at the time is allowed to be out of operation.

The construction works shall be executed in 3 phases. The sequence of construction shall be:

1. Extension at Berth 6
2. Reconstruction Berth 7
3. Extension behind Berth 7

2.2.1 Extension at Berth 6

The extension includes:

- Demolition of rail tracks (row no. 3 and 4) behind the berth;
- Relocation of transformation building;
- Demolition of buildings;
- Earthworks (levelling, subgrading, installation and relocation of utilities;
- Construction of pavement;
- Construction of new rail track (extension rail line no. 2);

- Construction of new northern gate;
- Construction of office building.

2.2.2 Reconstruction Berth 7

The reconstruction includes:

- Demolition of rail tracks behind the berth;
- Demolition of existing pavement, buildings and walls;
- Relocation of transformation building;
- Earthworks (levelling, subgrading, installation and relocation of utilities);
- Construction of pavement;
- Construction of new southern gate.

2.2.3 Extension behind Berth 7

The extension includes:

- Demolition of existing buildings and walls;
- Earthworks (levelling, subgrading, installation and relocation of utilities);
- Construction of pavement;

2.3 Functional Requirements Operational Areas

2.3.1 Terminal area

The total area of the extended terminal shall enclose:

- 2.3 ha existing at Berth 7;
- 2.0 ha extension behind Berth 7;
- 3.1 ha extension at Berth 5 and 6.

Drawings:

- Drawing 3.1.4 Extension Container Terminal Poti; New Layout.

2.3.2 Berths

The terminal is provided with:

- Berth 5: length 175 m; design water depth 8.50 m;
- Berth 6: length 220 m; design water depth 9.75 m;
- Berth 7: length 170 m; design water depth 8.25 m;
- A Ro-Ro ramp in the corner of Berth 6 and 7 (using Berth 6).

Requirements berth:

- The existing quays are in a fairly reasonable condition except of Berth 6. The pile construction of this quay has been corroded around the water line and the quay anchoring system has been damaged. These piles and the quay anchors shall be repaired.
- New cable ducts shall be constructed at Berth 6 on the land side of the quay structure (Presently located on the waterside of the quay).
- Damaged concrete quay structures shall be repaired.

Drawings:

- Drawing 3.1.2: Extension Container Terminal Poti; Existing Cross Sections Berth 5 - 7
- Drawing 3.1.6: Extension Container Terminal Poti; Cross-Sections New Situation

2.3.3 Open Storage Area

The total amount of storage area is based on the results as presented in Phase 2 Report, Volume III, Section 2.3.4. Since the available area is limited, the area presently allocated for the extension is as large as possible.

The open storage areas have been split up into 3 areas:

1. The area at Berth 6: 17.500 m2 (excl. 15 m apron; incl. driving lanes)
2. The existing area at Berth 7: 18.900 m2 (excl. 15 m apron; incl. driving lanes)
3. The extended area behind Berth 7: 20.200 m2 (incl. driving lanes)

Requirements:

- The layout and design of the storage areas shall be based on storage of containers and can also be used as open storage area for general cargo.
- The storage areas shall be indicated by painted lines, which enables adjusting of the layout to new requirements in the future.
- To maximise flexibility, the pavement of all operational areas (storage areas, driving lanes, parking areas, aprons) shall be designed uniformly and shall withstand the highest cargo and traffic loads (10 mt/m2).

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout
- Drawing 3.1.6: Extension Container Terminal Poti; Cross Sections New Situation

2.3.4 Warehouses

There is no warehouse planned within this design.

2.3.5 Parking areas

Various parking areas are required:

1. Outside the gate
   Outside the gate a parking area for the trucks should be provided to allow truck drivers organising the required documents and to provide facilities for truckers waiting for Ro-Ro vessels. Outside the northern gate no special facilities for parking are available. The trucks are presently being parked at the side of the street. At the south-eastern side a new gate is planned. Outside this gate a parking area of 7.500 m2 is planned. The planned parking facilities outside the port area are not within the scope of works.
2. Storage area for trucks and trailers
   Parking facilities for trucks at the port area are foreseen near the northern gate. The total parking area shall be 1500 m2.

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout.

2.3.6 Areas for Dangerous Goods

For stacking dangerous goods containers special facilities are not required. Containers with dangerous cargo shall be stored in the front or at the end of the container rows, with the door-side always to the road in order to have direct acvcess to the cargo in case of emergencies. The actual stacking should follow international IMO recommendations or other environmental regulations. Usually dangerous cargo containers are stacked next to a normal container for "neutralising" the danger of spills.

Areas for storage of dangerous goods have to be allocated. However, this is an operational issue, which can take placė after construction. Therefore, no special areas are allocated within the design.

Requirements:

- Dangerous goods should be carefully stowed in appropriate locations in compliance with the commercial and safety requirements applicable to their stacking.
- The storage area for dangerous goods shall be clearly signposted.
- Dangerous goods placed in containers must be stowed in accordance with international IMO recommendations.
- When dangerous goods, whether containerised or not, are unloaded and stored at the terminal, they should be properly segregated.

2.3.7 Operational Area Quay Apron

This area is basically used for the movement of vehicles and the temporary storage of cargo during loading or unloading. At the present design, the width of these areas does not meet modern port standards. However, the limited available terminal area does not allow wider aprons.

The area between the crane rails at Berth 6 will not be paved in, because of the high rail track levels.

Requirements:

- At the quay an apron of 30 m width at Berth 7 and 25 m width at Berth 5 and 6 shall be allocated as operational area.
- At Berth 5 and 6 two railway tracks at the quay apron have to remain operational as access lines to Berth 4, where direct train loading at the quay is required.
- Rail mounted cranes will be used as handling equipment. Therefore, the existing crane rail tracks have to remain operational.

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout.

2.3.8 Driving Lanes

The requirements concerning driving lanes are:

- The minimum width of the driving lanes shall be 15 m.
- To maximise the flexibility of the terminal for future development, the pavement of the driving lanes at the terminal shall be equal to the pavement of the storage areas.
- The driving lanes shall be indicated by painted lines.

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout.

2.3.9 Railway Tracks

The railway tracks near Berth 7 shall be demolished. A new rail loading facility shall be created behind Berth 7 by doubling the railway line to the apron of Berth 4 to 6. Two railway tracks behind Berth 4 to 6 (so called line no 3 and 4) shall be demolished.

Requirements:

- Railway line no 1 and 2 (at Berth 4) have to remain operational.
- The level shall be equal to the pavement of adjacent areas.
- The new lines shall be paved in with concrete to enable access by rolling equipment.

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout

2.4 Functional Requirements Facilities

2.4.1 Gate

The existing gate at the northern side of the port has to be enlarged. Furthermore, the design foresees in a new second gate at the south-eastern side. For both gates the requirements are:

- A 2 x 2 lane gate (the southern gate shall be provided with only one exit lane).
- Entrance protection by electric barriers.
- Rain protection.
- Small office room.
- Utilities
  - Electricity
  - Telephone
  - Alarm system
  - Inter terminal communication system

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout.
- Drawing 3.1.8: Extension Container Terminal Poti; New Port Facilities

2.4.2 Office

Near the northern gate an office building for terminal operations is foreseen.

Requirements:

- Dimensions: 13 m x 20 m
- Two floor building
- Floor height 2.80 m
- Ground floor level: 0.50 m
- Rooms for:
  - Operational Manager and Assistant Operational Manager
  - Customs:
    - two rooms for 4 people
    - one storage room of 100 m2

- Foremen (4 people)
- Administration (4 people)
- Emergency Room
- Dockers facilities for 30 people (toilets, showers, changing rooms, etc.)
- Canteen room

- Utilities:
  - Water supply
  - Electricity
  - Telephone
  - Sewerage
  - Alarm system
  - Inter terminal communication system

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout.
- Drawing 3.1.8: Extension Container Terminal Poti; New Port Facilities

2.4.3 Workshop

The construction of a new workshop area is planned. The design has been prepared by the port authority. However the location has slightly been changed. It foresees in workshops, office building and cleaning facilities.

Requirements:

- Dimensions of total area: 5800 m2.
- Two workshop buildings of 1100 m2 and 700 m2.
- Cleaning facility for equipment.
- Waste water treatment facility.

The construction of the workshop area is not included within the present scope of works.

2.4.4 Custom Facilities

The custom facilities will be located within the office building.

2.4.5 Weigh bridge

Shall not be required.

2.4.6 Fire fighting facilities

The requirements for fire protection are:

- Fire hydrants shall be installed above ground level for easy identification.
- Hydrants shall be located next to permanent fixtures such as lighting poles.

2.4.7 Alarm system

For security reasons an alarm system and fence is required for the entire port.

Requirements:

- The alarm system shall be based on video camera controlling.
- The central controlling room shall be integrated with the gate security.
- The installation of fire alarms, with at least a manually operated system connected to the terminal control centre and automatic sound and visual signalling.

2.4.8 Oil separation basins

The drainage system shall be provided with a sedimentation basin with oil separator.

2.4.9 Communication system

A communication system is required, which shall link the operating areas, entrances and exits, and the control centre.

2.4.10 Reefer points

Reefer containers have to be permanently supplied with electricity.

Requirements:

- Power outlets for refrigerated containers shall be provided above ground and protected from damage.
- The power outlets shall provide 380 V / 50 Hz electricity.
- Each reefer connection point shall be equipped with a 5-pole plug, 12 points to be combined to one connection module.
- In addition two spare plugs per module shall be provided.
- The module shall contain the necessary protection equipment and switch gear.
- Reefer containers will be stacked two high.
- It is recommended to start with two tower units, which provide a total of 24 plugs serving 24 reefer boxes. Four additional tower units shall be installed in a second phase. Cable ducts for these additional reefer points shall be constructed to enable this extension.

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout.

2.4.11 Fenders and Bolders

The existing fenders are in a poor condition and too small (∅ 400 mm). New fenders shall be installed.

Requirements:

- The fenders have to withstand forces from 15.000 DWT vessels.
- The minimum diameter is 1.00 m.
- Installation of fender every 15 m.

2.5 Functional Requirements Utilities

2.5.1 Drainage and Sewerage

The drainage system shall be sufficient to prevent flooding. The drainage network is based on the design rainfall of 60 l/sec/ha. Drained water is collected in sedimentation basins, with an outflow to the existing sewerage system. During severe rainfall, the rainwater will flow directly into the port basin. This will not have an environmental impact, since waste will be collected in the sedimentation basin at the beginning of a rain-shower. This emergency overflow avoids high currents within the sedimentation basin and avoids flooding of the terminal area in case the sewerage network would not be able to discharge the rainwater.

The sewerage system of the new buildings (office, workshop, dockers facilities) shall be connected to the existing sewerage network located behind Berth 7.

Requirements:

- The paved areas shall be provided with a drainage system sufficient to handle the design rainfall quantities.
- The new drainage system shall be connected as described above.

Drawings:

- Drawing 3.1.4: Extension Container Terminal Poti; New Layout.
- Drawing 3.1.7: Extension Container Terminal Poti; New Utilities

2.5.2 Water

Requirements:

- The provision of drinking water and water for washing, with a minimum pressure of 2.5 kg/cm2 and a minimum flow of 50 l/sec.
- If the water is also to be used for fire fighting, the pressure must be increased to 7 kg/cm2 and the flow to 80 l/sec and hydrants of suitable height installed at intervals of not more than 100m.

2.5.3 Electricity

Two existing transformation buildings have to be removed to make area available for cargo storage. The new location of these transformation buildings is near the main transformation station.

Requirements:

- Replace the existing two transformation buildings for one new building near the main transformation station. The distance from the transformation building to the power outlets shall be less than 500 m to minimise power loss.
- New high voltage (6000 V) and low voltage (380 V) connections shall be made between the existing electrical infrastructure and the relocated transformation buildings.
- New cables shall be installed under ground in concrete cable ducts.
- Low voltage electricity network for lighting.

2.5.4 Gas

Gas connections are not required.

2.5.5 Lighting

To operate the terminal by day and night, the lighting shall meet the following requirements:

- Use as few lampposts as possible. Posts should be high to provide ample clearance.
- For operation en storage areas: 80 lux
- Other areas and areas not in operation: 50 lux
- Illumination at ground level should be at least 25 lux
- The average level should be 50 lux where required to ensure the safety of workers or cargo.

Drawings:

- Drawing 3.1.7: Extension Container Terminal Poti; New Utilities

2.6 Technical Specifications

2.6.1 Demolition

Existing pavement of storage areas and driving lanes, old buildings, rail tracks and other structures shall be demolished. These constructions are indicated in the drawings.

One building near the northern gate contains asbestos within the roof construction. The demolition of this building shall meet the requirements according to international health and safety regulations.

Drawings:

- Drawing 3.1.5: Extension Container Terminal Poti; Demolition

2.6.2 Reconstruction Quay Berth 6

Introduction:

The quay structure of Berth 6 has damages on:

- the pile sub-structure;
- the retaining wall;
- the mooring side.

Reconstruction Sub-Structure:

The sub-structure of the quay at Berth 6 consists of a concrete platform constructed on concrete piles. Near the water level these piles are eroded and damaged probably because of overload caused by train wagons.

In 1996 an underwater survey has been made. The main results of this survey are:

- the condition of the precast concrete piles and deck is satisfactory given their long period in service;
- a few of the pilecaps appear to be fractured, and these are concentrated mainly along the 3rd row behind the cope face. This row is apparently the most critical due to the statical geometry of the structure in combination with the directly overlaid railway loadings.

Possible rehabilitation measures may include fixing steel brackets around the pilecaps in conjunction with non shrinking cement mortar injection techniques. Local concrete damages can be repaired using appropriate cement mortars in order to protect reinforcement steel bars from corrosion.

Reconstruction Retaining Wall:

A concrete block retaining wall is located between the platform construction on piles and the land area. This retaining wall is subsided at various places. Furthermore, the anchors of the quay construction are broken.

This retaining wall shall be repaired. The old block wall shall be replaced by a new steel sheet pile construction. The anchor system of the quay shall be renewed.

Reconstruction Mooring Side:

The concrete quay construction at the mooring side is damaged and shall be repaired. Broken concrete slabs shall be renewed and damage of the concrete shall be repaired.

2.6.3 Pavement

In principal a range of pavements may be considered:

- Concrete slabs, which are unsuitable where the subgrade is uncompacted and settling may cause cracks.
- Concrete paving blocks, which are well suited to partly compacted subgrades and easily repaired.

For flexibility reasons no distinction is made between pavement of storage areas and roads.

Design loads caused by cargo and equipment are based on the use of reachstackers and storage of full containers up to 3 high. The design load for the entire area is 10 mt/m2.

For drainage the pavement shall be constructed under a slope of at least 0.5%.

2.7 Investment Costs

The investment costs as presented in Section 2 have been revised and are given in Annex IV.3.1. The main results are presented in the table below.

Extension Container Terminal	Investment Costs (in 1000 USD)
Site Preparation	2.140
Environmental	50
Civil Works	4.424
Buildings	240
Utilities	1601
Other	206
Total	8.661

3. Development Multi Purpose Terminal Port of Batumi

3.1 Introduction

The functional requirements of the Multi Purpose Terminal in Batumi are based on the results as presented in Phase 2 Report, Volume III Port Master Plan, Section 5.

The multi purpose terminal is designed to handle:

- Self-sustaining container vessels
- General cargo vessels
- Ro-Ro vessels (road and rail)

In the master plan a Ro-Ro ramp for road trailers is planned. Prior to the presentation of the results of the study, the Port of Batumi decided to construct a Ro-Ro ramp suitable to handle both, railway wagons and road trailers. The construction of this ramp is due to be finalised by the end of 1998. The latest plans of the port have been included within the preliminary design. However, at the moment of writing, detailed design drawings are not yet finalised.

The Multi Purpose Terminal is located at the area behind Berth 5. The Ro-Ro ramp is being constructed in the corner of Berth 5 (stern) and Berth 6 (side).

3.2 Scope of Works

a) Demolition of buildings, sheds, pavement, foundations and utilities.
b) Construction of new quay wall.
c) Extension of terminal area in eastern direction, including storage areas and driving lanes.
d) Construction of facilities, such as terminal gate.
e) Installation of utilities, such as water supply, electricity, communications, sewerage.

Within the existing warehouses an office building shall be constructed. The construction of this office building is not within the scope of works.

The construction works shall be executed in one phase.

3.3 Functional Requirements Operational Areas

3.3.1 Terminal area

The total terminal area encloses 4.1 ha, of which 3.1 ha is owned by the port. The remaining area has to be purchased from the surrounding land users / owners (0.7 ha) and reclaimed out of the port basin by construction of a new quay (0.3 ha). The adjacent extension area (East of the terminal) shall be purchased from the present owner.

The port is located near the main access road to Poti. The entrance gate to the terminal shall be located close to this road.

Drawings:

- Drawing 3.2.3 Development Multi Purpose Terminal Batumi; New Layout.

3.3.2 Berths

The terminal shall be provided with one berth with a length of 225 m and a Ro-Ro ramp (by using Berth 6).

The existing quay is constructed of a blockwall designed for a water depth of 5.00 m. A new quay has to be constructed in front of the existing blockwall as indicated in Drawing 3.2.2. The distance between the new and the existing quays varies between 0 to 12 m. The space between the two quays has to be filled up.

Requirements berth:

- Length : 225 m
- Ground level apron : 2.10 m above sea level
- Water depth : Based on the maximum expected vessel of 15.000 DWT, the draft of this vessel will be 9.00 m and therefore design water depth of the quay should be 10.50 m.
- Filling up of the area between new and old quay construction.

Drawings:

- Drawing 3.2.2 Development Multi Purpose Terminal; Existing and New Cross Sections Berth 5.
- Drawing 3.2.3 Development Multi Purpose Terminal; New Layout.

3.3.3 Open storage area

The total amount of storage area is based on the results as presented in Phase 2 Report, Volume III, Section 2.3.4. However, the new development area does not meet these requirements, because of the limited available area.

The open storage areas can be split up in 2 types:

1. Storage of containers : 12.000 m2 (including driving lanes)
2. Open storage and parking areas : 3.500 m2 (excluding driving lanes)

The layout of the storage areas is based on storage of specific types of cargo: container, parking, general cargo. The designed areas will be allocated accordingly. However, this allocation can be changed without any problem, since these areas will be indicated by painted lines and therefore interchangeable without any problem. The consequence is that the entire area should be designed uniformly and has to withstand the highest cargo and traffic loads.

Drawings:

- Drawing 3.2.3 Development Multi Purpose Terminal; New Layout.

3.3.4 Warehouses

The port authority has planned to use the existing warehouse at Berth 5. This warehouse shall be reconstructed to enable storage of general cargo. Reconstruction of this warehouse is not within the scope of works.

3.3.5 Parking areas

Various parking areas are required:

1. Near the gate
   Directly outside the entrance gate an area sufficient to park approximately 8 trucks shall be provided.
2. Outside the prot area:
   A parking facility for approximately 50 trucks should be provided outside the port area especially for Ro-Ro related truck traffic. This facility is not within the scope of works

3.3.6 Areas for dangerous goods

For stacking dangerous goods containers special facilities are not required. Containers with dangerous cargo shall be stored in the front or at the end of the container rows, with the door-side always to the road in order to have direct acvcess to the cargo in case of emergencies. The actual stacking should follow international IMO recommendations or other environmental regulations. Usually dangerous cargo containers are stacked next to a normal container for "neutralising" the danger of spills.

Areas for storage of dangerous goods have to be allocated. However, this is an operational issue, which can take place after construction. Therefore, no special areas are allocated within the design.

Requirements:

- Dangerous goods should be carefully stowed in appropriate locations in compliance with the commercial and safety requirements applicable to their stacking.
- The storage area for dangerous goods should be clearly signposted.
- Dangerous goods placed in containers must be stowed in accordance with international IMO recommendations.
- When dangerous goods, whether containerised or not, are unloaded and stored in the terminal, they should be properly segregated.

3.3.7 Operational area apron

This area is basically used for the movement of vehicles and the temporary storage of cargo during loading or unloading. At the present design, the width of these areas does not meet modern port standards. However, the limited available terminal area does not allow wider aprons.

Requirements:

- At the quay an apron of 25 m width shall be allocated as operational area.
- Mobile cranes will be used as handling equipment.

Drawings:

- Drawing 3.2.3: Development Multi Purpose Terminal Batumi; New Layout.

3.3.8 Driving lanes

The requirements concerning driving lanes are:

- The minimum width of the driving lanes shall be 15 m.
- To maximise the flexibility of the terminal for future development, the pavement of the driving lanes at the terminal shall be equal to the pavement of the storage areas.
- The driving lanes shall be indicated by painted lines.

Drawings:

- Drawing 3.2.3: Development Multi Purpose Terminal Batumi; New Layout.

3.3.9 Railway Tracks

A new rail loading faciltiy shall be constructed behind the existing warehouses. This railway track shall be connected to the existing track under the road bridge, which is presently not being used.

Requirements:

- The level of the new railway track shall be adjusted to the new railway track of the rail ferry presently under construction.
- The new railway track shall be paved in with concrete to enable access by rolling equipment.

Drawings:

- Drawing 3.2.3: Development Multi Purpose Terminal Batumi; New Layout.

3.4 Functional Requirements Facilities

3.4.1 Gate

At the south-western corner of the terminal a new terminal gate shall be constructed. This gate shall provide access to and from the main access road of Batumi.

Requirements:

- The gate shall be provided with two entrance lanes and one exit lane.
- Entrance protection by electric barriers.
- Rain protection.
- Small office room.
- Utilities:
  - Electricity
  - Telephone
  - Alarm system
  - Inter terminal communication system

Drawings:

- Drawing 3.2.3 Development Multi Purpose Terminal Batumi; New Layout.
- Drawing 3.1.8: Extension Container Terminal Poti; New Facilities (principal layout).

3.4.2 Office

The existing warehouse at Berth 5 shall be reconstructed to an office building. The reconstruction of this building is not included within the scope of works.

3.4.3 Workshop

A workshop shall not be required.

3.4.4 Custom Facilities

Shall be included within the office building.

3.4.5 Weigh bridge

Shall not be required.

3.4.6 Fire fighting facilities

The requirements for fire protection are:

- Fire hydrants shall be installed above ground level for easy identification.
- Hydrants shall be located next to permanent fixtures such as lighting poles.

3.4.7 Alarm system

For security reasons an alarm system and fence is required for the entire port.

Requirements:

- The alarm system shall be based on video camera controlling.
- The central controlling room shall be integrated with the gate security.
- The installation of fire alarms, with at least a manually operated system connected to the terminal control centre and automatic sound and visual signalling.

3.4.8 Oil separation basins

The drainage system shall be provided with a sedimentation basin with oil separator.

The present oil separator presently used to clean waste water from the rail wagon cleaning facility shall be demolished and the pipeline shall be relocated to the existing oil separator located farther North.

Drawings:

- Drawing 3.2.3 Development Multi Purpose Terminal Batumi; New Layout.

3.4.9 Communication system

A communication system linking the operating areas, entrances and exits, and the control centre.

3.4.10 Reefer points

Shall not be required.

3.4.11 Fenders

New fenders shall be installed at the new quay wall.

Requirements:

- The fenders have to withstand forces from 15.000 DWT vessels.
- The minimum diameter is 1.00 m.
- Installation of fender every 15 m.

3.5 Functional Requirements Utilities

3.5.1 Drainage and Sewerage

The drainage system shall be sufficient to prevent flooding. The drainage network is based on the design rainfall of 60 l/sec/ha. Drained water is collected in sedimentation basins, with an outflow to the port basin. During severe rainfall, the rainwater will flow directly into the port basin. This will not have an environmental impact, since waste will be collected in the sedimentation basin at the beginning of a rain-shower. This emergency overflow avoids high currents within the sedimentation basin and avoids flooding of the terminal area in case the sewerage network would not be able to discharge the rainwater.

Requirements:

- The paved areas shall be provided with a drainage system sufficient to handle the design rainfall quantities.
- The new drainage system shall be connected as described above.

Drawings:

- Drawing 3.2.3 Development Multi Purpose Terminal Batumi; New Layout.
- Drawing 3.2.5 Development Multi Purpose Terminal Batumi; New Utilities.

