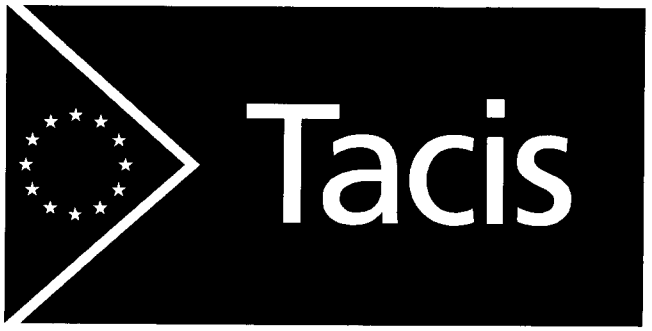

Feasibility Study of New Terminal Facilities in the Georgian Ports

Phase 2 Report

Vol. III - Port Master Plan

February 1998

Volume 3

Port Master Planning

Section 1: Recommendations for Improvements in Management Structures and Systems

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Section 1

Recommendations for Improvements in Management Structures and Systems

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1. Organisational Structure of the Ports

1.1 Introduction

In the Phase 1 report reference was made to the organisational structures described in detail in the GTZ Project "Optimising and Reorganisation Study for the Ports of Poti and Batumi" elaborated by HPC Hamburg Port Consulting GmbH., Hamburg, dated 4April 1996.

Meanwhile the GTZ-Team is preparing and executing training programmes based on the above mentioned study and the additional evaluation made in the past 4 month. The training courses are prepared by the GTZ-team and executed by the International Business Planning and Development Institute, Tbilisi.

The training is basically concentrated on Marketing, Electronic Data Processing (EDP) and Finance. These training courses are a first step into the direction to improve the management structures and systems, but only in the field of the capability of the staff.

The structures in the Port of Batumi seem to be unchanged. The Port has recently declared his status as a Municipality Port and if changes will occur, they are mainly to be expected not in the structure but in the persons involved.

In Poti the port is in a real change process. In respect of the forthcoming investments and the discussions with regard to privatisation, a profit centre structure has to be developed. The management structure and system itself has to be implemented by the General Manager of the Port. This can be only done as a top to down approach and has to go hand in hand with the improvement of the information flow and the delegation of responsibilities.

As already stated in the Phase I report, the problems are in the details. To change the attitude towards work or rather to make persons in charge feel responsible is the key to success. Consequently, the organisational structures have to be built in a way, that real responsibility for the port and its commercial results are given to the General Manager of the port and as top down approach result responsibility must be delegated from the General Manager to the Department Leaders.

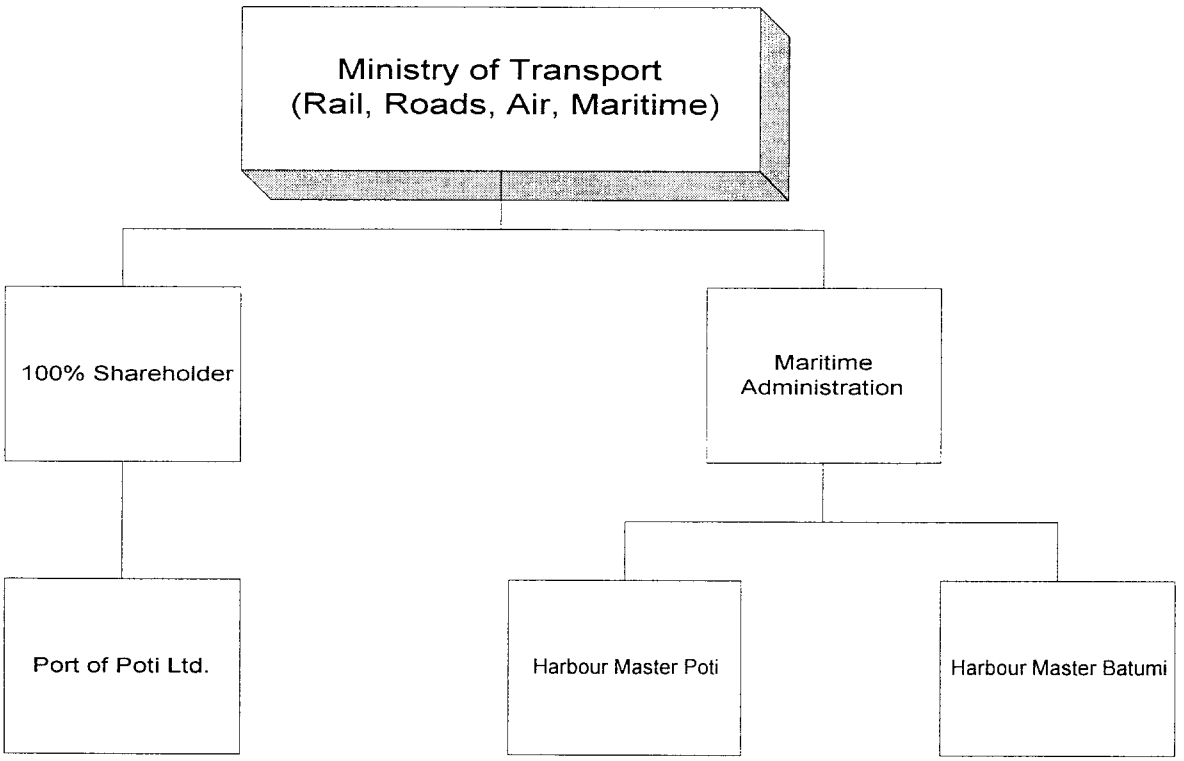
The Department Leaders of the different areas, in which the Port is producing services (production areas) should also be responsible for the commercial results. Departments which are not directly generating services to the customers of the port, should be transformed into service centres with budget responsible managers on top.

2. Shareholder concept for the Port of Poti Ltd.

The ownership of the Port of Poti is still not clearly defined. The Port is operating in a legally undefined status. A legal form for the Port has to be defined and implemented. Therefore, it is suggested, to establish a limited company with one shareholder , the Ministry of Transport of Georgia.

To implement the this form of the company legal steps have to be taken and the development of rules to conduct the business and describing the rights and duties of the general managers of the port.

The Port of Poti should be linked with its shareholders as per the following diagram:

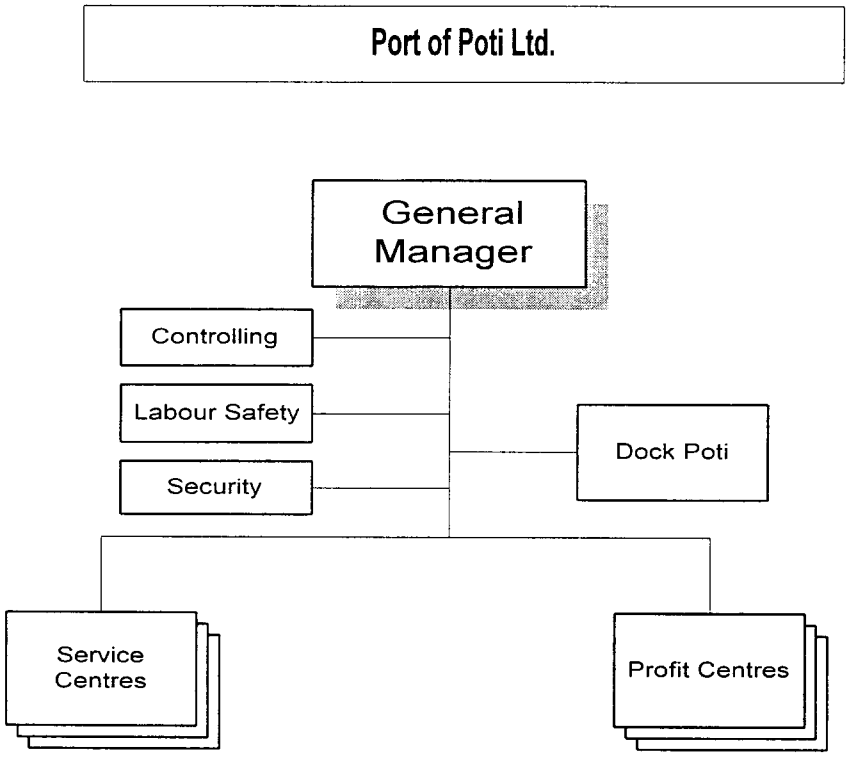


3. Efficient port management structures

3.1 Profit centres and service centres

The future organisational structures for the two ports will differ from each other. Batumi will continue its central management system and is not on the way to privatise. The recent decision to change the port into a municipality port is an indication of that fact. In this respect, no major changes to the organisational structures proposed by the GTZ Team in their studies can be expected.

The structural changes in Poti are vital. Instead of having a centralised system with the corresponding structure, the new systems and structure will be based on profit centres and the delegation of real responsibility.



The service centres should include following basic functions: Marketing, Personnel, Information technology (IT), Booking, Finance, Cost accounting, Commercial and Other Services e.g. Legal, refurbishing and maintenance

The profit centres are basically the Oil terminal, Rail Ferry, Terminal I + II, Container Terminal, Berths 12,13,14, Planning and civil engineering, Port fleet, Technical department, Port rail services.

3.2 Definition of profit and service centres:

A profit centre is a unit, which is providing services for port customers in a defined area, with a defined number of staff and a defined park of equipment.

A service centre is a unit, which renders clearly defined services to profit centres and other service centres with a given number of staff based on budgets. The prices of these services are to be calculated on a non

profitable and competitive level compared with same service from 3rd companies. It is not the intention to generate profits in the service centres at the expensed of the profit centres.

3.3 Necessary steps to establish Profit and Service Centres

To establish profit and service centres means, that the Port has to have the preconditions for this steps. The decision, to set up profit and service centres has to go hand in hand with the implementation of quite a number of preconditions such as:

- Personnel decisions
- Implementation of a cost accounting system
- Clearly described responsibilities
- Assistance from outside
- Neutral controlling department

3.4 Personnel decision

To be in the position, to take over the responsibility of an profit centre, the manager in charge has to be qualified in the following fields:

3.4.1 Personnel requirements of the Profit Centres

- Operational background with knowledge of cargo handling and the ability to improve the productivity.
- Commercial background with experience in the interpretation of figures out of a cost controlling system.
- Knowledge in calculation of operational contracts
- Knowledge in the usage of computer software
- Personal integrity
- Knowledge about personnel maters
- Personnel leadership experience to generate high motivation at the work side
- Knowledge of the English language

3.4.2 Personnel requirements of the service centres:

- Knowledge in the business field of the corresponding service
- Knowledge in the usage of computer software
- Personal integrity
- Knowledge about personnel matters
- Personal Leadership experienced to generate high motivation
- Knowledge in the English language

3.5 Implementation of a cost accounting system

To implement a cost counting system, sufficient EDP (Electronic Data Processing) programmes and systems are necessary. It is not possible to do the cost counting for each of the profit and service centres by hand. The figures, generated by hand are far be hind to be actual and a efficient system has to be as actual figures as possible. Systems to meet this requirements are available in the western markets. In the software equipment of the Rail Ferry Terminal a packages is mentioned, which is nearly 8000 times implemented, also

4. Additional remarks to the Organisational Structures

As already mentioned, the GTZ team is working on the improvement of the management structures in both Ports and meanwhile the have started with training programmes. This is not directly in contradiction to the proposed profit centre structure in Poti. The general methods of Management's are basically the same in all systems.

The impact of a profit centre system on the EDP requirements have to be described before tendering or making decision on software products.

in Russia. This could be suitable to satisfy the requirements of the whole port. In principle, the requirements of the cost accounting system are described in the comments to the financial report procedures.

3.6 Clear description of responsibilities

To avoid uncertainties and to give the necessary standing to the profit and service centres manager the rights and the duties have to be described in detail and in general. The description has to be as clear as possible to allow the manager to act in the given frame without additional confirmation.

3.7 Assistance from outside

It has to be foreseen, that in the beginning of the implementation and even later on, assistance from outside will be necessary. Therefore, the Port of Poti should include in the future personnel requirements assistance from abroad.

3.8 Neutral controlling department

The results of the profit and service centres have to be presented regularly and in time to the General Manager and the responsible managers of the profit and service centres. Resumes, interpretations and recommendations to the figures produced are to be given from well experienced specialists. It is important, that the controllers are not involved in the port business or in the accounting procedures. They have to be independent and neutral.

5.3.2 Objectives:

The objectives of a marketing department are to:

- investigate markets
- identify port's customers and evaluate their equity
- update the system of tariffs
- identify services required within the port and improve existing services
- identify competitors
- the presentation of Georgian ports

5.3.3 The investigation of markets

As mentioned above, in the past the main customers of the Ports were companies coming from FSU countries and they still remain regular clients of the Ports. Recently, the situation has changed. The Ports have customers from various countries. Interest of Europe and America in the countries of Caucasus and Central Asia make the Ports attractive to customers.

Georgian Ports are gateways of the TRACECA route, the silk route of the 21st century. These two Ports connect the Trans European Network (TEN) countries via the Caucasus with Central Asia, which leads to an increase of cargo volumes.

The Ports can serve as a corridor to connect Caucasus and Asia with European countries and vice versa. These countries can be considered as potential clients for Georgian Ports.

5.3.4 Identify Port's Customers and evaluate their equity

The customers of Georgian Ports could be private enterprises and private or state organisations which are transporting cargoes. These are mainly:

- ships and cargo owners
- shipping lines
- integrators (forwarding agencies)

To determine the value of each customer the Marketing Department should have the information based on following criteria:

- profitability of customer as per gross profit contribution
- payment ability (financial situation of the client)
- market position of the customer in his own industry
- whether it is growing or decreasing industry
- customer's share on total turnover of the port (average)
- customers claims

5. Improvement of Georgian Ports Marketing

5.1 The Marketing in the two Ports

5.1.1 Port of Batumi

Batumi has a marketing department with 10 employees. It is not clear, what this marketing department is really doing in respect of port marketing. In a discussion with the responsible managers it occurred that more or less Shipping agency respectively .forwarding marketing is being taken care of, but not of port marketing. The clients of the port are identified as shipping agencies or forwarding companies. These companies are offering their services, including the port services, to cargo or ship owners.

5.1.2 Port of Poti

The marketing department is currently under development. Therefore, presently no real marketing is existing.

5.2 Marketing Activities of GTZ project

GTZ project worked simultaneously with HPTI on the development of Georgian Ports Marketing. They elaborated the report about 'Reorganisation of the Georgian Ports Sector', which includes the proposal to establish a Marketing Department. This version has been studied and in principle agreed upon.

The following document is based on the GTZ project paper but with some additions, e.g. customers evaluation system and customers equity. It includes a detailed description of Georgian Ports customers, competitors and recommendations for new services.

5.3 Future marketing function of the Georgian Ports

5.3.1 Introduction

After the political and economical changes in Georgia, Georgian Ports have to identify their role in whole country's economy. During the Soviet period the main customers were the organisations and institutions of Former Soviet Union (FSU) and all Port activities were planned and regulated by the government. Nowadays Ports should look for new customers itself , should establish the organisational structure that meets the requirements of market economy.

The planned modernisation and restructuring of the Ports, includes equipping them with modern technology, new handling and storage facilities for different types of cargoes, up-to-date communications systems will attract new customers.

Presently, the Ports' organisational structures, which do not include a marketing department, makes it difficult for them to stay in contact with their customers and to distribute information about the Ports to interested parties.

Customer Evaluation System and customers equity (per customer)

Table 1

Scale	Profitability	Payment ability	Share in total Port Turnover	Market position	Condition of Indus-try	Claims
5						
4						
3						
2						
1						
Multiplicator	3-times	2-times	2-times	1-time	2-times	1-time
					Total Points	

Based on this information Port should divide it's customers by categories.

- Gold card customer **51-55**
- potential Gold card customer **46-50**
- good customer **36-45**
- difficult customer **16-35**
- better not to deal with **0-15**

5.3.5 Update the system of tariffs

To establish standard tariffs it is important to meet customers' requirements and to avoid informal payments. Nowadays Ports have tariffs but they are very general. The commercial and planning departments are working on the new tariffs that would consider all details in handling cargoes including the type of each cargo.

The Ports have opportunity to increase their business and compete with other ports by setting up tariffs based on higher productivity and less overhead expenses

5.3.6 Develop new services

The development of new types of services is important to satisfy the needs of customers and to attract new customers. First of all services that the ports provide should be implemented without delays and on a high level of quality. New services could be:

- container freight station
- new technological equipment to load-unload cargoes
- new facilities to handle special vessels (e.g. rail ferries)
- computerise information technology
- other facilities serving transport related equipment (e.g. wagons cleaning facilities, container repair)

All this information is needed to elaborate **customer's equity** (**Table 1**)

Scale of evaluation

Profitability
5-high profit
4-low profit
3-no profit, but high contribution
2-low contribution
1-only generating losses

Payment Ability
5-excellent (pre-payments)
4-good
3-sometimes with delays
2-always with delays
1-no payments

Share in total port turnover
5-more than 50%
4-50%-35%
3-35%-20%
2-20%-5%
1- 5%-0%

Market position
5-more than 50%
4-50%-35%
3-35%-20%
2-20%-5%
1-5%-0%

Condition of industry
5-fast growth industry
4-slowly growth industry
3-stagnity
2-slowly decreasing
1-fast decreasing

Claims
5-no claims
4-a few claims
3-sometimes claims
2-often claims
1-always claims

Section 2

Comments on financial reporting procedures

5.3.7 Identify competitors

Each Port should know its competitors as well as its customers. The competitors of the Ports could be:

- other ports with similar connections (local and other Black Sea Ports)
- competing routes
- other transport facilities (railways, tracking companies)

The Ports have to know about competitors all relevant information, such as:

- their tariffs
- their customers
- what their marketing activity includes
- their possibilities (capacity)
- services they provide
- hinterland connections
- strengths and weaknesses

After collecting and analysing all information about each competitor the Ports Marketing departments should define how to win in competition.

5.3.8 Presentation of Georgian Ports

The Ports as organisations are very limited in advertising, because their activities include only to play a role of a mediator between ship and land. Ports cannot inform customers in the streets about his service as Mc Donald does. Customers of Ports are not all persons but only those companies and organisations which are acting in transportation of cargoes.

The Ports should try to reach interested parties and potential customers out of the transport industry. Necessary steps are:

- develop folders describing services of the ports
- to make advertisement in special newspapers
- Public relations
- participation in transport exhibitions

The Marketing Department should have private meetings with new customers and explain to them the preference of the TRACECA corridor connected with old silk road.

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1 Overview of Existing Reports and Statistics

1.1 Organisational Conditions

The port organisations are involved in a process of change from the former Soviet Union (FSU) system into a modern business- and market-oriented system.

This change process is based on a model, as discussed in a meeting of

- Chancellery of State
- Marine Department
- Port of Batumi management
- Port of Poti management

on 20 January 1997 at the Chancellery of State of Georgia.

The headlines of the discussed model can be summarised as follows[1]:

- Port is and will remain under state ownership;
- A port operations company leases territory and aquatory from the state; from the legal point of view the operations will be organised as a joint-stock company, a construction usual in Georgia, comparable with a public company in the western economy.
- Tug boat, pilotage and similar services are rendered by a non-profit port service company
- A new organisation, the National Marine Administration (NMA), will be responsible for supervision on safety and environmental aspects.

As a consequence, the examination prior to give "Commentaries on financial reporting procedures" in the Feasibility Study should be understood in the context of a process in which considerable progress to modern ports has already been effected and is still going on.

1.2 Financial Reporting Procedures

1.2.1 General conditions

The present procedures in financial reporting find their origin in the system as developed under the FSU system.

The general regulations regarding financial accounting for companies are laid down in a nation-wide valid accounting plan. This plan describes:

1. The specific lines of the balance sheet and income statement
2. The statement of use of profit
3. The chart of accounts

[1] Reference is made to the report of HPC Hamburg Port Consultants GmbH to GTZ Gesellschaft für Technologische Zusammenarbeit mbH, dated 13 February 1997.

Table 1: Analysis of financial result (before taxes)

Pos	Description	Reference	INCOME	EXPENSE
1	Loading and discharging operations	030		
2	Auxiliary & local fleet	040		
3	Motor transport	050		
4	Outport works	060		
5	Port and other dues	070		
7	Hydrotechnical facilities	090		
8	Territory and aquatory of the port	100		
9	Electro department	110		
10	Sea (passengers) stations	120		
11	Lifting and underwater works	130		
12	Inspection of port control	140		
13	Other operations	150		
Sub-totals				
	Auxiliary production	170		
	Unplanned revenues and expenses	180		
Totals				
	Financial result			

Table 2: Analysis of total expenses incl. analysis of expenses of main activities

Description	Reference	Total expenses	Loading and discharging	Auxiliary and local fleet
Salaries and wages				
Social insurance				
Ration				
Fuel & electric power				
Materials and depreciation of low value items				
Depreciation of fixed assets				
Repair				
Administration expenses				
Operating expenses				
Other expenses				
Totals				

The frequency of these reports is quarterly.

The prescribed external distribution of these reports is as follows:

4. The journal types
5. The depreciation rates

In July 1997, a new law regarding accounting in Georgia came into force. An increase of depreciation rates is one of the changes, necessitated by very low rates under the FSU system.

The organisation of the balance sheet shows clear similarities with the western European type whereas the standard profit and loss-account is very summarily. An additional requirement for the Georgian ports is the reporting procedure on quarterly basis for income and expenses by type of activity, laid down by the (former) Marine Administration.

A difference to the western economical situation is that the amount of company profit is reflected before corporation tax, both in the balance sheet and in the profit and loss account. The ports are, however, tax-paying bodies in the sense of corporation tax. The corporation tax is presented as part of the profit distribution. Another difference is the profit distribution as such: this item is further described under the heading: "profit and privatisation considerations".

A specific problem will arise when it is necessary to analyse figures of previous years, because the Georgian currency changed twice in the last few years: on 1 August 1993, the Rouble was converted into Coupon. On 1 October 1995, the Coupon was converted into Lari. It is self-explanatory, that such conversions impose risks for errors in accounting, both in data-collection and processing, as well as in reporting and in the interpretation of figures. On top of that, the frequency of the conversion-operations and the fact that these conversions were implemented during the respective calendar years increase the specified risks.

1.2.2 Port Services

General

The financial reports are defined in the context of the accounting plan; additional requirements are laid down by the (former) Marine Administration. (Reference is made to 1.2.1 “General conditions".) The additional report reflects, in table layout:

1.2.5 Controls

In general, the value of the controls applied is doubtful.

- An example in this respect is the control of the invoicing procedures regarding port dues in the ports. In Batumi the information was given, that no confirmation regarding the completeness of the follow-up of disbursement accounts (for especially port dues) after departure of the ship existed other than the data the forwarding agent provides the invoicing department with. In Poti, the Head of the Planning Department explained that a monthly check of the full follow-up and assessment of disbursement accounts is done and signed off by himself together with the manager of the Financial Accounting Department.
- Another aspect of control is the definition and rate of tariffs. The tariffs for cargo handling are issued by the Marine Department. The tariffs are not based on costs of the companies. The tariffs for port dues are applied on the basis of a USSR list of the year 1988. In such a situation it is evident, that an analysis of the tariffs with regard to the real costs of the organisations is not possible.

1.2.6 Profit and Privatisation Considerations

The financial accounting figures are subject to the risk of being insufficiently realistic, since the profit distribution is a type of transaction about which only insufficient information is available. The yearly profits of the ports are remitted, partly for tax (20%) and the rest to funds. It was explained that a part of these funds are supplied to employees of the ports. Any cost accounting system on the basis of such financial accounting figures bears the risk of being incomplete.

The specific background of this situation is the freedom of management to distribute the profit, which is unusual in the western economy.

1.3 Port Traffic Statistics

1.3.1 General Conditions

In the same sense as described in 1.1 "Organisational Conditions", and further described 1.2.3 "Processing System", the scope of the port traffic statistics is very limited as a consequence of the origin of the present procedures in the FSU system.

1.3.2 Port Services

The scope of statistics is limited to the handling of cargo volumes, on the basis of which negotiations with governmental authorities take place. The information available concerning the movements of ships (size, types, frequency) and the occupation of the berths and other facilities (tug boats, etc.) is insufficient

On a quarterly basis the cargo volumes are reported to the Ministry of Transport and the national Marine Administration (formerly the Marine Department).

1.3.3 Processing and Input System

The production of statistics is performed manually in both ports. The basis of the statistics is the registration of ships handled by the dispatcher's department.

The collection of data takes place within 10 days after the end of the month.

1.3.3.1 Poti

The planning department prepares the statistics on the basis of data, that the commercial department receives from the dispatcher's department for invoicing purposes. Subsequently, the transaction data are sent

- Ministry of Transport (with additional copy to the Marine Department, respectively. NMA)
- Inspector of Taxes

1.2.2.1 Poti

Not all lines in the tables shown are applied in Poti, e.g. administration expenses.

1.2.2.2 Batumi

The financial reports in the Port of Batumi follow the standard accounting plan but provide internal information as well. A report regarding income and expense by department is produced monthly.

In this report the income is not specified further than department level; whereas the expenses are specified by department and by category. This report is provided to the Planning and Prognostics Department which performs analyses in behalf of the Deputy Manager for Marketing, Economy and Finance.

To other managers no standard reports are provided. Although information about financial data is provided on specific request, there is no structured use of the generated data as management information in the sense that all managers receive a report on a periodic basis.

1.2.3 Processing System

General

The way of processing of data is partially determined by the standard chart of accounts and the standard definition of the journals. A definition of the journals was found in a Russian manual of the year 1981. It was claimed that this definition is standard and is not explicitly overruled by new Georgian law.

1.2.3.1 Poti

The main ledger is the source for the completion of the financial reports. The entries in the main ledger are prepared by means of hand-written journals. The preparation of the journals is a labour-intensive job, but once when the entries are made, the balance sheet and profit & loss account can be produced, partly computerised by means of the spreadsheet programme Microsoft-Excel for the costs aspect.

1.2.3.2 Batumi

The production of reports is supported by EDP to a considerable extent. The computer is a stand-alone modern PC (pentium processor) with a tailor-made software for the Port of Batumi. Data in PC's of other organisational units are used to update the data in the computer of the accounting department on a monthly basis by means of download, transported from one computer to the other on diskette.

1.2.4 Input

General

The input for the financial reporting procedure is the general ledger system. The way of processing the accounts can be deducted from the standard balance sheet form, where the account numbers to use are given. The chart of accounts lacks a clear top-down approach and is structured poorly.

1.2.4.1 Poti

The input of data in the financial reporting system is a monthly recapitulation of the transaction journals. Monthly only one entry per account is made in the main ledger. The prior steps are regroupings from individual transactions to journals and the combination of journals to entries in the main ledger.

2 Planning and Control Requirements

In order to create an effective planning and control environment for the ports, general items for all enterprises, sector-specific items, organisation-specific items and individual items are relevant.

It is planned, that the port organisations are organised as public (joint-stock) companies under supervision of an independent board of directors. It is further planned, that directors and management will have a personal liability to exercise their tasks and duties, similar to the legal requirements in the western economy. In the same sense, the appointment of top-management will be the decision of directors.

Proceeding from general to specific items, the requirements can be specified as follows:

2.1 General Requirements

In order to create an effective planning and control environment for the ports the following general requirements have to be fulfilled:

- Harmonisation of the requirements for annual accounts to the standards, valid in the European Union. This is especially relevant for the organisation of the balance sheet and the profit and loss account.
- Harmonisation of the method of profit distribution to the standards, usual in the European Union. Especially, the principle of a proposal by top-management, that is subject to approval by independent directors deviates from the present practice.
- Review by external auditors of the functioning of the internal control measures as part of their audit of the annual accounts. Supplementary assignments are to be considered if a poor functioning of internal control is indicated by the audit.
- It should be free to organise the chart of accounts such that it is optimal for the specific organisation.

2.2 Sector-specific requirements

Sector-specific requirements are considered not to be necessary for external financial reporting procedures. But some specific requirements should be fulfilled:

- Statistic reporting procedures should be in accordance with guidelines of the (new) National Maritime Administration (formerly Marine Department). Safety and environment aspects are the main aspects of their responsibility.
- The National Marine Administration should in future not exercise tariff autonomy.

2.3 Organisation-specific requirements

- Clear identification of decision-making functions and the names of managers, who are accountable for the results of their respective operations. This includes the name, size and functional specification of the organisational units which they are responsible for.
- Top-management formulates the conditions on the basis of which the plans of managers of organisational units are developed and gives power to a central controlling function in order to exercise supervision on the financial aspects of the responsibilities of the accountable managers.
- The supervisory board authorises the combined plans and receives sufficient information about their realisation in order to exercise its legal duties.

to the foreign currency and account management department for settlement with the client. The accounting department is the next station for registration purposes. The data wait in the accounting department until the closure of the month and are sent all together to the planning department. A re-routing may be an adequate (temporary) solution for this bottleneck.

1.3.4 Profit and Privatisation Considerations

The poor information regarding statistics has mainly its basis in the history. One of the major features of a modern management information system is the relationship between income, costs and the relevant quantitative criteria. Reliable data-collection regarding the income and cost per unit depends on both sound procedures regarding financial accounting and the count of the operations, causing these incomes and costs. These data need to be collected on a continuous, day-to-day basis. A well-functioning sales system produces both invoices and traffic statistics as well. In this respect the situation in the ports is out of date.

1.4 General Planning Data

General

The planning sequence under the former SU system was a 5-year cycle. This cycle is not valid any more after the dissolution of the Soviet Union, but the way of thinking in terms of planning and operating did not change.

1.4.1 Poti

In Poti a yearly planning cycle is in use. It was explained to the Consultant that the central government and the port management negotiate with each other about the volumes to handle. This negotiation is a subject, where the differences in volumes required by government and the ones feasible in the view of the port are considerable.

In case of lower cargo volume handled than agreed between Government and the port, financial penalties are imposed on the port. It is not yet clear if these penalties (in 1996 Lari 970.000, approx. ECU 750.000) are taken into the profit & loss account or if this charge is one of the items of the use of profit. In this respect reference is made to the paragraph "Financial Reporting Procedures", in 1.2.6 "Profit and Privatisation Considerations".

1.4.2 Batumi

A discussion with the responsible deputy manager resulted in the view, that general planning is no longer applicable since the end of the Soviet Union. Reference was made to an organisation's business plan a copy of which is not yet submitted to the Consultant.

In Batumi no indications of difficulties in the negotiations with the government were indicated. The perspectives for 1997 in this respect are positive.

3 Necessary changes

3.1 Weak Point Analysis

To a considerable extent the weak points have a basis in the fact, that the history of the ports is based on the FSU structures and systems. Although the origin of weak points can be found in history, the weak points need to be described in a wide variety of aspects: external problems, general organisational matters, methods and procedures, education and working equipment should be understood distinctively and in their mutual (presently: negative) synergy.

Although a revision of the legal framework is going on, an effective change of the present situation in the financial reporting procedures, (port traffic) statistics and general planning will not be possible without long-term intensive external support.

On the basis of the previous information, the following aspects are important to consider:

1. The impression exists, that there are too many employees compared with the work load, that has to be done in the respective departments. It might be, that in peak-times, e.g. preparation of payroll calculation or quarterly balance, the quantity of personnel is necessary.
2. Permanent changes of legislation in Georgia makes the staff irresolute and complaining, e.g.
   - Complaints about incapable or unwilling officials
   - Unclear documents
   - Absurd documents for the port (not corresponding to the work of the port)
   - Lack of clear statements
   - Absurd inquiries by ministries
   - Necessity of a lot of statistics: have they still to be done or not? (Statistics are produced because Moscow ordered them)
   - No information list, i.e. international information on bulletin
3. Language problems: a main part of the staff is not capable to read and apply the new published laws. The new laws are all written in Georgian language, and there are no translations into the Russian language available. E.g., the book of the Merchant Marine Code "Normative Materials on Commercial Operation of Marine Fleet, edited by Marine Fleet, Ministry of USSR, Moscow 1980" is still in use in the Loading and Commercial Works Department. However, there is a new code in existence in Georgian language. This code is not in the possession of the Loading and Commercial Works Department, and not translated into the Russian language for their information as well.
4. There are some missing functions and/or not clear relations in the valid organigramme of the Port:
   - Internal audit is missing;
   - No controlling function is in existence;
   - The Cash function is not included as a special department or cost centre.
   - The Loading and Commercial Works Department is under control of the Deputy Manager on Operation and not under the control of the Deputy General Manager on Economics and Commercial Work on Currency Operations as it should be according to the work carried out in this department.

- Budgeting, realisation and analysis of deviations (hereafter: budget discipline) are performed on such a basis, that the respective managers have sufficient tools to make and update their plans. This means, that they have sufficient capacity available within their organisational units to generate information for their own use and for the central controlling function as well. It may be necessary to appoint financial officials within the operational units, especially in the big units.
- The budget discipline works for periods of 5 years (revolving), yearly, quarterly and monthly.
- The use of statistics is both for external use and for internal use. The external use of statistics is for supervision purposes on the safety and environment aspects and for that reason limited in comparison with the statistics necessary for the budget discipline. The statistics for budget discipline require information about port traffic, but also about the occupation of all resources (fleet, berths, cranes, labour; where applicable additionally distinctive by gang, shift, etc.). Proper management of productivity of individual organisational units is possible only with sufficient detail and relevant grouping on the level of the individual managers.
- The tariffs are calculated and contracted by the organisations themselves; the verification of the adequacy of the tariffs is the responsibility of the organisation as part of the budget discipline.
- Recording of operations and transactions is integrated in order to avoid double and (eventually) contradictory records. Statistical data are an automatic additional product of this recording system.

2.4 Requirements on the Individual Level

- Supervisory board and top management are experienced to execute their duties as mentioned above and are aware of the (eventual) necessity of engagement of additional know-how.
- Controllers are experienced with monitoring of the budget discipline both as a system and with respect to the results; with the compliance to this discipline by accountable managers; and with the monitoring and support of the financial officials, attached to the accountable managers.
- Accountable managers are experienced with the application of budgeting in their operational environment and are able to convert the budget discipline in terms of occupation, productivity and other relevant data as the situation requires.
- Financial officials in the organisational units are able to cope with the dualism of service of both to the accountable manager and to the central controller.
- Individual employees are used to instructions from the managers of the organisational units and are no longer influenced by the detailed operational regulations of the former Soviet Union.

9. The chart of accounts, laid down by government, does not support an efficient analysis of results, either by type of income or costs, or by department.
   - The organisation of journals presently reflects the structure as a remnant of the FSU and does not reflect such type of data-flow as convenient for each type of organisation.
   - The journal orders, which are used in accounting of the Sea Port of Batumi are totally not corresponding to the chart of accounts of the Port from July 1, 1997.
   - The chart of accounts from July 1, 1997 used in the Port is still based in principle on the former SU standard chart of accounts. Although some changes have been made in the structure –for example the subdivision of the fixed assets and the corresponding depreciation is partly done corresponding to the Standard Chart of Accounts for German Industry- the structure of the present chart is poor and results into insufficient insight in the type of costs on the global income statement level.
10. The manual character of many data-processing causes delays and results in insufficient depth of the registration of data and separate (again manual) data-collection and data-processing procedures for financial accounting and statistics. The EDP problems are described as elements of the working equipment at the end of this paragraph.
11. The grouping of financial data is done by journal type manually and the input of data in the EDP financial reporting system is a monthly recapitulation of the transaction journals, i.e. double work and the danger of transferring errors.
12. The registration of basic quantitative data for control purposes is very limited. Only the external quantitative data (mainly regarding cargo volume) are recorded on a regular basis. However, daily collection of data for the purpose of information about ship-movements (frequency, type) and about occupation of facilities are not self-explanatory in the present context.
13. Data-forms in Poti have waiting times in the accounting department but strong peaks in the planning department to process these forms for statistic purposes.
14. The accounting for fixed assets is very limited. A sub-ledger with the details about internal and external events (e.g. currency conversion) on the level of individual assets is not available.
15. The book-value of the fixed assets is too high as a consequence of partly extremely low depreciation rates. It has to be waited for the new fixed estimations by the new "Fixed Assets Commission", which will make a revaluation of all fixed assets in the Port in 11/1997. As foreseen in the "New Standard of Depreciation in the Taxes Code", valid from January 1, 1998, the percentages of depreciation seem to be reasonable for bookkeeping purposes (however, with exception of "Buildings – 7%" and "Depreciable assets, which are not carried in this group (No 1-4) – 10%"). For cost accounting purposes, however, they are not suitable.
16. A short-term or medium-term capital expenditure budget (plan for investments) does not exist. Decisions about the kind and extent of investments are deducted normally from the actual difficulties which the Port has to cope with.
17. The profit and loss account does not reflect the total view on incomes and especially expenses: in the profit distribution cost elements should be expected. The idea about profit and distribution of profit is not comparable to the ideas in Western economies. This means, that in the application of generally accepted investment selection criteria (discounted cash-flow, etc.) adjustments need to be made for those expenditures that seem to belong to profit distribution but actually are costs. The accounts No. 881 and 882 (consumption funds) and 883 (investment fund) are used for profit distribution, although most of these distributed sums are costs.

5. Controlling in the sense of steering a company is not done and not known.
   - The information, available to management in order to control operations is very limited. Even if there is information available, there is no periodic basis on which the managers discuss and communicate about the results and characteristic figures for their departments.
   - Management is not used to the principles of delegation of responsibilities and, consequently, not trained in using the information necessary to exercise their responsibilities in this sense.
   - One of the aspects of the use of management information is the budget discipline, which is currently lacking. There is no structure to collect the expectations of management about future operations, to combine these statements under responsibility of top-management and to compare the realisation with the expectations, including analysis of deviations. The budget in the present sense is meant for and suitable for external purposes only.
   - A budget in the sense of financial prognosis for the year is not available to a sufficient level, according to the structure of the organisation. The former budgeting cycle of 5 years is abolished and only a one-year budget is roughly made at the beginning of the year. The control value of the prognostics regarding financial figures is doubtful, if it is only a forecast.
   - A network of sub-budgets and cost-centres is not existing.
   - A report regarding income and expense by department is produced monthly. In this report the income is not specified further than department level, i.e. in can not be seen how the composition is of the different revenue accounts and their corresponding values; the expenses are specified by department and by category, but not by account. The report is provided to the Department of Economics and Prognostication, which performs analyses in behalf of the Deputy General Manager on Economics and Commercial Work on Currency Operations. Consequences of the results of the reports are not known.
   - Use of old norms is practised not only because of language problems: sometimes there are simply no new laws established. E.g., in the Loading and Commercial Works Department the book "Port dues and charges for Soviet commercial seaports, effective January 1, 1988" (Moscow, 1991) is still in use as a base. However, they have already special rates for handling import and export cargo which are developed by the Georgian Marine Department.
6. A MIS does so far not exist, as no standard reports are provided to other managers than the above mentioned deputy manager. Information about financial data is, however, provided on specific request.
7. The clear separation of bookkeeping and cost accounting does not exist. For calculation purposes the values of the bookkeeping are used, that means mostly historical costs. Imputed costs as e.g. imputed depreciation and imputed interests are totally unknown and therefore also not used for calculation.
8. Until 1996 the legislation for preparing the balance sheet and the profit and loss statement was like this, that they deviated in their relevant regulations decisively from comparable regulations in Western European countries. Structural changes of the assets and liabilities and capital of the balance, the repeated changes of the currency and the undervaluation of the fixed assets stipulate, that a real evaluation of the financial situation of the Port is only partially possible, a comparison of the different balances does not give qualified information and a key data analysis cannot be done as it is usually done in international business world.

- Furniture is poorly provided in general in the different offices. E.g. in the Department of Labour and Salary missing furniture for files, missing furniture for EDP, missing wardrobe; especially in the office of the Legal Adviser.

23. The EDP conditions are out of date, incomplete and not reliable regarding continuation of operation:
    - The lack of quantities in computers is massively hindering the work in several departments, e.g.
        * The Department of Registration (missing at least two further computers)
        * The Department of Commerce and Cargo, also called the Loading and Commercial Works Department (without any computer equipment)
        * The Sub-department of the Department of Labour and Salary (one for four persons)
        * The General Department (staff wants to have their own computers, each of them)
    - Hardware is –as far as it is available in the different departments- old-fashioned. A total lack of uninterrupted power supply (UPS) implies a lot of breaks in the ongoing works and a permanent source of errors when electric power fails (which happens frequently). Modern software programmes cannot be loaded as a consequence of restricted storage capacity. Printers –if available- are not in use, e.g. in the Department of Labour and Salary.
    - Software is not available in most of the departments, either for writing programs or for the day-to-day operations. The existing accountancy programmes do not include:
        * Billing/invoicing
        * Purchasing/ordering
        * Budgeting
        * Multiple currency
        * Cost accounting (only a rough distribution of bookkeeping figures to so-called "departments"/cost centres)
    - As a consequence the eventually available computers are used for non-productive activities, like playing games, e.g. in the Department of Labour and Salary.

3.2 Improved Procedures and other Instruments

Against the background of the planning and control requirements and the weak points analysis, the following improvements should be considered:

1. A management information system is necessary in order to control the operations. This system supports financial, statistical and other quantitative information needs on an integrated basis. Result-analyses on the level of individual ship, type of operation, type of commodity, and other specifications need to be developed. In this sense also a cost-accounting system should be developed, e.g. for the control of the cost of the use of equipment.
2. Management needs opportunity to learn how to work in an environment, where the performance of managers is visible and appraised under the application of criteria, quite different from their experiences under the former Soviet Union system.
3. Separation of the present functions of the chart of accounts in a chart, specifying the income and expenses in categories, and a separate system, specifying the organisation in profit- and cost-centres, in order to have a more efficient access to the analysis of results. The chart of accounts in the new set-up also provides grouping-totals on meaningful aggregation levels.

18. The way of purchasing is too time-consuming. There is no clear approach to planning and budgeting of material and spare-parts, necessary in the day-to-day operations. There is no contracting with suppliers, taking into account discounts, rebates etc.

19. The control of the payments received exists, but a follow-up is not made consistently enough. The total outstanding amount of the delayed invoices is too high. The reminders are done, but normally not strict enough and too late. There are existing clear rules in the contracts for delays of payment, but it is doubtful if they are consequently applied.

20. The "Labour and Salary" Department partly realises tasks of the Personnel Department.

21. The staff is not aware of the possible consequences of the changes to a market-orientated system. The ignorance of the possible changes produces a curiosity and a certain fear to them at the same time. The lack of know-how with several subjects combined with fear for the future changes is evident and also expressed by a part of the staff:

- Knowledge of computerisation is not existing or not sufficient. There have been no special computer courses for staff. The computer knowledge the staff has, has been got by working on the job. Training in computerisation is strongly wished by nearly all departments.
- Handling with modern office equipment is not self explanatory or not even existent.
- Knowledge of market-orientated the system is not existing and –therefore- also no knowledge of the practical consequences in the structure of decentralisation and the different systems of leading a company (e.g., management by objectives in a profit-centre organisation and the corresponding cost accounting system)
- Staff regrets that they had no possibility to join a lesson till today and that no training courses had been offered to them in the last years in their specific area of working.
- Lack of knowledge of modern management techniques (the staff of the Department of Economics and Prognostication reported that in 1990 games in economy and lessons in management have been followed).
- Controlling as a decisive mean of steering a company by concentrating on cost reduction, profit increasing by means of contribution margin in the different business fields is not known.
- Cost accounting is basically done by using the values of the bookkeeping department; values of imputed costs for calculation purposes are not applied (e.g. imputed depreciation –including replacement value depreciation- and imputed interest).

22. The working equipment is insufficient: both in general sense and in EDP (about the latter see the next item)

- Office machines: photocopy machines: The lack of photocopy machines is massively hindering the work of a lot of departments, especially the Department of Commerce and Cargo.
- Office machines: calculators: There is a lack of calculators in general in the different offices. E.g., the Department of Commerce and Cargo complained of the fact, that there are only 3 calculators for 10 employees who need calculators. Sometimes employees use their own calculators for working because of the lack of calculators in the Port.
- Office machines: typewriters: Typewriters with Latin, Russian and Georgian characters are available and in use. Besides of the fact, that these machines are antiquated and have no electrical power supply, there is a lack in quantity of such machines in general.

The GTZ project is already starting the implementation of the proposed changes. The programme for the implementation is foreseen to be done in 4 phases:

- Execution of basic training courses
- Elaboration of the required documents for the realisation of the agreed measures for re-structuring
- Execution of advanced training courses
- Implementation of the agreed measures for restructuring

The basic training courses will be given to employees in accountancy. The courses will be given from January '98 till end of April '98. The objective is:

- Explanation of the tasks for the restructuring of accountancy
- Discussion of the business measures and consequences for the implementation of the re-structuring
- Explanation of the basic requirements for the accountancy
- Transfer of knowledge

In this training course the standards for the accountancy in a market-oriented enterprise are explained, discussed and established.

In the second phase (elaboration of the required documents for the realisation of the agreed measures for restructuring), these standards are translated to the situation in both Ports. In fact, in this phase the requirements for the new accounting system, the new accounting procedures are worked out. The requirements for the output of the financial information system are also developed during this activity. The employees in accountancy supported by HPC consultants carry out this activity. This activity will take place in May and June 1998. This activity includes the following elements:

- Key data analyses of the balance sheet and the profit and loss statement
- Contents and organisation of the finance-economical reporting in the Ports
- Preparation, elaboration, execution and settlement of the budgets
- Cost accounting in the Ports

In phase 3 additional training is given for the implementation of the results from phase 2. During phase 4 the actual implementation will be executed.

4. Automation of data-collection and processing-functions is necessary to contribute both to more speed in the process and to more depth in the financial accounting. Where possible, integration of automated processes should be realised in order to avoid double registration and to support integrity of data.
5. Also an important feature of electronic data processing is the generation of quantitative data as an automatic product of data-processing. In that sense, traffic statistics can be produced as an extra product of an automated invoicing procedure.
6. The registration of data for statistics should be revised and extended in the sense, that more basic data are collected and evaluated, like ship-movements by type of ship, occupation of all facilities (berths, fleet, labour), etc.
7. The present routing of data-forms for statistics should be reorganised in such way, that strong peaks are avoided.
8. A budget discipline should be adopted. The present reports are based on the principle that external parties exercise control over the operation. The privatisation background means, that in the fist place the management has to exercise control over the operations. More detailed statements about budgeting are included in point 2. "Planning and Control Requirements".
9. The accounting for fixed assets needs to be extended. A detailed record of all fixed assets including purchase price and reference to the original purchase documents, the depreciation, revaluation, consequences of currency conversions, verification of existence and regular periodic reconciliation of the fixed assets register to the central financial accounting is recommended.
10. The basis of cost accounting should be a complete profit and loss statement, that reflects all expenses. Expenses, belonging to the result but presently part of the profit distribution should be accounted for in the way as usual in the western economies.

Final discussions with the management about an implementation of the proposed changes can only be held after the final agreement on the future organisational structure of the ports.

3.3 Proposed changes

Simultaneously with the current Tacis-Traceca project for the Georgian ports a GTZ project "Optimization and Reorganization Study for the Ports of Poti and Batumi", realised by HPC consultants. One part of this study is concerned with the restructuring of the accountancy in the two ports.

In order to avoid double working and to find a common approach in this sector for the two projects, we discussed the proposals for the restructuring of the accountancy in the Ports with the HPC team. The main proposals for improvement of accounting and bookkeeping are as follows:

- Creation of a department "Cost accounting"
- Set-up of invoicing sections in the profit-centres to be created
- Creation of a department "internal revision and controlling"
- Creation of a sub-department "fixed assets"
- Modification of the aim of the department "planning and prognosticating"
- Delete the department "Labour and salary"

It is also proposed to elaborate and implement a finance-economical information system.

available in Russian. These packages are suitable for enterprises like the Port of Batumi and the Port of Poti. The fact that the package is in Russian does not mean that the accounting has to be done in the Russian language. All transactions and all master data can be entered in the Georgian language and all reports are in the Georgian language, with the exception of some fixed headings. Only the menu structure and the documentation are in Georgian language.

Our opinion is that it is hardly possible to restructure the accountancy of the ports without a proper instrument. Our advice is to look for and purchase such a package in short terms. It is not only essential for the operations of accountancy, but it can also be a tremendous help in the training of the employees of accountancy and by the elaboration of the company's working documents for the practical transformation of the measures of the restructuring.

The main functional requirements for such a package are:

- Running on a PC and on a PC network
- User friendly
- Menu's and documentation in the Russian language
- Transactions and master data can be handled in the Georgian language
- Flexible system for the set-up and maintenance of the chart of accounts
- Flexible reporting system
- Integrated system for cost centres
- Integrated system for budgets
- Integrated system for accounts receivable and accounts payable
- Optional systems for invoicing and fixed assets, integrated or via interfaces.

Invoicing

In the organisation of the accountancy department as proposed by HPC, a new department called "invoicing" is created under the Deputy General Manager on Economics and Commercial work. The creation of such a department in the accounting department means a centralised invoicing process.

In case this invoicing process is restricted to the calculation and the printing of the invoices, this causes no problems. However, the primary registrations, negotiations and approval of the invoices can better take place on the spot of the operational activities, that means within the profit centre.

4 Remarks

In general we can conclude that the approach of the HPC consultants is in line with our ideas in such a process. Our additional remarks and suggestions for improvement are as follows:

Profit centres and cost centres

In the HPC report about accountancy the subject of profit centres and cost centres is elaborated. The creation of profit-centres is a first step on the way to a certain degree of independence. Further steps could be to creation of business units and the creation of separate companies as a separate legal entity.

The creation of profit centres should be accompanied by the creation of cost centres for the other divisions/departments in the port and for divisions/departments within the newly created profit centres. The creation of profit centres and cost centres goes together with delegation of responsibilities that can only be effectuated with a proper reporting system for the justification of the use of the authority. This has huge implications for the accounting system, for the accounting procedures, for the total system of internal control and for the reporting system. This whole process goes beyond the frontiers of accountancy but in our opinion it would be essential to give it proper attention in the training and in the implementation of the new accountancy structure.

Involvement of employees outside accountancy

The new structure of accountancy will be developed in phase 2 of the implementation of the GTZ project. This process will be executed by employees of accountancy supported by the trainers of phase 1. A major part of this process is related to the techniques of modern accountancy and the exclusive involvement of accountancy professionals is logic and justified.

A very important part of this process is the development of a reporting system for management information. In this part of the process the involvement of other management, including top-management, is essential. Top-management has to decide themselves what information they need for the control and the steering of the company. Of course with their background in FSU the management will need training and help to formulate their demands and later to use the information in a proper and efficient way. This concerns not only top-management, because also lower management should be heavily involved in this part of the process. The creation of a management information system is not a target for accountancy but for the benefit of the whole company and is the responsibility of management as a whole.

EDP

The financial accounting systems of the Port of Batumi and the Port of Poti are obsolete, they are not suitable for a market oriented Port. The requirements of a modern information system including the use of profit centres and cost centres and including a proper reporting system cannot be realised with the current system.

In countries in Western Europe there are a lot of standard computerised accountancy packages available that run on PC systems. These packages are user friendly, are relatively cheap, have a very high level of functionality and possess an extensive and flexible reporting system. Nowadays these packages become available for the markets of the countries of the former Soviet Union. Some of the packages are translated and

Section 3

Rail and Road Connection

Poti

Part 1 - Poti

1. Rail transport

In previous Tacis/TRACECA studies railway installations (rail, sleeper, bed, communication, wagons and locomotives) as well as the operation on the main route Poti/Batumi - Tbilisi and further connections to Armenia and Azberbaijan have been investigated.

- Tacis/TRACECA "Joint venture(s) for the Caucasian Railways", Interim Report April 1997
- Tacis/TRACECA "Trans Caucasian Railway, Railways Pre-Investment study and Pilot train Baku - Tiblisi - Batumi/Poti", Draft Final Report May 1997
- Tacis "Forwarding - Multimodal Transports Systems", Final Report May 1997

In those investigations the general condition of the railway system in Georgia and on further lines have been assessed and recommendations for investment stated. Therefore, the subjects here are the port rail operation, the shunting and operation in Poti and the connection to the Georgian Railway.

In addition, the following descriptions of rail transport have been concluded by the study

- HPC Hamburg Port Consulting GmbH "Optimising and Reorganisation of the Georgian Ports Poti and Batumi" (GTZ financed), Final Report April 1996

and especially from interviews in January 1998 with

- Mr. Konstantin Gkarkava, rail dispatcher of Poti port
- Robert Kacharava, Regional Manager of the Georgian Railway

Besides an overview of the working conditions of the shunting yards of Poti port and station, an insight of the section to Samtredia could also be gained in January 1998 during a visit.

1.1 Connection to Georgian Railway

In Georgia all tracks are electrified and even the cargo trains run by electricity (except the shunting yards and port areas). Therefore, the transport times suffers strongly from energy shortage. This problem is recognised by the Georgian Government. Improvements are visible as soon as the Armenian energy supply recovers. Then the Georgian Railway will be supplied with 20 MW per year, sufficient to allow operations without delays due to energy cut-offs.

The train is handed over from one depot region to the next one like a relay. Due to the high Georgian mountains the required traction on the main route varies. Therefore, decomposition of trains and additional locomotives are inevitable on the route to Tbilisi between Zestaponi and Kashuri. On this section high grades up to 2.9 % and the small horizontal radii of 140 m have to be surmounted..

From Poti the track of 68 km leads to Samtredea partly a double track, where it meets the track from Batumi. The condition of the track seams to be fairly good, partial renewal was visible. The gradient is very low. The typical train composition on this section is 31 to 35 wagons or 2,700 tons (3,300 tons in FSU), with one locomotive required.

1.1.1 Wagons

Wagons are provided by the Railways. The following list is an overview of available wagons from the Georgian Railways. The gauge is Russian standard (1,520mm).

Type of wagons	Axles	Length	Tara	Payload	Loading Remarks	Commodities (examples)
covered standard wagon: 4 - 11-260	4	16,970 m	25 t	67 t	4 intake valves at the top (0.4 m) 2 side doors (3.973 m x 2.717 m)	general cargo, grain
covered standard wagon: 4-11-270 4-11-264	4	14,730 m 14,230 m	23.5 t 25 t	68.5 t 68 t	4 intake valves at the top (0.4 m) 2 side doors (270: 3.902 m x 2.343 m) (264: 3.774 m x 2.343)	general cargo, grain
hopper wagon: 4-19-756 4-19-752	4	14,720 m	23.5 t 23 t	70.5 t 70 t	4 intake valves at the top 6 at the bottom	bulk e.g. cement, fertiliser, liquids
open wagon 8-12-915	8	20,500 m	46.4 t	129 t	volume 141 m^3	coal, scrap
open wagon 4-12-1000	4	13,920 m	22 t	69 t	volume 73 m^3	coal, scrap
tank wagon: 8-15-1500	8	21,250 m	51 t	125 t	2 intake valves at the top 4 at the bottom, heating system	petrol, kerosene, diesel
tank wagon: 8-15-880	8	18,690 m	51 t	125 t	1 intake valves at the top 2 at the bottom, heating system	oil products
tank wagon: 6-15-Z865	6	15,980 m	36 t	90 t	2 intake valves at the top 4 at the bottom, heating system	oil products, petrol
tank wagon: 4-15-869	4	13,570 m	25.3 t	62 t	1 intake valves at the top 2 at the bottom, heating system	petrol, kerosene, diesel, other oil products
platform/flats: 4-13-9004	4	19,670 m	26 t	65 t	52.5 m^2 = 3 TEU	container
platform/flat: 4-13-N455	4	14,620 m	21 t	62 t	38.5 m^2 = 2 TEU	container
refrigerator wagons	4	15,400 m	25 t	40 t	max. - 20 degree partly with own generator	perishables (food)

The number of wagons in working condition is very low and depends on the type of wagon. Data published in other reports[1] show a trend of damages and/or repair rate of up to 75 % per day. The reasons are the respectively high ages of the wagons and a lack of maintenance especially in the last decade.

During the visits the wagons mainly seen were the covered standard wagons for general cargo and tank wagons for oil products. For the handling of general cargo e.g. flour in sacks wagons with a flexible top would be optimal. As those are not available, the wagons have to be loaded manually sack by sack.

1 Tacis/TRACECA „Trans Caucasian Railway, Railways Pre-Investment study and Pilot train Baku - Tbilisi - Batumi/Poti" , Draft Final Report May 1997

Not only for that reason , it must be stated that the availability of needed wagons is not safeguarded at all times especially for specialised wagons. It was said that a delay of up to 24 hours may happen on ship unloading and demurrage charges for the vessel accrue in direct transhipment. Actually, the Georgian Railway is repairing the damaged wagons. Soon the problems of insufficient and inadequate wagons should be lessened.

Another transhipment delay is caused by Azerbaijan and Armenia who aim to transport their cargo on their own wagons. The reasons for this is due to fact that they would have to pay charges for using Georgian assets. But the information flow and the provision of Azerbaijan and Armenian wagons and locomotives is often not handled in time. Delays of up to 24 hours also occur.

1.1.2 Locomotives

The port has 3 diesel locomotives for shunting operation in the port from which only one is in working condition.

The railways has 5 working diesel locomotives for shunting in the station area. A further 8 locomotives are out of order.

The shunting operation inside the port area can only be performed with the close co-operation of port and railways. For the future, investments have to be concluded since the live span of the locomotives is nearly ended. Besides, with the introduction of indirect handling and the growing traffic demand the shunting operations will increase.

1.2 Rail logistics

In future the ports will change their operation from direct to indirect cargo handling. The vessels will be discharged and loaded to a stock at the berths independently from the rail traffic. From there, the rail wagons can be constantly loaded or unloaded.

The persisting restrictions of port transhipment will only depend on the possible rail operations. The berths have access by double track alongside the basin. Since there are only a few switches the rail operation at a single berths can hardly be handled autonomously.

In former times until 1990 the maximal capacity of the station and track were 12 trains per day and a handling capacity of approximately 350 to 400 wagons. By now, a maximum of 4 to 8 trains are handled. Not only caused by the decrease of cargo but also by the rocket transport times on rail due to energy shortage.

1.2.1 Trans-Caucasian Logistic-Express

Since 1996 dedicated trains (block train) for container transport have been introduced on the route from the Georgian ports via Tbilisi to Baku in Azerbaijann. There, the possibility for a further connection to Central Asian Republics per rail ferries to Turkmenbashi and Aktau is given. The project has been started with the help of TACIS/TRACECA. The main objectives were to establish a

- stable,
- regular,
- reliable,
- safe,
- fast and
- inexpensive

Rail track	Total length	Length for siding	Capacity of tracks	Remarks
12	250	207	14	poor condition, side track
13	505	450	30	poor condition, side track
Park G				
14	175	85	5	fair to good condition, access berth 7
15	189	85	9	fair to good condition, access berth 7
16	310	212	14	fair to poor condition, pull-out track, access to berths 1 - 6
17	670	470	31	poor condition, weigh (not working), access to berths 1 - 2
18	590	370	25	poor condition, side track
19	715	520	35	poor condition, useful only in eastern direction, side track
20	701	520	35	fair condition, side track
21	705	595	40	fair to poor condition, side track, access to berth 3
22	320	280	19	poor condition, side track
23	370	345	23	poor condition, not in use long, side track
24	370	345	23	poor condition, side track
25	600	545	37	poor condition, alongside berths 4 - 6
26	570	545	37	poor condition, alongside berths 4 - 6
27	158	118	7	fair condition, access tracks 14 - 15
28	260	215	14	fair to poor condition, access tracks 25 - 26
29	516	363	24	fair condition, alongside berths 1 - 2
30	481	426	28	fair condition, alongside berth 1 - 2
31	349	222	15	fair condition, alongside berth 3
32	279	224	15	fair condition, alongside berth 3
33	299	189	12	good condition,

railway link, which is supposed to be competitive with road freight traffic. At the first stage of implementation the train was run as a container train with 20 container wagons, i.e. it has an offer of 60 TEU. The capacity of the train is a maximum of 30 wagons (90 TEU). The frequency for the basic offer was once a week per direction. The travelling time of the train between the two terminals of Kishli (Baku) and Poti is under normal condition 29 hours. The information service renders transport advance and transport accompanying current status messages. Operation is done with a fixed number of container wagons out of a separate container wagon stock of 90 wagons. In addition, there is a small wagon reserve and a repair stock at the stations..

1.2.2 Co-operation between the port and rail company

In the past, both the railways and the ports were owned by the state. The relations between these corporates were defined centrally, and there are of course reasons for central organisation. Although, Georgia is heading towards a more decentralised governmental organisation and the ports have already gained some independence, the legal and organisational relations between the railways and the ports do not yet reflect these new circumstances. Many of the mutual rights and duties remain unclear even though they strongly depend on each other anyhow.

1.2.3 Shunting yards inside the port

The general conditions of the rail installations have already been assessed under civil engineers aspects in phase 1. The detailed descriptions can be found in the annex of the phase 1 report.

Shunting operation is done mainly outside the port. The tracks inside the port belong to the ports properties. The tracks are used as sidings for a fast exchange of the loading and unloading of wagons. There are two yards named G and B.

Rail track	Total length	Length for siding	Capacity of tracks	Remarks
Park B				
01	1.156	290	19	poor condition, weigh bridge, access
02	345	290	19	poor condition, side track
03	300	230	15	poor condition, side track
04	510	230	15	poor condition, side track
05	580	390	26	poor condition
06	425	390	26	poor condition, weigh bridge, side track
07	390	195	13	fair condition, alongside berth 7
08	817	762	51	fair to poor condition, alongside berths 8 - 10
09	819	669	45	fair to poor condition, alongside berths 8 - 10
10	290	240	16	fair condition, access track
11	590	300	20	poor condition, alongside berths 8 - 10

Rail track	Total length	Length for siding	Capacity of tracks	Remarks
05	730	715	48	siding for empty wag-ons
06	850	835	56	siding for empty wag-ons
16	350	350	23	weighing track
17	300	300	20	Rail track for accepting the wagons
18	150	150	10	Rail track for accepting the wagons
19	200	200	13	Rail track for accepting the wagons
22	150	120	8	Rail track for accepting the wagons
21	320	300	20	wagons cleaning track
20	320	300	20	wagons cleaning track

Figures rounded

1.2.5 Inbound traffic

The wagon stock of empty wagons is located in the shunting yard of the station. The dispatcher of the port and the railways work closely together. A request of wagons can be complied within 30 minutes, availability granted. Specific wagons not on sidings available, have to be reserved in the Railways Headquarters in Tbilisi. The time until providing them may take up to one week. In daily live, it happens often that wagons can't be supplied in the sufficient number and quality at requested time.

Actually, the loadings are made directly from vessel to wagons. Therefore, quick shunting operations have to be performed due to the large volume per ship. The formation of train is done inside the port with use of the siding tracks.

The strategy for the future operational concept is the indirect delivery mode. It can be introduced as soon as storage facilities may be offered. The cargo of the vessels may be unloaded directly to the storage area. From here it will be handled with equipment sufficient for the loading of wagons and trucks. For general cargo these are mainly different kinds of forklifts whereas loose bulk is handled by conveyor belts or pneumatic systems.

The length of the loading tracks is fixed due to the berths lengths. The operational concept has to consider that wagons cannot be shunted to a single berth. Therefore, detailed work plans for the loading and unloading of wagons and trucks have to be drawn up. This work plan contains the employment of the gangs and the shunting of the wagons. The loading and unloading of trucks have to be taken into account only for the employment of the gangs and for the needed manoeuvring space and loading requirements.

The following description contains a viable way for the required information and timetable. The most important transport information is provided by the forwarder preliminarily when ordering the transport services.. In addition, a phased information flow between port and rail company is recommended. This information flow is for inbound cargoes from port and ship agents respectively to rail company:

1. First advice of ship arrival and demand of wagons containing estimations of commodity, cargo volume, arrival time, route and recommendations for wagon types, sizes and number.
   at least 3 days before vessel discharging

Rail track	Total length	Length for siding	Capacity of tracks	Remarks
				pull-out track (access to oil tanks)
34	166	111	7	good condition, pull-out track (access to oil tanks)

Capacity of track is calculated by the average length of a wagon (14.7 m), figures rounded

One main bottleneck is the single track (01) between the port area and the shunting yard of the station especially since the setting of switches is done manually. The shunting capacity can easily be increased when a second access track will be build. Therefore, the availability of a second locomotive for shunting operations is vital. The required space at the interface between port and station is available. By that, the operation for the southern port areas can be done autonomously from the northern ones. Besides, a further weigh station is also needed. Furthermore, it would be helpful when a switch between those two tracks will be build which would allow easy exchange between the two port shunting yards.

1.2.4 Shunting yards outside the port

Tracks and switches are mainly in the same poor condition as inside the port.

Rail track	Total length	Length for siding	Capacity of tracks	Remarks
Park A				
03	540	520	35	
04	580	560	38	
05	685	670	45	
06	690	675	46	
07	192	192	13	
17	210	170	11	very poor condition
18	410	370	25	very poor condition
21	100	100	6	very poor condition
40	800	100	6	connection to industrial area
Park B				
I	785	765	52	main track
II	625	615	41	main track
10	626	616	41	
11	475	445	30	
12	225	225	15	
13	225	225	15	
Park D				
01	850	835	56	siding for empty wagons
02	700	685	46	siding for empty wagons
03	630	625	42	siding for empty wagons
04	630	615	41	siding for empty wagons

1.4 Estimated rail cargo volumes

According to the traffic forecast and the designed Master Plan, the daily volumes for the rail traffic can be estimated in a theoretical model. Therefrom, the kind and number of demanded wagons can be defined.

The following figures refer to scenario III (probable case) railway mode of the traffic forecast. As the basis for the forecast are the statistics of 1995, the establishment of the rail ferry line could not be expected during the performance. Therefore, in addition the rail ferry traffic is estimated for the forecasting period . The total volume for the rail ferry operation has been calculated by the estimated frequency of the line. Basis for the load is the size of the vessel already calling the Port of Poti (108 wagon units on each direction)

- 2002 1 per week
- 2007 1.5 per week
- 2012 1.5 per week

At a first approach the demanded number of wagons is calculated from the cargo volume of rail traffic and an average payload[2]. The assumed working days per year are 365 days. From this, the daily number of wagons can be estimated.

As the outbound volume of cargo in container is bigger than the inbound volume, the return of empty containers and container flats respectively have to be considered. As simplification can be assumed, that when a container can't be loaded with return cargo it has to be transported back empty. For this, the difference of the inbound and outbound container flat numbers is calculated and named as empty container commodity on the outbound relation.

Commodity	Annual rail volume in tons			∅ payload (tons)	No. of wagons per day		
	2002	2007	2012		2002	2007	2012
Inbound							
Bulk	464,700	639,700	804,400	65	20	27	34
Oil products	258,000	378,900	428,300	65	11	16	18
General cargo	271,800	297,500	334,500	40	19	20	23
Container	448,400	810,700	1,275,100	30	41	74	116
Rail ferry	308,880	463,320	463,320	55	15	23	23
Total in	1,751,780	2,590,120	3,305,620		105	160	214
Outbound							
Bulk	433,700	757,300	1,060,300	65	18	32	45
Oil products	616,100	704,100	869,700	65	26	30	37
General cargo	372,600	511,500	357,700	40	26	35	24
Container	341,100	380,000	986,100	30	31	35	90
Empty container				0	10	39	26
Rail ferry	308,880	463,320	463,320	55	15	23	23
Total out	1,763,500	2,352,900	3,273,800		111	171	222
Sum							
Bulk	898,400	1,397,000	1,864,700	65	38	59	79
Oil products	874,100	1,083,000	1,298,000	65	37	46	55
General cargo	644,400	809,000	692,200	40	44	55	47
Container	789,500	1,190,700	2,261,200	30	72	109	206

[2] Verified with the rail statistics in: Tacis "Port Network Plan and Improvement Programme: Renovation of the Ferry Terminals of Baku and Turkmenbashi" Phase 3, Economic and Financial Evaluation Report - Baku April 1997

2. Second advice of demand containing exact figures.
   1 to 3 days before vessel discharging
3. Order of operation containing in detail the wagons to be shunt at fixed tracks
   5 hours to 30 minutes before vessel discharging

To enable the involved partners, to act in the recommended way, computerised dispositioning systems are requested.

1.2.6 Outbound traffic

The shunting is performed in the same manner as described for inbound traffic. The wagon to be unloaded has to wait in the shunting yard until the ship moors and is ready for loading. This operation system bounds wagons which might be needed already for the next transport.

For the future the following required information and timetable should be strengthened on outbound cargoes from port and ship agents respectively to rail company as well as

1. First knowledge for the operation containing estimated arrival time of ship
   at least 3 days before loading
2. The second knowledge for the operation containing scheduled arrival time of ship
   1 to 3 days before loading
3. Order of operation containing in detail the wagons to be shunt at fixed tracks
   5 hours to 30 minutes before loading

To enable the involved partners, to act in the recommended way, computerised dispositioning systems are requested.

1.3 Rail ferry

After the performance of the traffic forecast the contract for the rail ferry line to Ukraine was negotiated. Without the line the transported rail wagons would follow the land bound route via Russia. The handling of rail ferry wagons highly depend on the operation of this single line Ukrferry. Therefore, that cargo volume has to be seen additional to the traffic forecast.

Besides the calculated demand of rail wagons for the reloading of goods in the port, the requirements of the rail ferry have to be considered thoroughly. It is possible to use the shunting yards of the station but this would hamper to a high degree the fast dispatch of the rail ferry vessel. Therefore, it is necessary to store the wagons to be loaded in the port area in direct access to the rail ferry berth. Furthermore, the unloaded wagons have to be shunted on a siding, too.

The maximum number of wagons on the vessel is 108. In regard of an average length of 14.7 m per wagon the total necessary length of tracks in one direction (outbound) is 1,590 m. To allow a fast load and unload of the rail ferry the tracks for the second direction (inbound) are also necessary. Due to an optimisation of the operation, it is sufficient to calculate the further tracks with the factor of 1.8.

Therefore, the total length of tracks necessary for rail ferry operation accounts to 2,860 m. Optimal length of single tracks in a shunting yard is the length of trains of 520 m. Therefore, six tracks are needed (rounded up). If it were not possible to install that length due to the available area, the tracks may be divided.

Berths	Designed for	No of gang	Productivity tons per gang/hour	Productivity tons per berth/hour	Capacity per day with 60%
10	General cargo	2	20	40	576
11	Bulk	2	95	190	2,736
12	Container	1	35	35	504
14	Container	1	35	35	504
15	not used				
2007					
1	Oil Products	2	200	400	5,760
2	RO/RO/Ferry	-	-	-	-
3	Bulk/General cargo	2	40	80	1,152
4	Bulk	2	95	190	2,736
5	General cargo	2	30	60	864
6	General cargo	2	30	60	864
7	General cargo	2	30	60	864
8	Bulk	2	190	380	5,472
9	General cargo	2	30	60	864
10	General cargo	2	30	60	864
11	General cargo	2	30	60	864
12	not used				
14	not used				
15	Bulk	2	190	380	5,472
New	Container	3	60	180	2,592
2012					
1	Oil Products	2	240	480	6,912
2	RO/RO/Ferry	-	-	-	-
3	Bulk/General cargo	2	40	80	1,152
4	Bulk	2	95	190	2,736
5	General cargo	2	40	80	1,152
6	General cargo	2	40	80	1,152
7	General cargo	2	40	80	1,152
8	Bulk	2	190	380	5,472
9	General cargo	2	40	80	1,152
10	General cargo	2	40	80	1,152
11	General cargo	2	40	80	1,152
12	not used				
14	not used				
15	Bulk	2	190	380	5,472
New	Container	4	60	240	3,456

Figures rounded

The productivity is calculated by the mix of direct and indirect handling per commodity

These calculations of the handled cargo volume have to be compared to the daily cargo volume on rail mode:

Commodity	Annual rail volume in tons			∅ pay-load (tons)	No. of wagons per day		
	2002	2007	2012		2002	2007	2012
Empty container				0	10	39	26
Rail ferry	617,760	926,640	926,640	55	31	46	46
Total	3,824,160	5,406,340	7,042,740		232	354	460

Figures rounded

1.5 Shunting, Siding and Cargo Handling

Loading and unloading of wagons are handled mainly by forklifts for general cargo. Packages are pallets or big bags, barrels and sacks which can be handled on one-way pallets. Bulk is handled by conveyor belts, filling stations or grabs into specialised wagons (silos or tank). Due to the high unitisation grade of general cargo, the handling time will reach a maximum of 20 minutes. As time for documentation, dispatching and customs procedures a maximum time of 20 minutes should be achieved. In order of quick total handling time, the administration should mainly be performed before or parallel to the handling.

The question now is, whether the calculated daily number of wagons can be loaded and unloaded on the track system. Therefrom, the recommendations for the investment for renewal, break down or extension of the existing track system have to be stated.

For the calculation, the share of direct and indirect operations has to be considered. Indirect handling operation means that the cargo has to be handled twice. It provides maximum flexibility of time but the capacities of the productivity of the gangs at the berths have to be taken into account. Besides, an effective rail operation on the double track alongside several berths has to be safeguarded.

1.5.1 Approach 1

The first approach considers the handling productivity.

The capacity of the rail ferry handling is not calculated in that way, since the limitation for handling lays in the pure rail operation system and not on the handling employment and available equipment.

The following table contains the productivity in time spans and therefrom the calculation of capacity of the daily handling of wagons. The work capacity is assumed for 60 %, because other operations have to be performed i.e. shunting of wagons, repair and maintenance of equipment as well as preparation times. The basis for the calculation is the concept of port development.