3.5.2 Water

Requirements:

- The provision of drinking water and water for washing, with a minimum pressure of 2.5 kg/cm and a minimum flow of 50 l/sec.
- If the water is also to be used for fire fighting, the pressure must be increased to 7 kg/cm and the flow to 80 l/sec and hydrants of suitable height installed at intervals of not more than 100m.

3.5.3 Electricity

The terminal shall be provided with cable ducts.

Requirements:

- All electric services should be located under the ground in concrete ducts
- Low voltage electricity network for lighting.

Drawings:

- Drawing 3.2.5 Development Multi Purpose Terminal Batumi; New Utilities

3.5.4 Gas

Gas connections are not required.

3.5.5 Lighting

To operate the terminal by day and night, the lighting must meet the following requirements:

- Use as few lampposts as possible. Posts should be high to provide ample clearance.
- For operation en storage areas: 80 lux
- Other areas and areas not in operation: 50 lux
- Illumination at ground level should be et least 25 lux

- The average level should be 50 lux where required to ensure the safety of workers or cargo.

3.6 Technical Specifications

3.6.1 Demolition

Existing pavement of storage areas and driving lanes, old buildings, foundations and other structures shall be demolished. These constructions are indicated in the drawings.

The demolition of this building shall meet the requirements according to international health and safety regulations.

Drawings:

- Drawing 3.2.4: Extension Container Terminal Poti; Demolition

3.6.2 Pavement

In principal a range of pavements may be considered:

- Concrete slabs, which are unsuitable where the subgrade is uncompated and settling may cause cracks.
- Concrete paving blocks, which are well suited to partly compacted subgrades and easily repaired.

For flexibility reasons no difference is made between pavement of storage areas and roads.

Design loads caused by cargo and equipment are based on the use of reach stackers and storage of full containers up to 3 high. The design load for the entire area is 10 t/m2.

For drainage the pavement has to be constructed under a slope of at least 0.5%.

3.7 Investment Costs

The investment costs as presented in Section 2 have been revised and are shown in Annex IV.3.1. The main results are presented in the table below.

Multi Purpose Terminal Batumi	Investment Costs (in 1000 USD)
Site Preparation	1.663
Environmental	150
Civil Works	6.801
Buildings	0
Utilities	789
Other	163
Total	9.566

LIST OF DRAWINGS

List of Drawing

Section 1:

Drawing 1.1.1 Port of Poti; Layout Existing Situation
Drawing 1.1.2 Port of Poti; Surrounding Areas
Drawing 1.1.3 Port of Poti; Cross Sections Quay Constructions

Drawing 1.2.1 Port of Batumi; Layout Existing Situation
Drawing 1.2.2 Port of Batumi; Surrounding Areas
Drawing 1.2.3 Port of Batumi; Cross Sections Quay Constructions

Section 2:

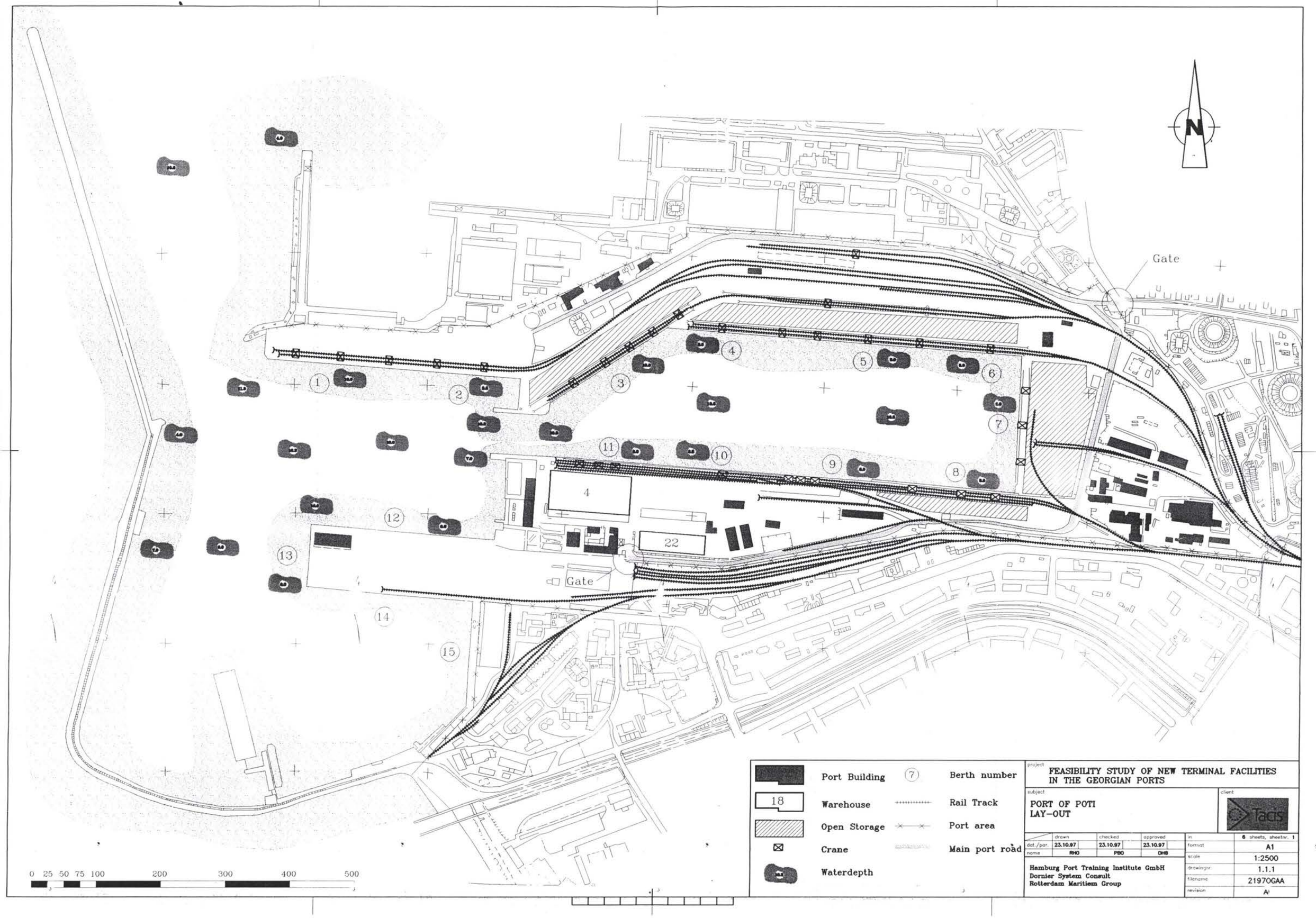
Drawing 2.1.1 Port of Poti; Master Plan
Drawing 2.1.2 Port of Poti; New Container Terminal

Drawing 2.2.1 Port of Batumi; Master Plan
Drawing 2.2.2 Port of Batumi; Reconstruction Handling & Storage Facilities Berth 9
Drawing 2.2.3 **Replaced by Drawing 3.2.3**

Section 3:

Drawing 3.1.1 Extension Container Terminal Poti; Existing Layout
Drawing 3.1.2 Extension Container Terminal Poti; Existing Cross Sections Berth 5 – 7
Drawing 3.1.3 Extension Container Terminal Poti; Existing Utilities
Drawing 3.1.4 Extension Container Terminal Poti; New Layout
Drawing 3.1.5 Extension Container Terminal Poti; Demolition
Drawing 3.1.6 Extension Container Terminal Poti; Cross Sections New Situation
Drawing 3.1.7 Extension Container Terminal Poti; New Utilities
Drawing 3.1.8 Extension Container Terminal Poti; New Facilities

Drawing 3.2.1 Multi Purpose Terminal Batumi; Existing Layout
Drawing 3.2.2 Multi Purpose Terminal Batumi; Existing and New Cross Sections Berth 5
Drawing 3.2.3 Multi Purpose Terminal Batumi; New Layout
Drawing 3.2.4 Multi Purpose Terminal Batumi; Demolition
Drawing 3.2.5 Multi Purpose Terminal Batumi; New Utilities



project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
PORT OF POTI
LAY-OUT

client
TACIS

	drawn	checked	approved
dat./par.	23.10.97	23.10.97	23.10.97
name	RHO	PBO	DHB

Hamburg Port Training Institute GmbH
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Rotterdam Maritiem Group

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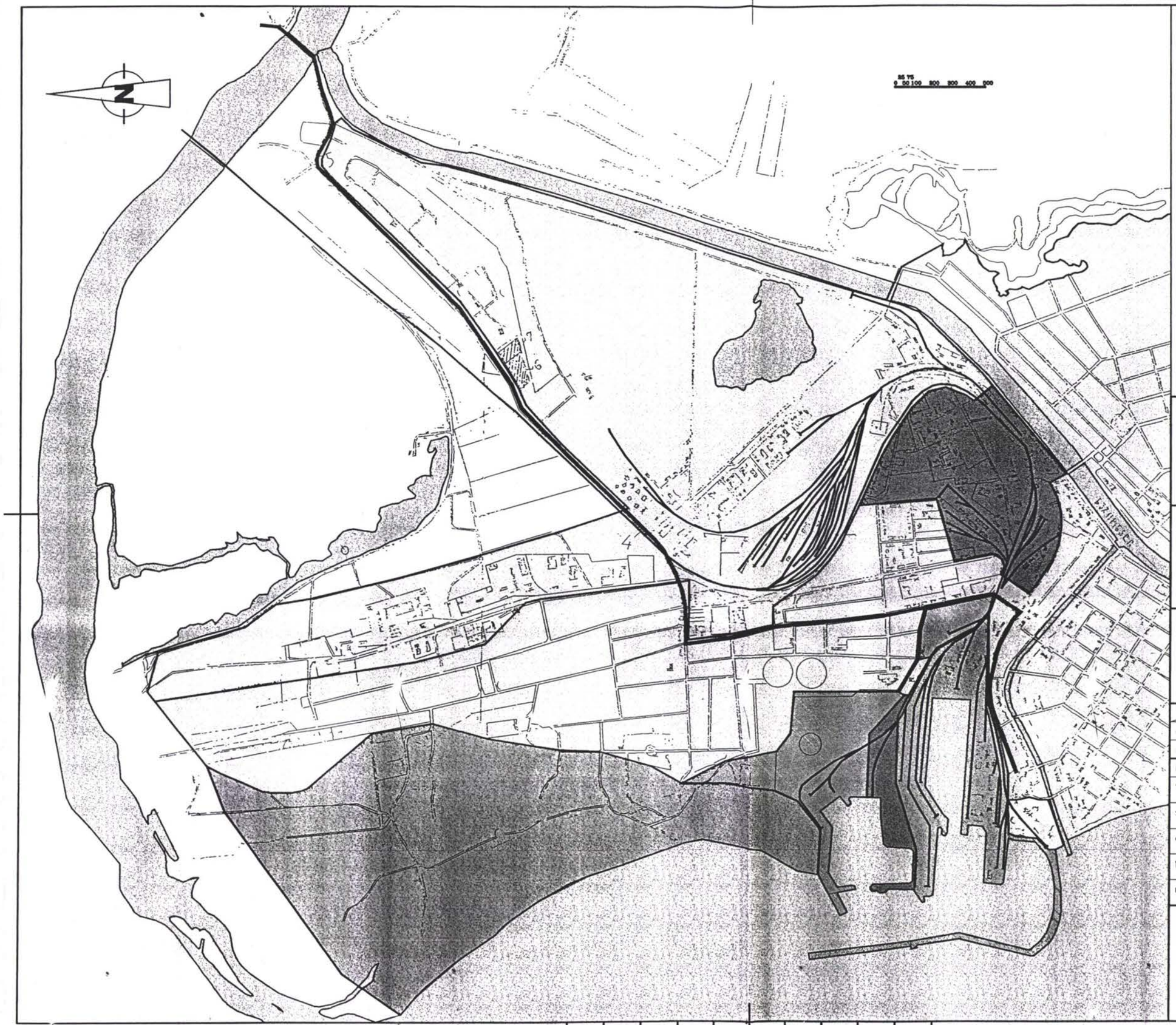

project

FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject

PORT OF POTI
AND SURROUNDING AREAS

client

	drawn	checked	approved
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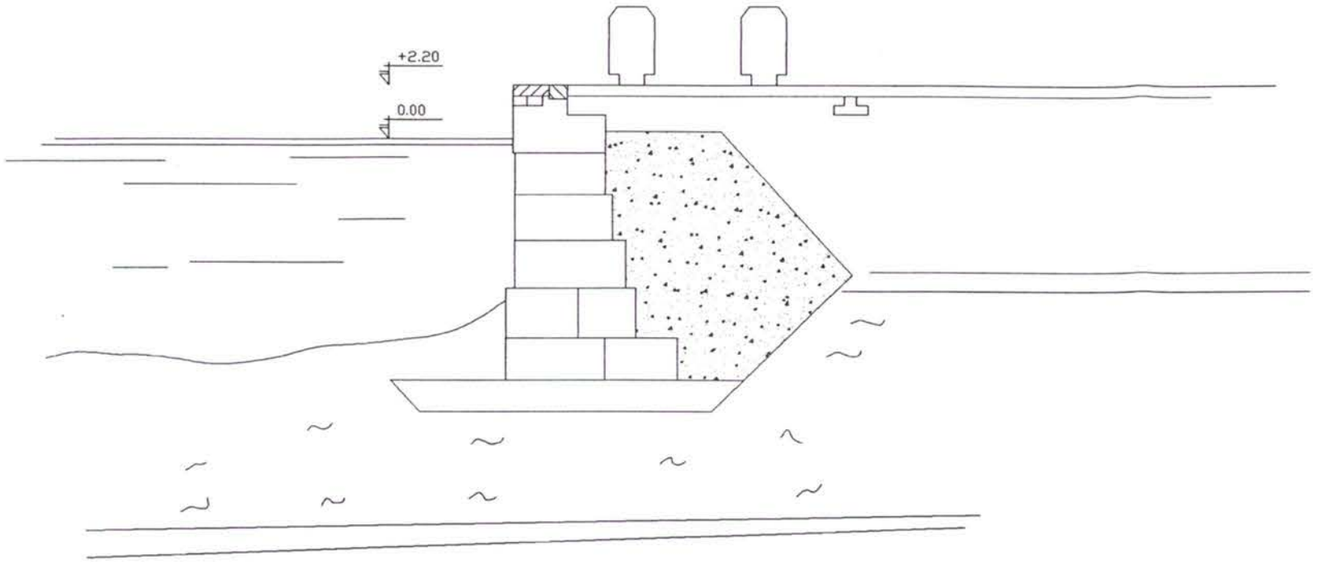

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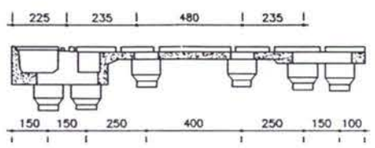

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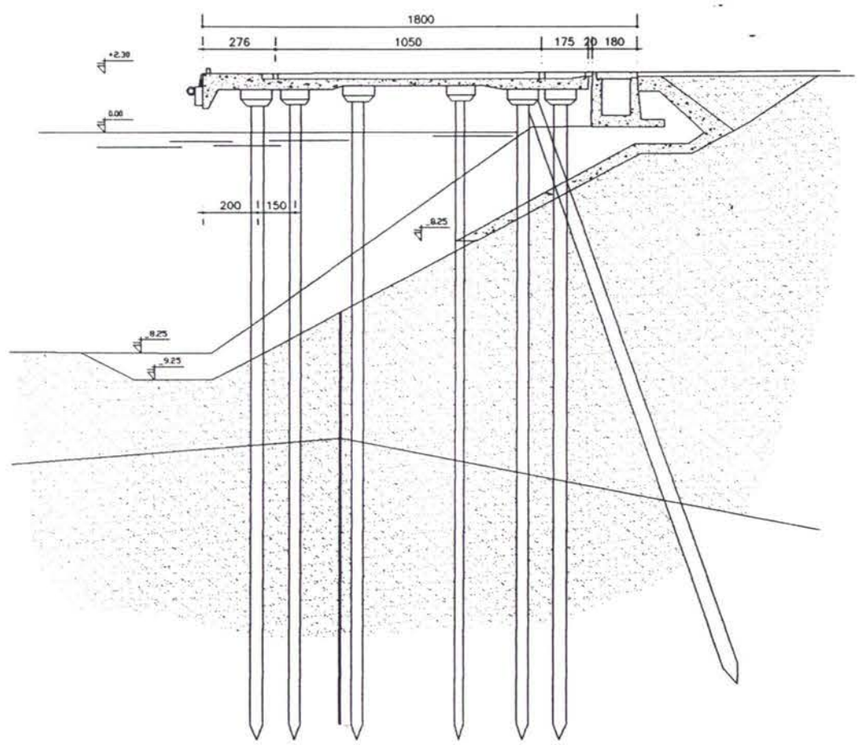

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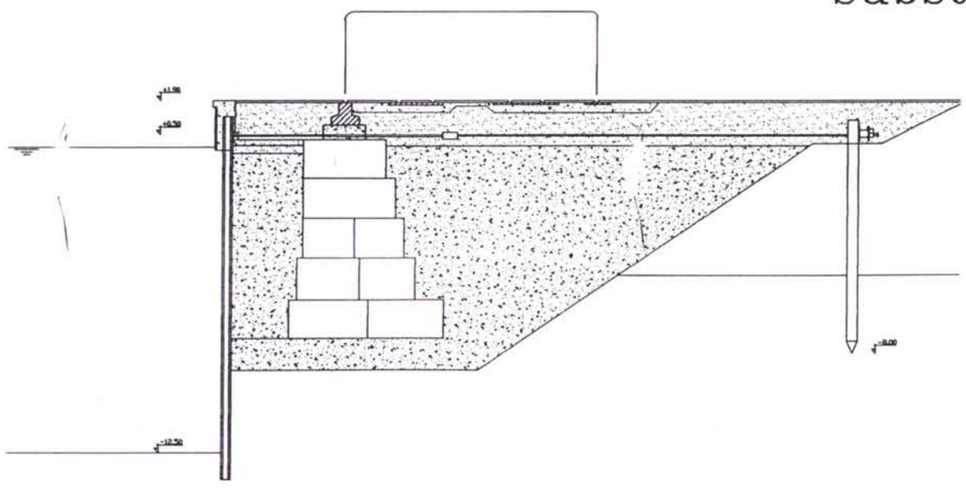

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project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
PORT OF POTI
Cross Sections Quay Constructions

client

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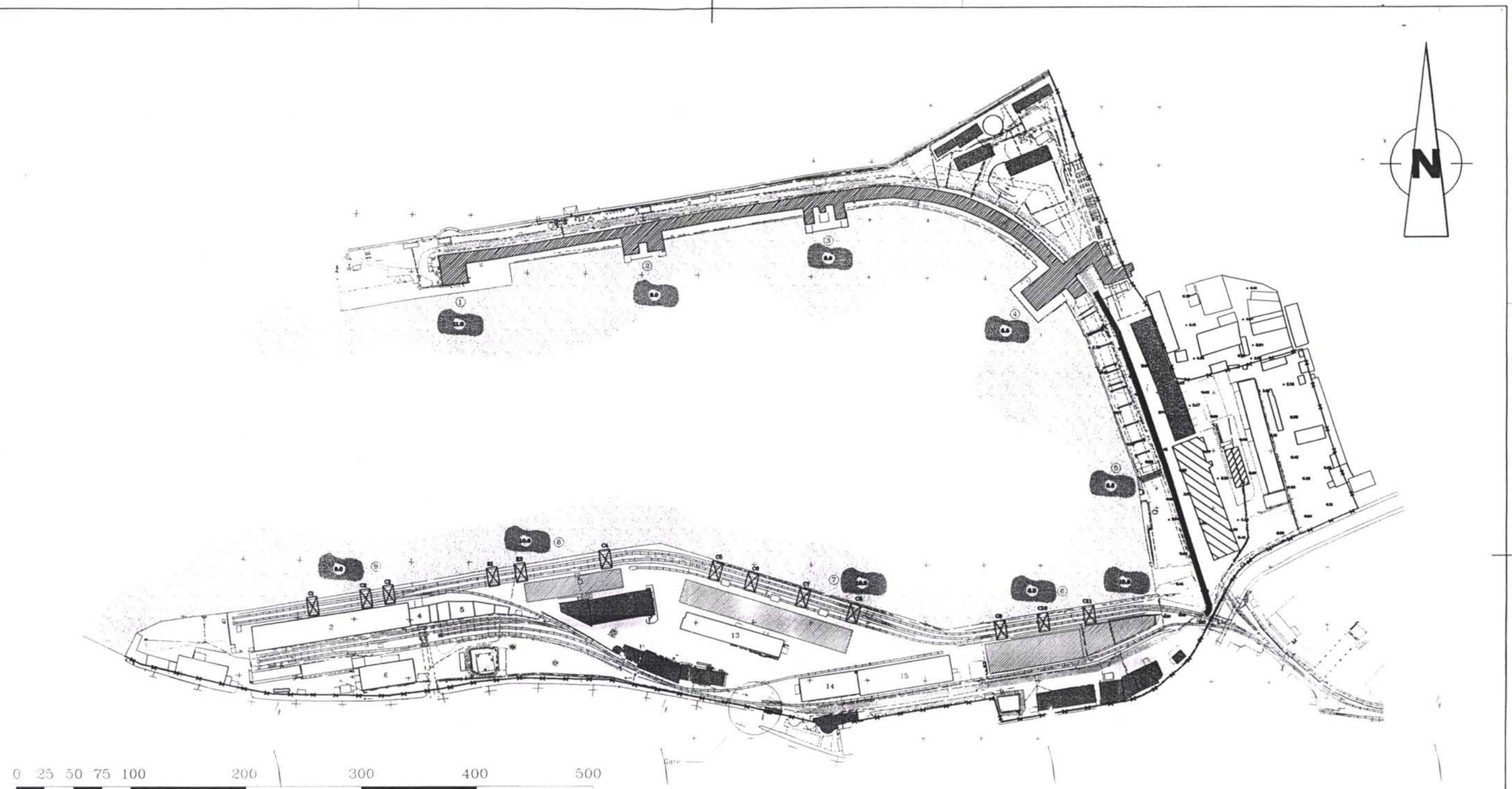

- Port Building
- Warehouse (18)
- Open Storage
- Crane
- Berth number (⑦)
- Rail Track
- Waterdepth (8)
- Oil pipelines
- Main port road
- Port area