Berths	Designed for	No of gang	Productivity tons per gang/hour	Productivity tons per berth/hour	Capacity per day with 60%
2002					
1	Oil Products	2	115	230	3,312
2	RO/RO/Ferry	-	-	-	-
3	Bulk/General cargo	2	40	80	1,152
4	Bulk	2	95	190	2,736
5	General cargo/Container	2	20	40	576
6	Container	1	35	35	504
7	Container	1	35	35	504
8	Bulk	2	95	190	2,736
9	General cargo	2	20	40	576

Commodity	Berth	Berth Occupation of Commodity	Total Track Length	Calculated Track Length	Wagon Capacity	Daily expected Wagons	Daily exchange Factor	Total handling Time per Wagon [h]
Container				1000	68	82	1.21	19.90
	6	100%	800	800				
	7	100%	200	200				
	12	100%	0	0				
Rail ferry	2	40%	3120	1248	84	31	0,37	65,03
2007								
Bulk				1460	99	38	0,38	62.53
	1	40%	400	160				
	4	100%	400	400				
	9	100%	800	800				
	11	100%	0	0				
Oil products	1	60%	400	240	16	37	2,31	10,38
General cargo				1600	108	44	0,41	58.91
	5	100%	600	600				
	8	100%	400	400				
	10	100%	600	600				
Container				1000	68	82	1.21	19.90
	6	100%	800	800				
	7	100%	200	200				
	12	100%	0	0				
Rail ferry	2	40%	3120	1248	84	31	0,37	65,03
2012								
Bulk				1460	99	38	0.38	62.53
	1	40%	400	160				
	4	100%	400	400				
	9	100%	800	800				
	11	100%	100	100				
Oil products	1	60%	400	240	16	37	2,31	10,38
General cargo				1600	108	44	0.41	58.91
	5	100%	600	600				
	8	100%	400	400				
	10	100%	600	600				
Container				1000	68	82	1.21	19.90
	6	100%	800	800				
	7	100%	200	200				
	12	100%	0	0				
Rail ferry	2	40%	3120	1248	84	31	0,37	65,03

Wagon capacity (rounded figure) is calculated with the average wagon length of 14.7 m.

The low possible handling times per wagon of 10 to 20 hours for oil products and containers means that more than twice per day all wagons have to be exchanged considering the based tracks. That fast operation is possible under the condition, that the shunting of wagons for those berths can be performed unlimited by other operations.

The handling times of wagons for general cargo and rail ferry are high enough to safeguard the dependent parallel operation of several berths.

Commodity	Daily rail volume in tons			Calculated capacity		
	2002	2007	2012	2002	2007	2012
In- and Outbound						
Bulk	898,400	1,397,000	1,864,700	8,208	13,680	13,680
Oil products	874,100	1,083,000	1,298,000	3,312	5,760	6,912
General cargo	644,400	809,000	692,200	1,152	5,184	6,912
Container	789,500	1,190,700	2,261,200	2,016	2,592	3,456
Rail ferry	617,760	926,640	926,640	-	-	-
Miscellaneous				1,728	1,152	1,152
Total	3,824,160	5,406,340	7,042,740	16,416	28,368	32,112

Figures rounded

The calculated figures reflect the completely different handling possibilities for rail wagons for different commodities. The mixed commodities are considered as miscellaneous handling possibility. The storage of general cargo in warehouses generates excellent handling conditions with considerable high productivity. Furthermore, the high handling maximum handling capacities reflect the increasing amount of berths.

1.5.2 Approach 2

The second approach tests the maximum wagon capacity of the planned track system with respect to the expected cargo handling on each berth. Basis for the calculation is the commodity allocation on berths and the tracks on the backside of the berths. From this, the theoretical wagon capacity can be calculated. The daily expected number of wagons, calculated above from the forecasted cargo volume can now be compared to the capacity. The total handling time per wagon expressed in hours (24 working hours per day assumed) as well as the daily exchange factor of wagons give an impression of the handling intensity.

To evaluate these calculated figures it is necessary to take into account the average loading/unloading time per wagon of 20 minutes and the number of wagons on one track per berth which is an average of 13. The loading/unloading time therefore calculates to 4.3 hours. The documentation handling and customs clearance may be performed parallel to the cargo handling in best case, but as average should be calculated 1 hour in addition. Further time of estimated 1 hour per train is needed for the shunting and other specific railway operations e.g. brake and coupling tests. In total the minimal handling time for a train per berth accumulates to about 6.5 hours. Furthermore, it has to be taken into account, that not all berths have independent rail access. Therefore, waiting times may occur before the exchange of full or empty wagons can be performed.

Commodity	Berth	Berth Occupation of Commodity	Total Track Length	Calculated Track Length	Wagon Capacity	Daily expected Wagons	Daily exchange Factor	Total handling Time per Wagon [h]
2002								
Bulk				1460	99	38	0.38	62.53
	1	40%	400	160				
	4	100%	400	400				
	9	100%	800	800				
	11	100%	100	100				
Oil products	1	60%	400	240	16	37	2,31	10,38
General cargo				1600	108	44	0.41	58.91
	5	100%	600	600				
	8	100%	400	400				
	10	100%	600	600				

2. Road transport

In previous times the cargo flow from and to the port has been performed almost exclusively by the railways. Due to the change from the planned economy to an open market the road transport becomes like all over the world more important. The investigation and improvement plans of the national road infrastructure are subject of an ongoing project:

- TACIS/TRACECA "Road, Pavement and Bridge testing, TN REG 9601, by FINNROAD/PARKMAN

Therefore, the necessary task left is the check of the road access of the port to the national road system.

2.1 Trucks

Regulations about truck weights and measures vary from country to country, although common efforts for unifying are ongoing. The following table gives an overview on permissible measures and weights in international transport. Whereby, the various terms are reduced to the most important figures.

Country	Length (Solo / Trailer / Combination) in m	Width in m	Height in m	Payload per axle in t	Max. payload in t for a 5 axles trailer
Bulgaria	12 / 16.5 / 20	2.5	4	8 (10 for 2 ax & gap >2m	38
Romania	12 / 16 for 3ax, 16.5 >3ax / 18.35	2.5 (ref 2.6)	4	10 (int r) 8 (nat r) 7.5 (other r)	40 (int r) 32 (nat r) 30 (other r)
Turkey	10 for 2 ax, 12 >2ax / 16 / 18	2.5	4	13	42
Ukraine	- / 20 / 20 for 1tr, 24 for 2tr	2.5	4	10	38
Kazakhstan	12 / 20 / 20	2.5	4	10	30
Russia and CIS	12 / 20 / 20	2.5	4 (main r) 3.8 (other r)	10 (7 - 10 dep on ax gap)	- 38 (dep on payload per ax)

Status: 1996

Abreviations:

ax	axles
int	international
m	meter
nat	national
dep	depending
r	road
ref	refrigerator truck
t	tons
tr	trailer

Regarding the multiple suppliers transport market the types of trucks used widely vary. Not only by the international truck manufacturer but also by the considerable high live span of trucks and their further usage in countries with low traffic safety restrictions. Therefore, the following description of new trucks and specialised cargo spaces can be regarded as being the trucks in use for the next 10 to 20 years.

In general they can be divided between a single trailer (traction unit with one trailer up to approximately 15 m) and a combination (traction unit with two trailers each with maximal 8.2 m). For transportation of cargo tran-

As a conclusion from the theoretical model it can be stated, that the rail infrastructure in the port is sufficient for the handling operations on condition that tracks are usable. Peak times can be handled on the rail system. Since the theoretical capacity is higher than is needed, it is possible to operate with less manpower and equipment by covering several stocks and warehouses with one gang.

A further aspect of rail systems are the operations i.e. providing of wagons, shunting and forming of trains. Those requirements have to be considered within the layout of the port development concept.

2.3 Trucking

The normal operation of truck transhipment is as follows:
The management of trucks i.e. booking and administration for independent and group owned trucks is done by road haulage companies. The truck driver gets the information to receive a specific cargo at a certain time and place. Moreover, he is informed about delivery requirements.

Taking into account the long distances of average road transports and the transport times which can hardly be planned exactly due to bad road conditions it is impossible to get to the port just in time on the direct way. Besides social affairs i.e. ordered rest times have to be considered. Therefore, at the entrances of most cities so called "autoports" are established. Here are gas stations and refreshing/relaxing possibilities for the drivers installed. Often also warehouses and other logistical services are settled in the near. From here, the truck is driving just-in-time to the point of transhipment in the port.

At the port the following installations are vital

- parking space outside the port for 10 units
- one entrance gate for trucks (security, dispatching, customs control)
- separate parking and manoeuvring space for the RO/RO trucks (70 to 100 trucking units)

In future times the establishment of an electronically information system at the port entrance as well as at the autoport may be projected. This would reduce the waiting time in front of the port. Since unloading and reloading rarely can be arranged to directly follow, the trucks may move outside the port if it takes longer.

2.4 Estimated road cargo volumes

To design the dimensions of the access to the national road system the number of trucks per day and especially in peak times has to be estimated. For this, the same theoretical model as already used for the estimation of rail demand is applied.

The following figures refer to scenario III (probable case) road mode of the traffic forecast. As the basis for the forecast are the statistics of 1995, the establishment of the RO/RO-lines could not be expected during the performance already to the extent of 1997. For the estimation of the future container traffic all containerisation potentials via the Black Sea have been taken into account. In containers, the same cargoes are transported as on trucks. With the establishment of RO/RO-lines it is highly possible that the cargo via Bulgaria and if a line is established via Romania will take the volume from the calculated container traffic. But taking into account the highly dependency of truck routes form traffic political effects, specific RO/RO-installations should be established in the most flexible way.

The average payload per full truck is also calculated to 20 tons, but the probability of getting return cargo on the route through the Black Sea is assumed for 50 %. The total volume for RO/RO-operation has been calculated by the estimated frequency of the lines. Basis for the load are the sizes of vessels already calling the Port of Poti (average of 75 truck units in each direction)

- 2002 2 per week
- 2007 2.5 per week
- 2012 3 per week

Due to the relatively small share of collective cargo the average payload is considerably high. For the calculation the yearly working time is assumed for 365 days. The probability of getting return cargo in the port is very high for trucks. But considering the operation in the port it can rarely be managed to dispatch directly. Therefore, each relation has to be counted separately.

shipped in the port are usually trucks and combinations with high possible payload used. Because of this, the list refers only to the large sizes. The measures are not mentioned because they depend on the supplying manufacturer. Besides, the total permitted measures for the trailer (1 to 3 axles) and the traction unit (2 to 3 axles) have to be considered.

Trailer type	Payload	Material processed	Remarks, Equipment	Commodities
Standard	to 28 t	tarpaulin, steel, aluminium, sandwich construction	loading from back an side, short coupling	General cargo
Refrigerator	to 20 t	isolated walls	temperature controlled from -20 to +10 degree	meat, fish, milk products, vegetables, fruits
Tank	to 24 t (20,000 - 42,000 l)	aluminium, steel, chrome nickel steel,	double walls, partitions, intake / outtake valves, temperature controlled, air pressure (to -190 degree), tilting, acid proof	beverages and hazardous goods as liquid / granular chemicals, oil products, liquid gases
Oversized	to 20 t	tarpaulin	moving floor system, short coupling	voluminous cargo as textiles, isolation materials, installation parts

2.2 Road Transport Organisation

Trucking is the most flexible transport mode in comparison to the others. Not only in regard of the least needed infrastructure and therefore the fast and easy access of all areas. But also due to the multiple supplier structure of the transport market with companies of all sizes. The basis are self driving entrepreneurs followed by small trucking companies having a couple of trucks and drivers under contract. They acquire cargo from forwarding companies. Those forwarders may be small companies or a commercial establishment of a large international group especially when international transports are concerned. A considerable market share is covered in international transporting by big road haulage companies such as Willi Betz or Militzer & Muench who acquire their cargo volume mainly direct from the shipper. They act therefore like forwarders.

The forwarders are commissioned by the shippers or the recipient to arrange the transport and to take care of the cargo. The forwarder chooses the route and transport mode best fitting to the requirements of the consignment. Unless, he doesn't offer the conveyance of transport with his own or contracted equipment he orders trucking, rail transport, shipping or air transport from the market. Besides that, he offers document handling, customs proceeding and further services.

In addition to the cargo flow the information flow is of high importance. The way of information exchange varies very much. On the one side, high technology with data transmission and satellite broadcasting for tracking and tracing of cargo is often used by western trucking companies to safeguard cargo and trucks. On the other side, low technology transports with old equipment can be found especially by self driving trucker often ignoring technical break downs of part considered as vital in western standards. The decision of which company is contracted concerning prices and service offered is done by the forwarder in agreement with the customer.

dispatching and customs procedures a maximum time of 20 minutes should be achieved. In order of quick total handling time, the administration should mainly be performed before or parallel to the handling.

The calculated number of trucks has to be handled at the warehouses, stores or berths. Therefore, the same theoretical model is used as for the rail wagon handling.

The following table contains the productivity in time span and therefrom the calculation of capacity of daily handling trucks. The work capacity is assumed for only 20 %, because other operations have to be performed i.e. loading/unloading of wagons, shunting of wagons, repair and maintenance of equipment as well as preparation times. Basis for the calculation is the concept of port development.

Since the RO/RO-trucks are self driving and don't need further handling equipment and personnel, it is not necessary to integrate them into this calculation.

Berths	Designed for	No of gang	Productivity tons per gang/hour	Productivity tons per berth/hour	Capacity per day with 20 %
2002					
1	Oil Products	1.6	115	184	883
1	Bulk	0.4	95	38	182
2	Rail Ferry	0	-	-	-
3	RO/RO	0	0	0	0
4	Bulk	2	95	190	912
5	General cargo	2	20	40	192
6	Container	1	35	35	168
7	Container	1	35	35	168
8	General cargo	2	20	40	192
9	Bulk	2	95	190	912
10	General cargo	2	20	40	192
11	Bulk	2	95	190	912
12	Container	1	35	35	168
14	not used			0	0
15	not used				
2007					
1	Oil Products	1.5	200	300	1,440
1	Bulk	0.5	95	48	228
2	Rail Ferry	-	-	-	-
3	RO/RO	2	40	80	384
4	Bulk	2	95	190	912
5	General cargo	2	30	60	288
6	General cargo	2	30	60	288
7	General cargo	2	30	60	288
8	Bulk	2	190	380	1,824
9	General cargo	2	30	60	288
10	General cargo	2	30	60	288
11	not used			0	0
12	not used				
14	not used				
15	Bulk	2	190	380	1,824
New	Container	4	60	240	1,152

As the outbound volume of cargo in container is bigger than the inbound volume, the return of empty containers have to be considered. As simplification can be assumed, that when a container can't be loaded with return cargo it has to be transported back empty. For this, the difference of the inbound and outbound container truck number is calculated and named as empty container on the outbound relation. The calculation does not include the origin of the empty container. For example there may be and exchange between Poti, Batumi, Novorossisk and other Black Sea ports.

Commodity	Annual road volume in tons			∅ pay-load (tons)	No. of trucks per day		
	2002	2007	2012		2002	2007	2012
Inbound							
Bulk	154,900	159,900	201,100	29	15	15	19
Oil products	5,300	7,700	8,700	29	0	1	1
General cargo	146,400	160,200	143,400	20	20	22	20
Container	124,400	201,150	371,000	20	17	28	51
RO/RO	117,000	146,250	175,500	15	21	27	32
Total in	548,000	675,200	899,700		73	92	122
Outbound							
Bulk	144,600	189,300	265,100	29	14	18	25
Oil products	19,100	14,400	17,700	29	2	1	2
General cargo	200,600	275,400	153,300	20	27	38	21
Container	66,600	121,350	247,100	20	9	17	34
Empty container				0	8	11	17
RO/RO	117,000	146,250	175,500	15	21	27	32
Total out	430,900	600,450	683,200		60	85	99
Sum							
Bulk	299,500	349,200	466,200	29	28	33	44
Oil products	24,400	22,100	26,400	29	2	2	2
General cargo	347,000	435,600	296,700	20	48	60	41
Container	191,000	322,500	618,100	20	26	44	85
Empty container				0	8	25	17
RO/RO	234,000	292,500	351,000	15	43	53	64
Total	861,900	1,129,400	1,407,400		112	164	189

Figures rounded

The figures in the table show as result the average number of trucks per day.

The mainly used road direction is the road to Tbilisi. This connection can be reached from the port via approximately 2 km through the suburbs of Poti. Right at the entrance of the city is the autoport located. The average daily road load can be considered to be acceptable as long as sufficient parking areas at the port as well as at the auto port are available.

2.5 Cargo Handling

Loading and unloading of trucks are handled mainly by forklifts for general cargo. Packages are pallets or big bags, barrels and sacks which can be handled on one-way pallets. Bulk is handled by conveyor belts, filling stations or grabs into specialised trailers (silos, tank or open trailer). Due to the high unitisation grade of general cargo, the handling time for truck loads will reach a maximum of 20 minutes. As time for documentation,

Part 2 - Batumi

Berths 2012	Designed for	No of gang	Productivity tons per gang/hour	Productivity tons per berth/hour	Capacity per day with 20 %
1	Oil Products	1.4	240	336	1,613
1	Bulk	0.6	190	114	547
2	Rail Ferry	-	-	-	-
3	RO/RO	0	0	0	0
4	Bulk	2	95	190	912
5	General cargo	2	40	80	384
6	General cargo	2	40	80	384
7	General cargo	2	40	80	384
8	Bulk	2	190	380	1,824
9	General cargo	2	40	80	384
10	General cargo	2	40	80	384
11	not used			0	0
12	not used				
14	not used				
15	Bulk	2	190	380	1,824
New	Container	5	60	300	1,440

Figures rounded

These calculations of the handled cargo volume have to be compared to the daily cargo volume on road

Commodity In- and Outbound	Daily road volume in tons			Calculated capacity		
	2002	2007	2012	2002	2007	2012
Bulk	821	957	1,277	2,918	4,788	5,107
Oil products	67	61	72	883	1,440	1,613
General cargo	951	1,193	813	576	1,440	1,920
Container	523	884	1,693	504	1,152	1,440
Total	2,361	3,094	3,856	4,882	8,820	10,080

Figures rounded

The calculated theoretical capacity is mostly higher than the necessary handling volume by the traffic forecast. With the capacity of miscellaneous the general cargo in 2002 and the container handling in 2007 can be equalised. Therefore, it can be stated that the handling possibilities can be organised sufficiently. Furthermore, the presumed manpower and equipment can be exchanged on the berths and storages.

The necessary loading space and manoeuvring area for the expected trucks are included to the layout of the Master Plan.

1. Rail transport

In previous Tacis/TRACECA studies railway installations (rail, sleeper, bed, communication, wagons and locomotives) as well as the operation on the main route Poti/Batumi - Tbilisi and further connections to Armenia and Azberbaijan have been investigated.

- Tacis/TRACECA "Joint venture(s) for the Caucasian Railways", Interim Report April 1997
- Tacis/TRACECA "Trans Caucasian Railway, Railways Pre-Investment study and Pilot train Baku - Tiblisi - Batumi/Poti", Draft Final Report May 1997
- Tacis "Forwarding - Multimodal Transports Systems", Final Report May 1997

In those investigations the general condition of the railway system in Georgia and on further lines have been assessed and recommendations for investment stated. Therefore, the subjects here are the port rail operation, the shunting and operation in Batumi and the connection to the Georgian Railway.

In additional, the following descriptions of rail transport have been concluded by the study

- HPC Hamburg Port Consulting GmbH "Optimising and Reorganisation of the Georgian Ports Poti and Batumi" (GTZ financed), Final Report April 1996

and especially from interviews in January 1998 with

- Mr. Tamaz N. Antadze, Deputy head of territorial management of the Georgian Railway,
- Mr. Badri K. Gorgiladze, Chief engineer of Batumi territorial management of the Georgian Railway

Besides, an overview of the working conditions of the shunting yards of Batumi port and station, an insight of the section to Samtredia could also be gained in January 1998 during a visit.

1.1 Connection to Georgian Railway

In Georgia all tracks are electrified and even the cargo trains run by electricity (except shunting yards and port areas). Therefore, the transport times suffers strongly from energy shortage. This problem is recognised by the Georgian Government. Improvements are visible as soon as the Armenian energy supply recovers. Then, the Georgian Railway will be supplied with 20 MW per year, sufficient to allow operations without delays due to energy cut-offs.

The train is handed over from one depot region to the next one like a relay. Due to the high Georgian mountains the required traction on the main route varies. Therefore, decomposition of trains and additional locomotives are inevitable on the route to Tbilisi between Zestaponi and Kashuri. On this section high grades up to 2.9 % and the small horizontal radii of 140 m have to be surmounted.

From Batumi the track of 108 km leads to Samtredea, where it meets the track from Poti. The connection can be considered as satisfactory since it is partly a double track and recently have been some renewals performed. The track seams to be of fair condition and the coastal mountains are bypassed directly at the coast level. The typical train composition on this section is 31 to 35 wagons or 2,700 tons (3,300 tons in FSU), with one locomotive required.

1.1.1 Wagons

Wagons are provided by the Railways. The following list is an overview of available wagons from the Georgian Railways. The gauge is Russian standard (1,520mm).

Type of wagons	Axles	Length	Tara	Payload	Loading Remarks	Commodities (examples)
covered standard wagon: 4 - 11-260	4	16,970 m	25 t	67 t	4 intake valves at the top (0.4 m) 2 side doors (3.973 m x 2.717 m)	general cargo, grain
covered standard wagon: 4-11-270 4-11-264	4	14,730 m 14,230 m	23.5 t 25 t	68.5 t 68 t	4 intake valves at the top (0.4 m) 2 side doors (270: 3.902 m x 2.343 m) (264: 3.774 m x 2.343)	general cargo, grain
hopper wagon: 4-19-756 4-19-752	4	14,720 m	23.5 t 23 t	70.5 t 70 t	4 intake valves at the top 6 at the bottom	bulk e.g. cement, fertiliser, liquids
open wagon 8-12-915	8	20,500 m	46.4 t	129 t	volume 141 m^3	coal, scrap
open wagon 4-12-1000	4	13,920 m	22 t	69 t	volume 73 m^3	coal, scrap
tank wagon: 8-15-1500	8	21,250 m	51 t	125 t	2 intake valves at the top 4 at the bottom, heating system	petrol, kerosene, diesel
tank wagon: 8-15-880	8	18,690 m	51 t	125 t	1 intake valves at the top 2 at the bottom, heating system	oil products
tank wagon: 6-15-Z865	6	15,980 m	36 t	90 t	2 intake valves at the top 4 at the bottom, heating system	oil products, petrol
tank wagon: 4-15-869	4	13,570 m	25.3 t	62 t	1 intake valves at the top 2 at the bottom, heating system	petrol, kerosene, diesel, other oil products
platform/flats: 4-13-9004	4	19,670 m	26 t	65 t	52.5 m^2 = 3 TEU	container
platform/flat: 4-13-N455	4	14,620 m	21 t	62 t	38.5 m^2 = 2 TEU	container
refrigerator wagons	4	15,400 m	25 t	40 t	max. - 20 degree partly with own generator	perishables (food)

The number of wagons in working condition is very low and depends on the type of wagon. Data published in other reports[3] show a trend of damages and/or repair rate of up to 75 % per day. The reasons are the respectively high ages of the wagons and a lack of maintenance especially in the last decade.

During the visits the wagons mainly seen were the covered standard wagons for general cargo and tank wagons for oil products. For the handling of general cargo e.g. flour in sacks wagons with a flexible top would be optimal. As those are not available, the wagons have to be loaded manually sack by sack.

[3] Tacis/TRACECA „Trans Caucasian Railway, Railways Pre-Investment study and Pilot train Baku - Tbilisi - Batumi/Poti" , Draft Final Report May 1997

Not only for that reason , it must be stated that the availability of needed wagons is not safeguarded at all times especially for specialised wagons. It was said that a delay of up to 24 hours may happen on ship dispatch and demurrage charges for the vessel accrue in direct handling. Actually, the Georgian Railway is repairing the damaged wagons. Soon, the problems of insufficient and inadequate wagons should be lessened.

Another operational delay is caused by Azerbaijan and Armenia who aim to transport their cargo on their own wagons. The reasons for this is due to fact that they would have to pay charges for using Georgian assets. But the information flow and the provision of Azerbaijanian and Armenian wagons and locomotives is often not handled in time. Delays of up to 24 hours also occur.

Another point to emphasis is the general condition of the wagons since the cleaning facilities are non existent or in very poor condition. The pollution of single wagons have to be removed manually when the new loading is performed. This causes further delays. It is therefore often accepted, that the cargo is spoiled.

1.1.2 Locomotives

The port has one own and one leased diesel locomotives for shunting operation in the port. The contract with the Railways safeguards the operation possibility for the leased locomotives at all times. By use of two locomotives the port can operate independently from the Railways. In case that one locomotive fails, shunting operation can still be maintained without delay.

The railways has three working diesel locomotives for shunting in the station area. A further 3 locomotives are out of order.

Concerning the actual cargo volume the number of working locomotives are sufficient for all rail operations.

For the future time investments have to be concluded since the live span of the locomotives is nearly ended. Besides, with the introduction of indirect handling and the growing traffic demand the shunting operations will increase.

1.2 Rail logistics

In future the ports will change their operation from direct to indirect cargo handling. The vessels will be discharged and loaded to a stock at the berths independently from the rail traffic. Therefore the rail wagons can be constantly loaded or unloaded.

The persisting restrictions of port operation will only depend on the possible rail operations. The berths have access by double track alongside the basin. Since there are only a few switches the rail operation at a single berths can hardly be handled autonomously.

In former times until 1990 the maximal capacity of the station and track were 26 trains per day and a handling capacity of approximately 800 to 900 wagons. By now, a maximum of 10 to 15 trains are handled. Not only caused by the decrease of cargo but also by the rocket transport times on rail due to energy shortage.

1.2.1 Co-operation between the port and rail company

In the past, both the railways and the ports were owned by the state. The relations between these corporates were defined centrally, and there are of course reasons for central organisation. Although Georgia is heading towards a more decentralised governmental organisation and the ports have already gained some independence, the legal and organisational relations between the railways and the ports do not yet reflect these new

1.2.3 Shunting yards outside the port

The large shunting yards of Batumi reflect not only the transport volume of the port but also the considerable high volumes to and from the refinery. Tracks and switches are mainly in the same poor condition as inside the port. Actually, approximately 15 tracks from a total of 25 can be used for shunting operation all of with a length of 500 to 800 m. Renewal of bedding and fastening of sleeper and rail are ongoing.

1.2.4 Inbound traffic

The wagon stock of empty wagons is located in the shunting yard of the station. The dispatcher of the port and the railways work closely together. A request of wagons can be complied within 30 minutes, availability granted. Specific wagons not on sidings available, have to be reserved in the Railways Headquarters in Tbilisi. The time until providing them may take up to one week. In daily live, it happens often that wagons can't be supplied in the sufficient number and quality at requested time.

Actually, the loadings are made directly from vessel to wagons. Therefore, quick shunting operations have to be performed due to the large volume per ship. The formation of train is done inside the port with use of the siding tracks.

The strategy for the future operational concept is the indirect delivery mode. It can be introduced as soon as storage facilities may be offered. The cargo of the vessels may be unloaded directly to the storage area. From here it will be handled with equipment sufficient for the loading of wagons and trucks. For general cargo these are mainly different kinds of forklifts whereas loose bulk is handled by conveyor belts or pneumatic systems.

The length of the loading tracks is fixed due to the berths lengths. The operational concept has to consider that wagons cannot be shunt to a single berth. Therefore, detailed work plans for the loading and unloading of wagons and trucks have to be drawn up. This work plan contains the employment of the gangs and the shunting of the wagons. The loading and unloading of trucks have to be taken into account only for the employment of the gangs and for the needed manoeuvring space and loading requirements.

The following description contains a viable way for the required information and timetable. The most important transport information is provided by the forwarder preliminary when ordering the transport services. In addition, a phased information flow between port and rail company is recommended. This information flow is for inbound cargoes from port and ship agents respectively to rail company:

1. First advice of ship arrival and demand of wagons containing estimations of commodity, cargo volume, arrival time, route and recommendations for wagon types, sizes and number.
   at least 3 days before vessel discharging
2. Second advice of demand containing exact figures.
   1 to 3 days before vessel discharging
3. Order of operation containing in detail the wagons to be shunt at fixed tracks
   5 hours to 30 minutes before vessel discharging

To enable the involved partners, to act in the recommended way, computerised dispositioning systems are requested.

1.2.5 Outbound traffic

The shunting is performed in the same manner as described for inbound traffic. The wagon to be unloaded has to wait in the shunting yard until the ship moors and is ready for loading. This operation system bounds wagons which might be needed already for the next transport.

circumstances. Many of the mutual rights and duties remain unclear even though they strongly depend on each other anyhow.

In Batumi the co-operation between port and Georgian Railways is arranged flexible. Usually, the Railways brings the wagons full or empty directly to the berths where the cargo is handled. The port shunts itself when the wagons have to be exchanged.

1.2.2 Shunting yards inside the port

The general conditions of the rail installations have already been assessed under civil engineers aspects in phase 1. The detailed descriptions can be found in the annex of the phase 1 report.

Shunting operation is done mainly outside the port. The tracks inside the port belong to the ports properties. The tracks are used as sidings for a fast exchange of the loading and unloading of wagons.

Rail track	Total length	Length for siding	Capacity of tracks	Remarks
24	338	290	19	fair condition, siding
25	258	207	14	fair condition, siding
26	180	105	7	fair condition, siding
27	258	207	14	fair condition, siding
28	100	100	6	fair condition, at berth 9
29	179	127	8	fair condition, at berth 9
31	334	282	19	poor condition, siding at berth 7 (3rd track)
32	740	601	50	fair - poor condition, at berths 6, 7 and 8
33	707	624	42	fair - poor condition, at berths 6 (165 m), 7 (235 m) and 8 (170 m)
34	575	471	32	fair - poor condition, access track
35	267	215	14	fair condition, siding

Capacity of track is calculated by the average length of a wagon (14.7 m), figures rounded

One main bottleneck is the single track between the port area and the shunting yard of the station especially since the setting of switches is done manually. A second track was considered for the operation on the berths 6 to 9. But the shunting operation between this part of port and the shunting yard has to be performed by a pull out track located at the Northwest side of the shunting yard. To reach those pull out tracks it would be necessary to use or to cross the connection track. Therefore, the operational improvement would cover only the relief of a few meters of the connection track. The capacity can be increased only slightly by that measure.

But with the establishment of the multipurpose terminal at berths 4 and 5 and the elongation of track 30 the construction of a second track should be taken into account. This will enable the operation of at least the quay sides autonomously if track 30 will be connected to separate pull out tracks.

In Batumi a refinery is settled directly near the port. Oil products are pumped via several pipelines to the quay for loading and unloading of vessels. Therefore, the rail transport has only to be considered as additional cargo in the shunting yard and on the railways section to Samtredia.

1.4 Shunting, Siding and Cargo Handling

Loading and unloading of wagons are handled mainly by forklifts for general cargo. Packages are pallets or big bags, barrels and sacks which can be handled on one-way pallets. Bulk is handled by conveyor belts, filling stations or grabs into specialised wagons (silos or tank). Due to the high unitisation grade of general cargo, the handling time will reach a maximum of 20 minutes. As time for documentation, dispatching and customs procedures a maximum time of 20 minutes should be achieved. In order of quick total handling time, the administration should mainly be performed before or parallel to the handling.

The question now is, whether the calculated daily number of wagons can be loaded and unloaded on the existing track system. Therefrom, the recommendations for the investment for renewal, break down or extension of the existing track system have to be stated.

It has to be considered that direct and indirect handling operations are performed. Indirect handling operation means that the cargo has to be handled twice. It provides maximum flexibility of time but the capacities of the productivity of the gangs at the berths have to be taken into account. Besides, an effective rail operation on the double track alongside several berths has to be safeguarded.

1.4.1 Approach 1

The first approach considers the handling productivity.

The following table contains the productivity in time spans and therefrom the calculation of capacity of the daily wagons handling. It has to emphasised that the productivity refers to the handling to wagons and not from ship to shore. The work capacity is assumed for 60 % of 24 hours per day due to idle times. These lead back to other operations e.g. shunting of wagons, waiting times as well as preparation times (e.g. cleaning). The basis for the calculation is the concept of port development.

Berths	Designed for	No of gang	Productivity tons per gang/hour	Productivity tons per berth/hour	Capacity per day with 60%
2002					
1,2,3	Oil products	0	0	0	0
6	General Cargo	1.9	20	38	547
6	Container	0.1	0	0	0
7	Bulk	2	150	300	4,320
8	Generl Cargo	2	20	40	576
9	Generl Cargo	2	20	40	576
11	RO/RO	0	0	0	0
2007					
1,2,3	Oil products	0	0	0	0
6	General Cargo	1	20	20	288
6	Container	0.2	0	0	0
6	RO/RO	0	0	0	0
7	Bulk	2	150	300	4,320
8	Generl Cargo	2	25	50	720
9	Generl Cargo	2	25	50	720

For the future the following required information and timetable should be strengthened for information on outbound cargoes from port and ship agents respectively to rail company as well as:

1. First advice for the operation containing estimated arrival time of ship
   at least 3 days before loading
2. Second advice for the operation containing scheduled arrival time of ship
   1 to 3 days before loading
3. Order of operation containing in detail the wagons to be shunt at fixed tracks
   5 hours to 30 minutes before loading

To enable the involved partners, to act in the recommended way, computerised dispositioning systems are requested.

1.3 Estimated rail cargo volumes

According to the traffic forecast and the designed Master Plan, the daily volumes for the rail traffic can be estimated in a theoretical model. Therefrom, the kind and number of demanded wagons can be defined.

The following figures refers to scenario III (probable case) railway mode of the traffic forecast.

At a first approach the demanded number of wagons is calculated from the cargo volume of rail traffic and an average payload[4]. The assumed working days per year are 365 days. From this, the daily number of wagons can be estimated.

Commodity	Annual rail volume in tons			∅ pay-load (tons)	No. of wagons per day		
	2002	2007	2012		2002	2007	2012
Inbound							
Bulk	394,100	556,900	907,700	65	17	23	38
Oil products	51,400	51,000	54,900	65	2	2	2
General cargo	101,000	80,200	81,100	40	7	6	6
Container	0	0	0	30	0	0	0
Total in	546,500	688,100	1,043,700		26	31	46
Outbound							
Bulk	204,900	374,400	335,400	65	9	16	14
Oil products	1,014,300	1,272,600	1,531,400	65	43	54	65
General cargo	328,600	345,400	380,400	40	23	24	26
Container	0	0	0	30	0	0	0
Total out	1,547,800	1,992,400	2,247,200		74	93	105
Sum							
Bulk	599,000	931,300	1,243,100	65	25	39	52
Oil products	1,065,700	1,323,600	1,586,300	65	45	56	67
General cargo	429,600	425,600	461,500	40	29	29	32
Container	0	0	0	30	0	0	0
Total	2,094,300	2,680,500	3,290,900		100	124	151

Figures rounded

4 Verified with the rail statistics in: Tacis "Port Network Plan and Improvement Programme: Renovation of the Ferry Terminals of Baku and Turkmenbashi" Phase 3, Economic and Financial Evaluation Report - Baku April 1997

Commodity	Berth	Berth Occupation of Commodity	Total Track Length	Calculated Track Length	Wagon Capacity	Daily expected Wagons	Daily exchange Factor	Total handling Time per Wagon [h]
2002								
Bulk	7	100%	600	600	40	25	0,63	38,40
Oil products	1,2,3	100%	0	0	0	0		
General cargo				1116	75	29	0,39	62,07
	6	93%	400	372				
	8	93%	400	372				
	9	93%	400	372				
Container				84	5	0	0,00	0,00
	6	7%	400	28				
	8	7%	400	28				
	9	7%	400	28				
RO/RO	11	100%	0	0	0	0		
2007								
Bulk	7	100%	600	600	40	25	0,63	38,40
Oil products	1,2,3	100%	0	0	0	0		
General cargo				1092	74	29	0,39	61,24
	6	91%	400	364				
	8	91%	400	364				
	9	91%	400	364				
Container				60	4	0	0,00	0,00
	6	5%	400	20				
	8	5%	400	20				
	9	5%	400	20				
RO/RO			0	48	3	0	0,00	0,00
	6	4%	400	16				
	8	4%	400	16				
	9	4%	400	16				
2012								
Bulk	7	100%	600	600	40	25	0,63	38,40
Oil products	1,2,3	100%	0	0	0	0		
General cargo				864	58	29	0,50	48,00
	6	72%	400	288				
	8	72%	400	288				
	9	72%	400	288				
Container				56	3	0	0,00	0,00
	4	7%	400	28				
	5	7%	400	28				
RO/RO			0	176	11	0	0,00	0,00
	5	22%	400	88				
	6	22%	400	88				

Wagon capacity (rounded figure) is calculated with the average wagon length of 14.7 m.

The low possible handling times per wagon of 10 to 11 hours for oil products and containers means that more than twice per day all wagons have to be exchanged considering the based tracks. That fast operation is

2012					
1,2,3	Oil products	0	0	0	0
4	Container	2	0		0
5	Container	0	0		0
5	RO/RO	0			0
6	Generl Cargo	2	30	60	864
6	RO/RO	0			0
7	Bulk	2	150	300	4,320
8	Generl Cargo	2	30	60	864
9	Generl Cargo	2	30	60	864

Figures rounded
The productivity is calculated by the mix of direct and indirect handling per commodity

These calculations of the handled cargo volume have to be compared to the daily cargo volume on rail mode.

Commodity	Daily rail volume in tons			Calculated capacity		
In- and Outbound	2002	2007	2012	2002	2007	2012
Bulk	1,641	2,552	3,406	4,320	4,320	4,320
General cargo	1,177	1,166	1,264	1,699	1,728	2,592
Total	2,818	3,718	4,670	6,019	6,048	6,912

Figures rounded

The calculated figures reflect the completely different handling possibilities for rail wagons for different commodities. The storage of general cargo in warehouses generates excellent handling conditions with considerable high productivity, whereas the productivity of handling of bulk decreases. The handling capacities for bulk are therefore not sufficient with the presumed equipment and employment. In contrast are the capacities for general cargo not fully employed. This can be compensated theoretically by the sufficient capacity of the multi purpose terminal.

1.4.2 Approach 2

The second approach tests the maximum wagon capacity of the planned track system with respect to the expected cargo handling on each berth. Basis for the calculation is the commodity allocation on berths and the tracks on the backside of the berths. From this, the theoretical wagon capacity can be calculated. The daily expected number of wagons, calculated above from the forecasted cargo volume can now be compared to the capacity. The total handling time per wagon expressed in hours (24 working hours per day assumed) as well as the daily exchange factor of wagons give an impression of the handling intensity.

To evaluate these calculated figures it is necessary to take into account the average loading/unloading time per wagon of 20 minutes and the number of wagons on one track per berth which is an average of 13. The loading/unloading time therefore calculates to 4.3 hours. The documentation handling and customs clearance may be performed parallel to the cargo handling in best case, but as average should be calculated 1 hour in addition. Further time of estimated 1 hour per train is needed for the shunting and other specific railway operations e.g. brake and coupling tests. In total the minimal handling time for a train per berth accumulates to about 6.5 hours. Furthermore, it has to be taken into account, that not all berths have independent rail access. Therefore, waiting times may occur before the exchange of full or empty wagons can be performed.

2. Road transport

In previous times the cargo flow from and to the port has been performed almost exclusively by the railways. Due to the change from the planned economy to an open market the road transport becomes like all over the world more important. The investigation and improvement plans of the national road infrastructure are subject of an ongoing project:

- TACIS/TRACECA "Road, Pavement and Bridge testing, TN REG 9601, by FINNROAD/PARKMAN

Therefore, the necessary task left is the check of the road access of the port to the national road system.

2.1 Trucks

Regulations about truck weights and measures vary from country to country, although common efforts for unifying are ongoing. The following table gives an overview on permissible measures and weights in international transport. Whereby, the various terms are reduced to the most important figures.

Country	Length (Solo / Trailer / Combination) in m	Width in m	Height in m	Payload per axle in t	Max. payload in t for a 5 axles trailer
Bulgaria	12 / 16.5 / 20	2.5	4	8 (10 for 2 ax & gap >2m	38
Romania	12 / 16 for 3ax, 16.5 >3ax / 18.35	2.5 (ref 2.6)	4	10 (int r) 8 (nat r) 7.5 (other r)	40 (int r) 32 (nat r) 30 (other r)
Turkey	10 for 2 ax, 12 >2ax / 16 / 18	2.5	4	13	42
Ukraine	- / 20 / 20 for 1tr, 24 for 2tr	2.5	4	10	38
Kazakhstan	12 / 20 / 20	2.5	4	10	30
Russia and CIS	12 / 20 / 20	2.5	4 (main r) 3.8 (other r)	10 (7 - 10 dep on ax gap)	- 38 (dep on payload per ax)

Status: 1996

Abreviations:

ax	axles
int	international
m	meter
nat	national
dep	depending
r	road
ref	refrigerator truck
t	tons
tr	trailer

Regarding the multiple suppliers transport market the types of trucks used widely vary. Not only by the international truck manufacturer but also by the considerable high live span of trucks and their further usage in countries with low traffic safety restrictions. Therefore, the following description of new trucks and specialised cargo spaces can be regarded as being the trucks in use for the next 10 to 20 years.

In general they can be divided between a single trailer (traction unit with one trailer up to approximately 15 m) and a combination (traction unit with two trailers each with maximal 8.2 m). For transportation of cargo transhipped in the port are usually trucks and combinations with high possible payload used. Because of this, the list refers only to the large sizes. The measures are not mentioned because they depend on the supplying manufacturer. Besides, the total permitted measures for the trailer (1 to 3 axles) and the traction unit (2 to 3 axles) have to be considered.

possible under the condition, that the shunting of wagons for those berths can be performed unlimited by other operations.

The handling times of wagons for general cargo and rail ferry are high enough to safeguard the dependent parallel operation of several berths.

The total handling capacities for the calculated infrastructure and operational concept are sufficient. Peak times can be handled. Since the theoretical capacity is much more higher than the needed, it is possible to operate with less manpower and equipment by covering several stocks and warehouses with one gang.

A further aspect of rail systems are the operations i.e. providing of wagons, shunting and forming of trains. Those requirements have to be considered within the layout of the port development concept.

Taking into account the long distances of average road transports and the transport times which can hardly be planned exactly due to bad road conditions it is impossible to get to the port just in time on the direct way. Besides, social affairs i.e. ordered rest times have to be considered. Therefore, at the entrances of most cities so called "autoports" are established. Here are gas stations and refreshing/relaxing possibilities for the drivers installed. Often also warehouses and other logistical services are settled in the near. From here, the truck is driving just-in-time to the point of cargo handling in the port.

In the past trucking was very much requested for hinterland transport in Batumi. Therefore, no facilities are installed so far. Since the trucking share increases rapidly, their requirements have to be satisfied.

At the port the following installations are vital

- parking space outside the port for up to 50 units
- one entrance gate for trucks, where all declarations can be performed
- parking and manoeuvring space for the RO/RO trucks inside (100 to 150 trucking units)

If the auto port cannot be established in Batumi e.g. due to the lack of space at the coast road, it is necessary to organise the parking spaces flexible. That means, that the truck included the drivers may have to wait up to several days in the port area. Since it is not possible to establish areas sufficient for all purposes simultaneous (space for 150 trucks inside and outside the port security area), the organisation of dispatching and declaration have to be performed adjusted to the call of the RO/RO-vessels.

In future times the establishment of an electronically information system at the port entrance may be projected. This would reduce the waiting time in front of the port. Since unloading and reloading rarely can be arranged to directly follow, the trucks may move outside the port if it takes longer.

2.4 Estimated road cargo volumes

To design the dimensions of the access to the national road system the number of trucks per day and especially in peak times have to be estimated. For this, the same theoretical model as already used for the estimation of rail demand is applied.

The following figures refer to scenario III (probable case) road mode of the traffic forecast. As the basis for the forecast are the statistics of 1995, the establishment of the RO/RO-lines could not be expected during the performance already to the extent of 1997. The contract with Constanta Port Authority i.e. has been signed in December 1997. Besides, it must be recognised that this traffic in Batumi is highly dependent on the transport political behaviour of Turkey. If the obstacles at the borders to Armenia and Iran will be relieved, it is highly probable that a considerable number of trucks will take the cheap route through Turkey again. Therefore, the RO/RO-traffic is estimated for the forecasting period in addition. Specific RO/RO-installations should be established the most flexible way.

The average payload per full truck is also calculated to 20 tons, but the probability of getting return cargo on the route through the Black Sea is assumed for 50 %. The total volume for RO/RO-operation has been calculated by the estimated frequency of the lines. Basis for the load are the sizes of vessels already calling the Port of Batumi (average of 75 truck units in each direction)

- 2002 2 per month
- 2007 3.5 per month
- 2012 5 per month

Trailer type	Payload	Material processed	Remarks, Equipment	Commodities
Standard	to 28 t	tarpaulin, steel, aluminium, sandwich construction	loading from back an side, short coupling	General cargo
Refrigerator	to 20 t	isolated walls	temperature controlled from -20 to +10 degree	meat, fish, milk products, vegetables, fruits
Tank	to 24 t (20,000 - 42,000 l)	aluminium, steel, chrome nickel steel,	double walls, partitions, intake / outtake valves, temperature controlled, air pressure (to -190 degree), tilting, acid proof	beverages and hazardous goods as liquid / granular chemicals, oil products, liquid gases
Oversized	to 20 t	tarpaulin	moving floor system, short coupling	voluminous cargo as textiles, isolation materials, installation parts

2.2 Road Transport Organisation

Trucking is the most flexible transport mode in comparison to the others. Not only in regard of the least needed infrastructure and therefore the fast and easy access of all areas. But also due to the multiple supplier structure of the transport market with companies of all sizes. The basis are self driving entrepreneurs followed by small trucking companies having a couple of trucks and drivers under contract. They acquire cargo from forwarding companies. Those forwarders may be small companies or a commercial establishment of a large international group especially when international transports are concerned. A considerable market share is covered in international transporting by big road haulage companies such as Willi Betz or Militzer & Muench who acquire their cargo volume mainly direct from the shipper. They act therefore like forwarder.

The forwarders are commissioned by the shippers or the recipient to arrange the transport and to take care of the cargo. The forwarder chooses the route and transport mode best fitting to the requirements of the consignment. Unless, he doesn't offer the conveyance of transport with his own or contracted equipment he orders trucking, rail transport, shipping or air transport from the market. Besides that, he offers document handling, customs proceeding and further services.

In addition to the cargo flow the information flow is of high importance. The way of information exchange varies very much. On the one side, high technology with data transmission and satellite broadcasting for tracking and tracing of cargo is often used by western trucking companies to safeguard cargo and trucks. On the other side, low technology transports with old equipment can be found especially by self driving trucker often ignoring technical break downs of part considered as vital in western standards. The decision of which company is contracted concerning prices and service offered is done by the forwarder in agreement with the customer.

2.3 Trucking

The normal operation of truck throughput is as follows:

The management of trucks i.e. booking and administration for independent and group owned trucks is done by road haulage companies. The truck driver gets the information to receive a specific cargo at a certain time and place. Moreover, he is informed about delivery requirements.

In Batumi a refinery is settled directly near the port. Oil products are pumped via several pipelines to the quay for loading and unloading of vessels. Therefore, the few trucks appear not directly in the port but at the national road system as additional cargo.

2.5 Cargo Handling

Loading and unloading of trucks are handled mainly by forklifts for general cargo. Packages are pallets or big bags, barrels and sacks which can be handled on one-way pallets. Bulk is handled by conveyor belts, filling stations or grabs into specialised trailers (silos, tank or open trailer). Due to the high unitisation grade of general cargo, the handling time for truck loads will reach a maximum of 20 minutes. As time for documentation, dispatching and customs procedures a maximum time of 20 minutes should be achieved. In order of quick total handling time, the administration should mainly be performed before or parallel to the handling.

The number of trucks calculated have to be handled at the warehouses, stores or berths. Therefore, the same theoretical model is used as for the rail wagon handling.

The following table contains the productivity in time span and therefrom the calculation of capacity of daily handled trucks. The work capacity is assumed for only 20%, because other operations have to be performed with same equipment i.e. loading/unloading of wagons, shunting of wagons, repair and maintenance of equipment as well as preparation times. Basis for the calculation is the concept of port development.

Since the RO/RO-trucks are self driving and don't need further handling equipment and personnel, it is not necessary to integrate them into this calculation. Oil products are not considered, because the handling location is the refinery and not the port.

Berths	Designed for	No of gang	Productivity tons per gang/hour	Productivity tons per berth/hour	Capacity per day with 20%
2002					
1,2,3	Oil products	0	0	0	0
6	General Cargo	1.9	20	38	182
6	Container	0.1	35	4	17
7	Bulk	2	150	300	1,440
8	Generl Cargo	2	20	40	192
9	Generl Cargo	2	20	40	192
11	RO/RO	0	0	0	0
2007					
1,2,3	Oil products	0	0	0	0
6	General Cargo	1	20	20	96
6	Container	0.2	60	12	58
6	RO/RO	0	0	0	0
7	Bulk	2	150	300	1,440
8	Generl Cargo	2	25	50	240
9	Generl Cargo	2	25	50	240
2012					
1,2,3	Oil products	0	0	0	0
4	Container	2	0		
5	Container	0			
5	RO/RO	0			
6	Generl Cargo	2	50	100	480

Due to the relatively small share of collective cargo the average payload per truck is considerably high between 20 and 29 tons for cargoes loaded or unloaded in Batumi. The probability of getting return cargo in the port is very high for trucks. Considering the operation in the port, it can rarely be managed to dispatch directly. Therefore, each relation has to be counted separately. For the calculation the yearly working time is assumed for 365 days.

As the inbound volume of cargo in container is bigger than the outbound volume, the supply of empty containers and container flats respectively have to be considered. As simplification can be assumed, that when a container can't be loaded with return cargo it has to be transported back empty. For this, the difference of the inbound and outbound container flat numbers is calculated and named as empty container commodity on the inbound relation. The calculation does not include the origin of the empty container. For example there may be an exchange between Poti, Novorossisk or other Black Sea ports.

	Annual road volume in tons			∅ pay-	No. of trucks per day		
Commodity	**2002**	**2007**	**2012**	**load** (tons)	**2002**	**2007**	**2012**
Inbound							
Bulk	131,400	139,200	226,900	29	12	13	21
Oil products	1,000	1,000	1,100	29	0	0	0
General cargo	54,400	43,200	34,800	20	7	6	5
Container	1,200	4,200	9,900	20	0	1	1
Empty container				0	3	5	6
RO/RO	27,000	47,250	67,500	15	5	9	12
Total in	215,000	234,850	340,200		27	33	46
Outbound							
Bulk	68,300	93,600	83,900	29	6	9	8
Oil products	31,400	26,000	31,300	29	3	2	3
General cargo	176,900	186,000	163,000	20	24	25	22
Container	23,500	37,700	56,000	20	3	5	8
RO/RO	27,000	47,250	67,500	15	5	9	12
Total out	327,100	390,550	401,700		42	51	53
Sum							
Bulk	199,700	232,800	310,800	29	19	8	29
Oil products	32,400	27,000	32,400	29	3	3	3
General cargo	231,300	229,200	197,800	20	32	22	27
Container	24,700	41,900	65,900	20	3	8	9
Empty container				0	3	5	6
RO/RO	54,000	94,500	135,000	15	10	17	25
Total	542,100	625,400	741,900		70	63	100

Figures rounded

The figures in the table show as result the average number of trucks per day.

The port has direct access to the national road alongside the coast. The north section runs through the coastal mountains which are densely inhabited. The transport time is very low for the first 20 km since narrow zigzag roads pass the high mountains. The road in south direction to the Turkish boarder runs through the city centre. The main direction for trucking is North to Tbilisi. For the average number of 70 to 100 trucks per day in and out of the port extra infrastructure is not necessary.

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Berths	Designed for	No of gang	Productivity tons per gang/hour	Productivity tons per berth/hour	Capacity per day with 20%
6	RO/RO	0			
7	Bulk	2	150	300	1,440
8	Generl Cargo	2	30	60	288
9	Generl Cargo	2	30	60	288

Figures rounded

These calculations of the handled cargo volume have to be compared to the daily cargo volume on road.

Commodity	Daily road volume in tons			Calculated capacity		
In- and Outbound	2002	2007	2012	2002	2007	2012
Bulk	547	638	852	1,440	1,440	1,440
General cargo	634	628	542	566	576	1,056
Container	68	115	181	17	58	576
RO/RO	148	259	370			
Total	1,485	1,713	2,033	2,006	2,016	2,496

Figures rounded

The calculated theoretical capacity is mostly higher than the necessary handling volume by the traffic forecast. With the capacity of miscellaneous the general cargo in 2002 and the container handling in 2007 can be equalised. Therefore, it can be stated that the handling possibilities can be organised sufficiently. Furthermore, the presumed manpower and equipment can be exchanged on the berths and storages.

The necessary loading space and manoeuvring area for the expected trucks are directly described within the layout of the Master Plan.

Section 4

(From Phase 1 Report)

Estimation of the Present Ports' Productivity

Calculation of Capacity

Recommendations for Cotton Handling Facilities

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1 PORT OF POTI

1.1 Analysis of Port Performance

1.1.1 Ship Handling

The approach to Poti anchorage and entering the port does not pose any major obstacles. The detailed description has been carried out under the civil engineering part of this report (compare Vol. IV).

The Port of Poti provides 24 hours uninterrupted service .General restrictions for night navigation do not exist.

The pilots are well trained and acting professionally. The port of Poti, its pilots and tugboats are expected to handle about 1,100 vessels in 1997 .

The port of Poti is equipped with three tugboats. Details as per below table.

Tugs Poti Port

Number of Tugboats	Age (years)	Horsepowers	Bollardpull
Rekvava	17	2500 (2 x 1250)	28 mt
Khibikov	20	1200 (2 x 600)	18 mt
Bukia	20	1200 (2 x 600)	18 mt

source : port fleet dpt.

The tugboat fleet of the port of Poti is overaged and will have to be renewed in the medium term.

1.1.2 Typical Stevedoring operations in relations to berths

The rail tracks are not paved, and not in level with the pier or apron, which forbids crossing by means of any mobile handling equipment. All piers are served by cranes of different reach and capacity.

Pier No. 1

This pier is exclusively used for oil transfer purposes. Hoses from vessel are being handled by crane and tankers' gear to lift hoses from or to wagons. New oil handling facilities are under construction since some time at Pier No. 1. Completion is uncertain. This will change the pattern of oil transfer. Oil will then be delivered to external storage facilities and pumped into rail wagons from there or vice versa .

Pier No. 2

This pier is mainly handling general cargo, project cargo and containers . The general and the project cargo is mainly directly landed on railwagons for ontransport to the final point of destination.
Work is severely hampered by shunting operations of the railwaytank - wagons for Pier No. 1.
The area behind this pier is used for the storage of containers .

Pier No. 9

Cargo handling pattern are similar to that of No 8 . Pier is equipped with hoppers, which can be moved by being pushed by cranes. However, pushing points at hoppers are not constructed strong enough, to resist the pushing forces, which becomes evident when viewing the affected constructional parts of the hoppers. In the back reach of the cranes there is a ramp, which matches the height of the rail wagon floor. The ramp is being used for loading and unloading of rail wagons with the assistance of Forklifttrucks .

Pier No. 10

Similar cargo handling pattern as Nos 8 & 9 but with a fairly wide apron in the back area which is used for open storage purposes. However, this potential cannot be used fully due to the prevailing problem at all piers - the lack of crossing facilities of rails. In the extended back area the construction of a shed had been started, which had reached the skeletal stage some time ago. Presently, no construction works are in progress.

Pier No. 11

Similar cargo handling pattern as Pier No 8 - 10. The rail track for cranes and hoppers are subject to subsidence which complicates the shifting of both cranes and hoppers in the vicinity of pier 11. This pier can at the western end only be used for direct delivery, because there is no space behind the cranes and hoppers, where trucks or FLTs could operate .

Piers No 12

This pier had been designed to accommodate passenger vessels. At the present it is utilised for the operation of RoRo services by side - or quarterramps.

Pier No 13

This pier is used for small RoRo vessels and also serves as commercial lay up berth for small vessels.

Pier No. 14

This pier also belongs to the former Passenger Terminal. It is now blocked completely by laid up fishery vessels, which are double and triple banked. The fate of these vessels is rather uncertain.

Pier No. 15

This is the former grain discharging pier. The modernisation of that pier had been stopped some years ago. The berth is now used for small ship repair activities .

1.1.3 Organisation of stevedoring and cargo handling activities

The operational and administrative distribution of responsibilities are as follows :

OILTERMINAL	Berth No. 1
TERMINAL NO. 2	Berth No. 2 - 6
CONTAINERTERMINAL	Berth No. 7
TERMINAL 1	Berth No. 8 - 11
PASSENGER- , FERRY AND RORO TERMINAL	Berth No. 12 -14

Pier No. 3

This pier is used for handling of general and project cargo and for containers in limited numbers, for ores in bulk as well as for scrap. The area behind is not useable for the storage of goods as it not paved in any way. Once laid out properly paved, it could be a useful area for open storage of project cargo.

Pier No. 4

This pier is used for the handling for similar goods as at pier No. 3. The stacking area behind is just being rehabilitated by cementing the area. Once finished, this will be the first open storage area, which from its construction would meet international standards.

Pier No. 5

Pier No. 5 is used for the handling of similar goods, as Pier Nos . 3 & 4. The area behind Pier No. 5 is in a bad state and in no way fit for storage of any cargo .Despite that, a considerable load of pipes was stored in the area within crane range. The pier, and the rail tracks are covered with lots of scrap , remnants of former loading operations .

Pier No. 6

The quay wall of Pier No. 5 to 6 is not in line. Pier No. 6 is built further into the harbour basin with about 60 cm .This constitutes a hindrance for vessels overlapping from Pier No 5 to 6 , and is thus decreasing the berthing flexibility in that particular area.

The condition of the area behind the quay wall is identical to that of Pier No 5. The space alongside berth No. 6 cannot be used for berthing, when one of the RoRo ferries is moored alongside with her ramp laid out on berth No. 7. If frequency of RoRo Ferry calls are increasing this pier cannot be used for handling of cargo any more, unless for lifting off containers from the deck of those ferries. At present Dockerill and the Port of Poti are operating there under a joint venture and a lease agreement.

The area behind Pier No. 6 is presently used for stacking, stripping and stuffing of containers, partly from and into rail wagons .

Pier No. 7

The Pier and the area behind it is currently being used as a designated Container and Roro Terminal for conventional RoRo ferries. At the southern end of the 'Container Terminal', and not separated from it by any means, a small workshop is located, which is currently repairing boats, small tugs and fast wave piercing passenger vessels.

Pier No. 8

This pier is designed for bulk cargo handling by grabs and general cargo in the direct mode. It is mainly used for bulk cargo. The pier could by its technical outfit and, this applies for all piers up to pier No. 11, handle a variety of cargoes like bulk - and general cargo .

Quay, railtracks and aprons are in an apparently better condition than on the northern side.
The junction of pier No 8 and 9 is not in line similar to Piers No. 5 and 6 with anticipated similar effects. Pier No 6, 7 & 9 have obviously been built later, than pier No. 8 and 5 respectively .

To Terminal 1 for example 4 brigades with 62 dockers each are being assigned.
To Terminal 2 4 brigades with 106 dockers each are being assigned.

The brigades are working in a rotating system. One of the brigades is always at the terminal. The basic principle is that one brigade works 12 hours and is then 24 hours off. Then the brigade works again 12 hours and is then 48 hours off. This system applies to all brigades on all terminals regardless of the daily workload.

The brigades with their permanent sizes have to cover all cargo handling activities on the terminal regardless of the actual volume. Should this not be possible because of the extraordinary workload, workers of other terminals are being shifted, if their workload so permits. If this cannot be arranged, the brigades will have to perform overtimes. On the other hand will the brigades are in the port and keep their turn even if the volume of available work does not justify their presence. In this case they are being paid a kind of stand - by compensation, albeit small sums only .

A dedicated planning system , which takes into account e.g. the workload of the current shift and the next ones and adjusts the number and composition of the workforce accordingly does not exist. The two shift system and the lack of flexible operational planning procedures are part of the reasons leading to the current problems in the port.

1.1.5 Gang Sizes

The brigades are divided, in what in international terms would be gangs .
The manpower and composition of these gangs are still in line with former rules of the Workers Technological Charta' deriving like other rules and regulations from the FSU and are still being observed .

Examples :

Steel products:

crane operator	1
signalman	1
docker in ship's hold	2
docker at the pier	2
Total number	**6**

Flour in bags

crane operator	1
signalman	1
dockers in ship's hold	6
dockers in railwagon or on truck	4
2 forklifts with drivers if required	2
Total number	**14**

GRAINTERMINAL Berth No. 15

Each of these terminals is headed by an Area Manager, who controls all the activities and the assigned personnel in 'his ' area. He is assisted by a Deputy Area Manager, who at the same time manages and oversees the stevedoring activities on the respective terminal.

The Area Managers are organising all operations on the terminal and are responsible for:

- distribution of gangs
- attendance's of personnel
- safety
- posting of mobile handling equipment
- disposition of railway activities
- cleaning operations
- decisionmaking about start of loading or discharging operations

All these activities are carried out in close co-operation with the Dispatch Department which is plays a very dominant role in this respect. The Area Manager will not make decisions of important nature influencing the daily operations without informing the Dispatch Office beforehand of his intentions.

According to those managing the operation, the size of Terminal 1 & 2 is complicating the effective control mainly due to two factors

- the still existing old norms and regulations
- the non existence of modern management structures with clear defined responsibilities, rights and accountability which leads to the art of delegating responsibilities upwards .

1.1.4 Stevedoring Operations

As a general rule all the information gathered and laid down in the following does also apply to Batumi Trading Port with the exception of manpower which is related to the size of the terminal.

Stevedoring operations are carried out in the two shift system

First shift:	08 : 00 to 20 : 00 hours
Second shift:	20 : 00 to 22 : 00 hours

These shifts are interrupted by breaks.

Breaks first shift:	12 : 00 to 13 : 00 hours
	16 : 30 to 17 : 00 hours
Breaks second shift:	01 : 00 to 02 : 00 hours

Why the more difficult shift, the night shift, is only interrupted by one break, cannot be comprehended. As a matter of fact , the physical appearance of the workers in the morning is rather exhausted .

The total number of dockers (including the Stevedore Foremen and the Brigadiers) is presently given with 888. This workforce is divided into 4 brigades for each terminal with different numbers of workers considering the size of the terminal and the typical challenges of the workloads .

1.1.7 Main bottlenecks in the field of stevedoring

- outdated oil transfer procedures
- the prevailing system of direct deliveries
- the work in the two shift system
- the work interruptions caused by shunting operations
- the lack of a properly sized and equipped Container Terminal
- lack of suitable buffer zones
- outdated stevedoring handling gear
- inappropriate pallets
- the inflexible shift and manpower distribution schemes
- lack of rolltrailers and tugmasters
- age and technical condition of forklifts
- age and technical condition of cranes
- missing effective management tools to control the different terminals
- non achievement of higher output figures when cargo is mechanised or unitised.
- lack of incentives for workers

1.1.8 Working in storage areas

Size, technical condition and layout of existing and potential storage areas have been covered in depth in the civil engineering part of this report.

The port, its layout, the construction and the design of its technical outfit have been carried out with the objective to focus on the direct delivery of goods to rail wagons or vice versa. Consequently, the development of storage areas have been considered to be of no importance. This reflects in the general condition of these areas.

Brief description of open storage areas under operational aspects:

Behind Pier No. 1

8,000 m^2 concrete slabs
Presently occupied by iron ore pellets. These have been stored there for a long period due to an uncertain legal status.

Behind Pier No.2

7,200 m^2 concrete slabs but partly not paved .
Used as container stacking area for predominantly empty containers originating from berths 2 to 5 .

Behind Pier No. 3

5,250 m^2 unpaved area
Presently in use for the storage of a consignment of iron tubes .

Behind Pier No. 4

5,950 m^2 concrete pavement under construction
Perfect area for open storage purposes once construction works completed .

Palletised goods

crane operator	1
signalman	1
dockers in ship's hold	2
dockers at the pier	2
forklift with driver if required	1
Total number	**7**

Grain in bulk discharged by grabs

crane operator	1
signalman	1
hopper operators	2
wagon attendance	2
Total number	**6**

Containers

foreman	1
crane operator	1
signalman	1
dockers on ship	2
dockers at pier	2
total numbers	**7**

Due to lack of space and equipment, horizontal movements of containers are not performed .

The individual gang sizes in relation to the cargoes which are supposed to be handled are in line with western European standards.

The number of gangs which are assigned to a particular vessel are still governed by ' Norms for the loading and discharging operations for the port of Poti '. There are however developments, where deviations from these rules by applying a more flexible attitude in posting the number of gangs and their sizes whilst considering the size of the vessel and the type of cargo.

1.1.6 Remuneration of Stevedores

The remuneration of the workforce is based on the production of that particular shift. The payment is calculated according to a fixed system which considers the category and nature of the cargo combined with parameters for the tonnage handled, and the qualifications of the individual employee. The calculated total sum for the brigade is then divided between all members of the concerned brigade. If one gang has been idling for whatever reason this will not be considered. At the same time, an excellent production of another gang will also not be rewarded. Individual production of the single gangs are not considered. This means, that incentives for the individual gang to reach better output are not existing.

Endeavours to replace the current system of remuneration under the aspect of inventing incentives for the individual gang , which could lead to increased production and which would honor the efforts made by the gang working on a vessel, are not yet under consideration.

1.1.9 Storing in warehouses

The port of Poti comprises of two warehouses which are operated by the port, with a total area of 11,700 m2 and a volume of 82,700 m3.

These two warehouses are :

Warehouse No. 4

This warehouse is located behind berth No. 10 and 11 . It is being used for the storage of various kinds of general cargo and chemicals.

Warehouse No. 22

This warehouse is located far behind pier No. 10 and is exclusively used for the storage of cotton.

Grain silo

The grain silo is located at Pier No. 15
It is out of operation since a couple of years. The capacity is 24,000 mt .

Further there are some unused capacities behind warehouse No. 4 . Some are in a state which forbids storage of any cargo. Small units are also leased to private parties, which are also carrying out the storage , loading and unloading capacities of the goods under their own control .

For a port of the size of Poti the number and size of warehouses is insufficient. This goes also for the specialisation of warehouses.

Storage facilities are not available for reefer goods, chilled goods, grain silo facilities.

A grain silo which can accommodate 24,000 mt is not in operation and does not have direct cargo transfer facilities from the quay to the silo. A new pier for the grain silo which would also have provided direct transfer facilities to the grain silo had been under construction . This activity has been stalled some time ago and it is uncertain, when this activity will be resumed .

Bottlenecks :

- Lack of warehouse space for reefer, chilled goods and controlled temperature
- Lack of suitable pallets to affect mechanised storage of goods in warehouses
- Lack of silo space
- Lack of specialized covered storage facilities for
    - cotton
    - tea
    - citrus fruits

It is obvious, that at the present time there is not a great demand for warehouse capacity with the exception of cotton. This however may change rapidly and the port has to be prepared not to loose customers .

Behind Pier No. 5
6,000 m^2 gravel and normal soil. Earmarked for construction of concrete pavement.
Presently used for scrap .

Behind Pier No. 6
7,200 m^2 poor condition of soil and part concrete pavement.
Backarea used as 'makeshift' stripping as stuffing area of containers.

Behind Pier No. 7 (Containerterminal)
12,500 m^2 paved by concrete slabs and used for stacking of containers .

Behind Pier No. 8
2,000 m^2 partly paved.
Area used in the 'makeshift' mode for the stuffing, stripping of containers .

Behind Pier No. 9
9,000 m^2 asphalted
presently not used for storage purposes but for cargo handling operations.

Behind Pier No. 10
9,000 m^2 asphalted
used as operational area only

Behind Pier No. 11
No open storage areas

The available open storage areas or such areas which could be used for such purposes are not being used in a preplanned matter. This may also be due to the lack of interests of customers to store cargo there .

This however might change, once the port is in position to offer areas , which are meeting the quality standards usually requested by customers .

At the present time, with the exception of the Container Terminal, where the area has a clear purpose, the other areas are mainly used to overcome the extreme bottleneck situation in the field of container handling. The operations taking place are in line with the difficult environment and would to a great extend not withstand a screening under existing safety rules and regulations .

Bottlenecks :

- The prevailing procedure of direct delivery or receipt of cargo mainly from and to railwagons.
- The undeveloped state of the potential open storage areas
- The partition of areas by railtracks, which could otherwise be used in full for storage purposes
- The lack of areas where damaged and probably leaking dangerous goods according to the
- could be stored and repaired/refilled without endangering the environment.

control of the railway system has meanwhile improved. A further problem is the technical condition of the tracks in the port. The railway tracks on terminal are apparently in a much better condition than those on Terminal 2. The rails on Terminal 2 side are partly lower, than the ground .

During a survey it was noticed, that a rail wagon had been dragged derailed unnoticed on a distance of about 200 meters. Loose scrap parts are a further potential danger, which is not taken care of. The physical condition had been described in detail by a railway expert in this report (compare section 5 in this volume).

1.1.12 Truck operations

The delivery and receipt of cargo by truck has to date not played a significant role considering the throughput figures of Poti Port. The trucking business has however captured a considerable slice of the transport cake of the imported goods. (See also table under 1.1.10). This can be attributed to the flexibility of the trucking operation on one hand and presumably also to the current weaknesses of the Georgian railway system.

The port of Poti, being much bigger than Batumi, has more space to accommodate waiting trucks. There are no dedicated waiting areas where the trucks could be called up, as their turn of loading or discharging would come up, though .

If the trend to carry more cargo on trucks would continue, especially in the indirect mode, which means receiving cargo from warehouses or open storage areas, the current fleet of forkliftrucks will not suffice to cover the operational needs. To date the impact of truck transport on the overall performance of the port is still not of big relevance.

1.1.13 Ferry Operations

The ferry operations are presently concentrated on two piers, which is Pier No. 6/7 and Pier No. 12 .

FERRY OPERATION - RORO
обработка парома - RORO

Year Quarter *Год Квартал*	Total No of units handled *Общее кол-во обработ-ых единиц*	Total Time at berth *Общее время у причала*	Total hours worked *общее число рабочих часов*	Idle time in % *Не работающее время в %*	Units per hour of operation *Обработка одной единицы за час*	Units handled per hour at berth *Единица обработанная за час у причала*
1995 3	376	283	238	16%	1,4	1,2
4	960	252	211	16%	4,5	3,8
1996 1	909	199	190	5%	4,8	4,6
2	578	173	146	16%	4,0	3,3
3	805	206	182	12%	4,4	3,9
4	1155	564	358	36%	3,2	2
1997 1	962	799	288	64%	3,3	1,2
2	1079	-	-	_-		

source: dispatch office poti / ИНФОРМАТОР: Диспетчер порта Поти

1.1.10 Dispatch and delivery

Georgian ports have been designed for the sole purpose of direct delivery from and to railwagons. This procedure is still prevailing and shapes todays operation.

The total throughput from January to September 1997 was 1,151,000 mt .

Distribution of on/pretransport
01-09.1997

IN / OUTBOUND	Transport by train	Transport by truck
Inbound	70 %	30 %
Outbound	90 %	10 %

The figure reveals , that the trucking activities have already reached a volume of 30 % of the inbound cargo. The cargo which is being trucked will predominantly be Georgian imports. This would be in line with the rule of the thumb that up to distance of 400 km transport by truck is more economic, than transport by train.

The direct delivery mode is a procedure , which is familiar to all dockers and other employees of the port . Despite of their experience in this field some obstacles which are going along with this kind of operation remain. Those are the interruptions of the operations by shunting operations. The quality of these operations are directly linked to the performance of the dispatch office provided that the railway technically performs. The performance of the railway is another important link in the chain .

The average production in this field cannot be compared with figures achieved in west European ports , where the indirect delivery mode is the preferred way of cargo handling , and by its nature is not subject to the negative impacts of direct delivery.

In this context it has to be mentioned , that changes in the performance cannot be achieved , unless the system of direct delivery is being phased out.

1.1.11 Railway operations

The port has been designed on the basis of the philosophy, that all operations should be on the direct delivery mode strictly bound to railway operations.

This way of operation inevitably leads to a certain degree of inflexibility. In many cases the operation on a number of vessels has to be interrupted, if shunting operations for one of them have to be carried out. A vessel recently discharging project cargo at berth No. 2 lost about 37 % of the operational time by shunting operations. At one instance the whole train with unlashed heavy lifts on the wagons disappeared for a couple of hours.

On top of the problems which are going along with this kind of operation the railway operations were also in the previous year severely hampered by lack of electricity or fuel. This grave situation, which was beyond the

Substantial non operational times are generating losses to the shipowners or the charterers.

The table ' Ship's time in port ' in Annex 4 of this volume, which is based on representative samples drawn over a period of 5 months delivers an impression about the general performance of the port in this respect .

Analysis :

The total time lost by a variety of detentions varies from 27 % to 75 % in relation to the time from dropping the anchor until sailing time. The corresponding average time lost amounted to 56 % .

The total time , which was lost whilst the ship was ready to deliver or receive her cargo alongside the berth varies between 38 % and 86 % .