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
PORT OF BATUMI
LAYOUT EXISTING SITUATION

client
Tacis

	drawn	checked	approved
dat./par.	23.10.97	23.10.97	23.10.97
name	RHO	PBO	DHB

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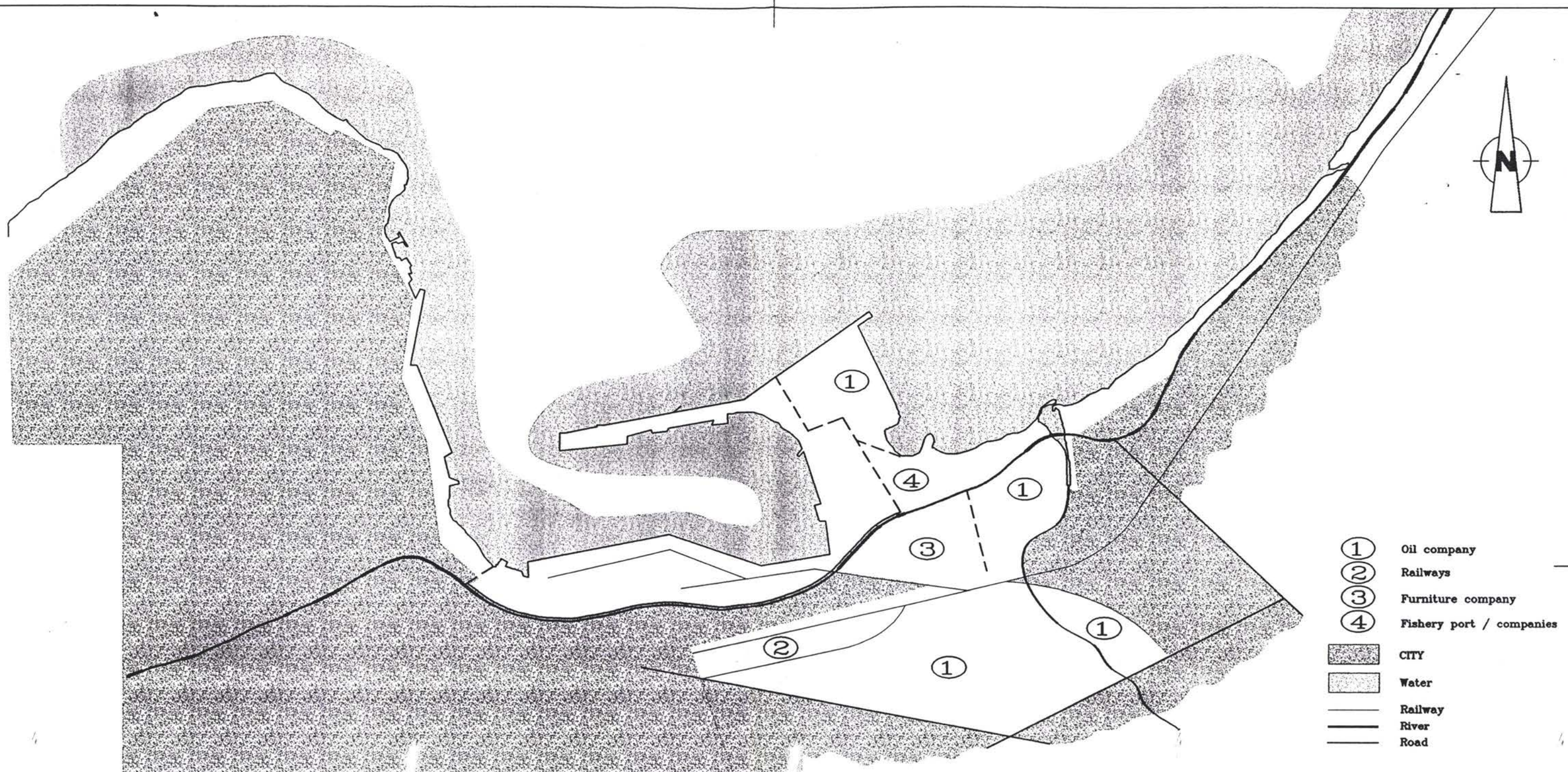

project

FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject

PORT OF BATUMI AND SURROUNDING AREAS

client

Tacis

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dat./par.	23.10.97	23.10.97	23.10.97
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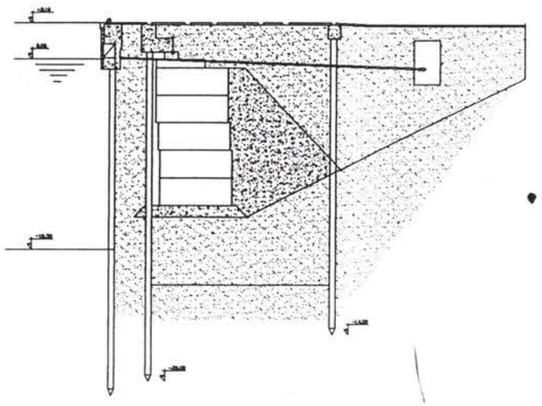

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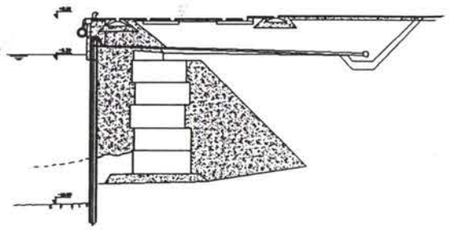

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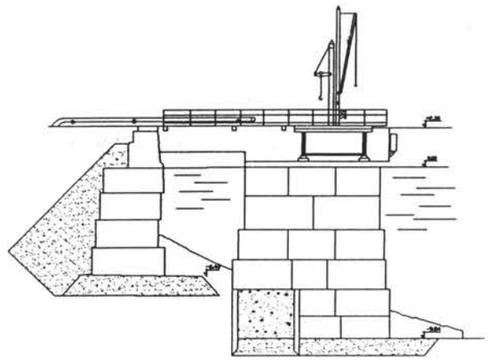

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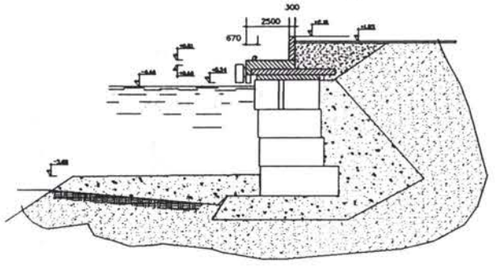

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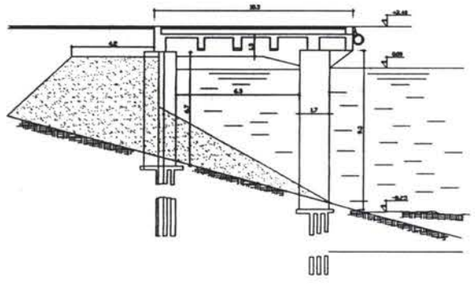

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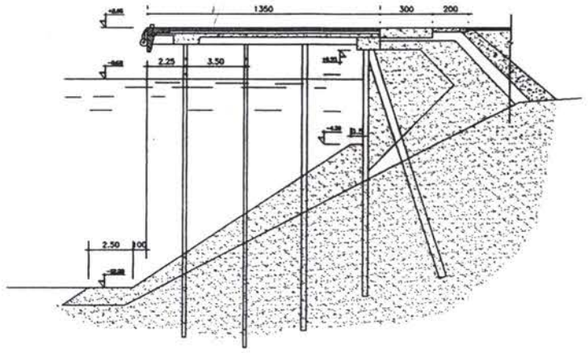

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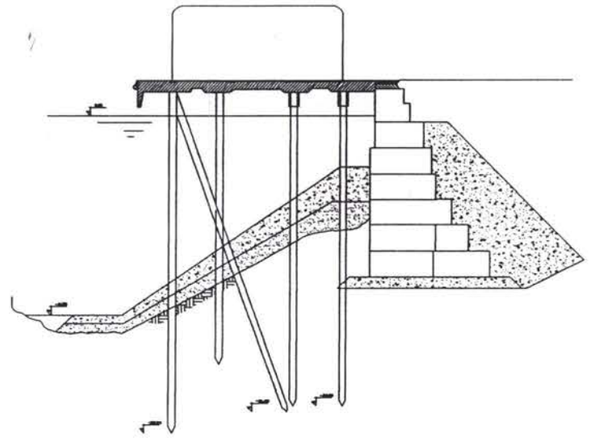

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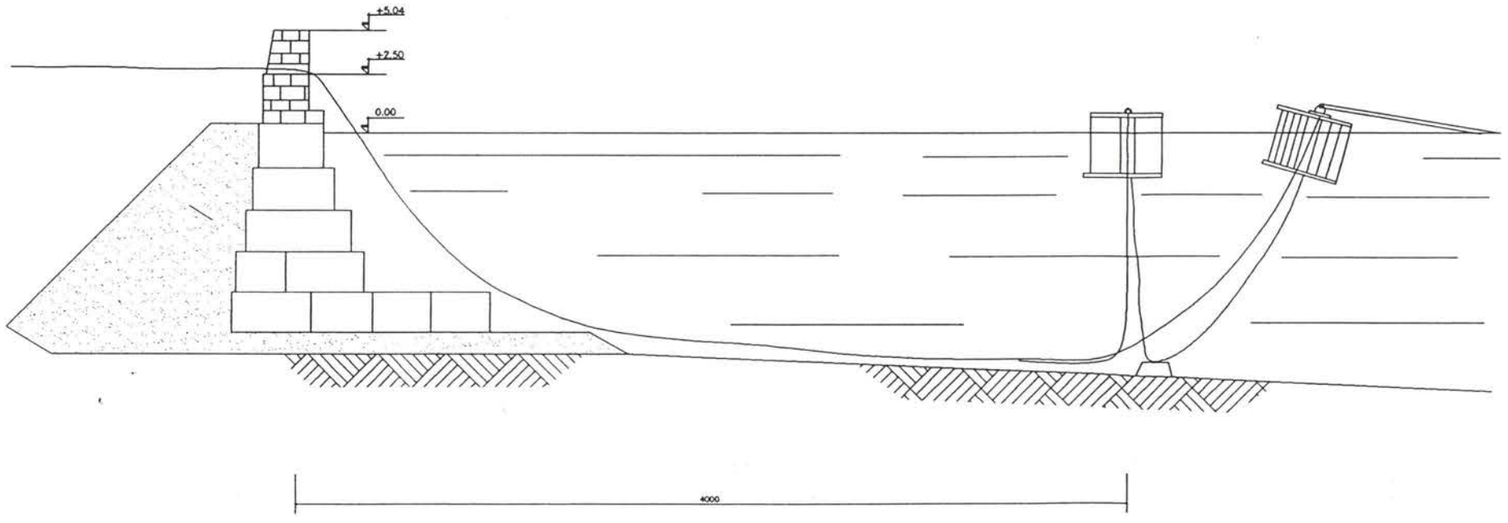

Off-shore mooring

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
PORT OF BATUMI
Cross Sections Quay Constructions

client
TeGIS

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dat./par.	23.10.97	23.10.97	23.10.97
name	RHO	PBO	DHB

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Dornier System Consult
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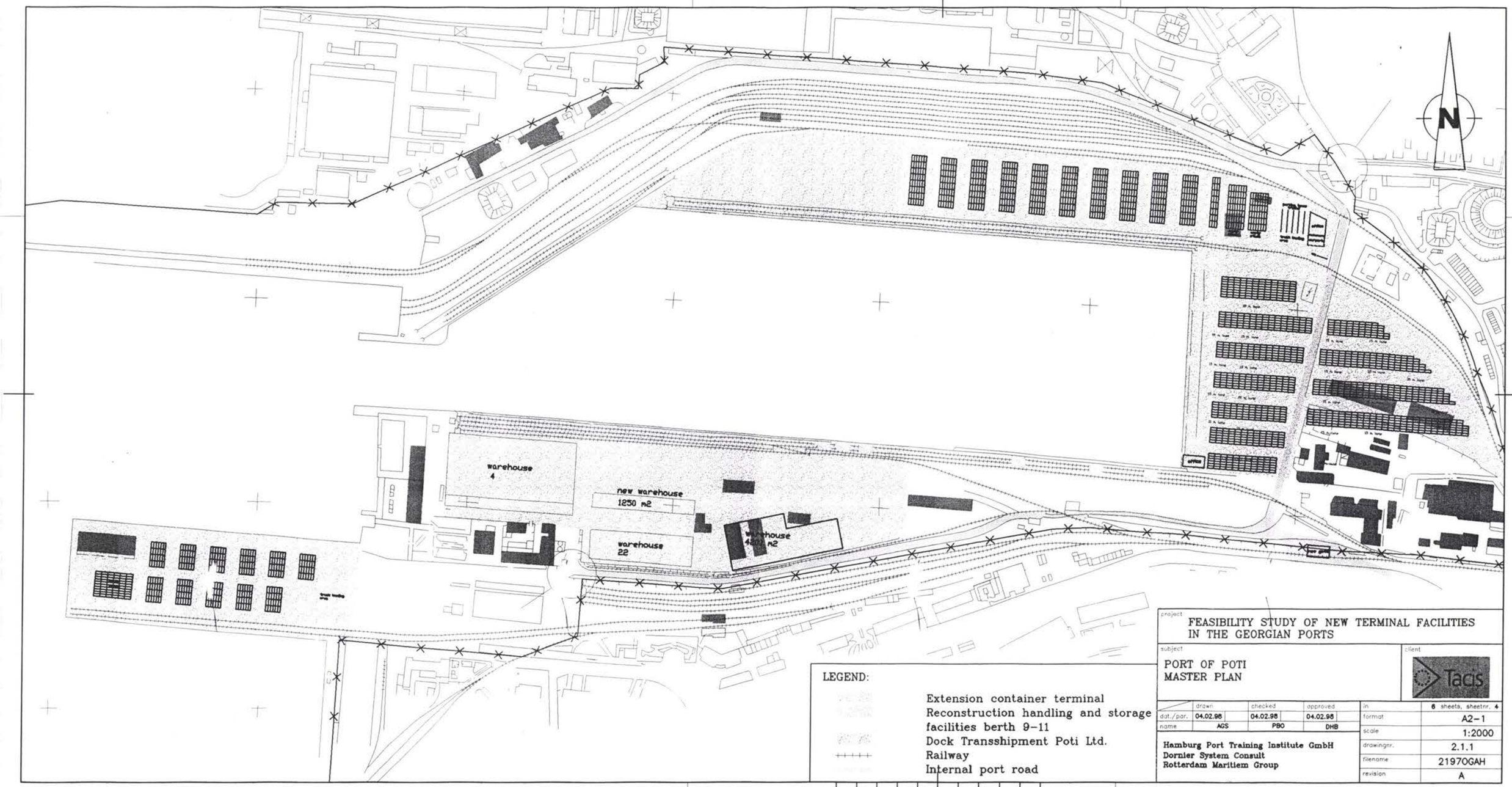

LEGEND:

- Extension container terminal
- Reconstruction handling and storage facilities berth 9–11
- Dock Transshipment Poti Ltd.
- Railway
- Internal port road

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
PORT OF POTI
MASTER PLAN

client
Tacis

	drawn	checked	approved
dat./par.	04.02.98	04.02.98	04.02.98
name	AGS	PBO	DHB

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Rotterdam Maritiem Group

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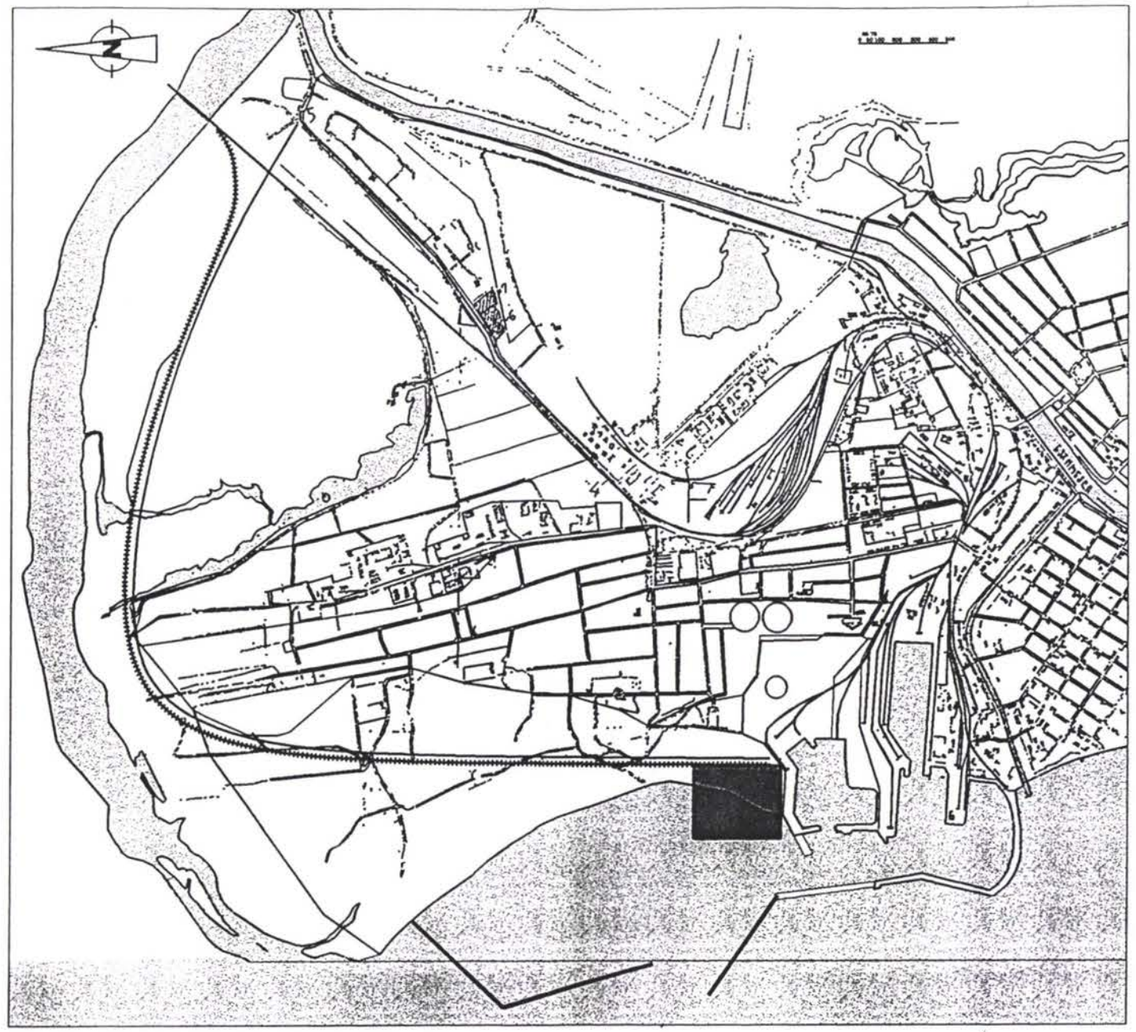

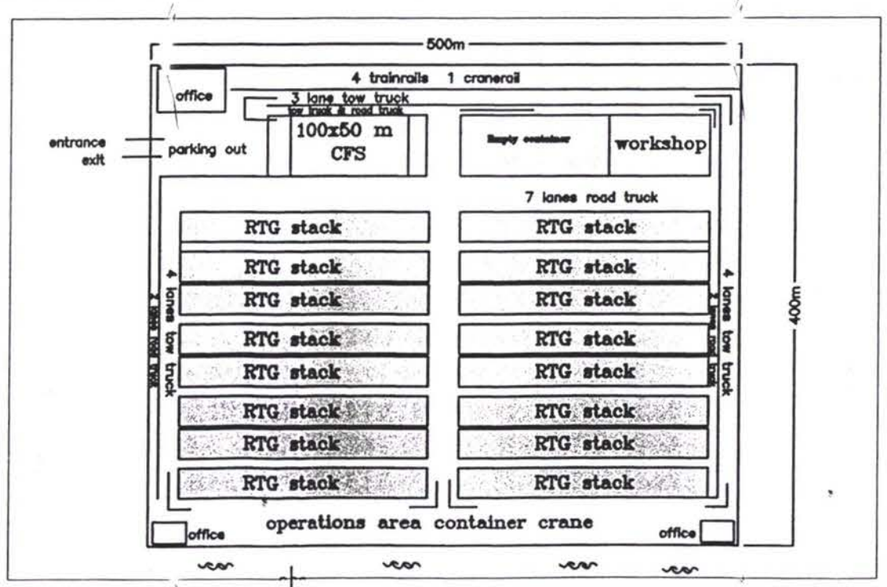

1ST PHASE : 2002

2ND PHASE : 2007

3RD PHASE : 2012

project

FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject

PORT OF POTI
NEW CONTAINER TERMINAL

client

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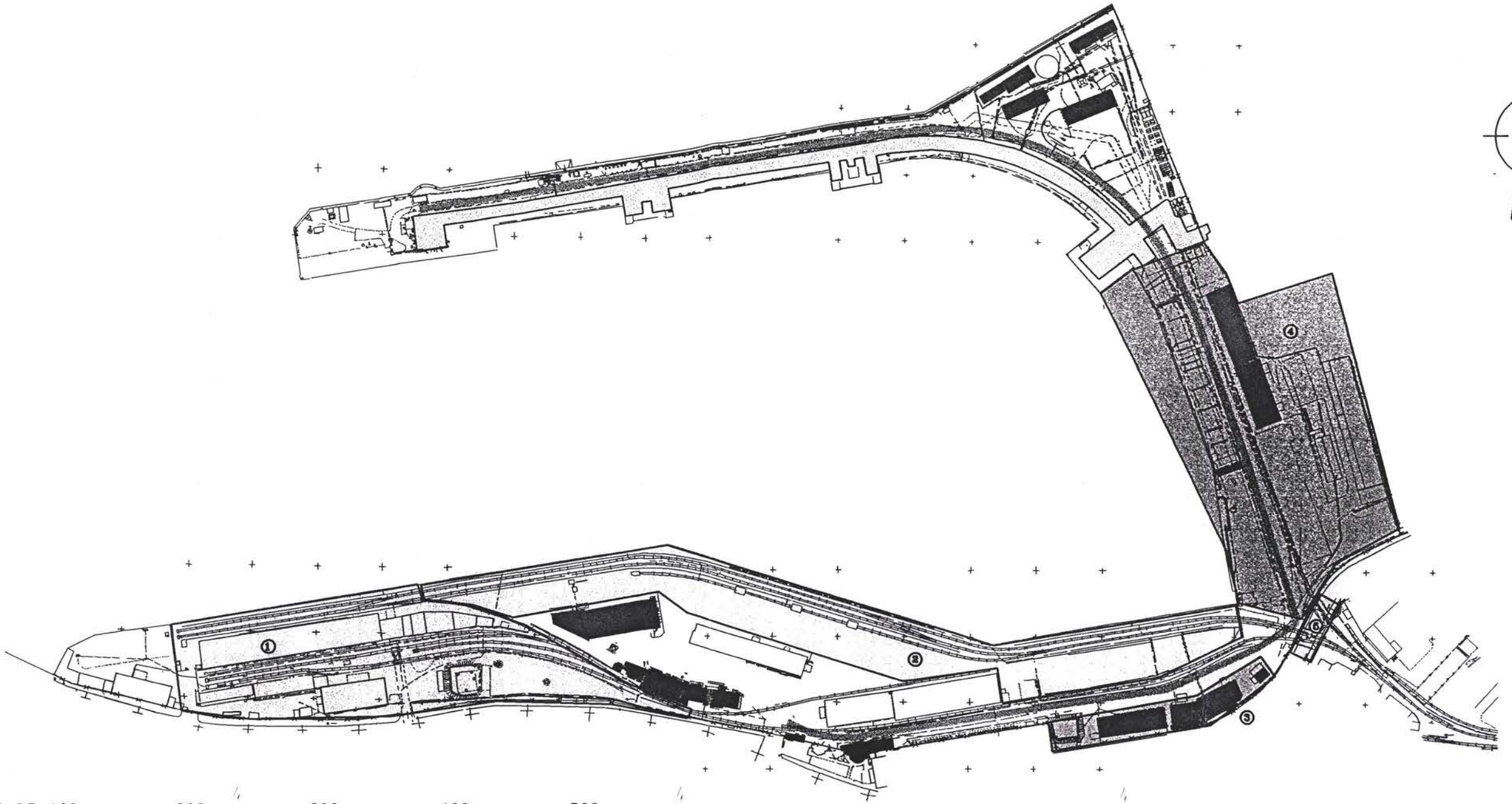

Port Building
18 Warehouse
Rail Track
Oil pipelines
Main port road
Port area

Investments Projects PORT OF BATUMI

① Reconstruction handling and storage facilities BE9–11
② Upgrading railway system and pavement storage areas
③ Reconstruction workshops
④ Construction multi purpose terminal
⑤ Construction new bridge