The total time lost at the anchorage accounted for 17 % of the total time spent at the port. In this it has to be said, that the waiting times at the anchorage are not always due to reasons, which the port can be blamed for. There are also many reasons, like pending documentation, payment of dues etc, which are beyond the control of the port. By comparing the figures it becomes nevertheless clear, that the main problems leading to the majority of detentions have to a large extend be attributed to the port and the prevailing direct delivery mode .

The situation which is documented, has already lead to regrettable consequences, insofar as a number of shipping companies are already demanding substantial congestion surcharges for cargoes they are accepting for shipment to Georgian ports.

1.1.15 Throughput figures Poti Port

PORT OF POTI - DEVELOPMENT OF TOTAL CARGO THROUGHPUT

YEAR	Throughput in mt	change in % to previous year
1993	1,221,271	n.a.
1994	1,104,756	- 10
1995	1,657,571	+ 50
1996	1,778,056	+ 7
1997 (1 - 8)	1,341,000	n.a.
1997 expected	2,011,500	+ 13

Source : Port of Poti Statistics Dept.

Above table shows a continuous upward trend of the total cargo throughput, which was dramatic in the course of 1995 .

Ferry Operation Pier No. 6/7

One location is Pier No. 7 which is the the Container Terminal . This pier is called by the ferry ' EIT ' which is trading between Sredets- Poti - Novorosiisk - Bourgas- Burgas -Poti. A further ferry calling at this pier is the ' Preslav' which is trading between Bourgas - Novorosiisk - Poti .

The ferries (one at the time) are moored alongside Pier No. 6 usually with their stern moored to Pier No. 7. They are then lowering their stern - ramp on the northern end of the Container Terminal. At this pier the conventional type of ferry is being handled there, which is carrying trucks, trailers , cars and roll trailers.

The combination of RoRo services and container handling does usually not pose any operational, organisational and administrative problems. These services are in many ports merged in one organisational unit. The problem at the Poti Container Terminal is the present dramatic lack of space. The Container Terminal which is already facing grave problems to accommodate the containers cannot provide the necessary marshalling areas for incoming and outgoing rolling units. This however is an indispensable precondition for any fast and efficient RoRo operation. These problems are also reflecting in the speed of the operation, which is very slow.

Ferry Operation at Pier No. 12

Pier No. 12 is the former passenger pier. This pier is now used predominantly for ferry services. The ferries are moored alongside the pier and the side ramp is lowered on the pier. This pier is called on a regular basis by the ' Geroi Shipski ' of UKRFERRY, which is trading between Ilichovsk and Poti.

The terminal provides sufficient space for the marshalling of trucks and other rolling units. Due to the low volume of cargo the space is never utilised near to capacity.

The way the operation is performed, is partly not matching the common understanding of RoRo operations. In fact roll trailers, cars, trucks are rolled in and out over the side ramp. The rail wagons located inside the ferry are being stripped whilst still being in the ship. The cargo is being shifted to trucks or other means of transport. This operation is carried out, because there are not facilities for direct transfer of the rail wagons from the ship to the national railway system.

The ferries are not self-sustaining as far as the loading and discharging of containers is concerned. This deficiency is overcome by placing a floating crane between ship and pier. This however is a very time consuming and complicated procedure .

General Remarks

An average between 3 and 4 Units are loaded or discharged by hour of operation.

An average of 3 units per hour are handled per hour at berth.

Summarising the above, it can be said, that the current ferry operations at the Port of Poti lack most of the ingredients, which would make a RoRo shipping link between Poti and another port in the Black Sea a viable undertaking

1.1.14 Ship's time in Port

As already mentioned before, the duration of the total turn-round time in port in correlation to the type of cargo and the times lost the various defined periods are very important factors, when a judgement about the port's performance as a whole is being made. The total turnaround time is one of the determining decision making tools for shippers, charterers and shipowners, when they are contemplating which port to call to deliver or receive their cargo for shipment.

The table shows the dramatic increase of the container traffic since 1994 . A trend which is supposed to continue and which will have to considered when establishing priorities in the development of the port.

Cotton Trade

The shipment of cotton coming from the central and western Asian states witnessed a substantial upsurge. According to port statistics the first shipments appeared in 1996 with a total of 28,044 mt. In the first 6 months of 1997 a steep upsurge took place, which reflected in the shipment of 42,910 mt of cotton. Assuming, that the development continues during the remainders of the year, these shipments would reach about 85,000 mt .

1.1.16 Port productivity and handling rates

The compulsory productivity indicators of the port have been investigated. The problem which appeared during this exercise was, that the ports have so far never kept statistics of that kind. The only parameter was the norm, which is still the parameter applied, when judging the productivity.

Cross-checking the figures, which were revealed by the port, it became obvious that they were based on the norms and did not reflect the real productivity, as it appeared during the daily stevedoring and cargo handling activities .To arrive at more realistic figures time sheets, and other statistics provided by the port have been screened, the findings of other consultants and verbal information have been merged.

It has been assumed, that an average of two gangs had been working with the exception of container handling and the services provided on ferry services.

PRODUCTIVITY CONTAINER TERMINAL POTI

ACCORDING TO TIMESHEET

10/97

Vessel	Containers per hour at berth	Containers per hour of operation	Remarks
Gevo Victory	1.6	3.8	
Mint Arrow	1.8	8.1	
Opimep	0.9	6.2	279 hrs waiting at anchorage
Gevo Victory	2.7	4.4	
STK 1011	2	5	
Mint Action	4.4	5.9	
Aksoy Gelibolu	2.7	1.3	

The above table does not confirm the official port figures, which had been given with 150 containers per ship and day .

The average for *container per hour at berth* taken from these 7 vessels is 2.3 containers . Calculated on 24 hours this amounts to 55 containers ,

The average for *container per hour of operation* based on above table is calculated with 5 containers. This amounts to 120 containers per day of operation .

These figures may of course vary a bit. But as the obvious main obstacles, the lack of space and appropriate equipment remains, the production is unlikely to improve before the removal of these hindrances.

PORT OF POTI - DEVELOPMENT OF CONTAINER TRAFFIC

YEAR	CONTAINERS	TEUS	change in % to previous year
1994	3,720	3,852	
1995	7,153	8,840	229
1996	14,975	20,099	227
1997 (1 -)	15,969	25,344	n.a.
1997 projection	21,000	34,000	

Source: Port of Poti Statistics Dept.

PORT OF POTI - AVERAGE DWELL TIME OF CARGO IN PORT

Type of cargo	Mode of delivery	Dwell time in days	Remarks
oil in bulk	direct rail wagon	nil	
Silicomanganese	direct rail wagon	nil	
scrap	direct rail wagon	nil	
wheat in bulk	direct rail wagon	nil	
chemicals in bags	direct rail wagon / truck	nil	
flour in bags	direct rail wagon	nil	
sugar in bags	direct rail wagon	nil	
cotton	direct rail wagon/truck	nil	
cotton	through warehouse	40 - 60	
containers	through container yard	60	import by vessel
containers	through container yard	20	export delivery by truck

1.1.18 Work interruptions

In the port of Poti the main factors interrupting the general cargo operation during the time at berth are caused by reasons, which can be attributed to the direct delivery operation and to the Georgian Railways. In particular these interruptions are caused by the frequent shunting operations, the lack of rail wagons and the poor technical condition of the rail wagons which are being supplied.

In the field of the container operations it is the limited space for the stacking of the containers, which can only be stacked within the reach of the cranes. This deficiency is further boosted by the lack of alternatives by e.g. by moving the containers to another location.

Interruptions in the ferry services can to a great extend be attributed to the slow and partly awkward operation and partly simply to the slow accumulation of the cargo. The volume of outbound cargo still leaves a lot of room for improvement.

The table 3.1 ' PORT PERFORMANCE - WORK INTERRUPTIONS' (Annex 5 of this volume) indicates the volume of times lost during the time at berth also referenced against the operational time and in set in relation to the total time spent in port. The figures are speaking for themselves . Also it delivers a clear indication that there is a lot room for improvement of the performance, once some of the main obstacles are successfully tackled.

The table 3.2 ' WORK INTERRUPTIONS BY REASON' (Annex 5 to this volume) is based on information rendered by the port. They are indicating with all reservations where the reason may lay. According to the port many of the detentions are caused by failure of presenting shipping documents and paying the dues and charges.

PORT OF POTI - PRODUCTIVITY INDICATORS IN MT

INDICATORS						
COMMODITY	**packed**	**per vessel per day**	**per vessel per hour**	**per gang per vessel per hour**	**per man per vessel per hour**	**remarks**
grain	in bulk	6,000	250	125	10.4	by grab
grain in	in bulk	n.a.	-	-	-	by elevator
flour in	bags	900	37.5	18.8	1.3	
sugar	bags	900	37.5	18.8	1.3	
fertiliser	bags	900	37.5	18.8	1.3	
bauxite	bulk	-		-	-	
coal	bulk	-		-	-	
other foodstuff	miscell.	600	25	12.5	0.9	
silico manganese	bulk	2,000	83	41.7	7	
metal products	unpacked	1,000	42	21	3.5	
caustic soda	drums	600	25	12	2	
cotton	bales	500	21	10.5	1.5	
ferry operations	units	69	2.8	2.8	0.5	
containers	units	55	2.3	1.1	0.2	time sheet
containers	units	105	4.3	2.1	0.3	port info

(productivity indicator poti)
Information based on port documents, verbal verification, and own observations.
Figures related to *hours at berth* .
Times lost are fully incorporated regardless the reason .

Assumption :
Two gangs working except for containers, where one gang is compulsory due to lack of space .
Oil cargo not considered .

1.1.17 Dwell time of cargo in port

The Port of Poti has been designed and is still operating in the direct delivery and receiving mode. As a result of such procedure the volume of cargo , which is dwelling *(being stored)* in the port is not representing a substantial volume of the total throughput. hence the available warehouse capacity , which is very small compared with the normal capacities of ports of similar size in Europe are not utilised to full capacity.

2 PORT OF BATUMI

2.1 Analysis of Port Performance

2.1.1 Ship Handling

The approach to Batumi Port is rather short (1.5 nautical miles) and uncomplicated. It has been described in detail in the civil engineering part (compare Vol. IV).

Under strong windy conditions it may come to the development of extremely strong currents and heavy swell inside the port. This phenomenon can lead to the evacuation of the port, because the ships cannot be held in their moorings without being endangered. According to the Harbour Master this can happen up to 15 days per year.

The Batumi Port provides 24 hours uninterrupted pilotage and berthing service.

The pilots are familiar with the challenges of the local maritime environment and experienced in handling the biggest ships, which are in the vicinity of 35,000 tdw and which can be accommodated in the inner port area, with its limited turning circle and draft limitations. The Harbour Master and the Pilots have recently been assigned to the Marine Administration. The pilots are as in the past reporting to the Harbour Master .

The port is furnished with two tugboats of differing power which are under the control of the port management.

Tugs Batumi Port

Name of tug-boat	Age (years)	hp	bp	Remarks
Komissar Kvachantiradze	1979	1,200 (2 x 600)	8 mt	
Uchba	1973	2,250 (2 x 1,125)	12 mt	
R.B.T. Garedji	1963	300 (2 x 150)	2.5 mt	Used mainly for linesmen
Metehi	1968	2,230 (2 x 1,115)	12 mt	under repair

Provision of sufficient spare parts provided and efficient maintenance and repair procedures carried out, it is possible to keep these tugs in service for some time .In the medium term these tugs will have to be replaced.

The pilot boat is rather big and of outdated design , but if properly fendered, it is in position to maintain its service even under difficult sea conditions.

1.1.19 Berth utilisation

The berth utilisation has been portrayed by showing the figures in relation to the pier and the prevailing activities at that particular pier. The figures provided by the port in 1997 do not reflect the general upward trend in the cargo throughput and also do not bear any relevance to the congestion situation the port is facing. The figures released for 1996 are however showing, that there were capacity problems in some areas, where the utilisation of Pier No 9 reached 52.2 % . This figure combined with a degree of inflexibility due to the previous and still existing dedication of the pier, may well lead to a bottleneck situation .

On the other hand the berth utilisation figures show, that a measure aimed at erasing the specialisation of piers and the type of cargo supposed to be handled there, combined with reconstruction and rehabilitation measures considering the future changed cargo pattern and modern cargo handling techniques will have an equalising effect on the berth occupancy. This would also contribute to the effectiveness of berth utilisation and weed out the queuing of vessels for certain piers, whilst others are free.

The pier is furthermore used for loading and unloading of cargo of small coasters by means of mobile cranes .The stevedoring operation there is carried out on a private basis.

The area is not very suitable for this kind of operation because it is freely accessible for the public.

Pier No. 11

The intended use of this pier had been for the dispatch of big passenger vessels and RoRo vessels.

Whilst the pier is suitable for the handling of passenger vessels, which is also underlined by the existence of a big passenger reception facility, the pier is not suitable for the handling of RoRo vessels , as there are no marshalling areas for arriving or departing vehicles.

2.1.3 Organisation of Stevedoring

Stevedoring services are being provided in two shifts for seven days a week .

1rst shift from 08:00 hrs - 20:00 hrs
2nd shift from 20:00 hrs - 08:00 hrs

The work in the shifts is interrupted by breaks

1rst shift 12:00 hrs - 13:00 hrs, 16:30 hrs - 17:00 hrs
2nd shift 01:00 hrs - 02:00 hrs
Work on Saturdays and Sundays is compulsory.

In the understanding of the Georgian ports, the total number of workers, which are being assigned to one shift is called a Brigade. The total number of dockers at Batumi is approximately 349, which would make up for 5 Brigades including one Brigade for the elevators which are numbered between 28 and 32 men (4 Brigades of 7- 8 men).This Brigade is rotating in the similar way as the other Brigades, when the elevators are working.

The number of dockers working in each shift is about 80, varying slightly .In fact the number exceeds the official number needed to man the gangs but this is meant to compensate for ' no shows '.

The Brigades are then separated into working units, which come near to the commonly used port term 'gang'. As a general rule the normal brigade is split into 5 standard gangs composed of 12 workers each. Plus two gangs which consist of 7 - 8 workers which will be assigned to the ' Hartmann' elevators when in operation. When the elevators are not in operation , the dockers assigned to the elevators are called up for the day shift and distributed among the other gangs as and where it may be useful.

The gang size in the common international understanding would be as follows :
- 1 x crane
- 1 x deck (signalman)
- 4 x ship's hold
- 6 x railwagon (2 at outside platform)

Information was given that the number of dockworkers is presently 349 men, but within a short period of time the total number of dockers will be increased by a number of 60 workers, which are presently under training for the job. According to the port this is done to increase the flexibility of the operations. The port will then be in position to provide more gangs on the vessels, if required.

2.1.2 Typical stevedoring operations in relation to berths

Pier No. 1, 2, 3

Those piers are built specially for handling of oil cargoes and their derivatives. No other cargo is being handled there. The real estate belongs to the port, but the piers are operated by the oil refinery. The port does not have any influence or control on the cargo handling operations there .

Pier No. 4 , 5

Pier No. 4 is equipped with devices to load or discharge small tankers. These facilities have not been used for a long time and will due to their technical condition definitely never be used again. The pier is blocked by laid up and sunken vessels.

Pier No. 5 is completely blocked by laid up and in parts by sunken vessels.

Pier No. 6

This pier is used for direct delivery services only .The area cannot be reached by trucks or FLTs as no pavement is between the rails .

Pier No. 7

This area is designed for the direct delivery of bulk goods by cranes equipped with grabs.

The rail wagons can be served by three rail mounted mobile hoppers (can be pushed by cranes) on the shore side, and by three fixed installed hoppers on the shore side.

The area is not paved and cannot be reached by trucks or FLTs .

Pier No. 8

This pier is foreseen for the operation of the two ' Hartmann ' rail-mounted elevators . When those are not in operation, they can be driven out of the way and the pier can be used for other cargo handling activities. The operational range of the elevators can also be extended to pier No 7. They are using the rail track of the cranes which are having the same gauge.

The area cannot be crossed by trucks or FLTs due to the unpaved status .

Pier No. 9

This berth is used for the handling of a variety of cargoes in the prevailing direct delivery mode to or from rail wagons. The warehouse No. 1 is located very near , about 20 m from the quay side.

The apron is paved by a low quality pavement between the rails, which allows the crossing of trucks, but not the crossing of FLT carrying cargo .

Pier No. 10

This pier is not located within the port boundaries. It had been built to accommodate passenger vessels. It is also used by small passenger vessels sailing on a regular basis between Batumi and Sukhumi .

In brief, the open storage areas are :

In way of Pier No. 6
A 3,750 m^2 area paved with concrete, which is partly used for the storage of logs for export

In way of Pier No. 7
An area of 4,100 m^2 asphalt, used for the storage of small lots of cargo and mainly for grabs.

Due to the dominating procedure which is favouring the system of direct loading from or to rail wagons, the available comparatively small open storage areas of a total of 9,150 m^2 are still heavily under-utilised for the storage of cargo. They are used for the standby of equipment like grabs. Apart from that, the open storage area in way of Pier No. 8 is listed as open storage area. Although, from the operational point of view this area could only under extreme bottleneck situations be used for the storage of goods, because otherwise the access to the area of Pier No. 9 would be difficult.

The volume of incoming and outgoing goods which are being stored in the open storage areas are of negligible volume.

Bottlenecks :

- Some areas earmarked for the open storage of goods are not wide enough. Big consignments cannot be stored in way of the related pier .
- The storage areas are too small in their size , despite of being presently under-utilised
- Incoming stored goods would in most of the events necessitate the use of cranes for loading the means of transport for forwarding the cargo.
- Lack of proper lateral mobile handling equipment

2.1.5 Storage in Warehouses

The port of Batumi comprises seven warehouses with a total area of 9,255 m^2. Of these only warehouse No. 1 and 7 are in use for the storage of cargo with a total 3,844 m^2. The total storage capacity of the port for homogenous bagged cargo is 3,200 mt .

A typical example for the under-utilisation of sheds is shed No. 1. This shed could under normal circumstances, depending on the type of cargo, accommodate 2100 mt of a mix of general cargo or 2,500 mt of homogeneous bagged cargo. However, this shed is presently blocked by about 300 mt of vodka . As a consequence the shed is custom sealed and cannot be used for any other purposes .

Shed No. 7 had recently been used for the storage of approximately 440 mt of Azeri cotton, which led to an occupation of about 60 % of that particular warehouse .

Warehouses and silos represent a very important buffer function, thus laying the ground for smooth and uninterrupted cargo handling operations with excellent productivity figures. As a consequence of the aforesaid, it can be said ,that due to the lack of figures, which would render indications, the performance in the field of storage in warehouses cannot be assessed.

There are, however, some obvious bottlenecks which are visible even without an intensive warehouse operation.

- Lack of suitable pallets. Those pallets, which are available, are in a very bad state and in a desperate need of repair and have actually reached the end of their life span.

The dockers are not working every day. The port has invented a revolving system under which the existing work is distributed to more workers. Under this system the dockers are working 12 to 15 days per month. The rest of the days they will stay home. This system has been set up and maintained under social aspects and is taking into account the current difficult economic situation of the country. Any employee now working in the port will be deprived of his income once his services would be terminated. There is no relevant social net like unemployment benefits, which would render a substantial part for the sustainment of jobless persons and their families. The system does not consider any commercial aspects. The operational planning should consider the workload of the following shifts and arrange the posting of the personnel accordingly. The aim has to be that each vessel is served with the optimum number of gangs and equipment . A further aim in the commercial sense is, that nobody should be called up for a shift, if he is not needed .

According to the Deputy Manager Operations the norms are abolished as far as the payment of the workers is concerned, and dockworkers are paid by tonnage. The system which is being applied, is that the total salary of the dockers is based on the shift production of the entire port (except of the oil terminal) and is distributed equally between the dockers . The norms are used only as a guideline , when rendering information to customers. However, this means, that a change from the outdated system of norms had been implemented, but a component which would reflect the individual productivity of the gangs has not been implemented. If the mutually achieved earnings are distributed between all dockers the chance to invent an incentive momentum in respect of increased productivity has been missed.

The main bottlenecks hampering the stevedoring operation are

- Lack of modern stevedoring equipment
  - non availability of 40 ' spreader for lifting of containers
  - lack of modern special stevedore handling equipment
  - no stevedore handling equipment to handle unitised cargo in a productive way
- The lack of container handling facilities
- The prevailing system of direct delivery of goods to or from rail wagon
- The lack of modern mobile cargo handling equipment
- The insufficient number of forklift trucks
- Non-availability of special attachments for forklift trucks
- Railway tracks cannot be crossed by forklift trucks. At quay N° 9 the apron, the quay, the tracks and the gaps in between are not paved in by bricks or other suitable pavement means.
- Shunting operations of the railway very frequently interrupt stevedoring operations
- Discharging of heavy containers is a very dangerous undertaking. Two cranes have to be combined to lift containers exceeding a gross weight of 20 mt .
- The lack of stevedoring gear to lift unit loads and highly mechanised cargo by utilising the available lifting capacity of the cranes .
- The lack of adequate mobile cargo handling equipment to facilitate lateral movements like roll trailers operated by tugmasters .
- The prevailing system which assigns a fixed number of workers to the shifts without considering the current or anticipated workload.

2.1.4 Open Storage Areas

Whilst designing the general layout of the port of Batumi the need for open storage areas has never been seriously contemplated. A typical example is the erection of a 4 story high building for administrative purposes in the centre of a very valuable location for open storage facilities.

Location and size of the various open storage areas is described in detail under the review of the ports under civil engineering aspects (Vol. IV).

The shunting operations in Batumi port are carried out by two locomotives of the railway company which are permanently stationed in the port. They are equipped with 2,700 hp engines, which can be considered to be more than sufficient to cover needs of shunting.

In order to cope with the bottlenecks which are inherited from the system of direct cargo transfer to and from rail wagons and the poor state of the Georgian Railways, the port has rented one additional similar locomotive from the railways to improve the operations. This locomotive is on permanent standby and has proofed to be very helpful. If that locomotive breaks down, it will be substituted by the railway on return. Fuel and maintenance and repair are included.

One of the main bottlenecks of the Batumi Port railway system is, that only one railway track is leading out of the port.

Port of Batumi - Railway influenced operations

Average actual performance

Commodity	Package	Handling equipment	mt per day
Sugar	bags	crane	900
Flour	bags	crane	900
Grain	bulk	cane /grabs	5,900
Grain	elevator	elevator	1,700
Ammonium Nitrate	bags loading	crane	800

Considering the circumstances, the direct delivery of goods functions fairly good and seems to have improved also due to the improved performance of the Georgian Railways. A good example is, that recently a vessel carrying 34,500 mt of grain in bulk achieved a discharging rate of 361.5 mt/hour or 8,676 /day. This figure was based on the operational time at berth working time including time for shunting operations but excluding periods of rain. This discharging rate could only be achieved by maintaining a well organised and functioning railway operation throughout the discharging operation.

2.1.8 Truck operations

Truck operations do not play a significant role in Batumi port. The port layout does not provide sufficient parking space for trucks waiting to receive or deliver cargo. If the volume of cargo which received or delivered by trucks increases, the port would face serious problems to accommodate these waiting trucks. Trucks waiting to be served are often lined up in a bus stop area, and are thus representing a dangerous obstacle for the traffic and the public transport. As a general rule trucks are being loaded or unloaded in the open storage areas by the cranes in a direct cargo transfer mode.

Due to the very small cargo volumes handled there are no relevant statistics, which render information about the performance achieved. The impact on the overall performance of the port is minor

2.1.9 Ferry Operations

At the present time no ferry services call the port of Batumi.

- Lack of s which could be used to cover cargo, which needs special care. Also tarpaulin is a must, when vulnerable cargo is touching the apron.
- Valuable space in warehouses is used as magazines for stores. Viewing the contents e.g. in building No 15 (warehouse No 6) and building No. 13 it remains rather doubtful , whether any of the goods stored there, will ever be used inside the port.
- The location and the layout of most of the warehouses render the impression that they have been chosen under civil engineering aspects rather than under operational ones
- The majority of the doors are too small for unhindered cargo operations .
- The warehouses do not match international standards as it may be required by customers of the port .
- Lack of adequate equipment for lateral movements. The cargo has to be transported virtually sling by sling by FLTs from or to the warehouse. This is a very inefficient procedure, having a very negative effect on the productivity.

In view of the anticipated change in the cargo pattern and under the objective to increase the productivity of the ports, the port will in the future have to provide warehouses for a wide variety of goods as general cargo, all kinds of bagged goods, chilled and frozen cargo and facilities for bulk cargo like grain silos .

2.1.6 Dispatch and Delivery

The typical mode of cargo transfer in both directions ship/shore and v.v. is the direct receiving of discharged cargo, or delivery of cargo by rail wagon and direct loading on the ship. The volumes of cargo, which are stored either in warehouses or in open storage areas are negligible. The principle, which is being applied in all well organised and efficient ports of the world, that the cargo should, in order to increase the productivity of the ports, not be received or loaded by a direct mode, has still to be implemented in the Georgian ports. The recent exceptions, where the indirect mode had been applied was the outgoing shipments of cotton and logs.

The direct cargo transfer mode as a general rule is very inefficient because of frequent interruptions due to lack of rail wagons or trucks supposed to deliver or to receive cargo, which are bringing the operations to a complete standstill .Whereas cargo being discharged in the indirect mode, e.g. via silo of warehouse or open storage areas, would not be subject to such delays. In European ports losses incurred to the party concerned and caused by standby periods are charged with substantial amounts to the party being responsible for these delays .

Reduce the direct transfer mode in favour of the use of buffers will be one of the measures to be taken in order to reach the objective to improve the performance and productivity of the Georgian ports to the level of the best organised ports of the world.

The productivity which can be achieved with the direct cargo transfer mode, and which is governing the productivity of the port is dealt with below .

2.1.7 Railway operations

Railway operations are the factor dominating the layout and the operation of the Georgian ports. The operation is solely focusing on direct delivery to and from rail wagons. As already stated before, this constitutes a very unfavourable environment for a good productivity.

The operation is frequently interrupted by shunting operations. These shunting operations cannot always be undertaken in the shift breaks. During the last years the performance of the railway was very poor, and mainly caused by lack of fuel and electric power. Many of the rail wagons are in a very poor technical condition, which adds to the other complications.

PORT OF BATUMI
PRODUCTIVITY INDICATORS IN MT

INDICATORS						
COMMODITY	**packed**	**per vessel per day**	**per vessel per hour**	**per gang per vessel per hour**	**per man per vessel per hour**	**remarks**
grain	in bulk	6,800	283	94	12	by grab , 3 gangs
grain in	in bulk	1,700	850	425	53	by 2 eleva-tors
flour in	bags	950	40	20	1.2	
sugar	bags	950	40	20	1.2	
fertilizer	bags	900	37.5	18.8	1.6	
wooden logs	loose	650	27.1	13.4	2.3	
Aluminum powder	bulk	6,450	300	150	18.7	
scrap handy size	loose	270	11.3	5.7	0.5	
other foodstuff	miscell.	900	37.5	18.8	1.6	
silico manganese	bulk	2,000	83	41.7	7	
metal products	unpacked	1,000	42	21	3.5	
caustic soda	drums	600	25	12	2	
cotton	bales	300	12.5	6.3	0.5	
ferry operations	units	not existing				
containers	units	no container services calling Batumi				

Information based on port documents, verbal verification, and own observations.
Figures related to *hours at berth.*
Times lost are fully incorporated regardless the reason .

Assumption:
Two gangs working except for containers, where one gang is compulsory due to lack of space .
Oil cargo not considered .

PUMPING RATES FOR OIL CARGO

TYPE OF OILPRODUCT	PUMPING RATE PER HOUR IN MT
Fuel oil	800
Diesel Oil	1,000
Naphta	450
Gasoline	370

2.1.13 Dwell time of cargo in port

In this area, the remarks to Poti are also valid for Batumi. Here, the direct cargo delivery and receiving mode determines the dwell time of the cargo in the port. In the field of incoming cargo the figures are negligible when set in relation to the total throughput.

2.1.10 Ships' Time in Port

The duration of the total turn-round time in the port in correlation to the type of cargo, and the times lost within the various defined periods, are very important factors, when an assessment about the port's performance as a whole is being made. The total turn-round time is the determining decision making tool for shippers, charterers and ship owners, when they are contemplating which port to call to deliver or receive their cargo for shipment. Substantial non operational times generate losses for the owner (if on liner terms) and for the charterer, who would then have to pay demurrage to the ship owner as compulsory stipulated in the charter party.

The table 3.6 '*Ship's time in port of Batumi*' in Annex 6 of this volume shows the main port performance data from January 1997 to September 97.

Analysing the table it becomes quite evident, that the overall performance of the port is negatively influenced by detentions in the operation. The reasons are varying from factors beyond the control of the port, like lack of documentation, missing instructions by shippers or receivers, delays due to the direct delivery mode and last not least by the typical climatic conditions at Batumi. According to the meteorological office Batumi is witnessing about 160 -170 rain days annually, a factor which cannot be altered .

The summary of the pre-berthing waiting time makes up for 32 % of the total turn-round time.
The average of the total time lost in port is 61 % of the total turnaround time.
The average of the total time lost between the operational time and the time at berth is 37 % .

2.1.11 Throughput figures

PORT OF BATUMI
DEVELOPMENT OF YEARLY THROUGHPUT

Year	Total Throughput	Change in % to previous year	Dry cargo throughput	Change in % to previous year
1993	1,757,200	n.a .	974,700	n.a.
1994	1,147,400	- 35 %	664,400	- 32 %
1995	1,383,900	+ 20 %	741,600	+ 12 %
1996	1,350,200	- 3 %	602,600	- 19 %
1997 (1 - 9)	2,170,000	n.a.	728,300	n.a.
1997 (projected)	2,500,000	+ 85 % (projected)	971,00 (projected)	+ 61 % (projected)

2.1.12 Port productivity and handling rates

What had been said about Poti port in respect of the productivity and the typical hindrances going along with the prevailing direct delivery and receiving procedure to and from the railwagons, does also apply for the Port of Batumi albeit on a somewhat smaller scale.

The port is smaller and can be controlled easier. The dispatcher office is manned by qualified staff and located in a position which allows also visual observance of the railway operations.
The differences in the productivity are only marginal.

3 Port of Poti and Batumi - Theoretical Capacity Calculation

The theoretical capacity of the port of Poti and Batumi have been calculated by assigning the predominantly handled types of cargo to the berths which have been designed for these types of cargo or are being mainly used for the latter. Only a calculation, which is based on this principle will lead to realistic results. The typical cargoes handled at the berths have been described under the 'Stevedoring' part of this report.

Further basic principles which have been incorporated are

- Pump capacity of cranes in relation to type of cargo
  grab capacity for grain 6 m3 corresponding to about 5 mt and for other bulk cargo with 9 mt per grab .
- 20 working hours per day . Deriving from 21.5 working hours minus time for berthing/unberthing etc.
- A general efficiency factor of 66 % (deductions for shifting operations of gangs and cleaning 1.5 hours).
- It has been assumed, that the two cranes , which are located at each pier are the only ones working, despite of the fact, that the system of crane posting is being handled flexible as far as the railtracks are permitting changes of position.
- It has been assumed, that the cranes are in a good working condition, without substantial breakdown times .
- The port has been considered ' full' as far as the berth occupancy of the operational berths is concerned.
- 365 working days per year are applied .
- 80 days deductions for rain effecting the handling of vulnerable cargoes.
- Deductions for existing bottlenecks which cannot be changed considering the present layout of the port have been considered in relation to the type of delivery/receipt and commodity.
- The calculated best case scenario had been set in relation with the approximate actual figures.
- The state of the open storage behind the berths and the possibility to serve as buffer has been observed as well, as the availability of warehouse space for such purpose.

The numbers of working days have been calculated with 365 , because the ports are working throughout the year also on Sundays and National Holidays .

The cargo pattern has changed during the last years, which also reflects on the type of cargo handled on the berths. The former special designation each of the piers and the way of operation has undergone some changes, which applies especially to Poti Port. In particular the changed cargo pattern at Terminal No. II has in turn also altered vital elements of the capacity calculation.

The somewhat exorbitant deductions for bottlenecks will be found confirmed in the 'Productivity' part and the table ' Ship's time in port '. Deductions for losses caused by rain have been integrated on a very moderate level and may well be higher in fact. There are seasonal and annual changes, which may influence the throughput in a negative or positive way.

Changes in the cargo pattern have not been witnessed in Batumi Port on the same scale as in Poti Port. Advantages in the field of bottlenecks in Batumi, like a more effective railway operation are more than offset by the number of rain days (between 150 - 170 per year) and sometimes boisterous weather conditions, which at times are forcing vessels to leave the port.

PORT OF BATUMI
AVERAGE DWELL TIME OF CARGO IN PORT

Type of cargo	Mode of delivery	Dwell time in days	Remarks
oil in bulk	direct railwagon	nil	
scrap	by truck	90 -120	Accumulation for shipment
grain in bulk	direct railwagon	nil	
chemicals in bags	direct railwagon / truck	nil	
flour in bags	direct railwagon	nil	
sugar in bags	direct railwagon	nil	
cotton	direct railwagon/truck	nil	
cotton	through warehouse	40 - 60	
wooden logs	by truck - open storage	30	
spirits	ex ship - warehouse	120	

2.1.14 Work interruptions

Viewing the contents of table 3.1 in annex 6 of this volume, which is showing a representative cross section of interruptions. The figures shown under the heading *' time lost by interruptions in % to total time in port '* are fairly stable. The average time lost under this category amounts to 99% .

The figures shown under the heading *' time lost by interruptions in % to operational time at berth '*, Table 3.2 in annex 6 of this volume, are subject to substantial variations. The average time lost in this category amounts to 38 %.

Analysing this table it is surprisingly revealed, that the influence of the current problematic situation on the electric power supply has not been of big relevance for the operation of the port. The data shown in the table furthermore underline, that the main bottleneck hampering the operation is the performance of the Georgian Railways .

Batumi suffers - and this cannot be altered - by the extremely high rainfall, which brings the dry cargo area to a complete standstill sometimes for days. As a consequence of this unchangeable reality any future development activities will have to take this meteorological environment into account, and should thrive to lessen the dependency on rainy intervals

PORT OF POTI

APPROXIMATE ACTUAL CAPACITY CALCULATION

Berth No	Cargo	Crane type	Lifting cap. mt	Theoretical handling capacity per working day and crane	No of cranes per berth	Estimated daily production in mt	Working days per year (no deductions for rain)	Calculated anual capacity for berths in mt	Deductions for unchangeable bottlenecks (civil engin. Constraints, direct delivery mode)	Estimated capacity after deductions for bottlenecks	Remarks
1	oil	none	---	5,000 mt	n.a.	5,000	365	1,825,000	50 %	912,500	
2	general cargo Project cargo, containers	Sokol	16	6 mt-20cycles - 20 hrs	2	4,800	365	1,752,000	80 %	350,400	
3	general cargo, project cargo	Sokol	16	6 mt-20 cycles-20 hrs	2	4,800	365	1,752,000	80 %	350,400	
4	bulk	Sokol	16	9 mt 40 cycles -20 hrs	2	14,400	365	5,256,000	70 %	1,576,800	
5	scrap	Sokol	16	3 mt- 30 cycles- 20 hrs	2	3,600	365	1,314,000	60 %	525,600	loading
6	bulk , projects	Sokol	16	5 mt -20 cycles -20 hrs	2	4,000	365	1,460,000	90 %	146,000	RoRo berth
6	RoRo	--	--	15mt-50trailers-20hrs	--	15,000	365	5,475,000	95 %	273,750	via No. 7
7	containers	Kondor	40	10mt-10 moves-20 hrs	2	4,000	365	1,460,000	80 %	292,000	
8	grain	Sokol	16	5 mt - 40 cycles-20 hrs	2	8,000	365	2,920,000	80 %	584,000	10 % rain
9	grain, gen. cgo	Ganz	6	2,5 mt-25 cycles-20 hrs	2	2,500	365	912,500	80 %	182,500	10 % rain
10	grain, gen. cgo	Albatros	10	2.5 mt-25 cycles-20 hrs	2	2,500	365	912,500	80 %	182,500	10 % rain
11	no activities										
12	RoRo	n.a.	--	15mt-50 trailers-20 hrs	-	15,000	365	5,475,000	95 %	273,750	no rails
13	no handling										
14	lay up berth										
15	no activities										
TOTAL CAPACITY								**30,514,000**		**5,650,200**	

PORT OF BATUMI

APPROXIMATE ACTUAL CAPACITY CALCULATION

Berth No	Cargo	Crane type	Lifting cap. mt	Theoretical handling capacity per working day and crane	No of cranes per berth	Estimated daily production in mt	Working days per year (no deductions for rain)	Calculated annual capacity for berths in mt	Deductions for unchangeable bottlenecks (civil engin. constraints, direct delivery mode)	Estimated capacity after deductions for bottlenecks	Remarks
1,2,3	Oil	pumps	700/ hour	20 x 700	n.a.	14,000	365	5,110,000	66%	1,737,400	mix of oil & derivatives
4	lay-up berth	no operation									
5	lay-up berth	no operation									
6	Scrap, logs, bagged cargo	Ganz	6	2 mt - 30 cycles 20 hrs	2	2,400	365	876,000	80 %	175,200	20 % rain
7	grain	Albatros	2	5 mt - 40 cycles 20 hrs	2	8,000	365	2,920,000	80 %	584,000	20 % rain
8	grain	Hartmann elevator	n.a.	100 mt - 20 hrs	2	4,000	365	1,460,000	80 %	292,000	20 % rain
9	gen. cargo & bagged cargo	Ganz	6	2mt -30 cycles 20 hrs	2	2,400	365	876,000	80 %	175,200	20 % rain
10	private operation	priv. mobile cranes	--	outside port control							
11	passenger & RoRo facilities	none	--	15mt- 50 trailers 20 hours	n.a.	15,000	365	5,475,000	80 %	1,095,000	no marshalling
TOTAL CAPACITY								**16,717,000**		**4,058,400**	

4 Proposals for the Development of new Cotton Storage Facilities

4.1 Identification and Specification of storage requirements for cotton

4.1.1 Size and weight of bales

The size and the weight of the cotton bales are varying slightly by their country of origin.

At the time of drafting this report a lot of 440 mt of cotton originated from Azerbaijan had been stored at Batumi Port in Warehouse No. 4 and loading was under progress.

The size of these bales was
L x W x H = 100 x 750 x 500 mm
The average weight was calculated 200 kg.

Cotton bales originated from Uzbekistan are usually measuring
L x W x H = 100 x 700 x 600
The average weight was given with 220 kg

4.1.2 Maximum stacking height

The criteria determining the maximum permissible stacking height of cotton are

- The permissible stack loads of the warehouse floor
- Stacking safety and accident prevention
- Fire prevention and fighting aspects
- General mode of stacking (e.g. on pallets or conventional)

Cotton bales from the Central Asian area are usually not stacked more than five and at times maximum six high.

4.1.3 Numbers of different consignments to be stored simultaneously

It is compulsory to stack the consignments separately by incoming rail wagon. Each stack is marked with the number of the rail wagon and the date of receipt.

Considering the above said, the need for further separation under commercial aspects is not evident. The lots cannot be mistaken unless on purpose. Here the quality of the concerned warehouse managements will be the governing factor. Major traders, moving big volumes, will however thrive to have their exclusive storage facilities.

Separation because of fire protection will be dealt with later .

4.1.7 Constructional requirements for dedicated warehouses for the storage of cotton in bales

When constructing a warehouse dedicated to the storage of cotton certain facts have to be observed.
Cotton is considered a dangerous good under the IMDG Code. It is listed under class 4.1 (flammable solid) when dry and under class 4.2 (spontaneously combustible) when wet. As a result, the volume which can be stored in one compartment is limited by the need to avoid the spreading of any fire. For the calculation of the size of the shed and the fire protected compartments the following data have been considered :

- size of one bale 1000 x 700 x 600 mm
- weight of one bale 220 kg
- proposed size of warehouse 120 x 60 m
- maximum size of fireprotected compartment 2,400 m2 gross
- usable for storage after deduction for driveways 60 % or 1,440 m2
- size of warehouse 120 x 60 m (3 fireprotected sections of 40 x 60 m)
- Cotton stacked five high

It has however to be mentioned, that under existing rules (safety regulation PD 31.82.03 -87) cotton may be stacked 9 high, but under no circumstances higher than 1.5 m under the roof of the warehouse

4.1.8 Calculation of Storage Capacity

1 bale - 100 x 700 x 600 cm	= 0.42 m2
per m2	= 2.38 bales
2.38 bales x 220 kg	= 0.5236 mt/m2 (one layer)
1,440 m2	= 2,618 mt/m2 (5 layers)
	=3.770 mt (one fireprotected compartment)
3 x 1,440 m2	**= 11.310 mt (one complete shed)**

A shed utilisation of 60 % might be the maximum achievable under block stowage conditions. Any deviation from that principle may well bring the utilisation factor down to 50 %. Provision for space for 'grading ' has not been made, due to uncertain extend and temporary nature.

Considering the possibility, that Poti might reach a throughput of 100,000 mt of cotton at the end of 1997, three of these warehouses would have to be in place within a short time period. For economic and security reasons, these warehouses should be located within the port area.

In a meeting with the representative of 'Uzneshtrans' Mr. Anvar Samigdzhanov in the office of 'Orion Maritime Agency' he stated, that his organisation would like to have storage facilities at Batumi to accommodate 15 - 20,000 mt of cotton .

4.1.9 Important general factors to be incorporated in the design

The entire warehouse has to be built of solid material of fireproof material. This applies also for all technical instalments and appliances .

The loadcapacity of the surface should allow for the use of FLTs and under no circumstances be less, than 10 mt/m2.

4.1.4 Ventilation requirements

Ventilation is only required to avoid the development of mould .

4.1.5 Construction measures to protect against moisture and dirt

The warehouses dedicated for cotton for whichever period have to be kept very clean and free of oily substances. The cleaning has to be an ongoing process in particular with focus on oily substances, which will be found on the warehouse floor caused by the use of FLTs during the stacking and unstacking process .

Ingress of humidity has to be avoided under all circumstances. Selfignition of damp cotton is a constant danger. Damp cotton by its nature tends to generate an exothermic reaction which leads to selfignition. In a port environment, which produces a wide variety of chemical and non chemical dusts, it will be necessary to seal off cotton warehouses against the influx of such substances and humidity whenever applicable.

As a general rule, it is recommended, if natural or electrical ventilation systems are installed, that they should be constructed or rebuilt, considering the natural characteristics of cotton and the possible impacts by the transport from the ginnery to the port of shipment. Ventilation is necessary, when the cotton which is being delivered for storage is already damp or humid. In this case a ventilation system would serve to avoid the development of mould. It is however imperative, that such ventilation pits can be effectively, and rapidly closed in the event of outbreak of fire.

4.1.6 Equipment used for the handling of cotton

Stevedoring

The loading of cotton in Poti and Batumi is being carried out as described below.

In **Batumi** the bales are taken from the stack inside the warehouse by FLT. They are then lowered into a custom made steel pallet. The loaded steel pallet is transported into the loading area.

The alternative mode is direct transfer from rail wagon to the loading location. In this operation a FLT is also used to unstack the bales inside the rail wagon, and to put them on a similar pallet which is located on a loading platform. The pallet is taken to the loading area, where the bales are being lifted by hooks. Each lift consists of 4 bales. Precautions to protect bales, which might and in fact do fall from the pallet during that procedure by e.g. spreading tarpaulins on the ground, are not taken.

The achieved loading rate per ship per day lies between 300 - 400 mt .

At **Poti** the procedure is different .
The cotton is transported from the warehouse to the loading point by means of trailers. The cotton bales are loaded by hooks which are fitted to a spreader. By this way each lift carries 10 bales of cotton. Hence the average daily productivity per ship and day is about 500 mt, compared with 300 - 400 mt at Batumi.

Shore handling & storing

The cotton bales are arriving at the prospective port of loading by rail wagons. The unstacking of the rail wagons is then performed by means of FLTs and mobile or fixed loading ramps. The stacking in the warehouses is carried out by FLTs .

Section 5

Port Master Planning

Each compartment should be fitted with one door, which should also allow for the passage of forklifts .

The warehouses should at one side be equipped with a ramp for the unloading of rail wagons. The surface level of this ramp should match the floor of the rail wagons for easy unloading by FLTs . For this purpose the ramp will have to have a width of not less, than 6 m.

Considering the prevailing climatic conditions and the vulnerability of the cotton ,it is recommended to cover the entire ramp by a roof, reaching also over the first rail track. This will foster the uninterrupted unloading of rail cars also under unfavourable weather conditions and save standby payments for rail wagons.

Ventilation as a general rule is required on a very limited basis only. The only purpose of ventilation is the avoidance of development of mould.

4.1.10 Fire protection measures to be incorporated in the design

The fire protection walls have to be minimum 1 m higher than the roof .

- If electrical operated ventilation is installed , ventilator cowls leading into the warehouse have to be fitted with spark preventing screens.
- Emphasis has to be laid on the accessibility of the closing devices for the ventilation outlets.
- In case of fire it is significant how fast these outlets can and will be closed.
- Smoke detection systems combined with alarm systems , which are supported by a backup power supply in case of power cuts have to be installed.
- Sprinkler systems are considered to be a must for fast and efficient fire fighting and hence have to be installed.
- Smoking and the use of open fire to be strictly forbidden , corresponding warning tables to be fitted, and guards to be posted on 24 hours basis .
-

4.1.11 Cotton Storage Facilities Outside the Port

Considering the possibilities to construct cotton storage facilities in the port of Poti, it is interesting to know, that the cotton traders did not wait for the port to develop its facilities but have taken the initiative into their own hands. In order to overcome the present lack of appropriate facilities the State Transport Company of Uzbekistan (UZV) has appointed the Georgian Trans Expedition Ltd (GTE) as their agents. GTE has meanwhile actively promoted the rehabilitation of the "Old Tea Warehouse" for storage of cotton.

At present four warehouses have been rehabilitated and another one will be completed soon. The four warehouses provide approximately 20,000 mt of suitable storage space for cotton. The fifth shed, when completed will add about another 10,000mt to this capacity.

The completed warehouses are working to capacity. The cotton bales in the sheds are stacked up to 9 high. The stacking and unstacking operations are performed by new "Linde" forklifts which are equipped with the necessary special clamps for easy mechanical handling of the bales.

GTE can handle fifty rail cars with forty to forty-five tons each per day. Packing of containers on the premises as well as from rail car directly into the container is in full swing. After stuffing the containers are trucked to the port for shipment.

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1 Definition of Functional Requirements of the Ports of Poti and Batumi

1.1 Port handling commodities

In this chapter the commodities handled in the Ports of Poti and Batumi are determined as well as the way they are handled. On the basis of these data as well as on the size of the vessels foreseen to deliver and load the different commodities the functional requirements (storage area and berth length) of the ports are defined.

The commodities selected for the Traffic Forecast serve as a base to determine the 'Port Handling Commodities' .

Port Handling Commodities

Cargo	***shipped as***
Bulk	
All bulk cargoes	loose (in bulk)
Oil products	
Mineral oil and derivates from oil	predominantly loose
General Cargo	
Metal products	unpacked
Timber	packed/stripped
Logs	unpacked
Mineral building materials	bags ans pallets
Foodstuff, others	predominently bagged
Containers	*TEUs (Twenty feet equivalent units)*

1.2 Kind and size of vessels

1.2.1 Average size of vessels for selected cargoes at Batumi 2002 - 2012

Type of cargo	*Average size of vessel in mtons deadweight (loading capacity)*	*Maximum size of vessels (mtons)*	*Average length of vessels (m)*	*Estimated average draft of vessels (m)*	*Maximum expected draft of vessels (m)*
Bulk	10,500	35,000	190	9.50	11.50
Oil Products	20,000	35,000	220	10.50	11.50
General Cargo	1,500	15,000	95	4.50	10.50
Containers *	5,000	15,000	120	6.50	10.50

source: port of batumi statistics*

The amount of containers handled at Batumi is negligible at the present.

1.2.2 Average size of vessels for selected cargoes at Poti 2002 - 2012

Type of cargo	*Average size of vessel in mtons deadweight (loading capacity)*	*Maximum size of vessels (mtons deadweight)*	*Average length of vessels (m)*	*Estimated average draft of vessels (m)*	*Maximum expected draft of vessels (m)*
Bulk	10,500	35,000	170	9.50	11.50
Oil Products	7,000	20,000	120	6.50	11.00
General Cargo	3,000	15,000	100	5.00	10,50
Containers *	5,000	25,000	120	6,50	11.50

source: port of Poti Statistics

2 Demand of Future Facilities in the Ports of Poti and Batumi

2.1 Demand of Storage Facilities

2.1.1 General Remarks to the mode of calculation for storage demands

2.1.1.1 General cargo

Mode of calculation for general cargo storage requirements:

For the purpose of ascertaining the demand for shed- and open storage space, the following formula has been applied (*Unctad Monographs on Port Management Vol. 9)*

S	=	Total demand for storage area including the space needed for operations
T	=	Annual throughput
n	=	No. of entries and removals of goods during the year
q	=	Mt per m^2 referring to the area actually occupied by the goods
K	=	Deduction for operational requirements

Formula applied for general cargo : $S = \frac{T}{n \times q \times K}$

2.1.1.2 Containers

Mode of calculation for container storage requirements:

Operation by mix of Reachstacker and 'Empty Container - Handler' .

A/ m^2r	= total area requirement
e/thp:	estimated annual container throughput
m^2/teu:	actual consumed storage space per TEU
avr/sth:	average stacking height of containers : empties 3-5; loaded1-3 high (2.5)
dwt/f :	dwell time factor based on 20 days average for container. dwt/f = d/p.a. (365 :20 =18)
rst/f :	actual reachstacker utilisation factor 0.4

Formula applied :

A/ m^2r = e/thp x m2/teu : avr/sth x dwt/f x rst/f

2.1.1.3 RoRo

Mode of calculation for space needed for RoRo operation:

This type of operation requires space for waiting trucks to be custom cleared and/or such trucks waiting to be loaded on the vessel.

For an effective roro operation there must be ample marshalling space ready available and cannot therefore be used for storage purposes. Including sufficient space for manoeuvring an area of 85 m^2 per vehicle has been allocated for that purpose.

2.1.1.4 Grain in bulk

The Port of Batumi does not in the foreseeable future have sufficient space for the erection of a grain silo . It is therefore assumed, that a direct delivery will have to be maintained, possibly modernised by a buffer - silo solution, which would facilitate a fairly unimpeded delivery of cargo to rail wagons.

2.1.1.5 Other bulk

The forecasted cargo volume cannot be handled in the port in a compulsory manner. This would include the storing of at least one shipload of iron ore or coal. This space can under no circumstances be secured in the Port of Batumi in its present location. It would occupy about 5,300 m^2 of open storage space. *(The port's total available open storage capacity being 9,150 m^2 with none of these areas having even the capacity to provide the required space. The largest area behind Berth No. 7 having 4,100 m^2).* An additional railway line and unloading facilities for the rail wagons would have to be constructed, which would further decrease the remaining balance.

2.2 Determination of shed - and open storage demand of Poti Port

2.2.1 Demand of storage area in 2002

2.2.1.1 Grain in bulk

This cargo is now been handled directly at Berth No. 8 and no storage space will be required. Once the grain silo is rehabilitated, storage space for about 24,000 mt of grain will be available. It is assumed, that the main part of the imported grain will be in transit to Central Asian and neighbouring countries.

Intermediate storage space in steel silos combined with direct loading to rail wagons as proposed by EBRD will be useful to serve as a buffer in case not sufficient rail wagons will be available.

The viability of this project considering the economic returns under the aspect of likelihood that the port might have to pay for it from its revenues, has to be studied.

2.2.1.2 Other bulk

It is assumed, that 20 % of this cargo will be loaded directly. The remaining part of it will have to be stored in the open storage areas. Considering the total space available this does not seem to pose a problem. Looking at it in a more specified approach, the open storage area behind Berth No. 4 which is measuring 5,950 m^2 and by considering the necessary space of 4,400 m^2 there is an indication, that the available space is reaching its capacity soon at this berth.

It is assumed, that the scrapping activities inside the port area will have ceased by the end of 2002, which would be the end of the current contract of the company operating the scrap loading.

Until the end of the current contractual period between the port and Docktranshipment Poti (Ltd) covering the scrap loading the storage and the loading of the other bulk cargoes will have to be conducted, as in the past, at Berth No. 1. This being a combination of cargoes *(Oil and bulk)* which is very unsatisfying to say the least.

2.2.1.3 General cargo

Direct and indirect delivery systems are expected to reach a sharing of 80 % for direct and 20 % for indirect delivery.

The total demand for this type of cargo which is expected to be stored in the port will need 5,508 m^2. It is expected, that 90% of this cargo will be subjected to be stowed in the sheds which would be 4,957 m^2. This would occupy 42 % of the available shed space.

What would be still missing is a dedicated warehouse for the storage of cotton. It is proposed to complete the shed behind Berth No. 10, which construction had been interrupted, into a warehouse for the storage of cotton. This warehouse should then provide all the necessary facilities as described in the first Phase Report under the Heading 4 *(Proposals for the Development of new Cotton Storage Facilities)*

The demand for open storage will be 1,530 m^2 (13%) which can be easily covered by the available space, which will be 20,000 m^2 minimum. The figure will cover the needs which are deriving from the forecasted volume of cargo. It has however to be mentioned, that part of the declared 'open storage areas' are also utilised for operational purposes, and would in the port terminology be aprons. This reduces the realistic space in the open storage areas.

2.2.1.4 Containers

The demand for storage space *(not the demand for the total operational areas handling containers)* has been identified with 65,962 m^2 based on reachstacker operation and an average dwell time of 10 days which stands for a dwell time factor of 36. The best possible the port can do is 54,000 m^2. This represents a deficit of 11,962 m^2. This underlines the necessity to build a new dedicated container terminal as soon as possible. The number of forecasted 98,500 TEUs does underline and justify such an investment. By internationally unchallenged experiences, the border for the construction of a container terminal lies in the range of 50 - 60,000 TEUs. This line will presumably be crossed in the year 1999-2000 at the latest.

Meanwhile the storage of containers will have to be split. Bottlenecks will appear have to be solved by higher stacking. The development of the dwell times will also have a considerable impact on the actually needed storage space. Summarising it has to be stressed, that under no circumstances the available space will render the possibility to conduct an efficient container - operation.

2.2.1.5 Roro cargo

The open storage space of 8,500 m^2 which had been identified for this type of port operation represents the general parking space for 100 trucks. It has to be taken into consideration, that also other types of rolling units will have to be handled and in the interest of an efficient operation will have to be parked in waiting lanes for in-or outgoing operations in order to facilitate a fast dispatch of the RoRo - ferries.

The marshalling and shunting area for the rail ferry have not been calculated under the current project. The related construction works are under way and posed to completed well in time with the completion of the roro-ramp at Berth No. 2/3. The figures have been studied and verified to be sufficient to cover the needs.

For details, concerning the space requirements for the different commodities see Table 1.8, Annex 1 of this volume.

2.2.2 Demand of storage area in 2007

2.2.2.1 Grain in bulk

It is assumed, that this cargo will be handled in the direct mode, provided that none of the grain - handling facilities will have been built or rehabilitated. Otherwise the scenario would remain as described under the period 2002.

2.2.2.2 Other bulk

This cargo-type will be handled to 84 % in the indirect mode. The balance which will be scrap is expected to be handled in the direct mode ex rail wagon. In line with the traffic forecast the necessary open storage space for this cargo has been calculated with 5,000 m^2 against 6,800 m^2 of available space. The occupied space represents 73% of the available space, which does at this stage not require any measures as far as the storage space is concerned.

Due to the nature of the scrap and its high potential of damaging the pavement and the potential danger, which derives from small metal residues leading to extensive damages of tires, this type of cargo is to be handled in the direct mode only. No scrap should be cut in the port area anymore.

2.2.2.3 General cargo

The direct delivery system is phased out slowly and is projected to reach 50 % for both direct and indirect delivery. Shed space has been calculated accordingly.

The demand for shed space is calculated with 8,201 m^2 against 11,700 m^2 of available space.

Open storage space demand is calculated with 9,113 m^2 against 20,000 m^2 of available space. These figures do not consider cotton storage facilities which are proposed to be constructed in line with the completion of the abandoned shed where the construction had been interrupted behind the apron of Berth No. 10.

2.2.2.4 Containers

The total calculated demand is based on the figures of the traffic forecast and on a combined reachstacker- and truck-trailer system operation. The average dwell time is calculated with 10 days. Based on these assumptions the required storage area for containers will be 73,558 m^2. The available storage area with a given capacity of 54,000 m^2 does not cover the needs for the storage of containers in an economic manner. The needed *operational area,* which would allow an efficient container-operation would be about 150,000 m^2

It has further to be mentioned, that an increase in the dwell time would have immense affects on the requirement of storage space.

All above does underline the need for the construction of a new container terminal.

2.2.2.5 RoRo cargo

The open storage area for the RoRo - traffic remains unchanged compared with those of 2002. An efficient document processing on the part of state authorities will facilitate a fast dispatch.

For details, concerning the space requirements for the different commodities see Table 1.10 and 1.11, Annex 1 of this volume.

2.2.3 Demand of storage facilities in 2012

2.2.3.1 Grain in bulk

Storage requirements for this type of cargo will be - as described - under 2007. The basic questions will have to be tackled, if not solved in the meantime.

2.2.3.2 Other bulk

20 % of this type of cargo is expected to be handled in the direct mode, whereas the balance of 80% will be subject to intermediate storage in the open storage areas.

Based on the traffic forecast the requirements will not change dramatically as far as the demand for open storage areas is concerned. The total demand has been calculated with 5,500 m^2 whereas the available storage space remains at the figure of 6,800 m^2.

2.2.3.3 General cargo

By the year 2012 at the latest, the civil works, which are to be considered under the current project should be completed and the reorganisation of the general cargo handling procedures been implemented. This would embody the construction of new tailored to suit sheds and further upgrading of open storage areas, which will no longer be subjected to container handling.

The total demand for shed storage space will be 16,481 m^2 compared with only 11,700 m^2 of existing capacity. These figures do underline the need to construct sufficient storage space for the accommodation of the anticipated cargo volumes, which will be required to be stored in sheds until their delivery to consignees or for their shipment.

In the field of open storage the figures are expected to be 18,313 m^2 required against 20,000 m^2 available space. As the required space represents 92 % of the available space, an extension based on the actual figures will have to be contemplated.

2.2.3.4 Containers

The demand for open storage space had been calculated based on an average dwell time of 5 days, which would be near to European standards.

The available area for storage purposes is 54,000 m^2 whereas the needed area is 69,024 m^2. Apart from the fact, that the available space would not cover the demand, any increases in the dwell time would bring the demand further up pro rata.

As a consequence the demand can only be covered by a new container terminal, which dimensions would guarantee sufficient storage space apart the space needed for other operational requirements.

2.2.3.5 RoRo cargo

The open storage area for the RoRo traffic remains unchanged compared with those of 2002 and 2007. An efficient document processing on the part of state authorities is imperative and will facilitate a fast dispatch, which will not make it necessary to increase the parking and marshalling areas substantially.

Under this aspect it is assumed, that the allocated space of 8,500 m^2 will be sufficient, to meet the operational requirements. In case of need the possibility would be given, to extend the parking area to 15,200 m^2.

For details, concerning the space requirements for the different commodities see Tables 1.12 and 1.13, Annex 1 of this volume.

2.3 Conclusions concerning the determination of shed- and open storage space of Batumi Port

2.3.1 Storage Requirements in 2002

2.3.1.1 Grain in bulk

This type of cargo is presently being handled at Berth No. 7 and this will remain so for the foreseeable future. The cargo will be handled in the direct delivery mode. At this stage it is not recommended to deviate from this procedure, because the further development of the throughput of this type of cargo is uncertain. As a consequence the plan to invest into this part of cargo handling by providing storage facilities should be treated with great care, and not been undertaken, without having secured sufficient economic returns for any investments.

If the cargo level of this commodity will be on the increase again, an intermediate storage facility as proposed by he EBRD for Poti or coming near to it could also be considered, if expected to be viable. An alternative would be, to procure Vacuvator type mobile elevators, which would discharge into a section of a specially designed shed, and simultaneously into rail wagons. The balance could be transferred later into rai wagons by the same equipment from that shed.

The Port does in its present location not have the space to erect a big silo. Grain storage, whether permanent or intermediate will have to remain on the agenda.

2.3.2 Other bulk

The port does not have the space to provide the necessary open storage facilities, for the forecasted volume of iron ore. Sufficient space for storing such cargo, which is normally arriving well ahead of the arrival of vessels, would be needed to guarantee a smooth loading of iron ore. Direct loading from wagons by means of grab -there is no other alternative- is a very time consuming and inefficient procedure, which will very soon disqualify the port for the handling of such type of cargo. From this point of view, serious doubts are raised, if 273,000 mt of iron ore can be handled at Batumi under the given circumstances.

2.3.2.1 General cargo

For the purpose of calculating the necessary storage of this type of cargo, it has been assumed, that in line with the ongoing rehabilitation and construction process about 20 % of the general cargo will be handled in the indirect mode. Out of this figure 90 % are supposed to be stored in sheds and the remainder in the open storage areas. Based on the existing facilities this represents about 88 % of the available shed space. These facilities are oudated and have to be replaced by modern and bigger buildings to meet modern standards. The agreement of the ports to move away from the direct delivery - albeit hesitant at times- will require sufficient shed space to store the forecasted quantities of cargo. On the other hand it is assumed, that warehouses 1,2,3 have been demolished and been replaced by a modern much bigger building. Based on the proposal of the Port Development Experts, the new shed in way of Berth No. 9 should provide shed-storage space of approximately 7,000 m^2. This measure would be able to provide the necessary storage facilities until the year 2007.

The quantity which would have to be stored in the open storage areas is calculated with 626 m^2, which be about 0.04 % of the available space for this type of cargo, which will have to be shared with containers and possibly roro.

2.3.2.2 Containers

Based on the forecasted numbers of containers for Batumi Port, containers will occupy an area of about 3,002 ml, which will occupy about 32 % of the annual open storage capacity. This figure has been calculated under the assumption of an average dwell time of 20 days. The length of the dwell time will be a decisive factor influencing the actually occupied space.

2.3.2.3 RoRo cargo

In case this type of cargo would be handled inside the port, this would only be possible under the precondition, that sufficient space at the apron and the railway tracks has been paved and levelled. If this roro-cargo would in fact have to be handled in the inner harbour without the completion of the Multipurpose Terminal it would need to occupy about 8,500 m^2 of parking area in one dedicated area. The port, without the completion of the multipurpose terminal does simply not have that area, which would mean, that another parking and marshalling area would have to be found outside the port perimeters.

2.3.3 Storage requirements in 2007

2.3.3.1 Grain in bulk

Grain in bulk will be handled in the direct mode as described under *2002*. If the development of the cargo quantity justifies investments, the erection of a buffer facility or a tailored to suit shed for storage should be contemplated.

2.3.3.2 Other bulk

All which had been said in the comments under *2002*, still applies if the forecasted cargo quantities would become reality. Open storage areas for bulk cargo cannot be made available. From the operational point of view, the forecasted quantity of 468,000 mt of iron ore cannot be handled directly from rail wagons, As a consequence it cannot be ruled out, that this cargo will be routed to other ports.

2.3.3.3 General Cargo

It is presumed, that 50 % of this cargo category will be handled in the direct and indirect mode.

The cargo quantity identified for the indirect handling mode is expected to be 80 % of the total cargo for indirect delivery and hence the remaining balance of 20 % has been assigned to the open storage areas. This quantity of cargo, which needs open storage space would occupy 20 % of the available space. Under consideration of the factor 'q' (t/ m^2 in open storage), an additional demand for shed storage space of 3,844 m^2 has been identified based on the available shed space of 1998. If the proposed new buildings of the shed at Berth No. 9 and the planned multipurpose terminal are realised the total available shed space will be in the range of 11,500 m^2. which will be sufficient to cover the storage needs of 2007 and would also be in position to accommodate possible LCL - cargo (less-container-load cargo, which is either stuffed into or stripped from containers).

In the field of demand for open storage facilities it is expected, that there will be a need for space for general- and project cargo of about 3,045 m^2. This will be enough to cover the needs of this type of cargo, but will also

have to be seen in the context of demand for other categories. The total available open storage space would be 9,150 m^2 and scattered around the port or, in the case of the completed multipurpose terminal an additional 6,400 m^2 would be available which would provide ample space (a total of 15,550 m^2) to store the anticipated total general cargo.

2.3.3.4 Containers

It is assumed, that containers will-in line with common practice- never be handled in the direct mode. Consequently an annual demand for open storage capacity for containers of 4,074 m^2 has been identified. This demand would occupy about 45% of the available storage space (base 1998).

Provided, that the multipurpose terminal would have been constructed and in operation at 2007, the containers will be stacked in this area. There is no other feasible option.

2.3.3.5 RoRo cargo

It has been forecasted, that the RoRo-traffic calling at the Port of Batumi will pick up by about 69 % compared to 2002.

2.3.4 Storage requirements in 2012

2.3.4.1 Grain in bulk

The forecasted increase of grain in bulk would necessitate changes in the cargo transfer mode to rail wagons if this would materialise. This has been considered in the general master planning of Batumi Port, by not yet proposing any changes in the apron behind Berth No. 7 in order to preserve that space, if the need to erect back up facilities of this kind should appear.

2.3.4.2 Other bulk

This type of cargo will have to be handled without the provision of any open storage space in the direct delivery mode. Open storage capacities for this type of cargo cannot not be made available within the prevailing port perimeters. For the rest - whatever has been stated under *2002* and *2007* is still valid.

2.3.4.3 General cargo

As a result of the plan to phase out the direct delivery system the year 2012 has been proposed to finally reach 100% of indirect delivery. No cargo with few exceptions should be loaded directly from ships' or cranes' hook to the means of transport. In order to efficiently operate by this system sufficient shed- and open storage space has to be made available.

Total required shed space to cover the operational needs for general cargo will be in the range of 11,700 m^2. The total available shed space basis 1998 would be 3,844 m^2, which would not be sufficient. In case the proposed new sheds at Berth No. 7 (17,000 m^2) and the shed on the multipurpose terminal (4,500 m^2) would be completed, there would be no problem to provide the necessary shed for the general cargo operation.

The open storage requirements for general cargo can be accommodated in the available space.

2.3.4.4 Containers

It is anticipated, that based on the forecasted numbers of containers to be handled at the port, a need for about 600 m^2 will exist. This space can be provided in the shed, which is planned to be erected in the course of the construction of the multipurpose terminal. Without this terminal, the port will not be in position to handle the forecasted numbers of containers efficiently.

2.3.4.5 RoRo cargo

It is expected, that the numbers of RoRo vessels calling at the port will increase further and consequently the number of units, which will have to be handled will increase simultaneously. The effect on the necessary open storage area of 8,500 m^2 will therefore be sufficient to cover the needs, provided that the parties involved in the necessary clearing and documentation procedures are fulfilling their tasks as it is compulsory in well organised ports.

3 Demand of Berths in the two Ports

3.1 Summary of conclusions concerning determination of berth demand at Poti Port

3.1.1 Berth Demand in Poti in 2002

3.1.1.1 Grain in bulk

The viability of the proposed construction of a modern grain handling facility at Berth No. 8 will have to investigated under the aspect, that the port will have to shoulder the investment costs from port revenues.
The handling will during the current phase have to be maintained by grab discharge.

3.1.1.2 Other Bulk

This type of cargo has to be shifted to Berth No. 4 during this phase, because the oil transfer will, based on the forecast almost fully utilise the berthing capacity of Berth No. 1.

Scrap operations will be carried out at Berth No. 4 by Messrs. Docktransshipment Poti (Ltd), a joint venture by Messrs. Dockerill of Germany and the Port of Poti . The company has voiced its agreement in principle to move from Berth No. 8 to Berth No. 4. The impact, if this would not materialise would have substantial negative affects on the container operations.

3.1.1.3 Oil products

Based on the projected forecast for this type of cargo the demanded berth length will not suffice in the period until the year 2002. The shifting of the bulk operations shifted to Berth No. 4 will ease the situation. The situation will be further complicated by the fact, that roro-operations are deemed to begin at Berth No. 2-3 with anticipated overlaying of vessels to Berth No. 1.

The only way to overcome the situation would be to increase the pumping and receiving capacity of vessels and ashore, depending on the type of operation.

3.1.1.4 General cargo

Based on the forecasted cargo volume and due to the fact, that Berth No. 6 will be exclusively allocated for container handling, a bottleneck scenario will emerge in the general cargo area, which will result in an additional berth requirement of 142 m.

As a preventive measure direct transfer of cargo to rail wagons on Berth No. 3 has to be carried out. This would increase the available berth lengths per year to 196,918 m, which would about just cover the calculated needs to handle the forecasted amount of general cargo.

The port management did not foresee any problems in performing direct delivery to rail wagons at this berth in connection with the operation of the roro-services behind Berth No. 3.

3.1.1.5 Containers

Based on the assumption, that the proposed measures

- to allocate berth No. 6, Berth No.7, the area across the road behind Berth No. 7 and Berth No. 12-14 for container operations
- the related infrastructure works have been carried out
- modern container handling equipment will have been provided,
- an efficient EDP assisted container operation with the compulsory interfaces will have been established,

the port will be able to cope with the forecasted volume of container traffic. This will however be strongly influenced by the effectiveness of the ship/shore operation.

Due to the decentralised locations, the speed of operation will be affected negatively if an EDP guided control will not be established.

3.1.1.6 Roro cargo

This cargo category has been assigned exclusively to Berth No. 2 and the head of No. 3. The forecasted volume of units to be handled and the present speed of dispatch indicates, that the ferry handling facility will reach almost 80 % of its calculated berth capacity at the year 2002. If a bottleneck situation should appear, this could be resolved, by occasionally dispatching conventional roro-vessels in the area of Berths Nos. 12-14.

3.1.2 Berth Demand in Poti in 2007

3.1.2.1 Grain in bulk

A modern grain handling facility will be under construction for grain silo in the range of Berth No.15. This will be subject to the actual developments in this category and subject to the decision about the location for the new container terminal.

Based on the monitoring of the actual development in the throughput of this type of cargo, decision will have be made about the construction of a modern grain handling facility at Berth No. 8 also.

3.1.2.2 Other bulk

It can be expected, that this type of cargo will witness improvements in the productivity, generated by the rehabilitation of the equipment and better performance of the railway. These factors will ease the situation and reduce the problems in this sector.

It is assumed, that the forecasted increase of the cargo volume will also trigger off an demand for increase of the size of the vessels. This does traditionally apply in particular to the bulk sector. The demand of shipment in lots, which would make the export of e.g. iron ore fit to compete on the world market would require ship sizes between 60 - 80,000 metrictons-deadweight onwards, which cannot be accommodated by the port in its present layout of piers and depth.

The only feasible option would be to shift the bulk operation into the northern extension area of the port. The actual development of the throughput figures will have to be monitored prior to embody on the construction of a new bulk-handling terminal.

3.1.2.3 Oil products

The theoretical berth capacity will be utilised to about 62 %. This figure does not take into consideration, that the operation of bigger tankers will be hampered at times by the occupation of about 30 m of berth space of Berth No. 1 by roro-ferries operating at berth No. 2/3.

A further increase of pumping and receiving facilities would contribute to counter this effect.

3.1.2.4 General cargo

Improvements in the productivity in handling this type of cargo will not suffice to ease the tight situation in this category. It is assumed, that the composition of this category will witness a change to a bigger share of project cargo. As a consequence, it becomes obvious, that Berth No. 3 has to remain an integral part of the general cargo handling operations on basis of direct delivery to and from rail wagons, which would defuse the situation.

In the broad sense the greater flexibility of cargo handling operations, caused by the application of reorganisation of this department and the invention of modern cargo handling techniques backed up by modern equipment and increased mechanisation of cargoes will most likely breed a higher productivity. The productivity level will not yet have reached European standards, whilst still depending to 50 % on the direct delivery system to predominantly rail wagons. This dependency will influence the productivity level.

3.1.2.5 Containers

It is assumed, that a new modern container terminal will have started its operation on the first two berths and the container-operation will have shifted completely to the new terminal. The foreseen berth length will be sufficient to cover the berth requirements.

3.1.2.6 Roro cargo

The throughput will have reached 81,276 units. At the same time the productivity will have increased. This however will presumably not be sufficient to avoid delays in the dispatch. Berths No. 12 -14 will provide buffer functions to avoid those delays. Other factors which might influence the performance in this field may be of administrative nature caused by authorities and railway.

3.1.3 Berth Demand in Poti in 2012

3.1.3.1 Grain in bulk

It is assumed, that a modern handling facility will be established at Berth No. 15, to serve the existing grain silo if a feasibility study and market developments do provide evidence which indicates a sound basis for such an investment.

Subject that above mentioned parameters would proof the viability of a modern railway-loading facility at Berth No. 8. In this context it would have to be observed, that the viability has been studied, because the port will have to pay for it.

3.1.3.2 Other bulk

The berth capacity of Berth No. 4 to handle this type of cargo will be fully exhausted by 2007. Under the given circumstances and the composition of the cargo, it is unlikely , that the productivity can be further increased.

Shifting of the operation to the northern extension area will have to be considered, subject to the actual development of the volumes.

3.1.3.3 Oil cargo

Despite of the increase of the forecasted cargo volume, the scenario would not have been changed substantially, if the pumping and receiving capacities will have been increased to 10,000 mt/day.