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
PORT OF BATUMI
MASTER PLAN

client

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dat./par.	04.02.98	04.02.98	04.02.98
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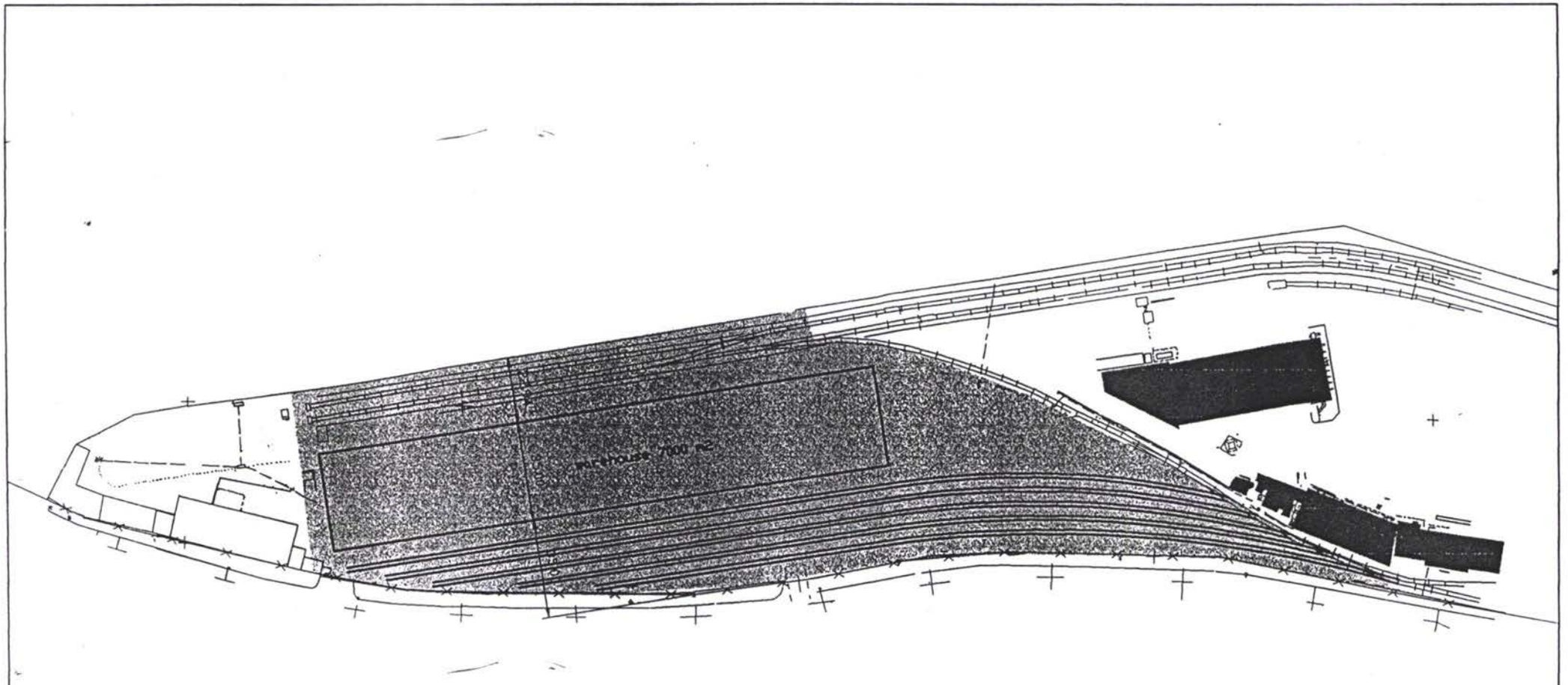

project

FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject

PORT OF BATUMI
RECONSTRUCTION HANDLING AND STORAGE FACILITIES BERTH 9

client

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Berth 5

Berth 6

Berth 7

A
see drawing 3.1.6

B
see drawing 3.1.6

C
see drawing 3.1.6

X = 500
Y = 2500

X = 0
Y = 2250

LEGEND

- border
- building
- railway
- road
- fence
- crane
- groundlevel
- road
- concrete
- sand

levels in m. Ref. system Baltic Sea Level
diameter in mm

project: FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject: PORT OF POTI
LAY OUT
EXISTING SITUATION

client: Tacis

	drawn	checked	approved
dat./par.	23.04.98	23.04.98	23.04.98
name	GOJ	DHB	ROI

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Rotterdam Maritiem Group

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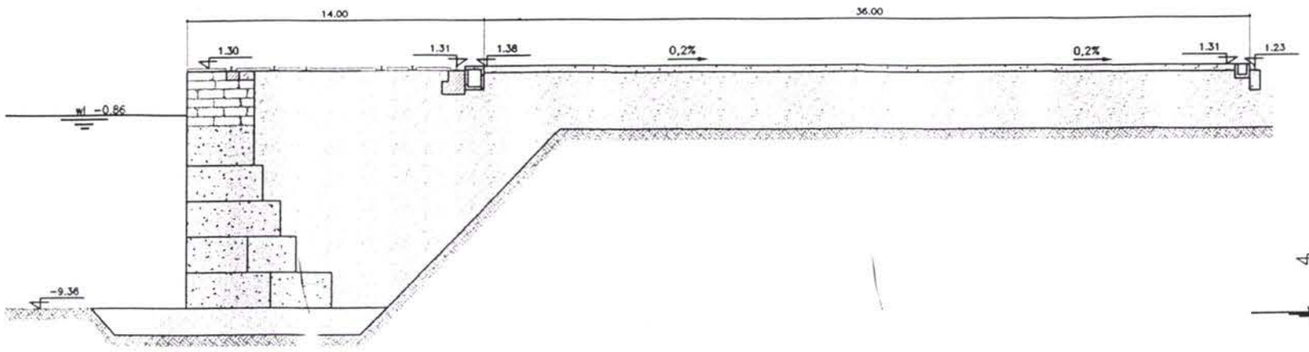
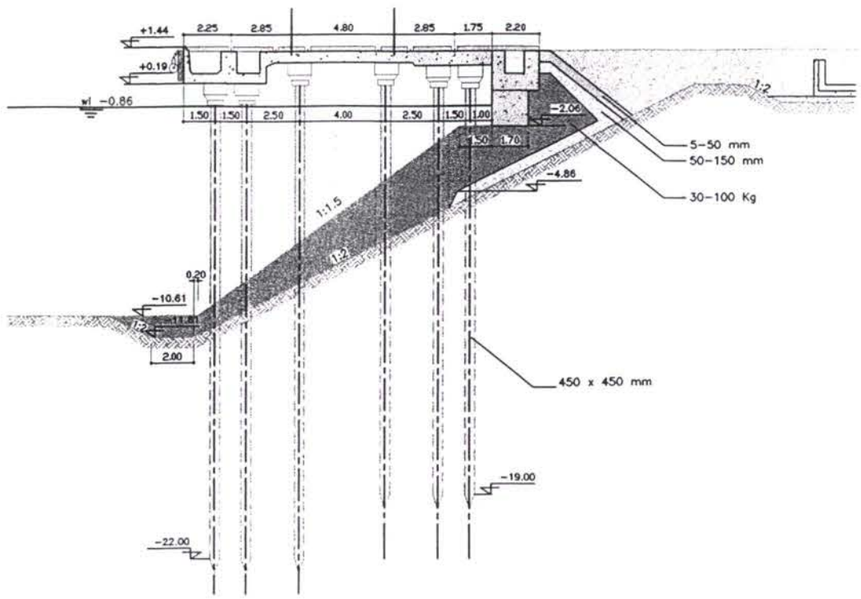


CROSS SECTION BERTH 5



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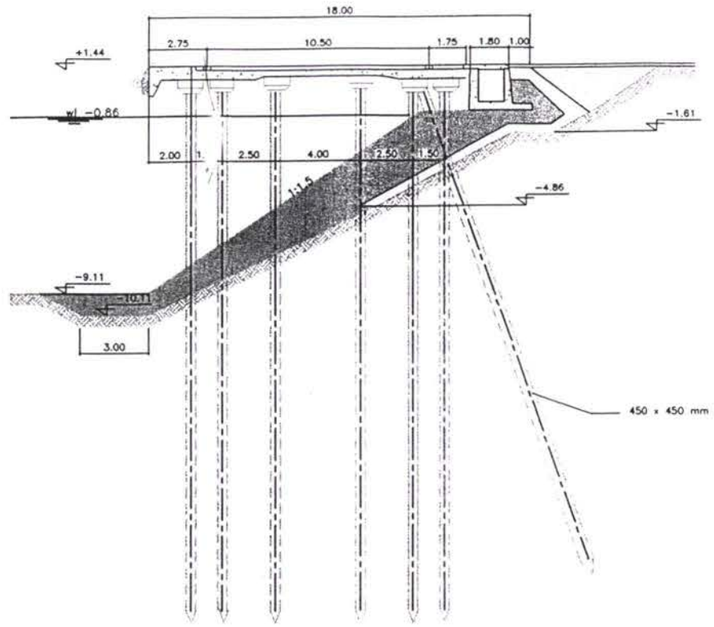

CROSS SECTION BERTH 7

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
EXTENSION CONTAINER TERMINAL POTI
CROSS SECTIONS BERTH 5-7
EXISTING SITUATION

client
Tacis

	drawn	checked	approved
dat. par.		23.04.98	
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Dornier System Consult
Rotterdam Maritiem Group

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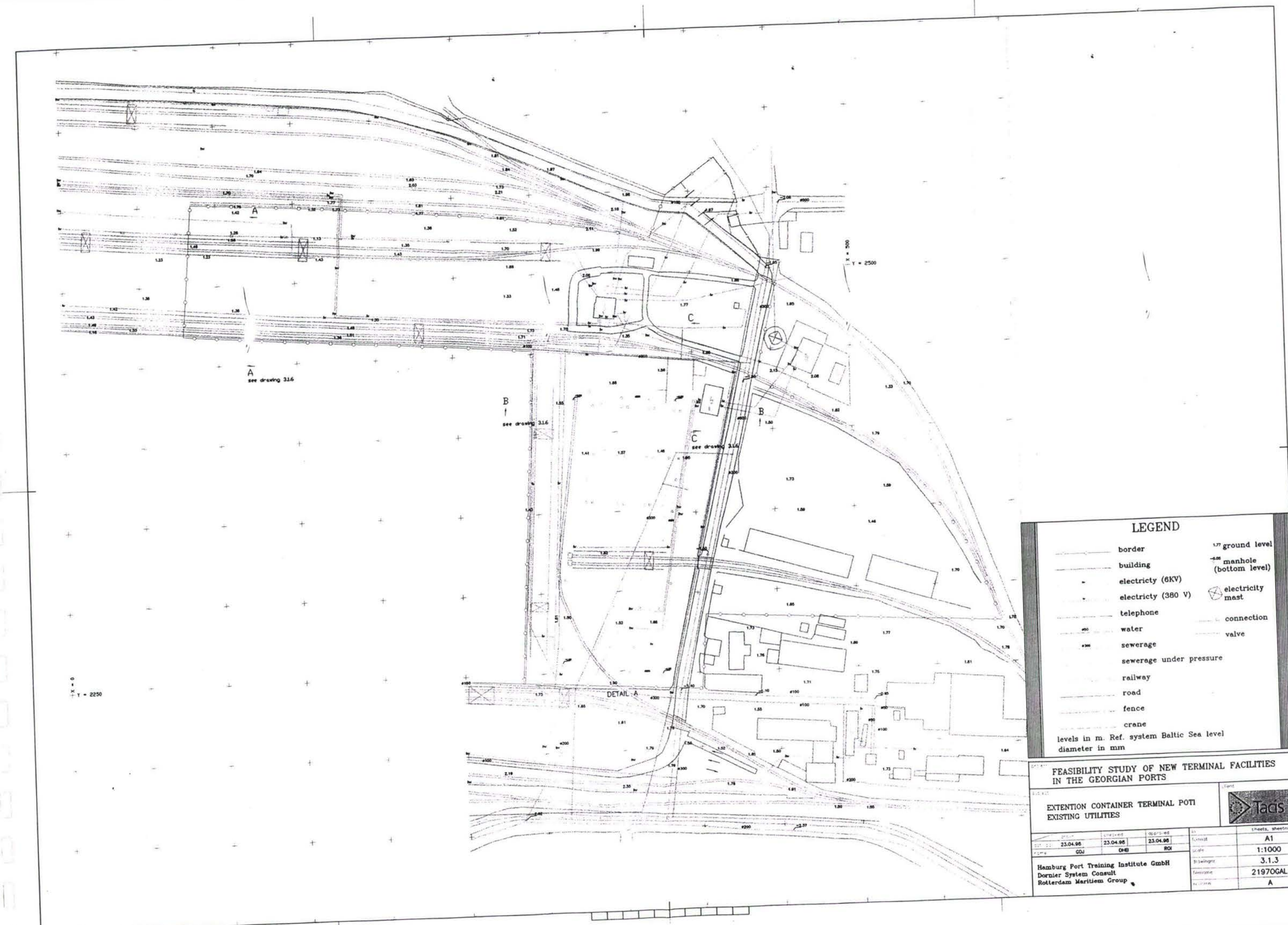

LEGEND

- border
- building
- electricity (6KV)
- electricity (380 V)
- telephone
- water
- sewerage
- sewerage under pressure
- railway
- road
- fence
- crane
- 1.77 ground level
- manhole (bottom level)
- electricity mast
- connection
- valve

levels in m. Ref. system Baltic Sea level
diameter in mm

FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

EXTENTION CONTAINER TERMINAL POTI
EXISTING UTILITIES

Client: Tacis

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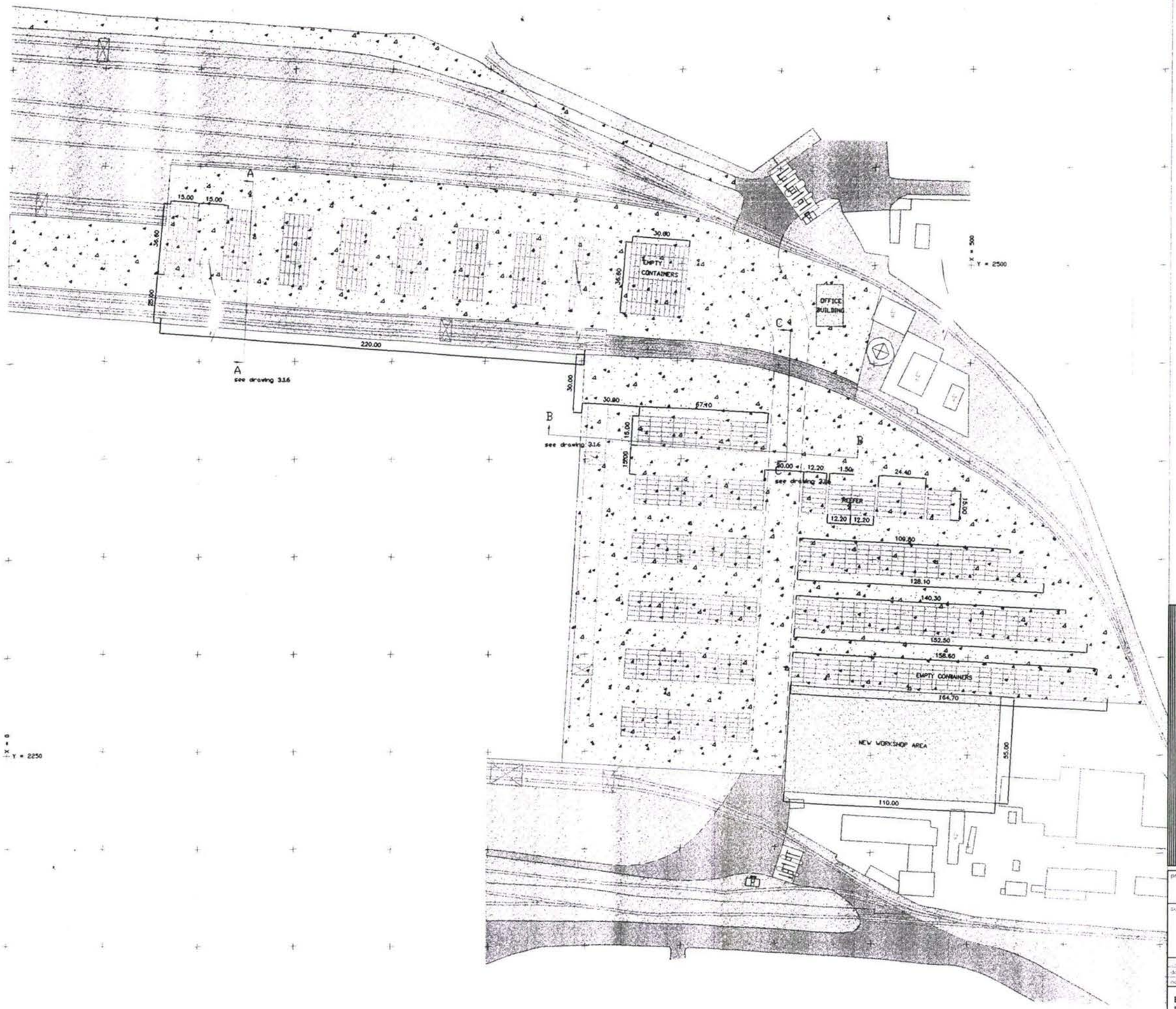

LEGEND

border	concrete
building	stones
railway	new building
road	sand
fence	new road
crane	
road	
15.00 lenght	

Dimensions in m

project:
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject:
EXTENSION CONTAINER TERMINAL POTI
NEW LAY OUT

Tacis

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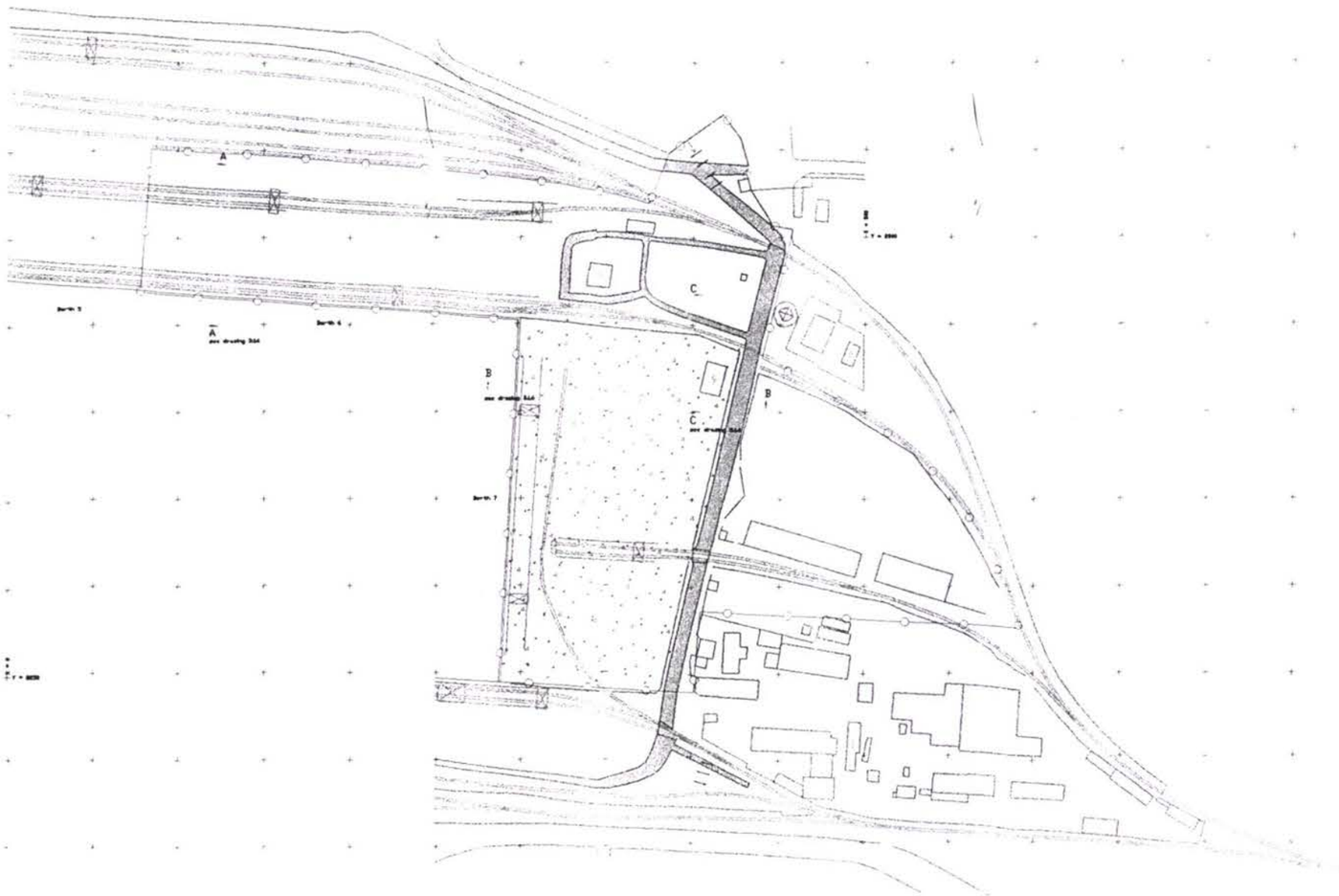

LEGEND

EXISTING		DEMOLITION
	border	
	building	building
	railway	railway
	road	road
	fence	fence
	crane	crane
		concrete
		road

project: FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject: EXTENTION CONTAINER TERMINAL POTI
DEMOLITION

client: Tacis

	drawn	checked	approved
dat. sign.	23.04.98	23.04.98	23.04.98
name	GDJ	DHB	ROI

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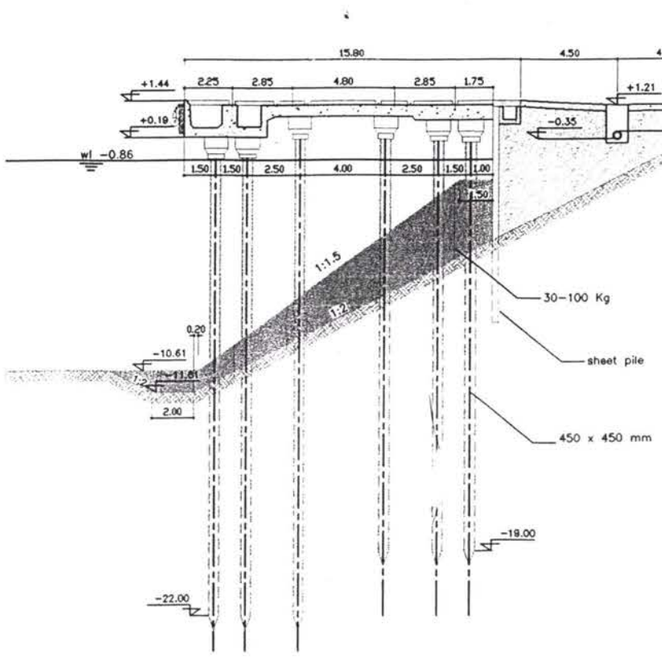

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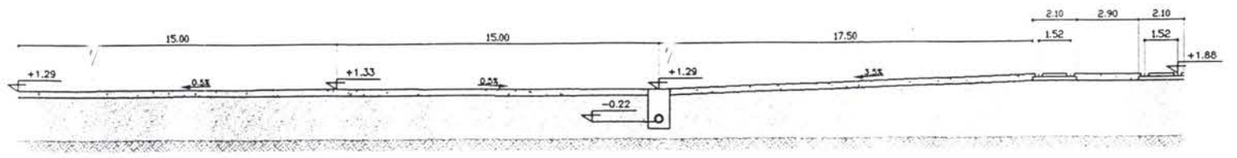

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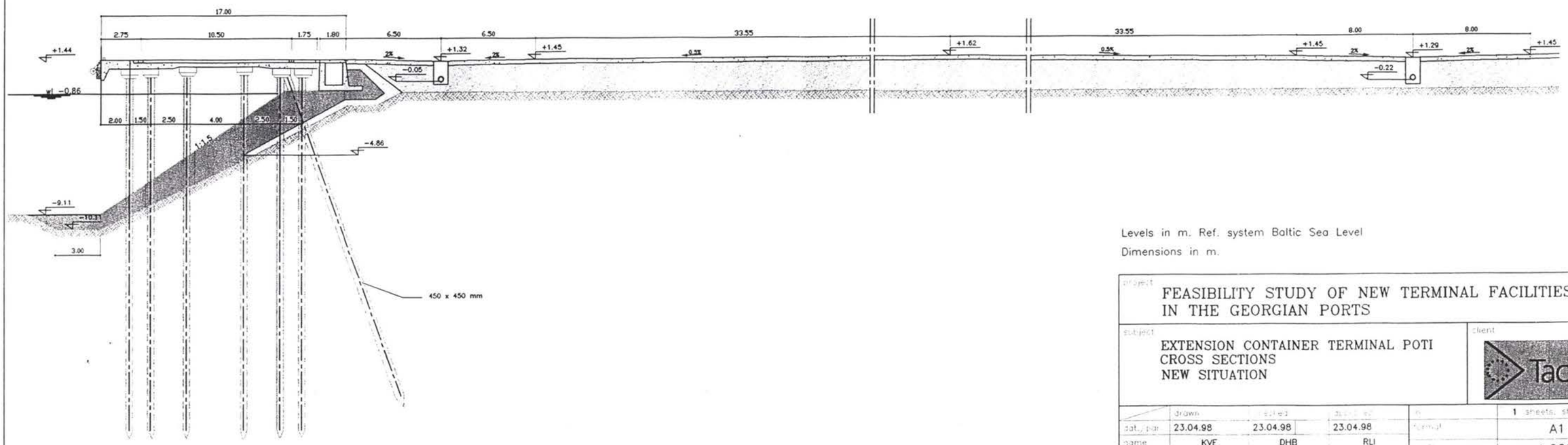

CROSS SECTION B-B (BERTH 7)

Levels in m. Ref. system Baltic Sea Level

Dimensions in m.