Still the hindrances caused by the ferry services will prevail and lead to occasional delays in the berthing and dispatch.

3.1.3.4 General cargo

The berth capacity accommodating the general cargo vessels is fully utilised. Use of Berth No. 3 for direct cargo transfer to rail wagons is likely to be maintained to serve as a buffer function in bottleneck-situations.

3.1.3.5 Containers

Container operations at the new terminal are in full swing. No berthing problems are anticipated.

3.1.3.6 Roro cargo

The theoretical berthing capacity based on the traffic forecast and the applied productivity is fully utilised. This may however look much better, if the port succeeds to improve the productivity further nearing European standards.

3.2 Summary of Conclusions concerning Berth demand at Batumi Port

3.2.1 Berth Demand in 2002

3.2.2 Grain in bulk

This commodity is mainly handled at berth No. 7, where the grain-hoppers are located. Grain handling is also performed at Berth No. 8, when two grain vessels have to be discharged simultaneously. The discharging is then performed by the two 'Hartmann' elevators. Those were originally procured to discharge aluminium-powder in bulk. The shipments of this commodity have ceased since 1992. Due to these circumstances the elevators are being used for the discharging of grain in bulk as the need appears. The productivity is much lower, than the discharge by grab at Berth No. 7. Another factor is the exorbitant high energy consumption of the elevators compared to their output. Berth No. 7 has been chosen for the purpose of calculating the berth demand for the handling of grain.

Based on the forecasted volume of grain in bulk, the berth will be utilised by about 50 % in 2002 which would leave free capacity to handle other bulk - cargo when the berth is not occupied by grain vessels.

3.2.2.1 Other bulk

This type of cargo has also been assigned to berth No. 7 because of its excellent grab handling facilities. Based on the forecasted cargo figures the berth will be occupied by an additional 27 % by the handling of this commodity. This would leave some capacity for the handling of general cargo.

3.2.2.2 Oil cargo

The oil cargo will be handled at Berth Nos. 1-3. These berths are expected to be utilised by 20 % in the year 2002. This figure would not require any measures to be taken.

3.2.2.3 General cargo

General cargo will be handled at berth No. 6,8,9.

Based on the forecasted cargo volume and the productivity which had been applied for the purpose of calculating the berth demand, these berths will be fully occupied and exceed their calculated capacity. The remaining balance of berth capacity at Berth No. 7 will suffice to cover this deficit.

3.2.2.4 Containers

Containers are supposed to be handled at the berths Nos. 6,8,9. The non availability of balance of berth capacity at Berth Nos. 6,8.9. does not provide any berthing space for container vessels within the desired flexibility margin They will however have to be handled in that area, which might lead to occasional delays of berthing at those berths. This apart from the fact, that the port will still lack the proper equipment to handle containers. This will not change, until the Multipurpose Terminal will have been completed and starts its operation, which would also include the ability to handle containers shipped on self-sustaining vessels.

3.2.2.5 Roro cargo

This cargo is supposed to be handled at berth No. 11 until the completion of the Multipurpose Terminal. The forecasted number of vessels (5) for 2002 does not pose a problem for the handling of this type of seabound traffic at this pier. This applies in particular, because the peak of the berth - demand will be in the citrus season which is at the end of the year, outside the tourist season. If based on recently concluded contracts with roro-ferry operators the number of vessels would increase considerably, Berth No. 11 would not be suitable to provide an efficient operation and a fast dispatch due to the total lack of parking and marshalling areas. Summarising it appears, that the port needs a dedicated roro handling facility in the inner harbour .

3.2.3 Berth Demand in 2007 (Multipurpose Terminal not completed)

3.2.3.1 Grain in bulk

This cargo will be, as in the previous period still be assigned to Berth No. 7. The berth will be utilised by this cargo to about 30%. this figure has been calculated under the assumption that the handling capacity has been doubled by modern grain handling equipment. This would however only be justified, if the current trend of decreasing imports will be reversed. If the current productivity prevails, this would mean, that the pier would be occupied by 60 %.

3.2.3.2 Other bulk

This type of cargo will also have to be handled at berth No. 7. The calculated necessary berth capacity will be in the range of 50 % of the available space. With the installation of a modern grain cargo handling facility at this berth the available berth capacity will be sufficient to cover the demand. Without this measure the handling of the forecasted volume of cargo of this type will lead to waiting times of vessels and effect the port performance. An alternative berth for handling such cargo is not available due to the limited space inside the port. Consequently it can be expected, that lay times for vessels which will have to be dispatched at Berth No. 7 will be subject to occasional waiting times.

3.2.3.3 Oil Products

The assigned Berth Nos. 1-3, will be sufficient to cover the berthing demand of tankers, even if the present pumping capacity would not be increased in the meantime.

3.2.3.4 General cargo

The handling of these commodities will be maintained in the area of Berth Nos. 6,8,9. The utilisation of these berths is expected to be in the range of 84 % of the calculated capacity, which comes near to saturation point.
The productivity will have increased further, due to the procurement of new equipment, changes in the organisation and the implementation of modern cargo-handling techniques.

3.2.3.5 Containers

This type of cargo would still have to be handled in the traditional general cargo handling area Berth Nos. 6,8,9. Based on the traffic forecast, the number of vessels calling the port and carrying containers is expected to be in the range of 28/year. From the berthing-capacity point of view this would not pose a problem.

3.2.3.6 RoRo cargo

The number of vessels will be difficult to accommodate at berth No.11 for the reasons already outlined under the previous period. A RoRo facility in the inner port will therefore be indispensable.

3.2.4 Berth Demand in 2007 (Multipurpose Terminal completed)

3.2.4.1 General cargo

The tight situation in this category would be eased, because the Berth Nos. 4-5 could easily accommodate any surplus traffic.

3.2.4.2 Containers

This type of traffic and would be accommodated at this berth. Based on the forecasted figures a berth occupation of 10% for this type of cargo has been calculated. Nevertheless it cannot be ruled out, that the container traffic will increase, once suitable handling facilities will be available.

3.2.4.3 RoRo cargo

RoRo vessels will be berthed with the bow- or stern-ramp laid on Berth No. 5. This will block the entire Berth No. 6 for operations during the stay of such vessel in the port. Based on the traffic forecast it is calculated, that 22% of Berth No. 6 will be occupied by this type of traffic. If the traffic should in fact reach bigger proportions this would further complicate the bottleneck situation at those berths handling general cargo

RoRo vessels fitted with quarter ramps could then be berthed at Berth No. 4 or 5 with their ramps laid on these piers in order to mitigate the situation.

3.2.5 Demand of Berths in 2012 (Multipurpose Terminal in operation)

3.2.5.1 Grain in bulk

This type of cargo will be handled at Berth No. 7. Based on the traffic forecast and the projected productivity level the occupancy rate will reach about 40 % . This means, that there will be no problems to handle this type of cargo even at lower productivity levels. The assumptions in view of the increase of productivity and the actual volume of traffic do prevail.

3.2.5.2 Other bulk

This cargo is still expected to be handled at Berth No. 7. The handling of the bulk cargo will require about 50% of the available berth-capacity of Berth No. 7. This means measures will have to be envisaged to cope with a further increase of the throughput of bulk-cargo.

3.2.5.3 Oil cargo

The Berth Nos. 1-3 will - based on the traffic forecast -, and the pumping productivity - be occupied by a rate of approximately 20 %.

3.2.5.4 General cargo

The cargo will be accommodate at Berth No. 4,5,6,8,9 and will occupy this space by 82%. This has been calculated assuming that the cargo pattern will witness a change from predominantly bagged cargo to typical general- and project cargo which will reduce the weight of the cargo (mt), but not necessarily the volume (m3).This will result in apparently smaller productivity as far as far as the weight statistics are concerned. Without the existence of the Multipurpose Terminal the port would not be in position to cope with the fore-casted cargo volume.

3.2.5.5 Containers

Containers are supposed to be handled at the newly built Berths 4 & 5, and are expected to occupy about 13% of the available space at those piers. The container numbers handled at Batumi Port are expected to increase further.

3.2.5.6 RoRo Cargo

RoRo vessels will be berthed at Berth Nos. 5-6, or 4 and 5 depending on their type and the actual berth-situation. It has been assumed, that the dominating scenario will be the berthing of RoRo-vessels at Berth Nos . 5/6. In this case Berth No. 6 would be occupied to 28 % of its annual capacity by RoRo vessels.

4 Port of Poti - Development of Container Handling Facilities

Anticipated most likely container throughputs :

1997	Actual	43,495 TEUs
2002	Projection	98,500 TEUs
2007	Projection	151,320 TEUs
2012	Projection	287,930 TEUs

The above figures are standing for a most likely scenario. The actual development during the last years reached astronomic proportions as far as the percentage is concerned. The growth rate from 1994 to 1995 was 229 % (4,988 TEUs) albeit from a very low level. The growth rate from 1995 to 1996 was 227 % (11,259 TEUs). The growth rate from 1996 to 1997 was 220% (23,730 TEUs).

For the purpose of further demonstrating the current and future needs to deal with the above prognosticated numbers of containers, a number of calculations has been undertaken.

All calculations are based on following assumptions:

- All cargo handling equipment is in a sound operable condition
- No shortage of manpower or equipment exists
- The berths and yards are fully capable of meeting the intended purpose
- Cargo handling and stacking areas are fully available and accessible
- The productive utilization factor is assumed to be at least permanently above 85 %
- No constraints would occur outside the control of the port which would deny free access to the goods .

Note:
The maximum capacities which are calculated in the following examples are based on ideal working conditions and therefore, realistic on very few occasions only. Nevertheless, they are necessary for decision making - process in view of the need to improve the port operation, planning of terminals and port extensions and/or future investments plans.

4.1 Present Parameters for container handling facilities of 43,495 TEUs (Throughput 1997)

The calculations will show:

- The berth capacity of the existing container terminal in TEUs
- The crane capacity of the existing container terminal in TEUs
- The storage capacity of the existing container terminal in TEUs
- The total land area requirements in m^2 to handle the current container traffic effectively.

4.1.1 Actual berth capacity Berth No. 7

Bcap = total annual berth capacity of a terminal (e.g. terminal 'X') in TEUs
nr/b: number of berths (1)
av/thp: average throughput per vessel (TEU/vessel/shift)
based on 10.5 hour shifts, 5 moves /hr ,1.3 TEU per move and 2 cranes per berth per vessel. (136.5)
u/f: berth utilization factor on less than 3 berths (0.30)
d/pa: working days per annum (365)
t: number of shifts per day (2)

Bcap = nr/b x av/thp x u/f x d/pa x t
= 1 x136.5 x 0.3 x 365 x 2

Actual crane capacity Berth No. 7 = 29,894 TEUs per annum

Remark : This will apply only, if all conditions as mentioned above are prevailing
If the moves per hour could be increased to 20 the theoretical berth capacity would increase to 113,880 TEUs

4.1.2 Actual Crane capacity Berth No. 7

CrCap total annual crane capacity of Berth No. 7 in TEU
grc: number of installed cranes at berth (2)
u/f : berths utilisation factor (0.3)
cf : .container factor, i.e. average TEU/container/move (1.3)
av/mvs/hr: average crane moves per hour (5)
h/shift: working hours per shift (10.5)
d/p.a: number of working days per annum (365)
t: number of shifts per day (2)

CrCap gcr x u/f x cf x av/mvs/hr x h/shift x d/p.a. x t
2 x 0.3 x 1.3 x 5x 10.5 x 365 x 2

CrCap *Actual crane capacity Berth No. 7 = 29,894 TEUs per annum*

4.1.3 Annual storage capacity for containers in TEUs for existing container terminal at Berth No.7

Stcap = total annual container storage capacity of the container yard Berth No. 7 (12,500 m^2 - 3,400 for apron = 9100 m^2) in TEUs by
(RTG operation - present conditions)

Assumption :
50% export , 50% import containers; average dwell time of export containers 20 days; average dwell time of import and transit containers 60 days ; (Source: Commercial Dept. Port of Poti)

Slots:	number of 20' container slots (based on RTG operation)	(338 x 2.5 = 845)
avr/dlt:	average dwell time of containers in days	(30)
d/p.a.:	number of working days per annum	(365)
ut/f:	utilisation factor of stacks	(0.8)

Stcap: = slots x d/p.a. : avr/dlt

$$= \frac{845 \times 365 \times 0.8}{30}$$

Stcap *= 8,225 TEUs total annual storage capacity of storage area at Berth No. 7.*

4.1.4 Storage area requirements based on 43,495 TEUs (1977) rubber tired gantry operation

Assumptions: Rubber - tyred gantry operation
365 days operation per annum
2 shifts daily of 10.5 hours
Stacking 3 high maximum

A/ m^2r = total storage area requirements

e/thp:	estimated annual container throughput (43,495 TEUs)
teu/ m^2:	actual consumed storage space per TEU (17.5 m^2)
avr/sth:	Average stacking height of containers : empties 3-5 and loaded 1-3 high (2.5)
dwt/f:	dwell time factor based on 30 days average per container - 365 d/p.a. :30 days (12)
rtg/f :	actual rubber - tyred utilisation factor (0.65)

A/ m^2r: e/thp x teu/ m^2 x : avr/sth x dwt/f x rtg/f

$$= \frac{43{,}495 \times 17.5}{2.5 \times 12 \times 0.65}$$

A/ m^2r = 39,034 m^2

Total storage area requirement based on RTG operation under prevailing conditions for 43,495 TEUs/annum is 39,034 m^2.

Total storage area requirements based on RTG operation under *normal conditions (7.5 days dwell time) for 43,495 TEUs would be 9,559 m^2.*

Storage area requirements for RTG operation under normal conditions for 100,000 TEUs = 21,978 m^2

Storage area requirements for RTG operation under normal conditions for 150,000 TEUs = 33,000 m^2

Storage area requirements for RTG operation under normal conditions for 300,000 TEUs = 66,000 m^2

4.1.5 Storage area requirements for straddle carrier operation based on 43,495 TEUs per annum

Assumptions:
Operation based on 'one over two ' stacking mode. Rest as under RTG.

A/ m^2r e/thp x teu/ m^2 : avr/sth x dwt/f x stc/f

$$= \frac{43,495 \times 17.5}{2 \times 12 \times 0.4}$$

A/ m^2r = 79,288 m^2

Total storage area requirement for straddle carrier operation for 43,495 TEUs under present conditions is 79,288 m^2.

Total storage area requirement for straddle carrier operation for 43,495 TEUs under normal conditions . 19,417 m^2

Total storage area requirement for straddle carrier operations under normal conditions for 100,000 TEUs is 44,643 m^2

Total storage area requirement for straddle carrier operation for 150,000 TEUs under normal conditions is 67,000 m^2

Total storage area requirement for straddle carrier operation for 300,000 TEUs under normal conditions is 134,000 m^2

4.1.6 Storage area requirements for freight lifter (40 mt container forklift) operation based on 43,495 TEUs per annum under present conditions

Assumption: Average stacking height will be 2.5

A/ m^2r =e/thp x teu/m2 : avr/sth x dwt/f x flt/f

$$= \frac{43,495 \times 17.5}{2.5 \times 12 \times 0.3}$$

A/ m^2r = 84,574 m^2

The total area requirement for a freight lifter carried operation for 43,495 TEUs /annum under present conditions would be 84,574 m^2

The total area requirement for Freight lifter operation for 43,495 TEUs/annum under normal conditions would be 20,700 m^2.

Exclusive forklift operation with the possible exception of empty stock handling is not advisable and not practiced in the range above 50,000 TEUs/year. This type of container - handling equipment needs the largest stacking area

4.1.7 Storage area requirements for reachstacker operation throughput of 43,495 TEUs per annum based on present conditions

A/m²r =e/thp x teu/ m^2 : avr/sth x dwt/f x rst/f

$$= \frac{43{,}950 \times 17.5}{2.5 \times 12 \times 0.4}$$

A/m²r = 63,430 m^2

The total area requirement for reachstacker operation for the storage of 43,950 TEUs per annum will be, under present conditions is 63,430 m^2 .

Under normal conditions, with an average dwelltime of 7.5 days (5 days and less in Europe) the necessary storage space would be 15,534 m^2

4.1.8 Storage area requirements for reachstacker operation based on the forecasted numbers of containers

Year	Nos. of TEUs handled	Applied dwell time	Required space in storage area m^2
2002	100,000	20 days	97,222
2007	150,000	15 days	109,375
2012	300,000	7.5 days	107,142

Note:
These figures are indicating the storage area requirements only, and not the land requirements for the entire container terminal, which would also have to provide space for back up facilities.

Exclusive reachstacker operation beyond the volume of 50,000 TEUs/year is generally not advisable. In the case of Poti the Consultants do not see an alternative to stack the anticipated numbers of containers until the new container terminal will be ready.

4.1.9 Reachstacker operation as the best intermediate option for stacking of containers in Poti Port

Transtainers and rubber-tired gantries would provide a very dense stacking, which would save space, which Poti Port will probably not have. The high investment costs do rule out such undertaking for a limited period. The next option would be, to embark on a straddle carrier based operation, which would facilitate the same stacking density as the reachstacker. This system does however require a very sophisticated maintenance and an extra workshop building for M&R purposes.

Freightlifter operation provides the least efficient stacking density and should therefore not be used. This type of equipment would not alleviate the desperate lack of stacking space efficiently.

The reachstacker system would provide the following advantages, which would be the most suitable under all aspects to deal with the current and future problems :

- Reasonable investment costs.
- Excellent flexibility in covering operational needs including loading of trucks and railway wagons

- Easy maintenance, which does not differ from the maintenance of a normal forklift, which maintenance and repair procedures are well known to the mechanical staff.
- Equipment can be shifted to the new terminal and can cover several operational tasks there at comparable low cost.

4.1.10 Land Requirements for effective container - handling facilities *

Estimated land requirements For efficient operation of Container- Terminal in m^2				
Annual throughput in TEUs	***RTG/RMG operation***	***Straddle Carrier Operation***	***Reachstacker Operation***	***Freightlifter Operation***
1997 43,495	50,000	70,000	70,000	75,000
1998 50,000	55,000	75,000	75,000	80,000
2002 100,000	65,000	100,000	n.a.	n.a.
2007 150,000	90,000	150,000	n.a.	n.a.
2009 200,000	150,000	200,000	n.a.	n.a.
2012 300,000	200,000	300,000	n.a.	n.a.

* based on worldwide experience

In addition to the calculated storage - yard requirements there are a number of installations and facilities which are absolutely indispensable for any modern container terminal .

- As a rule of the thumb container terminal requires an area of over 10 hectare (100,000 m^2) per berth to cater for the operation, the stacking and all back up facilities.
- Sufficient depth of 12-14 m alongside the berth depending on the maximum size of container vessels , that may be expected to call there. In the case of Poti Port a depth of 12 m will suffice.
- The apron, where the container gantry crane is supposed to be installed, has to be 20 - 50 m wide.
- Container Freight Station (CFS),
- Reefer Points
- Parking areas for trucks
- Railtracks (fully paved in)
- Facilities for dangerous goods requiring special treatment
- Interchange with waiting lanes before the gates and inside the terminal
- M&R facilities for mobile handling equipment (MHE)
- Repair-workshops for containers as far as proofed to be viable.
- Administration buildings accommodating all authorities and other parties involved in the clearing and dispatch of the vessel.
- Firebrigade

All told these facilities may require additional land in the range of another 50 % of the storage yard space. In the case of smaller terminals the percentage, which has to be added may well be reaching another 100 % and more of the storage area.

4.2 Final Word:

Summarising all the facts, it is the opinion of the Port Development Team, equally shared by the port management, that Poti Port needs a container terminal within the shortest possible time.

The proposed options in the southern harbour basin near the breakwater and the northern option which would be located in the assigned port extension area, should be studied in depth and a swift decision taken.

5 Mooring facilities for harbour fleet

5.1 Port of Poti

Agreement has been reached with the port management, that the port fleet would be assigned another berthing place, not to interfere with the berthing places in the inner harbour basin. Two possibilities were envisaged. The first possibility would be to utilise the area of the Yacht Club. The second alternative would be to utilise a berth in the southern basin.

The related maintenance and repair facilities should be removed from Berth No. 7. These activities are also including welding and flame cutting . Such type of activities should never be conducted near to cargo handling areas, where also a dangerous goods are being handled, because they are posing a potential danger and have to be banned from the operational areas. The port management indicated, that the workshop area could also easily be moved to the same area within the southern basin.

5.2 Port of Batumi

The traditional mooring area for the port fleet are the old berths 4 & 5. This pier will have to be evacuated, when the construction of the multipurpose terminal will start.

The port fleet could berth at Berth No.10-11, when they are not busy occupied. The necessary space is usually available. In case of berthing bottlenecks at those piers, the tugs and the pilot boats, which do not occupy much space could be double-banked

The second alternative, which would be the pier and the area, which extends from Berth No. 9 to the West which is presently used by the Coast Guard. Consultants do favour this option, because it would also comprise the erection of a port fleet workshop in a safe location. Port Management advised, that they see a good chance to succeed obtaining that pier and the area behind it.

The makeshift workshop area at the end of Berth No. 6, which is carrying out rehabilitation works on the port fleet including the total range of works related to such activities, which are also including the use of open fire. It is considered to shift that workshop to the peak of Pier No. 1, where such activities are already carried out. This area is adjacent to the oil handling area, which is actually disqualifying it for such kind of operation. This however is a subject, which has to be taken up and settled with the local authorities which are responsible for the safety in the port.

In terms of common understanding of safety procedures in ports it is not dangerous to have such kind of operation going near tanker operations. The problem is, that there is no shipyard except Poti, where such works could be carried out.

6 Phased development plan for the Ports of Poti and Batumi

6.1 Port of Poti

6.1.1 Crash actions *(actions proposed to be carried out by the port during 1998)*

6.1.1.1 Port general

The decision about the construction of a new container terminal and its location will have to be made in order to alleviate the grave problems in the container handling operation.

A new traffic separation scheme, which separates traffic generated from the northern and southern side of the port will have to be invented based on the proposals of the Experts. It will contribute in a big way to minimise traffic jams at the gates.

The container- handling facilities within the port boundaries will have to be extended to the absolute maximum in order to cope with the forecasted container throughput until the completion of the new container terminal. The quality of container handling at the port of Poti will be a decisive factor, whether Poti will remain or not in the top league of container handling ports of the Black Sea Region.

The port will have to undertake to demolish obsolete and unused buildings, which will supposedly never be used again, or where the rehabilitation costs would exceed those of a new building.

All scrap and all obsolete equipment including cranes will have to be dismantled and removed from the port.

The port will have to be cleared of cargo residues, of scrap and take measures to avoid negative impacts on environment by oil spills in particular in the workshop area.

The stevedoring gear will have to be modernised including the repair of pallets.

Measures in the organisation of the labour deployment scheme will have to be taken, to react flexible to the actual workload of the port. Another subject, which deserves some attention would be to minimise losses of working time at shift changing and breaks.

The port management will have to co-ordinate with the state authorities and agents to streamline and speed up the processing of documentation and clearing of vessels. This will minimise losses caused by detentions between arrival of vessels and start of work, and completion of work and their departure.

The joint venture company , which undertakes the scrap loading operation from Berth No.6 will have to move their operations to Berth No.4. This will provide the necessary space to extend the container operations to Berth No. 6.

6.1.1.2 Pier No. 1

The most pressing problem is to get rid of the ore in bulk , which is stored at the open storage area behind that berth. This would provide the port with a considerable increase of the available storage space. This

cargo which is still said to be in the range of 47,000 mt is lying there for years. The port does not expect to ever get any payment of the accumulated storage-dues. All legal ways should also be used to effect sale and the shipment of this iron ore.

6.1.1.3 Berth No. 2

This berth will be needed for the berthing of RoRo vessels and will not be subject to any crash actions

6.1.1.4 Berth No. 3

At this berth the RoRo-ferry landing facility will be constructed. The port will have to undertake works, which have been stipulated in the contract covering this project.

Apart from above to facilitate a junction and connection to rail No. 5 for the direct access to the rails at Berth No. 3 which are needed for the direct cargo transfer of cargo to rail wagons at this pier. Without disturbing the scrap loading at Berth No. 4, the general cargo operations at Berth No. 4 and the container operations at Berth No. 6

In line with extending the opens s area behind Berth No. 6 for container operations Removal of the crane rails and crane behind Berth Nos. 3 & 4. is necessary.

6.1.1.5 Berth No. 4

This area will be assigned to Messrs. Docktranshipment Poti (Ltd) for the handling of scrap. Due to the planned container handling at Berth No. 4 this company has to shift its activities from Berth No. 6 to Berth No 4, and will then be responsible for all maintenance and repair in this area.

6.1.1.6 Berth No. 5

The area behind this berth has to be paved, in order to provide a modern operational area for the handling of general cargo.

6.1.1.7 Berth No. 6

This berth will be assigned to the handling of containers in order to increase the yard capacity of the port. In this context it has to be mentioned, that whatever the port will undertake to cope with the anticipated increased numbers of containers, will be an interim solution only. The prognosticated container traffic can only be handled efficiently at a real container terminal, planned designed and built for that purpose. For this purpose the some preparatory measures will have to be undertaken at the area of Berth No. 6 The levelling and paving of the area for container handling will have to be carried out under consideration of wheel loads of heavy-duty mobile cargo-handling equipment (MHE)

The rail tracks Nos. 3 & 4 will have to be shifted about 20m near to rail tracks Nos 5 & 6.

A further very important tasks would be the rectification of the subsidence of the land side crane-rail foundation.

6.1.1.8 Berth No. 7 (existing container terminal)

In order to facilitate safe handling of the containers, the some important measures will have to be taken.

One of them is the procurement and the utilisation of container handling equipment as suggested by the Cargo Handling Equipment Expert under .Section 6 of the present volume.

The pavement is in a state which needs urgent repairs, and the missing drainage covers will have to be put in place, considering the prevailing wheel loads of the heavy container handling equipment. In order to utilise the utmost space on the container-yard of this berth the workshop for the port fleet will have to be shifted to another location, in order to gain space for container operations. Apart from that point an operation like that, which includes burning and welding should never be near the operational areas. The container operation also includes the handling of dangerous goods of various character.

The crane- and the railway rails are proposed to be removed from the stacking area. The Experts in co-operation with the port management identified the area behind Berth No. 7 across the road to be a more convenient area for the purpose of loading containers to the railway wagons originated from this yard.

6.1.1.9 Area behind Berth No. 7- across the road

The area behind berth No 7 across the road has been allocated for the stacking of containers and for the transfer of containers to rail wagons by reachstackers Paving of the area for heavy duty MHE is therefore required

The construction of a rail track in the proposed position at the northern perimeters of this yard will have to be carried out.

The road connecting the northern and southern part of the port will have to be closed for the general through traffic except for emergency events, like Firebrigade and ambulances.

In order to render easy access to the southern part of the port, it will be necessary to construct a new gate for traffic entering and leaving southern port area.

6.1.1.10 Berth No. 8

In the vicinity of this berth no crash actions will have to be taken.

6.1.1.11 Berth No. 9

In the vicinity of this berth no crash actions will have to be taken.

6.1.1.12 Berth No 10

In the vicinity of this berth no crash actions will have to be taken.

6.1.1.13 Berth No.11

The possibility of the rehabilitation of the grain-hoppers and rails should be undertaken if proven to be viable

6.1.2 Medium Term measures *(proposed to be carried out 1998-2002)*

6.1.2.1 Port general

The findings of this report do underline that the construction of a new container terminal for Poti Port is a top priority subject.

The required water depth in the port area has to be ensured by corresponding dredging measures.

The procurement of the necessary MHE should be carried out in a phased approach as proposed by the Cargo Handling Equipment Expert.

The upgrading of stevedoring equipment will be necessary enabling the port to handle highly mechanised and project cargo, which is to be expected in the future.

The procurement and instalment of an EDP container control system with the necessary hard- and software and interfaces to all involved departments is an indispensable tool for the handling of the anticipated numbers of containers. It will have to include the option to operate in the Russian language, with a proven performance record in other ports of the Black Sea or Baltic Region.

Increase customer awareness among all levels of port management, and improve the image of the port to be service- and customer oriented.

Establish an efficient marketing department, which should also have influence on future investments, tariffs and the structuring of meaningful statistics which may serve as a decision making tool for port planning purposes.

It is the dedicated opinion of the Port Development Experts that the Invention of a flexible labour deployment system is important in the sense, that the port can react swiftly to the actual daily demands. It will further contribute to minimise the labour costs.

The level of port security has to be improved considerably. It was observed, that even children have access to the port and are roaming around freely. This also applies to some kind of animals which can usually be watched in the farming sector only.

6.1.2.2 Berth No. 1

The completion of the abandoned construction of the new oil transfer facility, including the pipelines is of utmost importance, because it will relieve the port from a lot of railway-shunting operations. This would be a big step for forward to increase the productivity in the northern part of the port.

6.1.2.3 Berth No. 2

Rehabilitation and relocation of cranes at Berth No. 2 as suggested by the Cargo Handling Equipment Expert.

6.1.2.4 Berth No. 3

The rehabilitation and relocation and possible scrapping of cranes has to be carried out as suggested by the Cargo Handling Equipment Expert.

The construction of a handling facility for rail ferries and conventional RoRo-traffic will be competed and go into operation by the third quarter of 1998 .

6.1.2.5 Berth No. 4

The berth and the related open storage area is leased out to Docktranshipment Poti (Ltd) for loading of scrap. This contract had been actually agreed to incorporate Berth No. 6, but the company has already nodded to move to Berth No 4. The official decision will be in force until 2002. The maintenance of all port assets within this area rests on the tenant.

If agreement can be reached with the tenant rehabilitation of the quay side railway tracks to be undertaken.

6.1.2.6 Berth No 5

This berth has been assigned for the handling of general cargo and, if the need appears and the berthing situation would allow it, containers would have to be handled on an exceptional basis also, therefore the stacking area will have to be paved for heavy duty MHE.

The rehabilitation of the railway tracks in this area in connection with the paving and levelling of the area will have to be carried out in coherence with the general rehabilitation of the railway tracks at Berth Nos. 3-6.

The railway tracks 3 & 4 will have to be relocated adjacent to tracks No. 5 & 6 in order to gain more open storage space. This measure is also triggered off by the transformation of the area of Berth No. 6.

The rehabilitation of the cranes should be carried out as suggested by Cargo-Handling Equipment Expert.

6.1.2.7 Berth No. 6

The pavement for heavy duty MHE and the realignment of crane-rails will have to be completed for heavy duty MHE for container handling if not done yet.

A new port gate, which will replace the old one, will have to be erected to control the entry and exit of all traffic.

The rails of Nos. 3 & 4 adjacent to 5 & 6 will have to be relocated in order gain the utmost space for container stacking purposes.

The subsidence of land side crane rails, will have to be completed in 1998.

One of the Condor cranes from Berth No 7 which was formerly used for the loading of the railway cars will be shifted to Berth No 6 for container handling after the correction of the subsidence and concurrent strengthening of the land side crane-rail foundation.

6.1.2.8 Berth No. 7

The civil works should be carried out as lined out in the civil engineering section of this report. This would be in particular the paving of the road behind Berth No 3 and to level it with the with stacking area at Berth No. 7 and the area behind the existing container terminal. The former road will then serve as an integral part of the terminal, but still marked for the emergency transit.

The perimeter wall sealing off the container terminal to the road will have to be demolished to facilitate free access to area behind container terminal.

6.1.2.9 Berth Nos. 8 - 11

All berths will have to be paved where necessary including the railway-tracks and the levelling of the apron with the railway-tracks.

6.1.2.10 Berth No. 9

The railway loading ramp will have to be demolished, to achieve a more flexible mode of cargo operation, to gain open storage space, and to render free access to the sheds planned to be erected there.

6.1.2.11 Berth No. 10

The construction of the shed which construction had been interrupted has to be completed, and provisions have to be made and technical installations for the storage of cotton.

6.1.2.12 Berth No.11

The paving of the rail tracks and the apron is being performed, to allow a unhampered general cargo operation

6.1.2.13 Berth Nos. 12-14

The area has to be prepared for container and occasional handling of conventional RoRo vessels.

The port-boundary wall has to be extended to the official limit of the port perimeters, to East of Pier 12-14.

Consultants proposed to demolish the fountains, the related basins and other recreational objects, in order to pave the whole area between those berths for heavy duty MHE. The Passenger Reception Building to remain and to serve for administrational and social purposes.

An extension of the existing rail tracks into the terminal area will be necessary to facilitate the loading of containers to the rail wagons.

The shifting of lay-up fleet of fishery vessels to another berth will be imperative.

6.1.2.14 Berth No. 15

It will be necessary to undertake feasibility study for the construction of a dedicated berth for vessels carrying grain in bulk for the local consumption.

In case that the basic decision has been taken, whether or not to embark on the construction of a mooring facility, the decision about the design will have to be made, and in this context it is also important to consider a dolphin-berthing type mooring facility, instead of constructing a traditional quay wall. The dolphin-type berthing at grain handling facilities is quite compulsory.

6.1.2.15 New Container Terminal

A monitoring team for the construction will have to be appointed within the port management. Managers supposed to run the operation of the Terminal to be appointed at least 6 months ahead of the completion of the terminal to get aquatinted with the terminal, and with the proposed operation.

Tailored to suit training programmes will have to be conducted by well reputed firms to prepare the staff for the operation of the terminal. In case of the completion of the terminal within the current period, a fully fledged operation will start.

6.1.3 Long term measures *(proposed to be carried out 2002-2007)*

Port general

Due to the long time passed since the forecasted scenarios on which the proposals are based will have to re-evaluated considering the actual developments in a wide range of fields.

Due to the experience gained, fine tuning of operational and administrative procedures will be necessary.

Further improvements have to be reached in existing facilities in the most economic way to increase the productivity and service quality, in order to reach the optimum level of the relation between investments and economic returns.

The upgrading of existing facilities in the old port will continue, in order to prepare the port to meet new challenges.

The rehabilitation measures will have been completed.

No containers are handled in the old port anymore, and the remaining berths will to a large extend be utilised by the increased cargo volume of general-,project- and bulk cargo.

The bookkeeping- and accounting system will have reached western standards and the various cost centres will reveal, where privatisation would be advisable, and where measures will have to be considered for reorganisation.

The development of the dry-bulk cargo sector will have to be monitored in order to reach a decision, if and when it should be transferred to the northern port extension area. This however would exclude the grain, unless dramatic increases of transhipment cargo would necessitate a shifting of the related operation into the northern area.

Simultaneously the development the domestic consumption of grain will have to be incorporated into the further planning of the handling of grain in bulk.

6.1.3.1 Berth No. 1

The completion of construction of new handling facility for oil products in bulk will lead to improved productivity.
In case roro-ferry services would ship also rolltrailers and cassette-systems loaded with cargo, which would have to be unloaded, the area behind berth No 1 would be ideal to erect the required sheltered or shedspace.

6.1.3.2 Berth No. 2

Due to the expected increased traffic of roro services, this pier will not be available for any other traffic.

Consequently no investments should be carried out there, with the exception of an extension of the parking and marshalling area for trucks and other vehicles if it would be so required.

6.1.3.3 Berth No. 3

The situation there remains unchanged. The berth will have to serve as a buffer in case bottleneck situations would appear. Cargo handling will have to be on direct delivery basis, due to the limited space.

6.1.3.4 Berth Nos. 4-6

All these berths are foreseen to handle bulk cargo in small lots and general- and project cargo, which does not require sheltered or shed space.
It is assumed, that all civil works which will have been proposed will have been completed by that date.

6.1.3.5 Berth No. 4

If the scrap loading operation will be maintained, there will be no changes in the mode of operation at this pier. In case of non continuation of the private operation at this pier, it will serve for general- and bulk cargo.

6.1.3.6 Berth No. 5

This berth will be used for continued general cargo operations. Further developments in the cargo pattern will determine, if any new investments will have to be made. Those should then in principle be carried by the port's revenues.

6.1.3.7 Berth No. 6

This pier will be utilised for general cargo, and is perfectly well suited for the handling of mechanised cargo and for loading of cargo, which does not need sheltered storage space.

Heavy lift facilities would also be available by the transferred Condor crane from Berth No. 7.

Civil works are not supposed to be carried out at this stage.

6.1.3.8 Berth No. 7

This berth is perfectly well suited for the handling of project cargo, which would also include the handling of heavy lift cargo up to 40 mt. The only hindrance would be, that the length of the berth is only 170 m, which limits the size of vessels, which can be moored there to 8,500 mtdwt.

6.1.3.9 Berth No. 8

The erection of a new grain handling facility for direct transfer to railwagons with considerable improved capacity and silos with buffer function will have been completed or will be under construction. The justification of an economic return for this investment will have to be established under the aspect, that the cost centre based calculations would reveal, that this investment would carry the financial burden by the additional profit deriving from it. Privatisation of this operation also may be a solution to overcome this problem.