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
EXTENSION CONTAINER TERMINAL POTI
CROSS SECTIONS
NEW SITUATION

client
Tacis

	drawn	checked	approved
dat./init.	23.04.98	23.04.98	23.04.98
name	KVE	DHB	RLI

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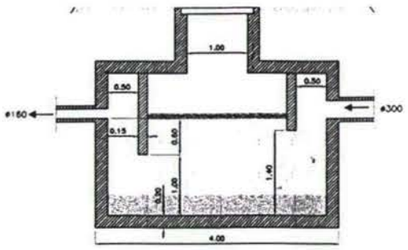
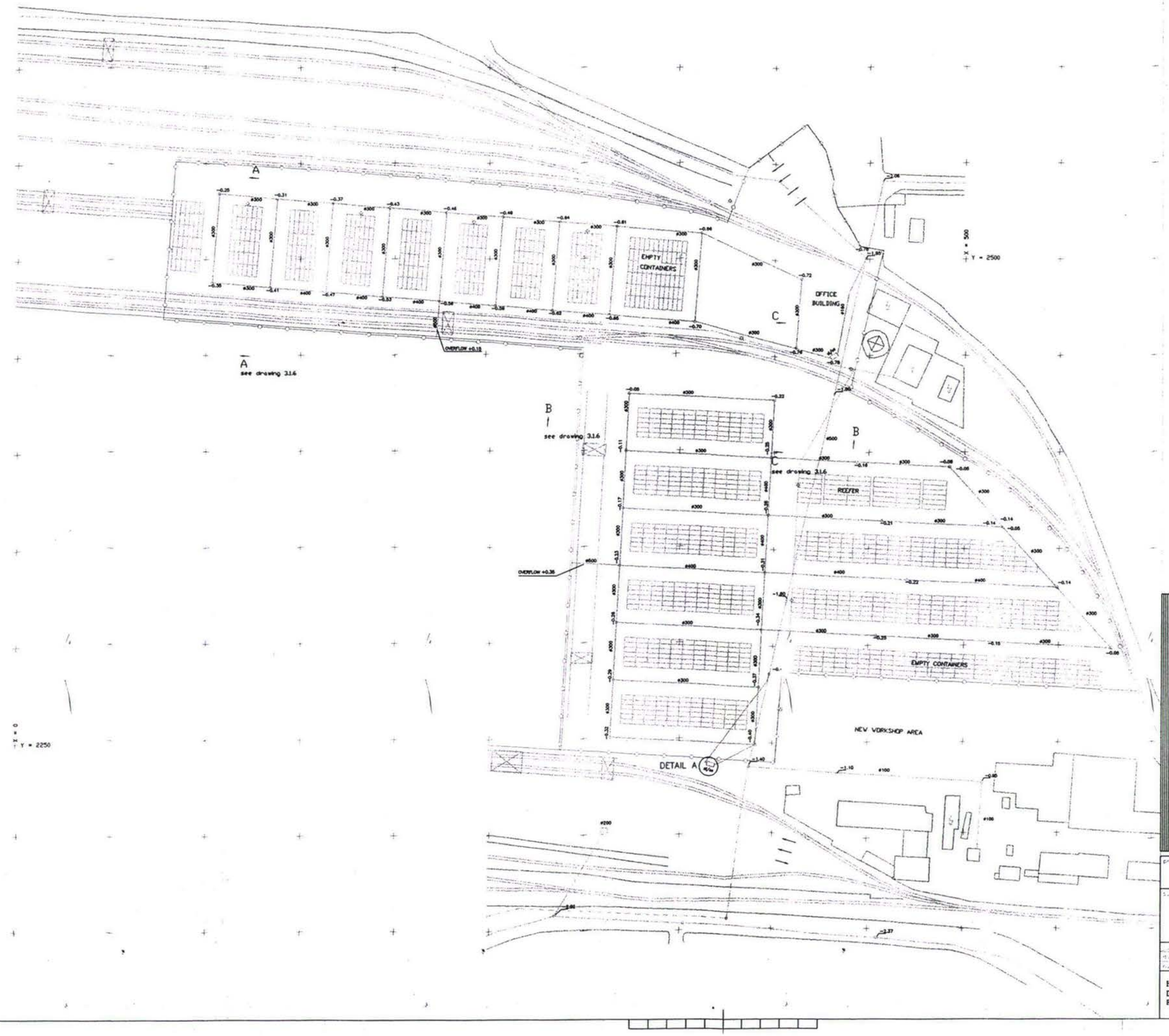


DETAIL A SCHAAL 1:50



LEGEND

- border
- ø300 sewerage (new)
- ø300 sewerage (existing)
- cable duct
- tranformation building
- lighting pole
- electricity mast
- ø00 sedimation tank / oil seperator
- manhole (bottom level)

levels in m. Ref. system Baltic Sea level
diameter in mm

FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

EXTENSION CONTAINER TERMINAL POTI
NEW UTILITIES

Client: Tacis

	drawn	checked	approved	in	sheets, sheetnr
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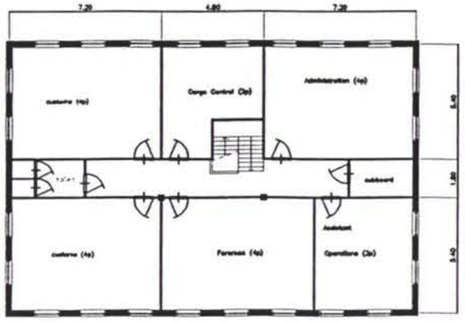
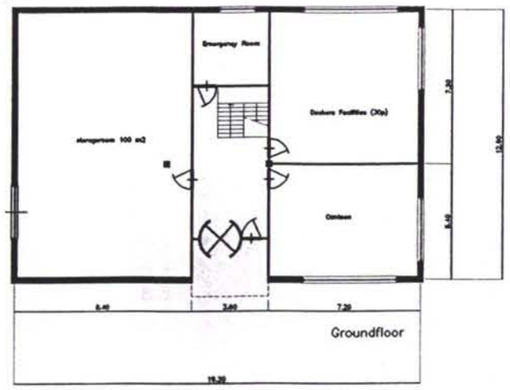
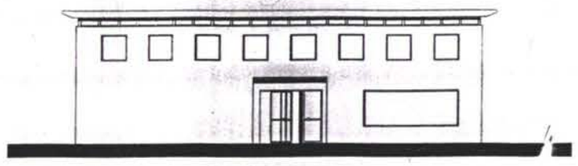
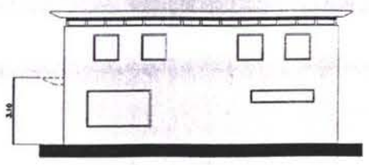


First floor





Frontface



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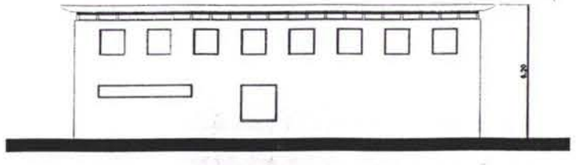

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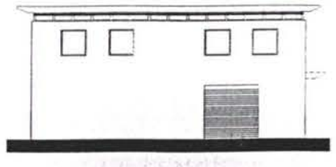
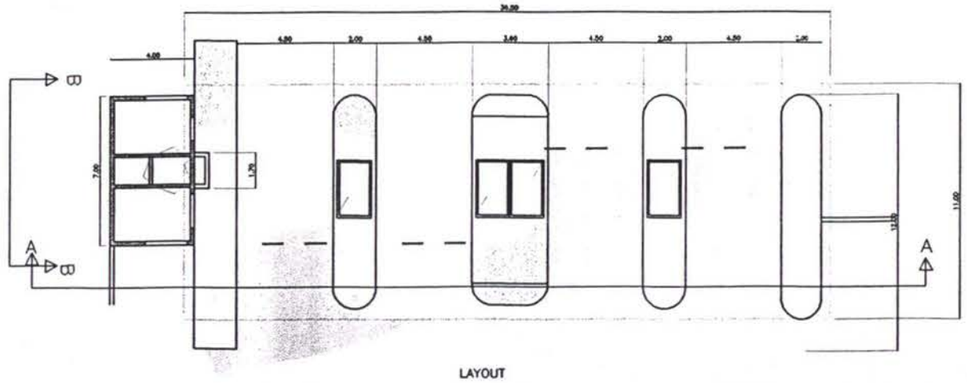
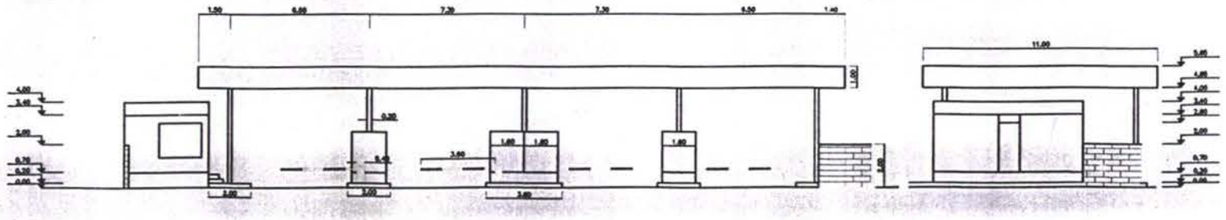


Sideface

OFFICE BUILDING



LAYOUT



CROSS SECTION A–A

CROSS SECTION B–B

NEW NORTHERN GATE

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
EXTENSION CONTAINER TERMINAL POTI
NEW FACILITIES

client
Tacis

	drawn	checked	approved
dat./par.	24.04.98	24.04.98	24.04.98
name	SAS	DHB	ROI

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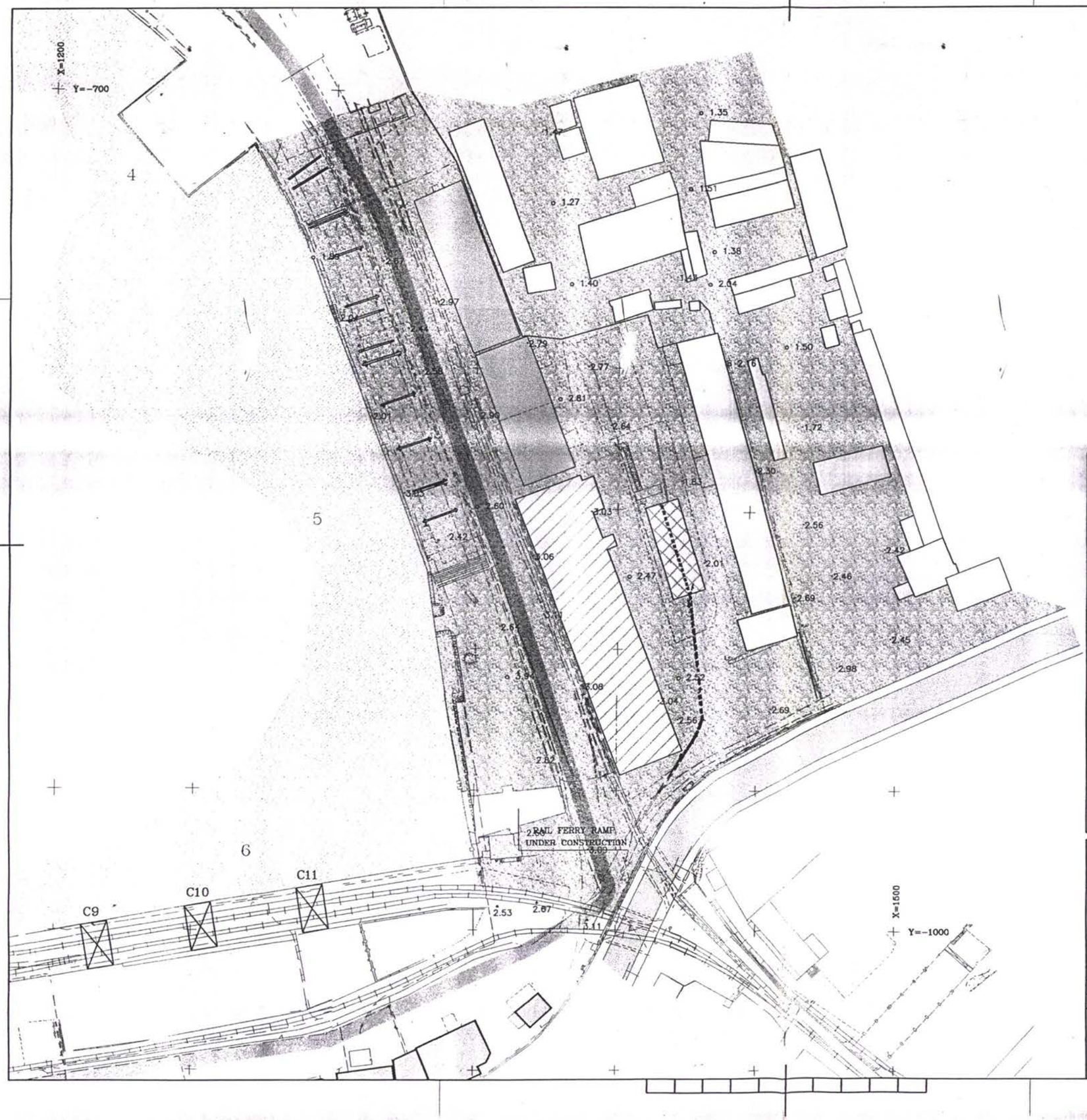

N

LEGEND

- road
- sand
- sheds/buildings
- port road
- foundation
- oil seperator
- Building
- 3.31 Ground level

LEVELS IN M. REF. SYSTEM BALTIC SEA LEVEL

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
MULTI PUPOSE TERMINAL BATUMI
EXISTING SITUATION

client
Tacis

	drawn	checked	approved
dat./par.	28.04.98	28.04.98	28.04.98
name	GHJ	DHB	RIJ

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revision	A

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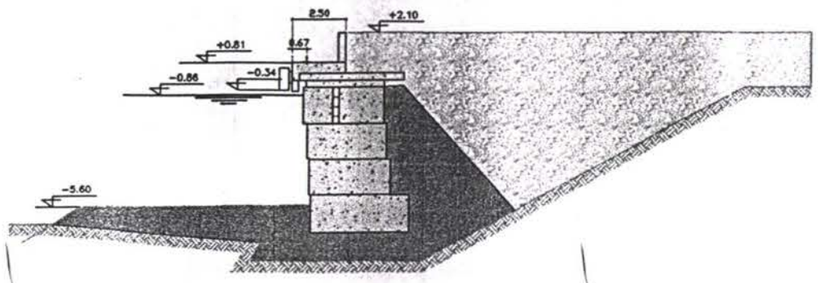

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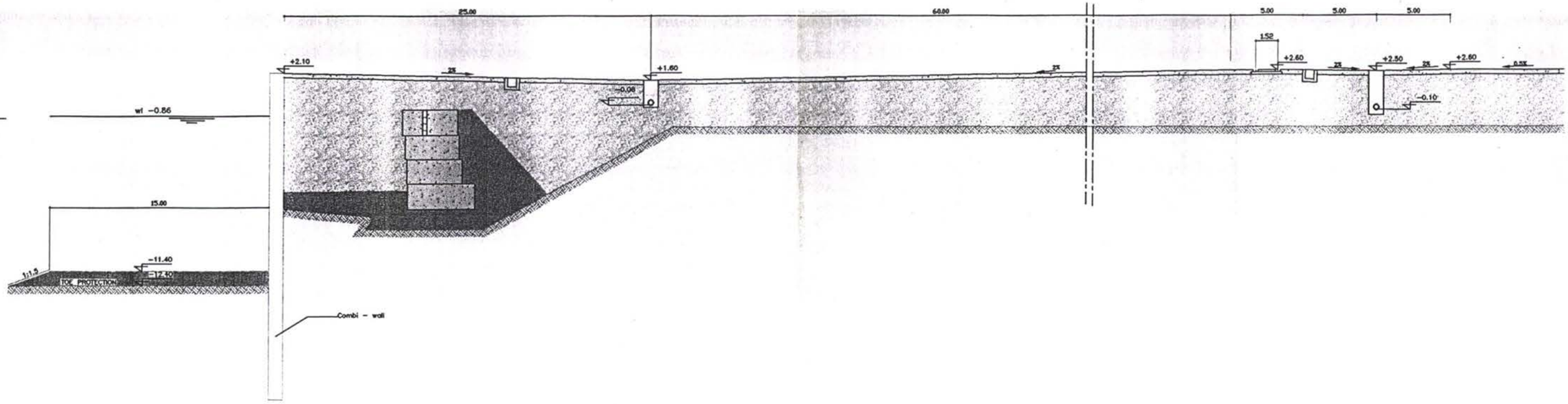

CROSS SECTION D–D BERTH 5 (NEW SITUATION)

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
MULTI PURPOSE TERMINAL BATUMI
CROSS SECTIONS
EXISTING AND NEW SITUATION

client
Tacis

	drawn	checked	approved
dat. / sir.	23.04.98	23.04.98	23.04.98
name	KVE	DHB	RLI

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filename	2197DEAF
revision	A

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LEGEND

- Existing building
- Concrete
- Asphalt
- Stones
- New railway
- New quay wall

Dimensions in m

project: **FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS**

subject: MULTI PUPOSE TERMINAL BATUMI NEW LAYOUT

client: Tacis

	drawn	checked	approved
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name	GHJ	DHB	ROI

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filename	21970GAM
revision	A

X=1200
Y=-700

1.35
1.47
1.27
1.51
1.38
1.40
1.45
2.04
1.50
2.76
2.79
2.77
2.81
2.64
1.72
2.30
1.83
2.60
3.03
2.56
2.42
2.01
2.06
2.47
2.46
2.69
2.64
2.45
3.94
2.52
3.08
3.04
2.56
2.98
2.69
2.82
2.67
2.97
2.44
2.58
2.90
2.01
3.83
2.42
1.89

RAIL FERRY RAMP
UNDER CONSTRUCTION
3.09

5
6
C9
C10
C11
2.53
2.67
3.11

X=1500
Y=-1000

N

LEGEND

———	Demolition sheds/buildings
▬▬	Demolition road
▨	Demolition foundation
▩	Demolition oil seperator
▭	Building
3.31	Ground level

LEVELS IN M. REF. SYSTEM BALTIC SEA LEVEL

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
MULTI PUPOSE TERMINAL BATUMI
DEMOLITION

client
Tacis

	drawn	checked	approved		
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				filename	21970GAM
				revision	A

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X=1200
Y=-700

+0.60 ø500 overflow
+0.20
ø400
+0.08
ø300
-0.04
+0.14
-0.07
+0.08
-0.10
+0.03
-0.13
-0.02
-0.16
-0.08
-0.20
-0.22
-0.31
ø160

open storage

Detail A
See drawing 3.1.7

RAIL FERRY RAMP
UNDER CONSTRUCTION

C9
C10
C11

X=1500
Y=-1000

N

LEGEND

- ø300 — new sewerage
- waste water rail wagon cleaning
- cable duct
- -0.07 — manhole (bottom level)
- st/os — sedimentation tank / oil seperator
- existing electricity cable
- New railway
- New quay wall

DIAMETER IN MM

LEVELS IN M. REF. SYSTEM BALTIC SEA LEVEL

project
FEASIBILITY STUDY OF NEW TERMINAL FACILITIES IN THE GEORGIAN PORTS

subject
MULTI PUPOSE TERMINAL BATUMI
NEW UTILITIES

client
Tacis

	drawn	checked	approved
dat./par.	28.04.98	28.04.98	28.04.98
name	GHJ	DHB	ROI

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format	A2
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file name	21970GAM
revision	A

ANNEXES

Annexes

Section 1:

Annex IV.1.1 Quay Characteristics
Annex IV.1.2 Existing Port Development Plan
Annex IV.1.3 Photo's Technical Condition Infrastructure

Section 2:

Annex IV.2.1 Investment Costs Port of Poti
Annex IV.2.2 Investment Costs Port of Batumi

Section 3:

Annex IV.3.1 Revised Investment Costs

Annex IV.1.1

Dimensions of the Quay-walls, Basins and Storage Areas

PORT OF POTI
Quay Facilities

Berth	Length (m)	Width (m)	Design Waterdepth (m)	Actual Waterdepth (m)	Type of Construction	Max. Load (t/m2)	Year of Construction	Physical Condition	Present Use	Remarks
1	200	55	12.5	10.00	Sheet Piles	4	1978	Satisfactory	Oil	Sheet piles in front of existing blockwall
2	185	55	12.5	9.50	Sheet Piles	4	1980	Satisfactory	Bauxite and container	This berth will be used for the new rail ferry terminal
3	215	45	8.5	8.50	Blockwall	4	1900	Unsatisfactory	Dry bulk	
4	175	50	8.5	8.50	Blockwall	4	1910	Unsatisfactory	Dry bulk	
5	175	50	8.5	8.00	Blockwall	4	1910	Unsatisfactory	Dry bulk	
6	220	50	9.75	8.00	Concrete Piles	4	1968	Unsatisfactory	Dry bulk, ro-ro and container	
7	170	115	8.25	8.00	Concrete Piles	4	1984	Satisfactory	Container	
8	220	50	9.75	8.50	Concrete Piles	4	1974	Satisfactory	General cargo and grain	
9	220	60	8.00	8.00	Blockwall	4	1900	Unsatisfactory	General cargo	
10	220	60	8.00	8.50	Blockwall	4	1900	Unsatisfactory	General cargo and grain	
11	100	10	8.00	8.00	Blockwall	4	1900	Unsatisfactory	Port vessels	Not suitable for cargo handling
12	275	50	8.00	6.00	Blockwall	4	1900	Satisfactory	Passenger and ro-ro	Not suitable for cargo handling
13	100	0	6.50	6.00	Blockwall	4	1900	Satisfactory	Ferry and ro-ro	
14	250	50	8.50	?	Blockwall	4	1910	Unsatisfactory	Laying up	Not suitable for cargo handling
15	155	10	8.50	?	Blockwall	4	1910	Unsatisfactory	Laying up	Not suitable for cargo handling

PORT OF POTI
Open Storage Facilities

Berth	Dimensions (L x W)	Area (m2)	Construction Pavement	Stack loads (t/m2)	Physical condition	Present use	Suitable for storage of	Hinterland Connection	Remarks
1	200 x 40	8,000	Concrete slabs	10	Satisfactory	Storage of iron ore	Dry bulk cargo	Rail	Not being used at the moment
2	180 x 40	7,200	Concrete slabs, partly not paved	10	Unsatisfactory	Container	Container and general cargo	Rail / road	Connected to inner port road
3	175 x 30	5,250	Partly concrete	10	Unsatisfactory	Steel pipes	General cargo	Rail / road	Connection to port road is in very poor condition
4	170 x 35	5,950	Concrete	10	Good	Under construction	Container and general cargo	Rail	Direct connection to port road not available
5	150 x 40	6,000	Gravel	10	Poor	Iron scrab	Bulk cargo	Rail	It is planned to provide this area with concrete pavement
6	225 x 40	7,200	Partly concrete and gravel	10	Poor	Container	Container and general cargo	Rail / road	Connection to port road is in very poor condition
7	125 x 100	12,500	Concrete slabs	10	Poor	Container	Container	Rail / road	Combined entrance (rail/road) is too small
8	100 x 20	2,000	Partly concrete and gravel	10	Poor	Container	General cargo	Rail / road	Vry small area
9	200 x 45	9,000	Asphalt	10	Satisfactory	Operational area general cargo	General cargo	Rail / road	Presently not used as storage area
10	200 x 45	9,000	Asphalt	10	Satisfactory	Operational area general cargo	General cargo	Rail / road	Presently not used as storage area

PORT OF POTI
Existing Warehouses

WH No	Port Bldg No.	Location	Dimensions (L x W x H)	Area (m2)	Volume (m3)	Construction	No of doors	Size of doors (W xH)	Stack loads (t/m2)	Physical condition	Present use	Suitable for storage of .....
1	5	Berth 10/11	121 x 72 x 7.8	8,700	68,000	concrete , roof asphalt	6 Front 2 Side	4.2 x 5	4	OK, not leaking Doors: poor	Storage of general cargo	General cargo
2	22	Berth 10	102 x 30 x 4.8	3,000	14,700	steel frame and corrugated roof plates	8 Front 8 Back 2 Side	4.2 x 4	4	Poor	Storage of general cargo	Small consigments

PORT OF BATUMI
Quay Facilities

Berth	Length (m)	Width (m)	Design Waterdepth (m)	Actual Waterdepth (m)	Type of Construction	Max. Load (t/m2)	Year of Construction	Physical Condition	Present Use	Remarks
1	200	n.a.	12.00	11.00	Sheet piles	0.5	1972	Good	Oil	
2	140	n.a.	10.20	9.00	Blockwall	0.5	1928	Poor	Oil	Superstructure has to be renewed
3	165	n.a.	10.20	8.00	Blockwall	0.5	1928	Poor	Oil	Superstructure has to be renewed
4		n.a.	10.20	5.50	Blockwall	3	1976	Poor	Not operational	
5	225		8.00	5.50	Blockwall	3	1958	Poor	Mooring fishing vessels	Not being used as cargo berth
6	187	45	8.60	8.00	Concrete piles	3	1958	Unsatisfactory	Dry bulk	
7	260	50	11.00	10.00	Concrete piles	3	1958	Unsatisfactory	Dry bulk	
8	176	40	10.00	10.00	Sheet piles	3	1962	Satisfactory	General cargo and grain	
9	176	35	10.00	9.00	Sheet piles	3	1962	Satisfactory	General cargo and grain	
10	220	20	11.60	10.00	Concrete piles	1.5	1978	Satisfactory	Ferry and ro-ro	Also used for small general cargo vessels
11	194	20	8.25	7.50	Concrete piles	1	1967	Unsatisfactory	Ferry and ro-ro	
12	n.a.	n.a.	n.a.	15.00	Off shore bouy	n.a.	1966	Satisfactory	Oil	

PORT OF BATUMI
Open Storage Facilities

Berth	Dimensions (L x W)	Area(m 2)	Construction Pavement	Stack loads (t/m2)	Physical condition	Present use	Suitable for storage of	HinterlandConnection	Remarks
6	125 x 30	3,750	Concrete (pertly not paved)	14	Satisfactory	General cargo	General cargo and dry bulk cargo	Rail / road	Surrounded by concrete wall. Only one entrance. Area is very uneven.
7	180 x 23	4,100	Asphalt	14	Unsatisfactory	Operational area	Temporary storage	Rail / road	Operational area, not really to be used as storage area
8	90 x 15	1,300	Asphalt	14	Unsatisfactory	Operational area	None	n.a.	Very small area which is required for port operations

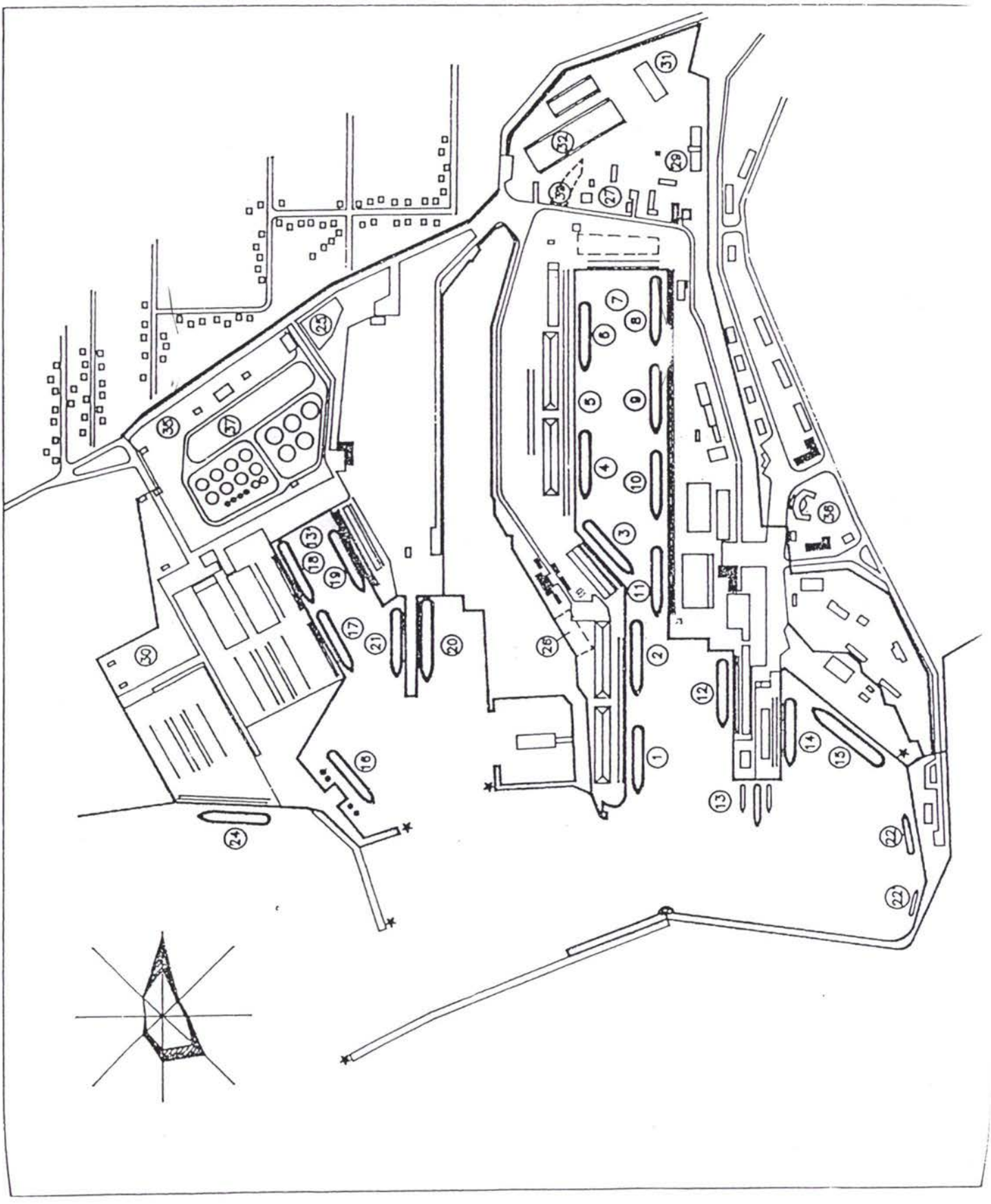
PORT OF BATUMI
Existing Warehouses

WH No	Port Bldg No.	Location	Dimensions (L x W x H)	Area (m2)	Volume (m3)	Construction	No of doors	Size of doors (W x H)	Stack loads (t/m2)	Physical condition	Present use	Suitable for storage of .....
1	3	Berth 9	139 x 21 x 8 (Partly 5 m high)	2,872	13,211	concrete , roof corrugated steel - sheets	6 Front 6 Back	4 x 5	10	OK, Doors: poor	Storage of General Cargo	General Cargo
2	4	Berth 9	17 x 15 x 5	254	1,173	dito	1 Front	3 x 4	10	OK	Spare Parts	small consigments
3	5	Berth 8-9	47 x 13 x 5	624	2,870	dito	4 Front	3 x 4	10	Poor, roof is old	General Cargo & Spare Parts	small consignments
4	13	Berth 7	15 x 83 x 4	1233	4,980	steel frame, corrugated steel sheets	1 Side 3 Front	5 x 4	14	OK	Store Civil & Mechanical	General Cargo
5	6	Behind WH 1	48 x 20 x 8	960	7,680	dito	1 Front	5 x 5	20	Good	Stores of Georgian Shippg.Co	General Cargo but no connection to the berth
6	15	Berth 6-7	113 x 21 x 5 (up to 8 in the middle)	2,340	10,760	concrete , roof steel - sheets	3 Front 1 Side	3 x 4	14	OK, floor oily and dirty	Spare Parts	General Cargo
7	14	Berth 6-7 connected to no.6	49 x 20 x 6	972	4,784	steel frame with alluminium plates, roof steel sheets	2 Front	5 x 5	14	Good	General Cargo	General Cargo

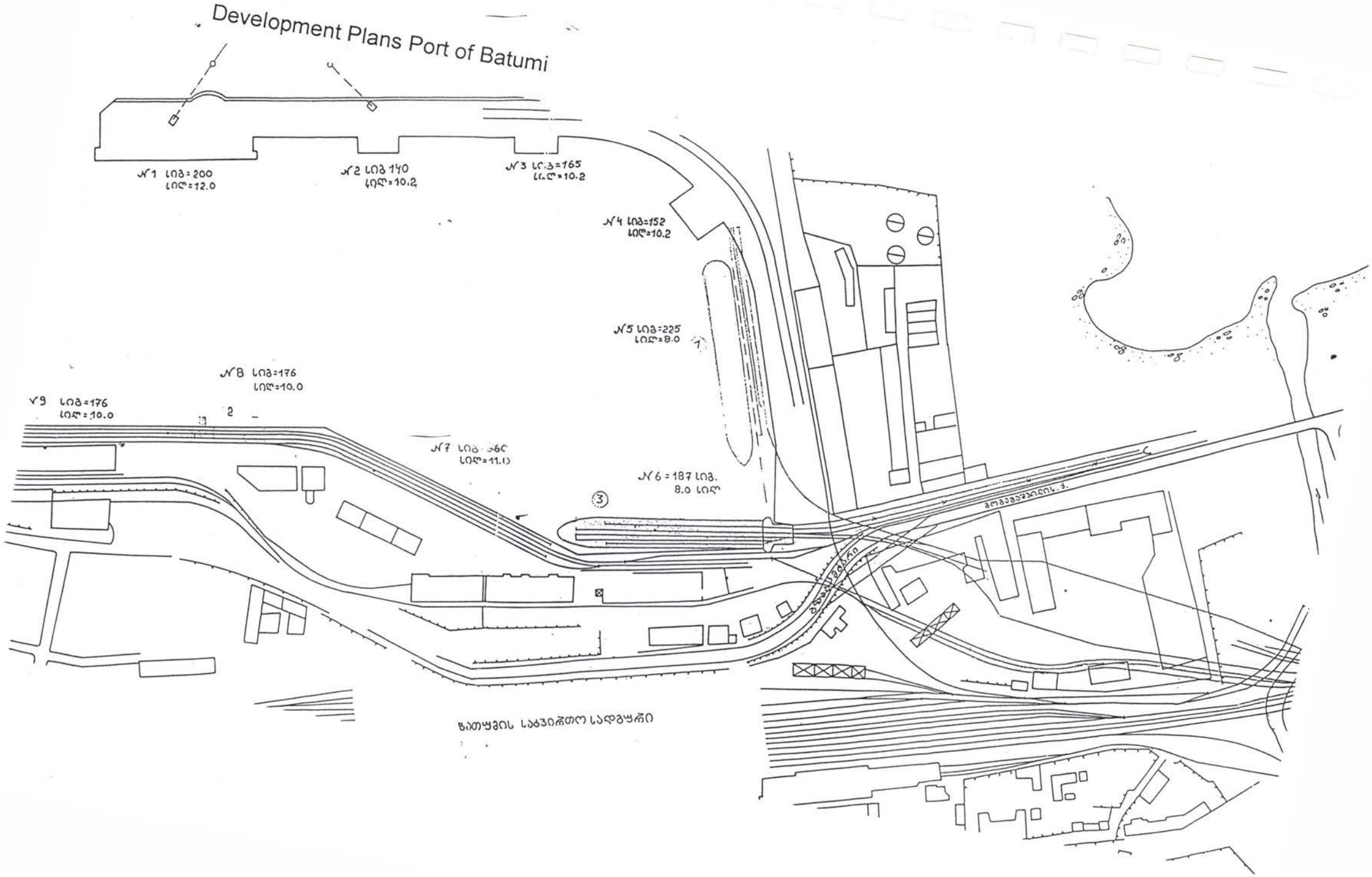
Annex IV.1.2

Existing Port Development Plans

Development Plans Port of Poti



Development Plans Port of Batumi

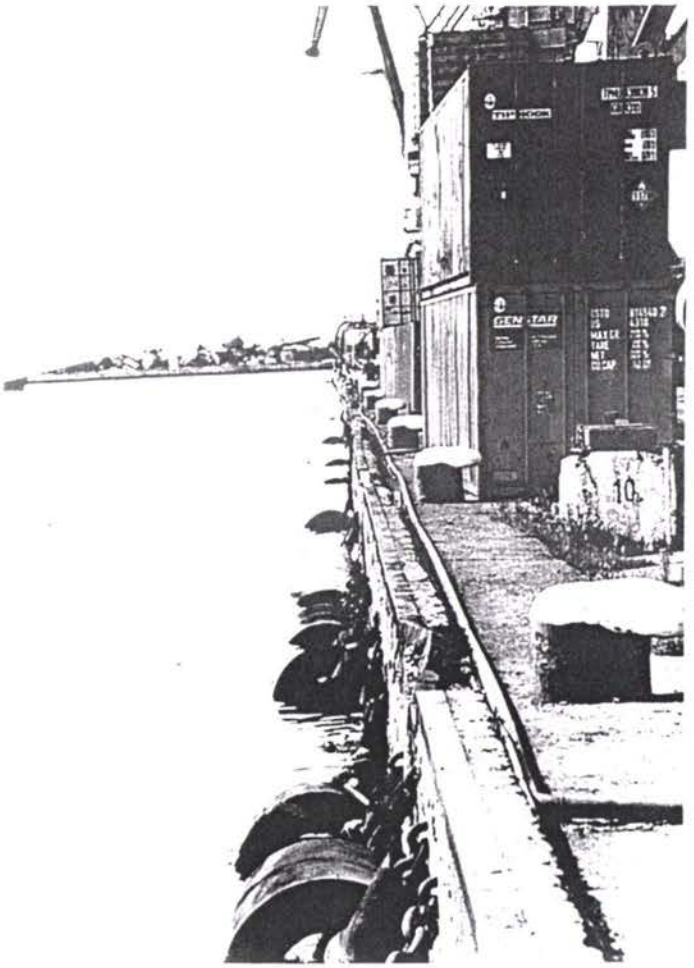


Annex IV.1.3

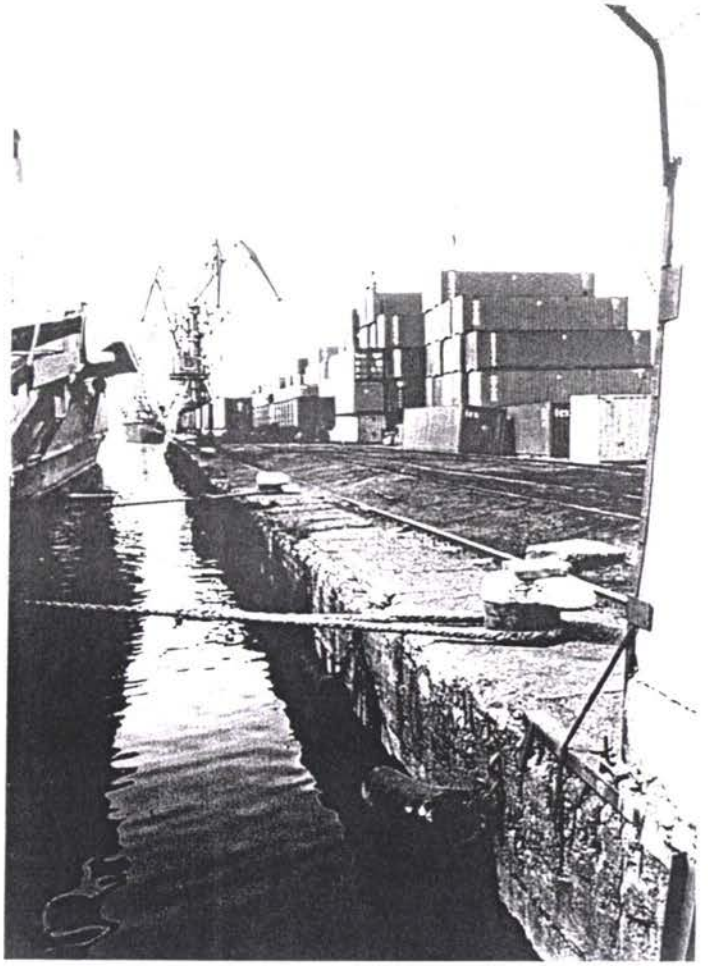
Photo Documentation of the Technical Condition of Infrastructure

Annex IV.1.3 Photo's Technical Condition Infrastructure

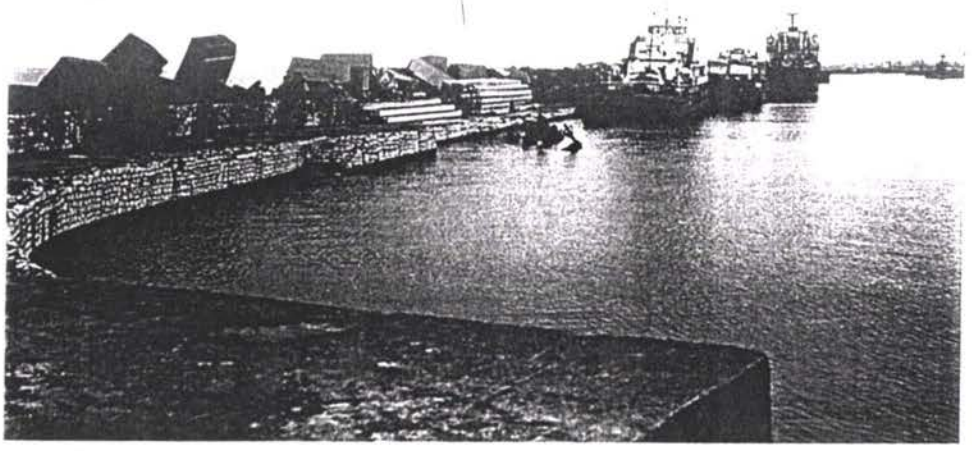
Photo Number	Description
Poti	
P1	Berth 1 and 2: The lining of the quay is not straight. The edge of the quay is damaged at some places. Containers are stored between the crane rail and quay.
P2	Berth 6: The edges of the quay wall are eroded, which results in corrosion of the reinforcement of the concrete. There is no pavement between the rail tracks. This berth is presently used for ro-ro and container handling.
P3	Breakwater: This is the south-western part of the breakwater. The subsidence is clearly visible. The level of the breakwater used to be horizontal. However, near the vessels the breakwater is subsided by approximately 1 meter.
P4 & P5	Storage area berth 7: These photo's of the container terminal illustrate the unequal subsidence of the concrete slabs, big holes in the pavement and large crevices between the slabs. This part of the storage area is also used by traffic from and to the ro-ro vessels at berth 6.
P6	Storage area berth 4: New concrete pavement at berth 4, which is presently under construction.
P7	Northern breakwater: This is a view on the inside of the northern breakwater overlooking the northern basin. The siltation problem is clearly visible. Old fishing vessels are "drowned" in the sand.
P8	Berth at shipping yard: The photo illustrates the condition of the pavement at the quay of the shipping yard. This berth is presently being used for general cargo handling.
P9	Berth 6: The quay construction and the pavement at the quay is unsatisfactory.
P10	Rail track berth 8: The photo illustrates the lining of the rail tracks.
P11	Rail track connections: An example of the condition of the rail tracks. On this photo the big gap between the rail tracks is illustrated causing damage to equipment and rail foundation.



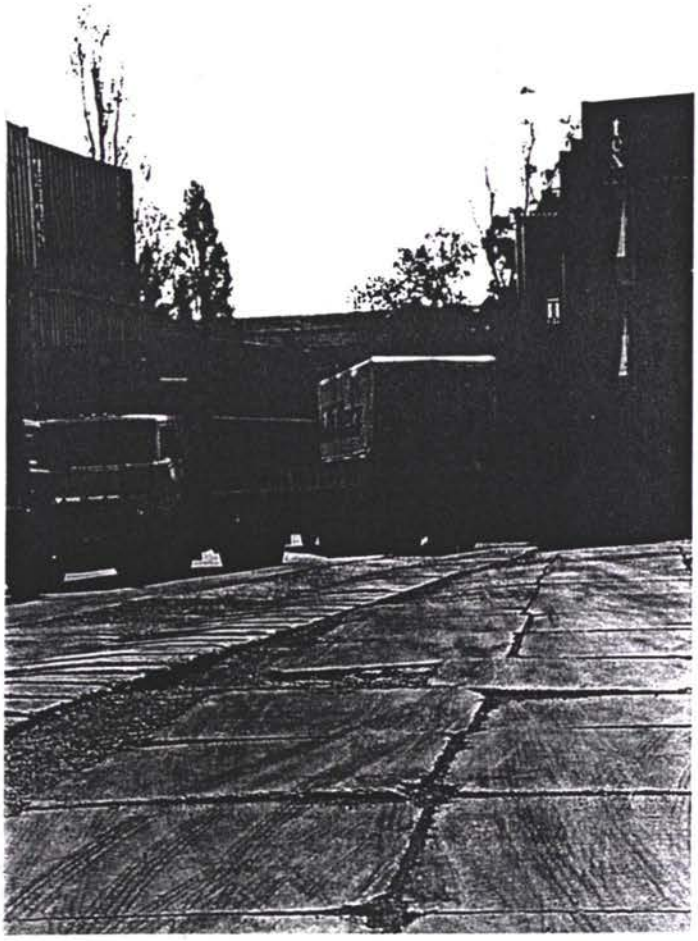
P1



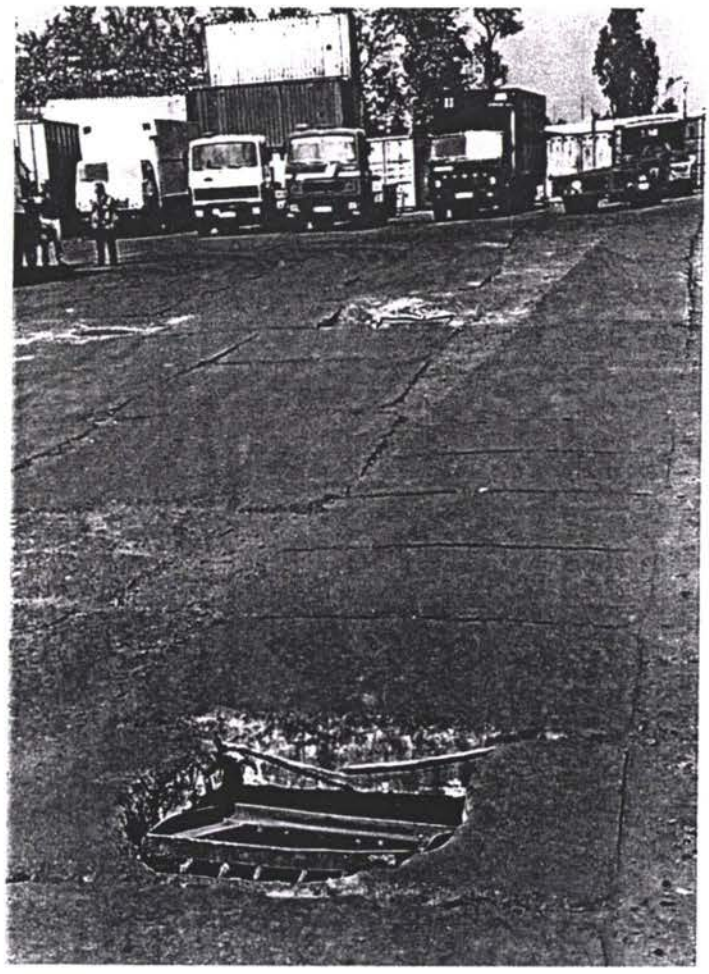
P2



P3

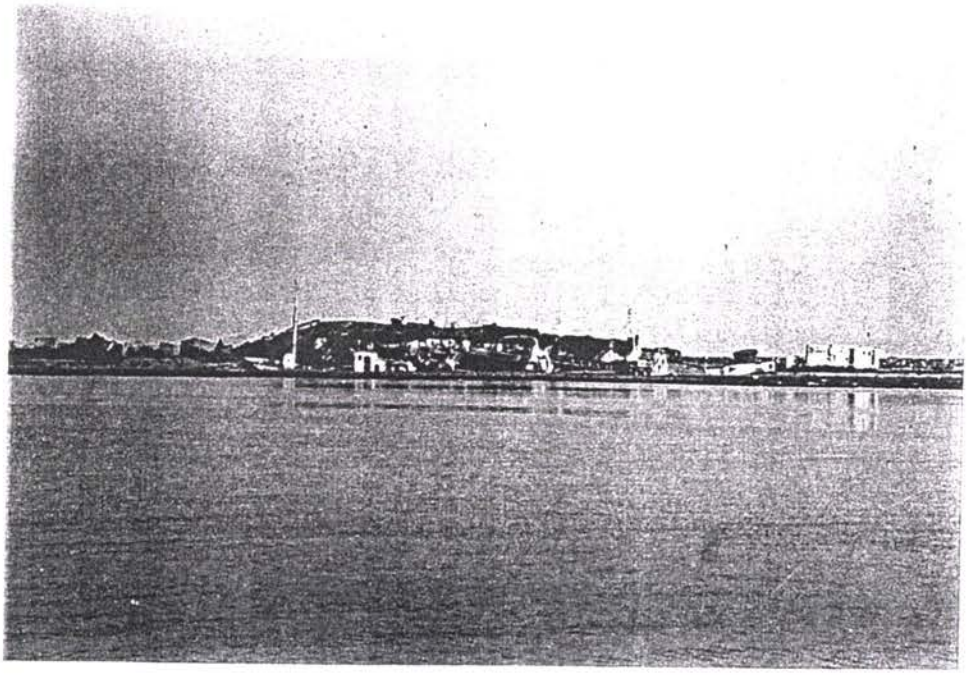


P4

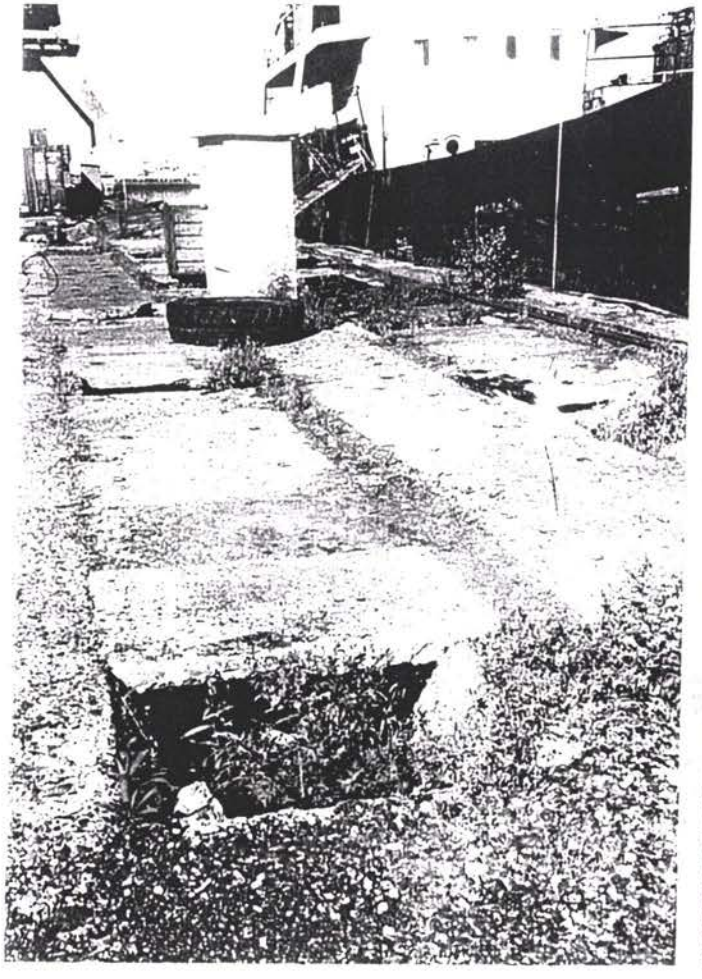


P5

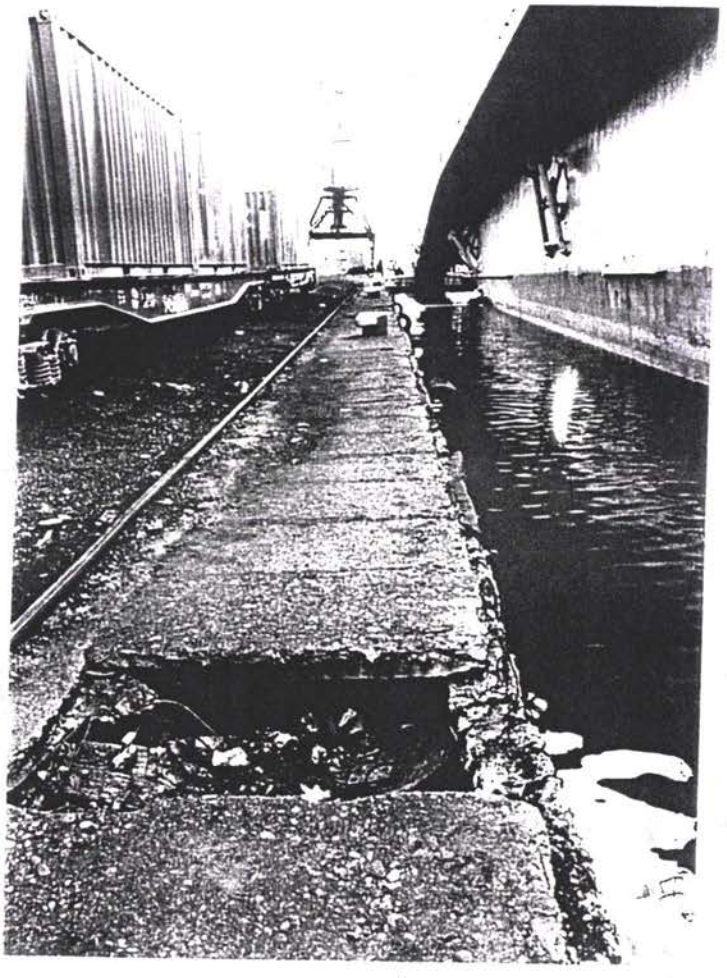
P6



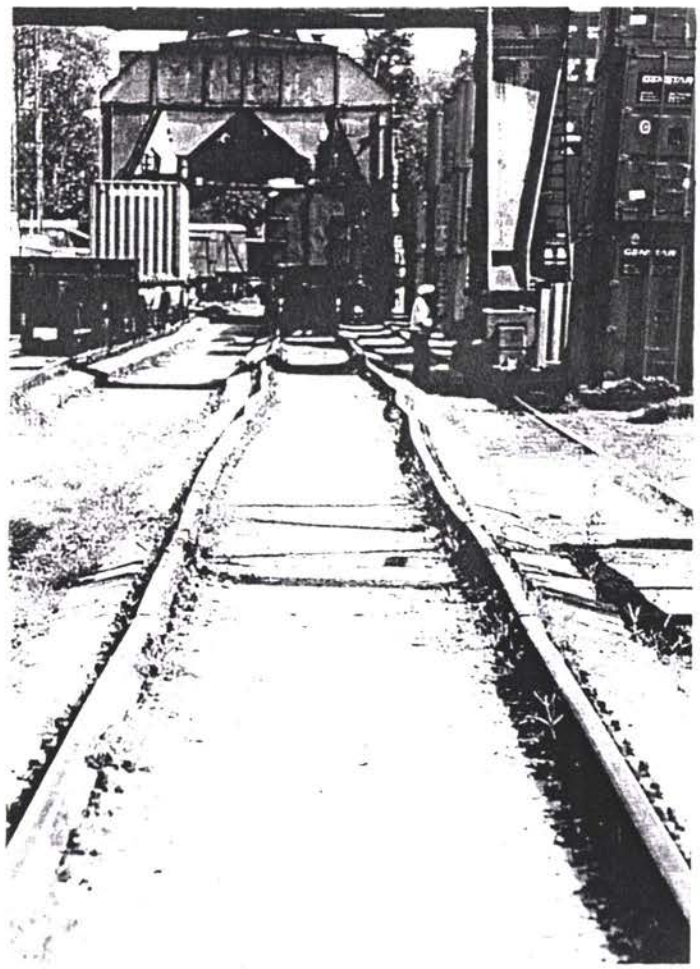
P7



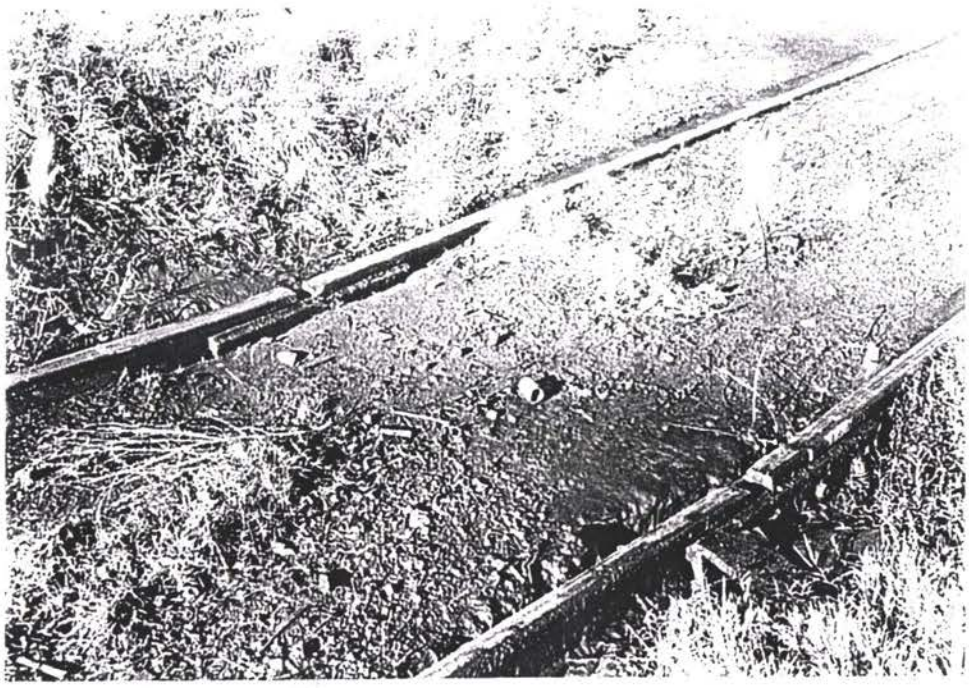
P8



P9

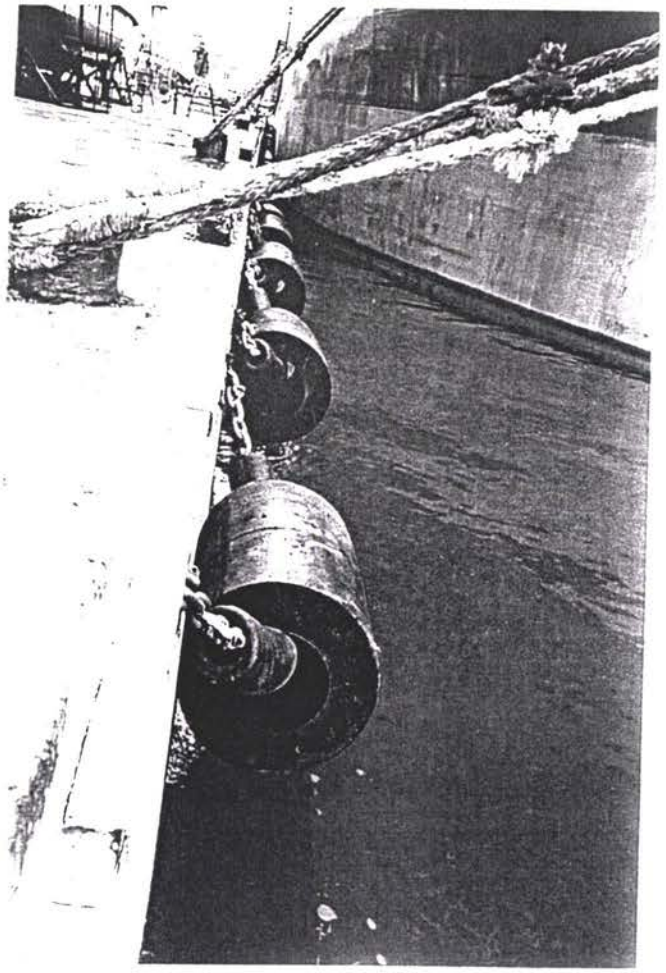


P10

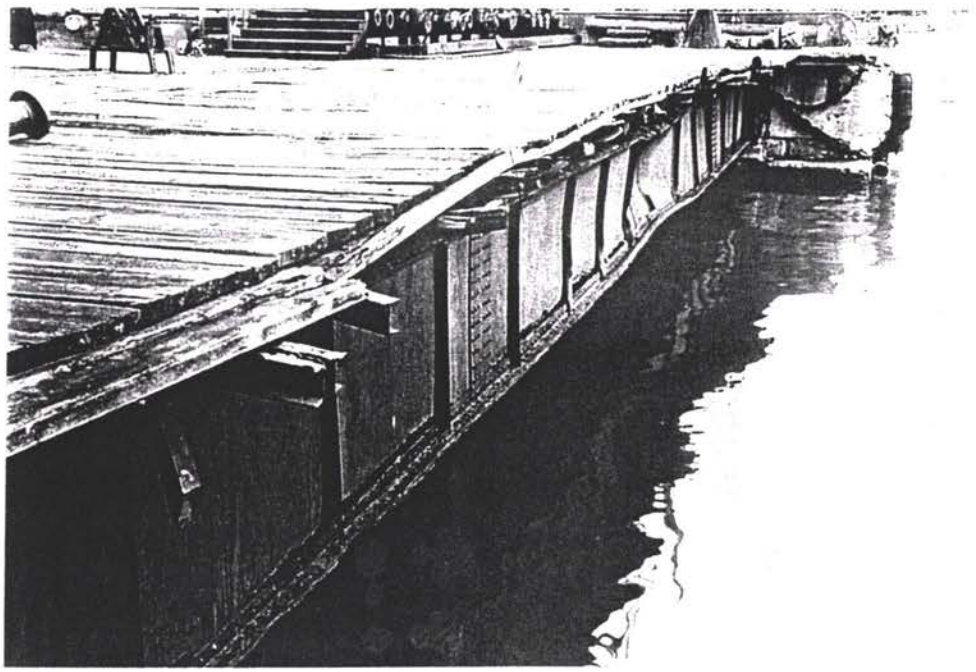


P11

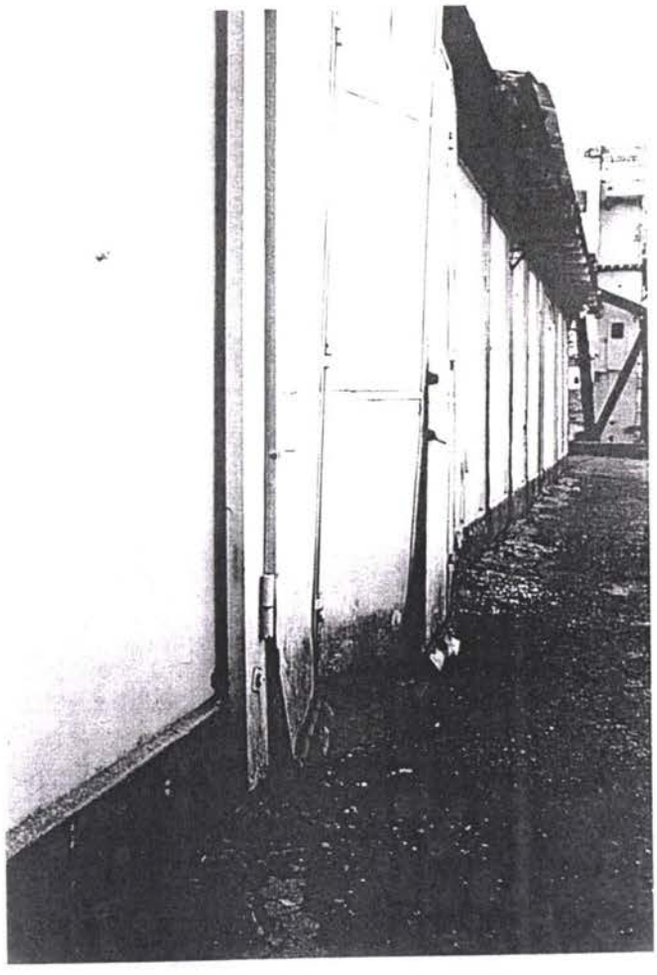
Photo Number	Description
Batumi	
B1	Berth 1: The quay wall of berth 1 is in a good condition.
B2	Berth 2: The superstructure of this berth and also of berth 3 is in a poor condition. Especially the steel beam is severely corroded.
B3	Warehouse 1: The photo illustrates the condition of the doors. However, the roofs of the warehouses are well maintained.
B4	Berth 7: The concrete of the superstructure is severely damaged at various places. The fenders are very small.
B5	Pavement: New rail tracks and new concrete pavement . The condition is good with sufficient drainage. However, the level of pavement is approximately 6 cm lower than the rail tracks.
B6	Railway crossing: This photo illustrates the condition of railway crossings.



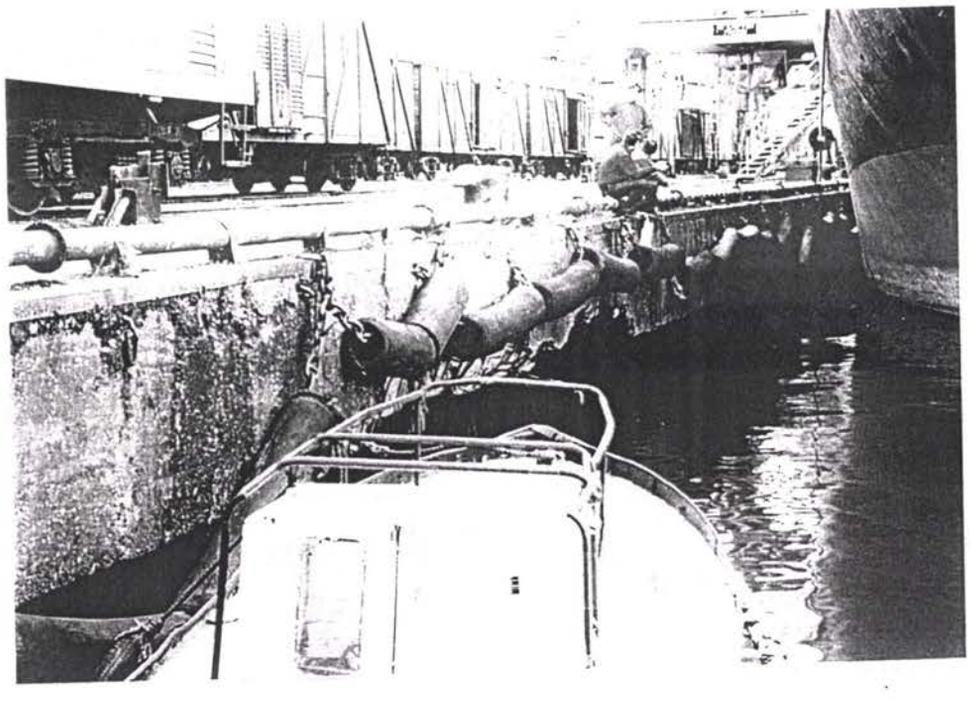
B1



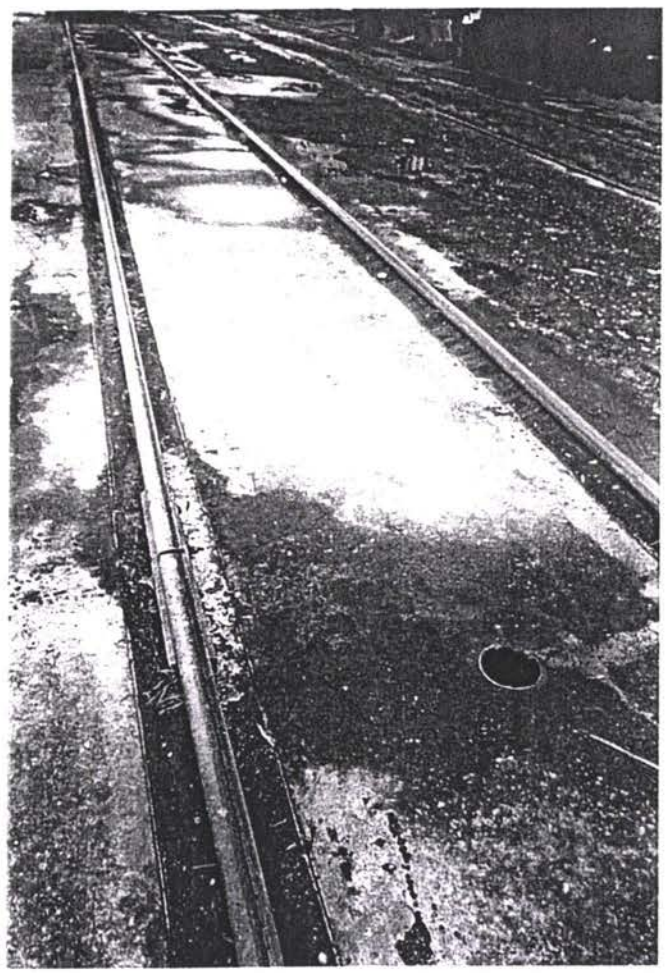
B2



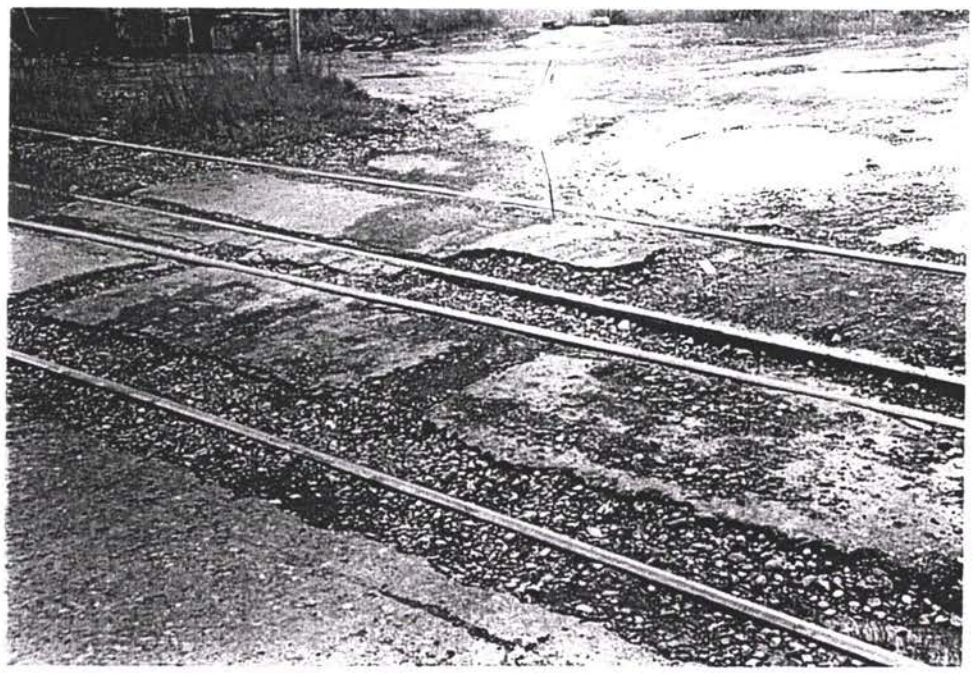
B3



B4



B5



B6

Annex IV.2.1

Investment Costs Port of Poti

Investment Costs Port of Poti

Investment Costs Poti

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
1.	**Extension Container Terminal**					
	- Site preparation	1	#	2,770,360	2,770,360	
	- Environmental	1	#	50,000	50,000	
	- Civil Works	1	#	4,911,000	4,911,000	
	- Buildings	1	#	200,000	200,000	
	- Utilities	1	#	1,785,500	1,785,500	
	- Other	1	#	195,000	195,000	
	Sub-total					9,911,860
2.	**Reconstruction Facilities Berth 9 - 11**					
	- Site preparation	1	#	1,734,850	1,734,850	
	- Environmental	1	#	0	0	
	- Civil Works	1	#	2,867,500	2,867,500	
	- Buildings	1	#	1,635,000	1,635,000	
	- Utilities	1	#	297,750	297,750	
	- Other	1	#	50,000	50,000	
	Sub-total					6,585,100
3.	**Reconstruction Aprons and Storage Areas**					
	- Site preparation	1	#	1,835,950	1,835,950	
	- Environmental	1	#	0	0	
	- Civil Works	1	#	5,094,500	5,094,500	
	- Buildings	1	#	0	0	
	- Utilities	1	#	366,250	366,250	
	- Other	1	#	0	0	
	Sub-total					7,296,700
4.	**Development New Container Terminal North**					
	- Site preparation	1	#	7,720,000	7,720,000	
	- Environmental	1	#	0	0	
	- Civil Works	1	#	19,404,000	19,404,000	
	- Buildings	1	#	1,950,000	1,950,000	
	- Utilities	1	#	2,360,000	2,360,000	
	- Other	1	#	215,000	215,000	
	Sub-total					31,649,000
	TOTAL INVESTMENT					**55,442,660**

Investment Costs Port of Poti

Extension Container Terminal

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
1.1	**Site Preparation**					
	- Demolition buildings	2,295	m2	40	91,800	
	- Demolition rail tracks	1,450	m	10	14,500	
	- Preparation of the ground	85,100	m2	15	1,276,500	
	- Earth works (incl. sand supply)	85,100	m3	12	1,021,200	
	- Dredging	20,000	m3	3	60,000	
	- Sewage and drainage	5,106	m	60	306,360	
	Sub-total					2,770,360
1.2	**Environmental**					
	- Removal fuel station	1	#	50,000	50,000	
	-				0	
	-				0	
	Sub-total					50,000
1.3	**Civil Works**					
	- Reconstruction of quay wall	500	m	400	200,000	
	- Rail tracks	1,050	m	400	420,000	
	- Railway switches	2	#	18,000	36,000	
	- New pavement	85,100	m2	50	4,255,000	
	Sub-total					4,911,000
1.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	500	m2	400	200,000	
	- Office building	0	m2	500	0	
	Sub-total					200,000
1.5	**Utilities**					
	- Water (fire line, fresh water)	1,000	m	60	60,000	
	- Electricity	1,000	m	100	100,000	
	- Lighting	85,100	m2	5	425,500	
	- Reefer points	20	#	5,000	100,000	
	- Transformation building	1	#	600,000	600,000	
	- EDP hardware and software	1	#	500,000	500,000	
	Sub-total					1,785,500
1.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	1	#	50,000	50,000	
	- Perimeter wall	900	m	50	45,000	
	Sub-total					195,000
	TOTAL INVESTMENT					**9,911,860**

Investment Costs Port of Poti

Extension Container Terminal (excl. Berth 12 - 14)

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
1.1	**Site Preparation**					
	- Demolition buildings	2,295	m2	40	91,800	
	- Demolition rail tracks	1,450	m	10	14,500	
	- Preparation of the ground	60,100	m2	15	901,500	
	- Earth works (incl. sand supply)	60,100	m3	12	721,200	
	- Dredging	0	m3	3	0	
	- Sewage and drainage	3,606	m	60	216,360	
	Sub-total					1,945,360
1.2	**Environmental**					
	- Removal fuel station	1	#	50,000	50,000	
	-				0	
	-				0	
	Sub-total					50,000
1.3	**Civil Works**					
	- Reconstruction of quay wall	500	m	400	200,000	
	- Rail tracks	250	m	400	100,000	
	- Railway switches	1	#	18,000	18,000	
	- New pavement	60,100	m2	50	3,005,000	
	Sub-total					3,323,000
1.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	500	m2	400	200,000	
	- Office building	0	m2	500	0	
	Sub-total					200,000
1.5	**Utilities**					
	- Water (fire line, fresh water)	1,000	m	60	60,000	
	- Electricity	1,000	m	100	100,000	
	- Lighting	60,100	m2	5	300,500	
	- Reefer points	20	#	5,000	100,000	
	- Transformation building	1	#	600,000	600,000	
	- EDP hardware and software	1	#	500,000	500,000	
	Sub-total					1,660,500
1.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	1	#	50,000	50,000	
	- Perimeter wall	900	m	50	45,000	
	Sub-total					195,000
	TOTAL INVESTMENT					**7,373,860**

Reconstruction Storage Facilities Berth 9-11

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
2.1	**Site Preparation**					
	- Demolition warehouse	10,500	m2	30	315,000	
	- Demolition buildings	2,730	m2	40	109,200	
	- Demolition rail track	1,425	m	10	14,250	
	- Demolition ramp	1,400	m2	30	42,000	
	- Preparation of the ground	49,000	m2	10	490,000	
	- Earth works (incl. sand supply)	49,000	m3	12	588,000	
	- Sewage and drainage	2,940	m	60	176,400	
	Sub-total					1,734,850
2.2	**Environmental**					
	- Cleaning of the soil	0	m3	99	0	
	-				0	
	-				0	
	Sub-total					0
2.3	**Civil Works**					
	- Construction of quay wall	0	m	20,000	0	
	- Rail tracks	1,500	m	400	600,000	
	- Railway switches	5	#	18,000	90,000	
	- New pavement	43,550	m2	50	2,177,500	
	Sub-total					2,867,500
2.4	**Buildings**					
	- Warehouse	5,450	m2	300	1,635,000	
	- Workshop	0	m2	400	0	
	- Office building	0	m2	500	0	
	Sub-total					1,635,000
2.5	**Utilities**					
	- Water (fire line, fresh water)	500	m	60	30,000	
	- Electricity	500	m	100	50,000	
	- Lighting	43,550	m2	5	217,750	
	- Reefer points	0	#	5,000	0	
	- Transformation building		#	600,000	0	
	Sub-total					297,750
2.6	**Other**					
	- Alarm system	1	#	50,000	50,000	
	- Gate and barrier	0	#	50,000	0	
	- Perimeter wall	0	m	50	0	
	Sub-total					50,000
	TOTAL INVESTMENT					**6,585,100**

Reconstruction of Aprons and Storage Areas

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
3.1	**Site Preparation**					
	- Demolition buildings	0	m2	40	0	
	- Demolition rail tracks	3,400	m	10	34,000	
	- Preparation of the ground	73,250	m2	15	1,098,750	
	- Earth works (incl. sand supply)	36,625	m3	12	439,500	
	- Sewage and drainage	4,395	m	60	263,700	
	Sub-total					1,835,950
3.2	**Environmental**					
	-				0	
	-				0	
	-				0	
	Sub-total					0
3.3	**Civil Works**					
	- Reconstruction of quay wall	0	m	400	0	
	- Rail tracks	3,400	m	400	1,360,000	
	- Railway switches	4	#	18,000	72,000	
	- New pavement	73,250	m2	50	3,662,500	
	Sub-total					5,094,500
3.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	0	m2	400	0	
	- Office building	0	m2	500	0	
	Sub-total					0
3.5	**Utilities**					
	- Water (fire line, fresh water)	0	m	60	0	
	- Electricity	0	m	100	0	
	- Lighting	73,250	m2	5	366,250	
	- Reefer points	0	#	5,000	0	
	- Transformation building	0	#	600,000	0	
	- EDP hardware and software	0	#	500,000	0	
	Sub-total					366,250
3.6	**Other**					
	- Alarm system	0	#	100,000	0	
	- Gate and barrier	0	#	50,000	0	
	- Perimeter wall	0	m	50	0	
	Sub-total					0
	TOTAL INVESTMENT					**7,296,700**

New Container Terminal South

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
4.1	**Site Preparation**					
	- Demolition buildings	0	m2	40	0	
	- Demolition installations	1	#	100,000	100,000	
	- Preparation of the ground	200,000	m2	15	3,000,000	
	- Earth works (incl. sand supply)	1,750,000	m3	5	8,750,000	
	- Sewage and drainage	12,000	m	60	720,000	
	Sub-total					12,570,000
4.2	**Environmental**					
	- Cleaning of the soil	0	m3	99	0	
	-				0	
	-				0	
	Sub-total					0
4.3	**Civil Works**					
	- Construction of quay wall	550	m	20,000	11,000,000	
	- Rail tracks	1,100	m	400	440,000	
	- Railway switches	3	#	18,000	54,000	
	- New pavement	177,500	m2	50	8,875,000	
	Sub-total					20,369,000
4.4	**Buildings**					
	- Warehouse	5,000	m2	300	1,500,000	
	- Workshop	500	m2	400	200,000	
	- Office building	500	m2	500	250,000	
	Sub-total					1,950,000
4.5	**Utilities**					
	- Water (fire line, fresh water)	1,100	m	60	66,000	
	- Electricity	1,100	m	100	110,000	
	- Lighting	200,000	m2	5	1,000,000	
	- Reefer points	20	#	5,000	100,000	
	- Transformation building	1	#	600,000	600,000	
	- EDP hardware and software	1	#	500,000	500,000	
	Sub-total					2,376,000
4.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	1	#	50,000	50,000	
	- Perimeter wall	400	m	50	20,000	
	Sub-total					170,000
	TOTAL INVESTMENT					**37,435,000**

Infrastructure Connections and Breakwater

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
4.1	**Site Preparation**					
	- Demolition warehouse	0	m2	30	0	
	- Demolition buildings	0	m2	40	0	
	- Demolition rail track	0	m	10	0	
	- Demolition ramp	0	m2	30	0	
	- Preparation of the ground	0	m2	10	0	
	- Earth works (incl. sand supply)	0	m3	12	0	
	- Sewage and drainage	0	m	60	0	
	Sub-total					0
4.2	**Environmental**					
	- Cleaning of the soil	0	m3	99	0	
	-				0	
	-				0	
	Sub-total					0
4.3	**Civil Works**					
	- Construction of breakwater	2,500	m	10,000	25,000,000	
	- Rail tracks	16,000	m	400	6,400,000	
	- Road	112,000	m2	50	5,600,000	
	- New pavement	0	m2	50	0	
	Sub-total					37,000,000
4.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	0	m2	400	0	
	- Office building	0	m2	500	0	
	Sub-total					0
4.5	**Utilities**					
	- Water (fire line, fresh water)	0	m	60	0	
	- Electricity	0	m	100	0	
	- Lighting	0	m2	5	0	
	- Reefer points	0	#	5,000	0	
	- Transformation building		#	600,000	0	
	Sub-total					0
4.6	**Other**					
	- Alarm system	0	#	50,000	0	
	- Gate and barrier	0	#	50,000	0	
	- Perimeter wall	0	m	50	0	
	Sub-total					0
	TOTAL INVESTMENT					**37,000,000**

Annex IV.2.2

Investment Costs Port of Batumi

Investment Costs Batumi

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
1.	**Reconstruction Facilities Berth 9**					
	- Site preparation	1	#	910,750	910,750	
	- Environmental	1	#	0	0	
	- Civil Works	1	#	1,588,000	1,588,000	
	- Buildings	1	#	2,100,000	2,100,000	
	- Utilities	1	#	140,000	140,000	
	- Other	1	#	100,000	100,000	
	Sub-total					4,838,750
2.	**Reconstruction Aprons and Storage Areas**					
	- Site preparation	1	#	495,945	495,945	
	- Environmental	1	#	0	0	
	- Civil Works	1	#	2,352,250	2,352,250	
	- Buildings	1	#	0	0	
	- Utilities	1	#	0	0	
	- Other	1	#	0	0	
	Sub-total					2,848,195
3.	**Multi-Purpose Terminal (incl. adj. areas)**	Option:	2			
	- Site preparation	1	#	2,570,350	2,570,350	
	- Environmental	1	#	5,347,500	5,347,500	
	- Civil Works	1	#	7,261,000	7,261,000	
	- Buildings	1	#	1,250,000	1,250,000	
	- Utilities	1	#	868,750	868,750	
	- Other	1	#	160,000	160,000	
	Sub-total					17,457,600
4.	**Construction New Bridge**					
	- Site preparation	1	#	143,100	143,100	
	- Environmental	1	#	0	0	
	- Civil Works	1	#	535,000	535,000	
	- Buildings	1	#	0	0	
	- Utilities	1	#	0	0	
	- Other	1	#	0	0	
	Sub-total					678,100
		4,545	m2	30	136,350	
	TOTAL INVESTMENT					**25,822,645**

Reconstruction Facilities near Berth 9

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
1.1	**Site Preparation**					
	- Demolition sheds	4,725	m2	30	141,750	
	- Demolition other buildings	765	m2	40	30,600	
	- Demolition bunker	2,000	m3	*99*	198,000	
	- Demolition rail tracks	1,240	m	10	12,400	
	- Preparation of the ground	20,000	m2	15	300,000	
	- Earth works (incl. sand supply)	13,000	m3	12	156,000	
	- Sewage and drainage	1,200	m	60	72,000	
	Sub-total					910,750
1.2	**Environmental**					
	- Cleaning of the soil	0	m3	*99*	0	
	-				0	
	-				0	
	Sub-total					0
1.3	**Civil Works**					
	- Construction of quay wall	0	m	20,000	0	
	- Construction Ro-Ro ramp	0	#	200,000	0	
	- Rail tracks	1,520	m	400	608,000	
	- Railway switches	5	#	18,000	90,000	
	- Construction bridge	600	m2	400	240,000	
	- New pavement	13,000	m2	50	650,000	
	Sub-total					1,588,000
1.4	**Buildings**					
	- Warehouse	7,000	m2	300	2,100,000	
	- Workshop	0	m2	400	0	
	- Office building	0	m2	500	0	
	Sub-total					2,100,000
1.5	**Utilities**					
	- Water (fire line, fresh water)	250	m	60	15,000	
	- Electricity	250	m	100	25,000	
	- Lighting	20,000	m2	5	100,000	
	- Transformation building	0	#	*99,999*	0	
	Sub-total					140,000
1.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	0	#	50,000	0	
	- Perimeter wall	0	m	50	0	
	Sub-total					100,000
	TOTAL INVESTMENT					**4,838,750**

Reconstruction Aprons and Storage Areas

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
2.1	**Site Preparation**					
	- Demolition sheds	0	m2	30	0	
	- Demolition other buildings	0	m2	40	0	
	- Demolition bunker	0	m3	*99*	0	
	- Demolition rail tracks	2,490	m	10	24,900	
	- Preparation of the ground	25,325	m2	15	379,875	
	- Earth works (incl. sand supply)	0	m3	12	0	
	- Sewage and drainage	1,520	m	60	91,170	
	Sub-total					495,945
2.2	**Environmental**					
	- Cleaning of the soil	0	m3	*99*	0	
	-				0	
	-				0	
	Sub-total					0
2.3	**Civil Works**					
	- Construction of quay wall	0	m	20,000	0	
	- Construction Ro-Ro ramp	0	#	200,000	0	
	- Rail tracks	2,490	m	400	996,000	
	- Railway switches	5	#	18,000	90,000	
	- Construction bridge	0	m2	400	0	
	- New pavement	25,325	m2	50	1,266,250	
	Sub-total					2,352,250
2.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	0	m2	400	0	
	- Office building	0	m2	500	0	
	Sub-total					0
2.5	**Utilities**					
	- Water (fire line, fresh water)	0	m	60	0	
	- Electricity	0	m	100	0	
	- Lighting	0	m2	5	0	
	- Transformation building	0	#	***99,999***	0	
	Sub-total					0
2.6	**Other**					
	- Alarm system	0	#	100,000	0	
	- Gate and barrier	0	#	50,000	0	
	- Perimeter wall	0	m	50	0	
	Sub-total					0
	TOTAL INVESTMENT					**2,848,195**

Multi Purpose Terminal (excluding adjacent areas)

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
3.1	**Site Preparation**					
	- Demolition sheds	2,200	m2	30	66,000	
	- Demolition installations	1	#	99,999	99,999	
	- Demolition foundations and pavement	4,510	m2	20	90,200	
	- Preparation of the ground	31,250	m2	15	468,750	
	- Earth works (incl. sand supply)	52,500	m3	12	630,000	
	- Land reclamation	35,000	m3	6	210,000	
	- Dredging					
	- Sewage and drainage	1,875	m	60	112,500	
	Sub-total					1,677,449
3.2	**Environmental**					
	- Cleaning of the soil	52,500	m3	99	5,197,500	
	- Removal Oil Seperator	1	#	150,000	150,000	
	-				0	
	Sub-total					5,347,500
3.3	**Civil Works**					
	- Construction of quay wall	250	m	20,000	5,000,000	
	- Construction Ro-Ro ramp	1	#	200,000	200,000	
	- Rail tracks	500	m	400	200,000	
	- Railway switches	2	#	18,000	36,000	
	- New pavement	20,000	m2	50	1,000,000	
	Sub-total					6,436,000
3.4	**Buildings**					
	- Warehouse	3,000	m2	300	900,000	
	- Workshop	250	m2	400	100,000	
	- Office building	500	m2	500	250,000	
	Sub-total					1,250,000
3.5	**Utilities**					
	- Water (fire line, fresh water)	500	m	60	30,000	
	- Electricity	500	m	100	50,000	
	- Lighting	31,250	m2	5	156,250	
	- Reefer points	10	#	5,000	50,000	
	- Transformation building	1	#	500,000	500,000	
	Sub-total					786,250
3.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	1	#	50,000	50,000	
	- Perimeter wall	0	m	50	0	
	Sub-total					150,000
	TOTAL INVESTMENT					**15,647,199**

Multi Purpose Terminal (including adjacent areas)

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
3.1	**Site Preparation**					
	- Demolition sheds	4,200	m2	30	126,000	
	- Demolition buildings	2,000	m2	40	80,000	
	- Demolition foundations and pavement	4,510	m2	20	90,200	
	- Preparation of the ground	47,750	m2	15	716,250	
	- Earth works (incl. sand supply)	85,500	m3	12	1,026,000	
	- Land reclamation	35,000	m3	6	210,000	
	- Dredging	50,000	m3	3	150,000	
	- Sewage and drainage	2,865	m	60	171,900	
	Sub-total					2,570,350
3.2	**Environmental**					
	- Cleaning of the soil	52,500	m3	99	5,197,500	
	- Removal Oil Seperator	1	#	150,000	150,000	
	-	0			0	
	Sub-total					5,347,500
3.3	**Civil Works**					
	- Construction of quay wall	250	m	20,000	5,000,000	
	- Construction Ro-Ro ramp	1	#	200,000	200,000	
	- Rail tracks	500	m	400	200,000	
	- Railway switches	2	#	18,000	36,000	
	- New pavement	36,500	m2	50	1,825,000	
	Sub-total					7,261,000
3.4	**Buildings**					
	- Warehouse	3,000	m2	300	900,000	
	- Workshop	250	m2	400	100,000	
	- Office building	500	m2	500	250,000	
	Sub-total					1,250,000
3.5	**Utilities**					
	- Water (fire line, fresh water)	500	m	60	30,000	
	- Electricity	500	m	100	50,000	
	- Lighting	47,750	m2	5	238,750	
	- Reefer points	10	#	5,000	50,000	
	- Transformation building	1	#	500,000	500,000	
	Sub-total					868,750
3.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	1	#	50,000	50,000	
	- Perimeter wall	200	m	50	10,000	
	Sub-total					160,000
	TOTAL INVESTMENT					**17,457,600**

Construction New Bridge

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
4.1	**Site Preparation**					
	- Demolition sheds	0	m2	30	0	
	- Demolition bridge	500	m2	40	20,000	
	- Demolition pavement	2,000	m2	5	10,000	
	- Demolition rail tracks	0	m	10	0	
	- Preparation of the ground	2,900	m2	15	43,500	
	- Earth works (incl. sand supply)	4,800	m3	12	57,600	
	- Sewage and drainage	200	m	60	12,000	
	Sub-total					143,100
4.2	**Environmental**					
	- Cleaning of the soil	0	m3	*99*	0	
	-				0	
	-				0	
	Sub-total					0
4.3	**Civil Works**					
	- Construction of quay wall	0	m	20,000	0	
	- Construction Ro-Ro ramp	0	#	200,000	0	
	- Rail tracks	0	m	400	0	
	- Railway switches	5	#	18,000	90,000	
	- Construction bridge	500	m2	600	300,000	
	- New pavement	2,900	m2	50	145,000	
	Sub-total					535,000
4.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	0	m2	400	0	
	- Office building	0	m2	500	0	
	Sub-total					0
4.5	**Utilities**					
	- Water (fire line, fresh water)	0	m	60	0	
	- Electricity	0	m	100	0	
	- Lighting	0	m2	5	0	
	- Transformation building	0	#	***99,999***	0	
	Sub-total					0
4.6	**Other**					
	- Alarm system	0	#	100,000	0	
	- Gate and barrier	0	#	50,000	0	
	- Perimeter wall	0	m	50	0	
	Sub-total					0
	TOTAL INVESTMENT					**678,100**

Annex IV.3.1

Revised Investment Costs

Extension Container Terminal Poti

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
1.1	**Site Preparation**					
	- Demolition buildings	2,242	m2	40	89,680	
	- Demolition rail tracks	1,350	m	10	13,500	
	- Preparation of the ground	67,650	m2	15	1,014,750	
	- Earth works (incl. sand supply)	67,650	m3	12	811,800	
	- Dredging	0	m3	3	0	
	- Sewage and drainage	2,800	m	75	210,000	
	Sub-total					2,139,730
1.2	**Environmental**					
	- Removal fuel station	1	#	50,000	50,000	
	-				0	
	-				0	
	Sub-total					50,000
1.3	**Civil Works**					
	- Reconstruction of quay wall	220	m	4,000	880,000	
	- Rail tracks	270	m	400	108,000	
	- Railway switches	3	#	18,000	54,000	
	- New pavement	67,650	m2	50	3,382,500	
	Sub-total					4,424,500
1.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	0	m2	400	0	
	- Office building	480	m2	500	240,000	
	Sub-total					240,000
1.5	**Utilities**					
	- Water (fire line, fresh water)	1,000	m	30	30,000	
	- Electricity	1,600	m	50	80,000	
	- Lighting	67,650	m2	4	270,600	
	- Reefer points	24	#	5,000	120,000	
	- Transformation building	1	#	600,000	600,000	
	- EDP hardware and software	1	#	500,000	500,000	
	Sub-total					1,600,600
1.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	2	#	45,000	90,000	
	- Perimeter wall	330	m	50	16,500	
	Sub-total					206,500
	TOTAL INVESTMENT					**8,661,330**

Multi Purpose Terminal Batumi

Act.	Description	Qty	Unit	Unit Costs (USD / unit)	Costs (USD)	Total (USD)
3.1	**Site Preparation**					
	- Demolition sheds	4,200	m2	30	126,000	
	- Demolition buildings	1,000	m2	40	40,000	
	- Demolition foundations and pavement	2,625	m2	20	52,500	
	- Preparation of the ground	41,000	m2	15	615,000	
	- Earth works (incl. sand supply)	41,000	m3	12	492,000	
	- Land reclamation	15,000	m3	6	90,000	
	- Dredging	50,000	m3	3	150,000	
	- Sewage and drainage	1,300	m	75	97,500	
	Sub-total					1,663,000
3.2	**Environmental**					
	- Cleaning of the soil	41,000	m3	*p.m.*	p.m.	
	- Removal Oil Seperator	1	#	150,000	150,000	
	-				0	
	Sub-total					150,000
3.3	**Civil Works**					
	- Construction of quay wall	250	m	20,000	5,000,000	
	- Construction Ro-Ro ramp	0	#	200,000	0	
	- Rail tracks	270	m	400	108,000	
	- Railway switches	1	#	18,000	18,000	
	- New pavement	33,500	m2	50	1,675,000	
	Sub-total					6,801,000
3.4	**Buildings**					
	- Warehouse	0	m2	300	0	
	- Workshop	0	m2	400	0	
	- Office building	0	m2	500	0	
	Sub-total					0
3.5	**Utilities**					
	- Water (fire line, fresh water)	500	m	40	20,000	
	- Electricity	550	m	100	55,000	
	- Lighting	41,000	m2	4	164,000	
	- Reefer points	10	#	5,000	50,000	
	- Transformation building	1	#	500,000	500,000	
	Sub-total					789,000
3.6	**Other**					
	- Alarm system	1	#	100,000	100,000	
	- Gate and barrier	1	#	45,000	45,000	
	- Perimeter wall	360	m	50	18,000	
	Sub-total					163,000
	TOTAL INVESTMENT					**9,566,000**