6.1.3.10 Berth No. 9

The demand for shed space for storage purposes will increase, and it is expected, that the actual demand at the year 2012 will be around 16,500 m^2 against 11,700 m^2 of actual available space for that purpose not considering the shed designed to accommodate cotton at Berth No. 10.

Consequently the erection of shed space of about 10,000 m^2 in the area of Berth No. 9, extending into the area of Berth No 8 is proposed to cater for the needed shed-space in the upcoming years.

6.1.3.11 Berth No. 10

In case, that the cotton-shed is accepted by shippers, and its utilisation is reaching saturation point, shed No. 22 behind the new shed should be demolished, and the cotton shed will have to be extended. On the other hand it cannot be ruled out, that demand for such additional space would be imminent already in the medium term phase, which would justify the investment during that period.

6.1.3.12 Berth No.11

No action to be taken. The location of this berth is very unfavourable, because it is very near to the narrow entrance to the inner harbour basin, which bears the risk of collision with other vessels, if they would encounter problems during manoeuvring. Also for this reason this berth should only continue to serve as buffer and to accommodate the port fleet in the meantime.

6.1.3.13 Berths 12-14

It is assumed, that the container handling area has been relocated to a new terminal, and the open areas between Berth No 12 and 14 is available for other activities.

According to the forecast based calculations the roro berths at Berth No. 3 will reach the limit of its capacity. Therefore Berth Nos. 12-14 could accommodate the additional roro-traffic. The area will after the pavement be perfectly suited to handle this type of cargo.

In view of the possibly of an increased traffic load, which might have to use a short distance of city streets by using the new southern gate, environmental aspects may play an important rule. The city council should however never forget, that the port is the heart of the city. Without the port there would be no city in the location of Poti. Compromises will have to be made, which are considering this aspect.

6.1.3.14 Berth No. 15

Whatever has been said for the medium period also applies for the current phase.

6.1.4 Measures taken after 10 years *(beyond 2008)*

6.1.4.1 Grain in bulk

It is assumed, that the question of the future mode of grain handling has been decided upon, and the necessary steps taken.

6.1.4.2 Other bulk

Based on the *actual* cargo throughput figures for this type of cargo, the decision will have to be made, where to handle this type of cargo. In case of envisaging to handle this type of bulk cargo in the inner port, extensive civil construction measures by erecting new quay walls, which provide sufficient depth for bulkers of 60-80,000 mtdwt would have to be carried out. This would also require, independent from the location of a dedicated bulk handling berth, powerful tugboats, which would be capable to render effective assistance for safe manoeuvring of such vessels in the port area.

Another subject would be the erection of a specialised bulk handling facility for iron ore and similar cargoes.

6.1.4.3 Oil cargo

This type of cargo should be relocated to the northern extension area, if the throughput figure would justify such a move. This should also be contemplated under environmental aspects, considering the potential danger of such cargoes and the not too far distance of highly populated areas.

6.1.4.4 General Cargo

In line with the world-wide trend observed in this category, it can be expected, that the trend to ship such cargo containerised will increase. In view of the development of the oil and gas resources in the Caspian Sea, it very likely that a lot of project cargo will be transiting the TRACECA -Corridor, which is considered a safe route under many aspects for the main western investors in that region.

6.1.4.5 Containers

In case the container throughput would develop near the numbers forecasted in the 'most likely scenario', an extension of the new container terminal would have to enter the phase where planning of an extension will have to be conducted.

6.1.4.6 Roro cargo

It is not very unlikely, that with the picking up of the economies in the Black Sea Region a scenario.

could develop, which resembles that of the Baltic Sea Region in terms of roro traffic schemes. The port would, based on the present planning, be well prepared for the various types of this mode of transport.

6.1.4.7 Equipment

Much of the equipment procured during the preceding phases will have reached the end of its life span, and will thus have to be replaced.

6.1.4.8 Organisation

It can be assumed that the port management will have implemented a number of organisational changes, which will increase the efficiency in all fields.

The staff will face a reduction of the average age, which will make it easier to implement new ideas and procedures. Incentive schemes should be developed to increase the productivity among all staff members.

The imminent corruption will have to be tackled continuously and decisively.

6.1.4.9 Final remarks

Due to the long period passed until 2008, any predictions made about in the Caucasus Region will come near to crystal ball reading. Apart from that, some decisions and investments will be necessary simply because a certain period of time will have passed, since the Port Master Plan has been established, and new parameters will have to be applied.

6.2 PORT OF BATUMI

6.2.1 Crash actions *(actions proposed to be carried out by the port during 1998)*

Port General

The decision whether to rehabilitate Berth Nos. 4 & 5 by construction of a new quaywall and whether to embark on a multi-purpose port terminal has to be made.

Without the construction of such facility the port will not be able
- to transform its operations from the direct to the indirect delivery system
- to handle containers
- to accommodate roro services

The port should start the demolish unused and obsolete buildings on its premises.

The port area should be freed from all scrap including small vessels, which will obviously never be floating again.

Measures should be taken to free the port area from a lot of laid up vessels, because some of them are on the brink of sinking.

Sunken ships in the area of Berth Nos. 4 & 5 should be salvaged and then either scrapped or dumped.

The port should put up for sale all port owned vessels, which do not have any direct connection to port operation.

Effective control measures on daily basis will have to be established to monitor the status of the vessels still moored there in order to prevent more of these vessels from sinking.

Establish modern transparent finance- and accounting procedures

Start repairs of cranes where spare parts are available, or just comparable small amounts of money would have to be spent, to enable the Mechanical Department to carry out these repairs.

Depose of obsolete cargo handling equipment.

Upgrade social rooms for workers *(already under way)*

Port Management will have to co-ordinate with all authorities involved in the clearing and dispatch of vessels to speed up and streamline the processing and documentation procedures going along with the dispatch of vessels.

The stevedoring gear will have to be further modernised and kept in good working order.

6.2.1.1 Berth Nos. 1-3

As these berths are operated by the refinery. The port has no part in investments there, as far as the operation is concerned. Maintenance and repair measures and the entire operation are carried out by the refinery.

6.2.1.2 Berths Nos. 4 & 5

The planning and sorting out of legal framework in connection with the evacuation of the lay-up fleet and all other crafts and floating objects, has to be conducted. At least the stage should be reached, that all concerned know that they will have to move, or otherwise will be forced to move, once the construction works in connection with the proposed mult-purpose terminal are supposed to start.

6.2.1.3 Berth No. 6

The concrete separation walls behind this berth will have to be demolished.

6.2.1.4 Berth No. 7

Remove obsolete stationary hoppers at berth No. 7. This is already planned to be carried out during 1998.
It is planned to shift the stevedoring gear magazine and the rigger workshop to the port building No. 7, where renovation- and construction activities are already under way.

6.2.1.5 Berth No. 8

The beam of the crane, which is under repair is supposed to be removed, if the repairs of the damaged crane are carried out by applying the procedure proposed by the Cargo Handling Equipment Engineer to the Chief of Mechanical Services.

6.2.1.6 Berth No. 9

Start the administrative procedures -if any- to demolish the proposed buildings behind this berth. So that the actual start of the physical works will not be delayed by companies or authorities opposing the demolition.

6.2.1.7 Berth Nos. 10 & 11

Safety measures have to be taken, to limit the access of the public to the operational areas, when cargo handling activities are carried out. Otherwise there is no need for any activities concerning these berths.

6.2.2 Medium term measures *(proposed to be carried out 1998-2002)*

Port general

The findings of this report do underline the need for a wide range of civil construction activities, the procedures to obtain financing and the actual construction works are bound to be started as soon as possible in a phased approach.
The rehabilitating of the cranes has to be carried out.

The awareness for customer needs has to be increased. The fact, that Batumi Port will be surrounded by well equipped and well organised commercially operating, ports will have to be considered.

Customer-friendliness cannot be documented by applying military-style uniforms to all levels of port staff. This is a sign of a rather authoritarian style, which has no place in a modern port.

A strong professionally guided marketing department will have to be established, which should also deliver the basis for future investments, by undertaking market research, redesigning the tariff-structure and establishing statistics, which will may serve as an decision making tool.

Invention of a flexible labour-deployment system, putting the port in the position to use its human resources more flexible and adjust it to the actual daily workload. This applies specifically to the operational department.

The number of staff should be screened and reduced, where over staffing has been identified in a process considering social aspects.

Dredging of the harbour basin to the design depth to be undertaken, to allow the maximum size of vessels to moore at each particular berth always safe and afloat

Remark:

The description of the project covered in this and the following phases are subject to finding of adequate financial resources, which will also influence the schedule of the works, which have been proposed in this Port Development Plan..

6.2.2.1 Berth Nos. 1-3

These berths are to remain under the operational control of the refinery. The port is still maintaining a fully fledged dispatcher operation there, which is not necessary. This function is definitely not needed there any more.

6.2.2.2 Berths Nos. 4 & 5

The start of the construction and the possible completion of the proposed multi-purpose terminal is the main event which will determine all activities at this pier.

The laid up vessels, the floating cranes and the sunken vessels have to be removed from the area prior the start of the construction of the quay wall for the proposed multi-purpose terminal.

The oil separation facility belonging to the railway will have to be removed and the pipelines from the railway shunting area across the road will have to be relocated to the new set up just north of the port boundaries.

The soil of the entire earmarked area will have to be screened under environmental aspects in order to determine, what measures will have to be taken, to prevent negative impacts on the environment.

6.2.2.3 Berth No. 6

It is assumed, that the demolishing of the concrete walls has been completed.

No further activities are planned there prior to the completion of the multi-purpose terminal and completion of the pavement, and levelling of Berth Nos. 7-9.

It is proposed to extend the rail-tracks along the port buildings Nos. 14 & 15 and to route them as a third rail line along berth No. 6, to link up with the original railway system at the northern end of this Berth.

6.2.2.4 Berth No. 7

The start of the civil works at this berth is depending on the progress being made in the civil works carried out at other berths.

The stationary hoppers, which are out of use, will have to be demolished, if not already done.

6.2.2.5 Berth No. 8

The old port buildings No. 8 & 9 will have to be demolished, which will provide some extension of the open-storage space.

Furthermore the emergency generator now located alongside building No. 7 will have to be shifted, along the back of the building No. 7 into the free space, once that the connected building Nos. 8 &n 9 will have been demolished.

The beam of the damaged crane will be shifted to the back of shed No. 9 , where the repair is supposed to be carried out.

The transformer station near to the crane rails will also be shifted into the gained free space.

Reconditioning of the rail tracks and paving and levelling of the apron and the rail tracks will depend on the start and progress of these works at Berth No. 9.

In order to lessen the negative impacts of the construction works it is recommended in agreement with the port management, to extend the third railway-track to Berth No. 9, which is now ending at about half the berth and coming from Berth No. 7.

6.2.2.6 Berth No. 9

Any rehabilitation works for the apron and the railway-tracks are supposed to start at and behind berth No. 9, with the exception of the extension of the railway-tracks from No. 8 to No. 9.

The demolishing of the buildings near the port boundary wall behind the existing railway shunting yard should be performed. At the same time the elevated loading ramp will have to be levelled down. all these activities are meant to provide the space to establish a new extended shunting yard for the rail wagons.

The next step would then be, to construct the new railway-shunting yard which would increase the available shunting capacity by about 50% compared by the existing one.

It envisaged as the next step, to demolish the old shed at Berth No. 9 and erect the new one, which would provide about 7,000 m^2 modern shed storage space compared with the existing 2,872 m^2 of the existing shed.

Phased approach to rehabilitation works Berths 9-6.

The works are then supposed to continue in a phased approach to rehabilitate the rail system, and the simultaneous levelling and paving of the apron and the rail-tracks. A precondition for a smooth uninterrupted cargo operation will be the extension of the third railway line. While the third railway line will be integrated into the apron, the cargo operations can continue unimpeded by the civil construction works on the rail-tracks No 1 & 2.

When these two lines will be rehabilitated and paved, the direct loading operation can be maintained on the third rail-track. If bottleneck-situations would appear, because of the availability of just one available rail-track, the port could transport the cargo through the new shed and load the balance into rail wagons on the land side of the shed.

In principle, with the exclusion of the shed, this principle of a phased rehabilitation of the rail tracks and apron is recommended by the Experts to be applied also for the other berths as well, with the objective to minimise interference with the cargo-operations.

The Experts furthermore propose, to continue the works from Berth No. 9 in direction to Berth No. 6 in stages.

The final planning can only be done, when the financing of the rehabilitation programme and the actual start of the programme has been agreed upon.

6.2.2.7 Berth No. 10 & 11

No action will be taken on these piers.

6.2.3 Long term measures (*proposed to be carried out 2002-2007)*

Port general

It is anticipated, that the bulk of the proposed measures will be completed within this phase.

Due to fact, that a considerable period of time has passed, a review of what has been achieved, and what would be left to carry out, will have to be performed.

New developments in all port related matters will have to be incorporated into the finalisation of the proposed projects.

Operational and administrative procedures will have to be screened, followed by measures of fine-tuning in all areas relating to the operating of the port.

The upgrading of the existing facilities will have to be continued, in order to meet new challenges.

The bookkeeping and accounting systems are expected to have reached western standard. This will deliver the necessary financial data, which are indispensable for a sound port planning .

The multi-purpose terminal is in full operation and containers and roro cargo are being handled in the port.

In this context the purchase of ship/shore container handling equipment will have to be investigated under the aspect of requirements of the type of vessels calling and the economic returns of such investment.

The development of the throughput of grain in bulk will have been monitored, and decisions might be on the agenda, how to increase the productivity in this field. The procurement of new grain handling equipment including buffer installations will have to be studied.

The throughput of other bulk cargo in the years which passed, will reveal the actual tonnage which had to be handled. These figures will serve as the basis to contemplate how to cope with it in the future

6.2.3.1 Berth No. 1-3

As explained previously, the port will apart from dredging not have to undertake any measures in this area.

6.2.3.2 Multi-purpose terminal at Berth 4 -5

The terminal will be ready and in full operation. Apart from adjusting the number and type of equipment to the actual development of the volume and type of cargo handled, no other measures will have to be carried out.*Pier No. 6.*

This berth is expected to be occupied to a substantial part of the year by roro-vessels, which are operating with their bow- or stern ramp at the roro-landing place at Berth No. 5. When the pavement of the area and the other measures have been taken, there is also the possibility to dispatch vessels fitted with quarter ramps at this berth directly.

6.2.3.3 Berth No 7

No developments are proposed in that area.

The shed behind that berth has so far not been considered for the extension of shed space. The reason is, that the option to build a grain-handling facility there should be preserved.

6.2.3.4 Berth No. 8

It will have to be studied, if the two 'Hartmann' elevators could be rehabilitated with the objective to increase their grain handling productivity substantially.

The decisive factors will be the development of the throughput of grain in bulk, the physical condition of the two elevators and the size of the investment, and the calculated economic returns.

6.2.3.5 Berth No. 9

It is assumed, that the new shed is operating and about 50 % of the total volume of the general cargo is being handled in the indirect mode using the loading facilities at the shore side of the shed for the cargo transfer to rail wagons.

6.2.3.6 Berth No. 10 & 11

The roro-traffic at Berth No. 11 will have been discontinued in favour of the new roro facility in the inner harbour basin.
No further measures will have to be taken.

6.2.4 Measures to be taken after 10 years *(beyond 2008)*

6.2.4.1 Grain in bulk

If in fact a greater throughput as the forecasted volume will be witnessed , the port will have to embark on measures increasing the productivity substantially.

The space for such undertaking will have been available at the apron of Berth No. 7. Depending on the size and layout of such facility the port building Nos. 24 & 14 will have to be demolished.

6.2.4.2 Other bulk

The actual throughput figures in this cargo-section will render the necessary data, which will serve as a base for further planning concerning the handling of this commodity. If it appears, that the forecasted volume will in fact have to be handled, the construction of a dedicated bulk handling facility in the potential port extension area north of the existing port has to be studied. This would necessitate the construction of a new harbour basin north of the existing real estate. The investments for such undertaking would be tremendous, because it would include the construction of a new breakwater north of the fishery port, as well as landfill operations.

6.2.4.3 General cargo

Whatever has been said in respect of the actual development of the throughput of the other commodities also applies for the general cargo.

It is however expected, that the existing shed and open storage space will cover the requirements for some time beyond 2008.

If the demand for warehouse space should be increasing, it is proposed to demolish the port buildings 14 & 15 and replace them by a modern warehouse, which could then be used for the long term storage of goods in the port.

6.2.4.4 Containers

It is assumed, that once a container handling facility is in place, that the port will be in a supplementary position to handle containers to the Port of Poti. The port of Batumi is not less fortunate located for this kind of traffic, as far as it is scheduled for on-transport by train.

The port will however not have the capacity to be a competition for Poti Port, but rather serve as a supplement

6.2.4.5 Roro cargo

It is expected, that the roro traffic might exceed the forecasted figures. Due to complicated and dangerous crossing of the surrounding mountains, the port will never reach the attractiveness for this type of roro-cargo as Poti Port. There is however sufficient space to serve in a niche function.

The development of the railway traffic in the Black Sea Region will have to be monitored, and a comprehensive market-study will have to be conducted before embarking on the construction of a roro- facility for railway-wagons.

6.2.4.6 Equipment

If the type of cargo would require such a move, the purchase of either rail mounted- or mobile harbour cranes for the operation on Berth Nos. 4 & 5 will have to be studied.

6.2.4.7 Organisation

It can be assumed, that the port management will have introduced a number of organisational changes. These changes will include EDP backed up administration and cargo clearing procedures.

The over staffing of all departments will have been reduced under consideration of social aspects. The productivity will have increased due to modern management techniques and incentive schemes.

Strict measurers will have to be taken, to fight the corruption.

6.2.5 Final remark

Whatever is written applies for both Georgian Ports

Due to the long time passed until 2008, any predictions made about the Caucasus Region will come near to crystal ball reading. Apart from that, some decisions and investments will be necessary simply because a certain period of time has passed, since the Port Development Plan had been established, and new parameters might have to be applied.

Section 6

Demand of Port Cargo Handling Equipment in the Different Development Phases of the Ports of Poti and Batumi

Table of Contents

Annexes

1. Poti

Summary of Rehabilitation Costs and New Investment

During the first Phase of this project a thorough evaluation of the existing cargo handling equipment has been executed (see Annex 8, Phase 1 report).

Based on the traffic forecast, expected cargo flow and the berth occupancy rate the required port handling equipment was chosen for rehabilitation. Detail concerning type of equipment and costs for rehabilitation and new investment are shown on the following pages.

1.1 Summary of Rehabilitation Costs

Out of the 16 units of Sokol cranes only 13 units should be rehabilitated. Cranes No 10, 16, 18 should not be rehabilitated

1.1.1 Port Handling Equipment to be Rehabilitated

Phase I

Type of Equipment	Price in USD
Port Handling equipment, cranes	4.900.000
Port Handling equipment, cranes	181.100
Subtotal	5.081.100
10% Contingency	508.110
Total phase I	**5.589.210**

Phase II

Type of Equipment	Price in USD
Port Handling equipment, cranes	4.280.000
10% Contingency	428.000
Total phase I	**4.708.000**

Phase III

Type of Equipment	Price in USD
Port Handling equipment, cranes	4.600.000
10% Contingency	460.000
Total phase I	**5.060.000**

1.2 Summary of the New Port Handling Equipment (Existing Port)

1.2.1 Phase I, 1998 - 2002

	USD
Berth No 6 and 7	3,135,000
Berths No 12, 13 and 14	1,628,000
CTIS Container Terminal Information System	750,000
Bulk and General Cargo	321,000
Subtotal Phase I	**5,834,000**

1.2.2 Phase II, 2003 - 2007

	USD
Bulk and General Cargo	**789,500**

1.3 Equipment for the New Container Terminal North

1.3.1 Phase I, 2001 - 2002

Equipment: **Total: USD 21,590,000**

Requirements for the years 2003 to 2007 are covered with the equipment purchased in Phase I.

1.3.2 Phase II, 2008 - 2012

Cargo Handling Equipment: **Total: USD 12,840,000**

1.3.3 Phase III, 2012

Cargo Handling Equipment: **Total: USD 15,000,000**
(Only if total cargo turnover exceeds 250,000 TEU.)

1.4 Rehabilitation of Port Handling Equipment

During the evaluation of the existing equipment 31 cranes were inspected. Of these 24 were taken into consideration for rehabilitation under this subject.

Out of the following cranes No 3, 4, 15 and 28 two cranes should be shifted to berths No 1,2 and 3.

A maximum of two cranes can be rehabilitated at the same time. The works should be carried out the operational area to avoid interruptions.

The relocation of the cranes should be considered.

1.4.1 Phase I, 1998

Asset No	**Type of Equipment**	**Rehabilitation costs in USD**
2	Kondor 32 t.	700.000
5	Kondor 32 t.	700.000
6	Kondor 32 t.	700.000
22	Sokol 16 t.	500.000
26	Sokol 16 t.	600.000
32	Sokol 16 t.	600.000
36	Sokol 16 t.	600.000
38	Sokol 16 t.	500.000
Subtotal, Cranes		4. 900.000
!0 % contingency		490.000
Total		**5.390.000**

Asset No	**Type of Equipment**	**Rehabilitation costs in USD**
230	Jungheinrich FLT 1.5 t.	2.500
231	Jungheinrich FLT 1.5 t	2.500
232	Jungheinrich FLT 1.5 t	2.500
233	Jungheinrich FLT 1.5 t	2.500
234	Jungheinrich FLT 1.5 t	2.500
235	Jungheinrich FLT 1.5 t	2.500
236	Jungheinrich FLT 1.5 t	2.500
237	Jungheinrich FLT 1.5 t	2.500
238	Jungheinrich FLT 1.5 t	2.500
239	Jungheinrich FLT 1.5 t	2.500
240	Jungheinrich FLT 1.5 t	2.500
241	Jungheinrich FLT 1.5 t	2.500
243	Jungheinrich FLT 1.5 t	2.500
281	Kalmar FLT 25 t.	40.000
282	Kalmar FLT 25 t.	50.000

Asset No	Type of Equipment	Rehabilitation costs in USD
506	Bobcat 843	3.000
507	Bobcat 843	1.000
508	Bobcat 843	1.000
509	Bobcat 843	3.000
510	Bobcat 843	1.000
523	Komatsu WA 200	5.000
524	Komatsu WA 200	5.000
525	Komatsu WA 200	15.000
527	Sisu tractor	10.000
528	Sisu tractor	10.000
529	Sisu tractor	2.000
Subtotal		181.000
10% contingency		18.100
Total		**199.100**

Bobcats will be used for grain handling inside the ship.
The Komatsu wheel loader should be used during demolishing and civil construction works.
The Sisu terminal tractor can be used for container transportation.

The Port should repair some of the existing RoRo trailers by cannibalising others.

1.4.2 Phase II

Asset No	Type of Equipment	Rehabilitation costs in USD
1	Sokol 16t	650.000
17	Sokol 16t	650.000
24	Sokol 16t	650.000
35	Sokol 16t	600.000
27	Albatros 10t	550.000
31	Albatros 10t	400.000
20	Ganz 5t	400.000
30	Ganz 5t	380.000
Subtotal		4.280.000
10% Contingency		428.000
Total Phase II		**4.708.000**

1.4.3 Phase III

Asset No	Type of Equipment	Rehabilitation costs in USD
33	Albatros 10t	600.000
34	Albatros 10t	600.000
14	Ganz 5t	400.000
23	Ganz 5t	400.000
3	Sokol 16t	650.000
4	Sokol 16t	650.000
15	Sokol 16t	650.000
28	Sokol 16t	650.000
Subtotal		4.600.000
10% Contingency		460.000
Total Phase II		**5.060.000**

1.5 Rehabilitation Measures by individual berths

1.5.1 Berth No.1 Bulk, Oil and Berth No.2 Rail Ferry/RoRo

Both berths should be seen as one crane area. From the existing 5 units of Sokol crane 16t only 3 units should be repaired with last priority.

Asset No.	Year of construction	Type of equipment	Rehabilitation costs in USD	Priority
3	1981	Sokol 16t	650.000	Last priority
4	1981	Sokol 16t	650.000	Last priority
15	1981	Sokol 16t	650.000	Last priority
17	1984	Sokol 16t	650.000	Second priority
28	1981	Sokol 16t	650.000	Last priority
Subtotal	**3 units only**		**1.850.000**	

1.5.2 Berth No.3 General Cargo

This berth is foreseen for direct handling of general cargo as stand by peak situation. In the year 2002 this berth will be used regularly.
From the existing 5 units Sokol crane 16t only 3 units should be repaired with last priority.

Asset No.	Year of construction	Type of equipment	Rehabilitation costs in USD	Priority
16	1979	Sokol 16t	650.000	no repair
18	1975	Sokol 16t	650.000	no repair
26	1987	Sokol 16t	600.000	first priority
32	1987	Sokol 16t	600.000	first priority
36	1988	Sokol 16t	600.000	first priority
Subtotal	**3 units only**		**1.800.000**	

Cranes No.26, 32 and 36 should be repaired with first priority. Two cranes should be shifted to Berth No.8 in exchange of crane No.10.

All Albatros cranes will be located along berth No.10 and 11.

Both cranes have first priority for the container handling operation.

1.5.3 Berth No.4 Bulk, Scrap

This berth is operated by Messenger Dock Transhipment Poti Ltd. With Port of Poti as share holder.
Crane No.11 and 25 are not taking into account for rehabilitation under this project.

1.5.4 Berth No.5 General cargo

Asset No.	Year of construction	Type of equipment	Rehabilitation costs in USD	Priority
1	1987	Sokol 16t	650.000	second priority
31	1991	Albatros 10t	400.000	second priority
Subtotal			**1.050.000**	

Crane No.31, Albatros 10t should be shifted to berth No.10 and 11. All four Albatros cranes will be located along berth No.10 and 11 and allow simultaneous work on both berths with two cranes each.

1.5.5 Berth No.6, Container

The berth will be transferred from bulk/scrap area to container handling area. One unit of the Kondor ,40t crane from berth No.7 should be transferred to berth No.6.

The two units of Sokol 16t cranes should be repaired with the first priority. Alongside the berth No.5 and 6 are three units of Sokol cranes which can serve both berths according the operational requirements.

Asset No.	Year of construction	Type of equipment	Rehabilitation costs in USD	Priority
22	1988	Sokol 16t	500.000	first priority
38	1987	Sokol 16t	500.000	first priority
Subtotal			**1.000.000**	

Both cranes have first priority for the container handling operations.

1.5.6 Berth No.7, Container

This area will be a dedicated container berth. The existing ship repair facilities in the southern part next to berth No.8 has to be removed to berth No.15.

Crane No. 5 a Kondor crane 32t should be shifted from the railway loading area to the quay side either on berth No.5 or No.6.

Crane No.30 a Ganz 5t should be removed to berth No.9 to concentrate all Ganz cranes in one area and relief the very old Ganz cranes. A 5t crane is not sufficient for container handling operation requiring at least a lifting capacity of 30 t under the spreader.

Asset No.	Year of construction	Type of equipment	Rehabilitation costs in USD	Priority
2	1984	Kondor 32t	700.000	first priority
5	1984	Kondor 32t	700.000	first priority
6	1984	Kondor 32t	700.000	first priority
30	1987	Ganz 5t	380.000	second priority
Subtotal			**2.100.000**	

All three Kondor cranes should receive new rotating light-weight telescopic spreader to increase productivity remarkably.

1.5.7 Berth No. 8, Bulk Grain

The existing three Sokol cranes 16 t for grain handling should be assisted by a fourth unit to compensate Maintenance and Repair time.

Asset No.	Year of construction	Type of equipment	Rehabilitation costs in USD	Priority
10	1977	Sokol 16t	650.000	no repair
24	1980	Sokol 16t	650.000	second priority
35	1987	Sokol 16t	600.000	second priority
Subtotal			**1.900.000**	

Two Sokol cranes from berth No. 3 should be shifted to berth No. 8.
The existing hopper should be repaired by the Port itself. Only simple steel work has to be done.
Crane No. 10 should not be repaired under this programme and shifted to berth No. 3.

1.5.8 Berth No. 9, general cargo

The existing three Ganz 5t cranes for general cargo handling should be assisted by a fourth unit, namely crane No. 30 from berth No. 7. This crane will compensate M + R time.

Asset No.	Year of construction	Type of equipment	Rehabilitation costs	Priority
14	1975	Ganz 5t	400.000	last priority
20	1984	Ganz 5t	400.000	second priority
23	1975	Ganz 5t	400.000	last priority
Subtotal			**1.200.000**	

1.5.9 Berth No. 10, General Cargo and Berth No. 11, Bulk and General cargo, stand by berth for peak time.

The existing three units Albatros 10t cranes should be assisted by a fourth unit, namely Crane No. 31 from berth No. 6 to compensate M + R time.

Asset No.	Year of construction	Type of equipment	Rehabilitation costs in USD	Priority
27	1987	Albatros 10t	550.000	second priority
33	1975	Albatros 10t	600.000	last priority
34	1975	Albatros 10t	600.000	last priority
Subtotal			**1.750.000**	

1.5.10 Berth No. 12, 13 and 14, Container

This area will be transferred into a container handling area for self sustained container- and ro-ro ships. In the moment the rail ferry and some ro-ro ships are handled along berth No. 12 and 13.

Berth No. 14 is blocked by not operating fishery boats.

1.6 New Port Handling Equipment

1.6.1 Berth No. 6 and 7 and Extension area behind berth No. 7

For the container handling operation i.e. loading and unloading of Tractor/Trailers and railway wagons and the transportation of container between the stacks and the ships following equipment is needed. In extreme peak situations equipment can be transferred from berth No. 6 and 7.

Phase I, 1998

Quantity	Type of equipment	Unit price in USD	Total price in USD
5x	Reachstacker 40t	370.000	1.850.000
4x	Terminal tractor	100.000	400.000
8x	Terminal chassis 40'/38t	25.000	200.000
4x	Rotating telescopic lightweight spreader 35t	100.000	400.000
1x	Spare parts 10%	285.000	250.000
Subtotal			3.135.000

One ECH Empty container handler is not foreseen, as the empty stacks are shattered over the three container areas.

To increase the productivity for container handling a CTIS Container Terminal Information System is urgently needed. This computer based system allows a detailed control about all container movements, planning of loading/unloading of ships , trucks and railway wagons and the fast invoicing of port services. This system will lead to a better utilisation of the limited areas for container handling in Poti.

A faster handling of containers is possible as the location of each container is identified immediately . The time consuming search for containers will be no longer necessary. This will lead to a better utilisation of the equipment. The New Container Terminal North will need such a system anyway, and when the system will be applied already in the rehabilitated old container area the Port personnel will be familiar with the CTIS system and a smooth start-up of the new terminal can be achieved.

A well proven CTIS with multilingual displays, edp hardware, data communication and training will cost approximately $ 750.000 for Poti Port and approximately $ 500.000 for the adaptation for the New Container Terminal North

1.6.2 Berth No 12, 13 and 14

Following port handling equipment is needed for container handling after reconstruction.

Quantity	Type of equipment	Unit price in USD	Total price in USD
3x	Reachstacker 40t	37.000	1.480.000
1x	Spare parts	148.000	148.000
Subtotal			1.628.000

Phase II for Poti Port will correspond with the start of the New Container Terminal North.

Reachstacker and Tractor/Trailer units can be transferred to the new terminal.

The old part of Poti Port will mainly be used bulk and general cargo operations.

1.6.3 New Port Handling Equipment for Bulk and General Cargo

Phase I, 1998 - 2002

Quantity	Type of equipment	Unit price in USD	Total price in USD
4x	Rolltrailer 40'/60t	18.000	96.000
500x	Paletts Hanse 2t	50	25.000
1x	Workshop equipment	100.000	100.000
1x	Stevedoring Equipment	100.000	100.000
Total Phase I			**321.000**

Phase II , 2003 - 2007

Quantity	Type of equipment	Unit price in USD	Total price in USD
10x	FTL 2.5t	35.000	350.000
1x	FLT 10t	85.000	85.000
1x	Terminal Tractor	100.000	100.000
4x	Bobcats	40.000	160.000
1x	Spare parts 10%	69.500	69.500
500x	Paletts Hanse 2t	50	25.000
Total Phase II			**789.500**

Phase III

During this phase no new equipment is requiered, as the units purchased during phase II have not reached the end of their lifespan.

1.7 New Cargo Handling Equipment for the New Container Terminal North

1.7.1 Phase I, 2001 - 2002

Number + Type of Equipment	Unit Price in USD	Total Price in USD
2 Ship/Shore Container Gantry Cranes	4,500,000	9,000,000
2 Rail Mounted Gantry Cranes (RMG)	1,500,000	3,000,000
4 Rubber Tyred Gantry Cranes (RTG)	1,400,000	5,500,000
15 Terminal Tractors	100,000	1,500,000
30 Container Chassis 40'-38mt	25,000	750,000
Spareparts for items 1 - 4 (Basic)	700,000	700,000
Workshop Equipment	250,000	250,000
1,000 Hanse pallets	50	50,000
Stevedoring Gear	100,000	100,000
4 Container Stuffer	35,000	140,000
1 CTIS Container Terminal Information System		500,000
Total Phase I		**21,590,000**

The requirements for equipment for the years 2003 to 2007 are covered by the above equipment.

1.7.2 Phase II, 2008 - 2012

Number + Type of Equipment	Unit Price in USD	Total Price in USD
1 Ship/Shore Container Gantry Crane	4,500,000	4,500,000
2 RTG (2 in 2008)	1,400,000	2,800,000
2 RTG (2 in 2010)	1,400,000	2,800,000
1 RMG	1,500,000	1,500,000
5 Terminal Tractors	100,000	500,000
10 Container Chassis 40'-38mt	25,000	250,000
2 Empty Container Handler	150,000	300,000
Spareparts for items 1 to 4 (Basic)	140,000	140,000
1,000 Hanse pallets	50	50,000
Total Phase II		12,840,000

1.7.3 Phase III, appr. 2012

This phase might start earlier or later, only after cargo turnover will have exceeded 250,000 TEU. Furthermore, some of the equipment from Phase I will have reached the end of its life span and will have to be replaced.

Number + Type of Equipment	Unit Price in USD	Total Price in USD
1 Ship/Shore Container Gantry Crane	4,500,000	4,500,000
2 RTG	1,400,000	2,800,000
18 Terminal Tractors	100,000	1,800,000
5 Container Chassis 40'-38mt	25,000	125,000
5 FTL 2,5 mt	35,000	175,000
1 Empty Container Handler	150,000	150,000
Spareparts for items 1 to 4 (Basic)	450,000	450,000
Major overhaul of Ship/Shore Cranes, RMGs and RTGs	5,000,000	5,000,000
Total Phase III		**15,000,000**

2. Batumi

During the first Phase of this project a thorough evaluation of the existing cargo handling equipment has been executed (see Annex 8, Phase 1 report).

Based on the traffic forecast, expected cargo flow and the berth occupancy rate the required port handling equipment was chosen for rehabilitation. Detail concerning type of equipment and costs for rehabilitation and new investment are shown on the following pages.

2.1 Summary of rehabilitation costs

2.1.1 Phase I 1998

	Total Price in USD
Port handling equipment	2.915.000
Port fleet	495.000
Subtotal	3.410.000
10% Contingency	341.000
Total, Phase I	**3.751.000**

2.1.2 Phase II

	Total Price in USD
Port handling equipment	1.485.000
10% Contingency	148.500
Total, Phase II	**1.633.500**

2.2 Summary of New Port Handling Equipment

2.2.1 Phase I 1998 - 2002

Port Handling Equipment: USD 926,200

2.2.2 Phase II 2003 - 2007

Port Handling Equipment: USD 576,400

2.2.3 Phase III 2008 - 2012

Port Handling Equipment: USD 926,200

2.3 Summary of Equipment for Multi-purpose Terminal

2.3.1 Phase I

Port Handling Equipment: USD 1,452,200

2.3.2 Phase II

Port Handling Equipment: USD 999,000

2.3.3 Phase III

Port Handling Equipment: USD 1,153,000

2.4 Summary of rehabilitation costs

2.4.1 Port handling equipment

Phase I 1998

All of the following equipment has to be repaired within this year without a priority ranking in the following list.

Asset No	Type of equipment	Rehabilitation costs in USD
26	Ganz crane 5 t.	380.000
27	Ganz crane 5 t.	380.000
28	Ganz crane 5 t.	380.000
29	Ganz crane 5 t.	380.000
32	Albatros 10 t.	650.000
33	Albatros 10 t.	650.000
89	Toyota FLT 1.5 t.	5.000
90	Toyota FLT 1.5 t.	12.000
91	Toyota FLT 1.5 t.	10.000
92	Toyota FLT 1.5 t.	3.000
93	Toyota FLT 1.5 t.	3.000
94	Toyota FLT 1.5 t.	2.000
95	Toyota FLT 4 t..	5.000
96	Toyota FLT 4 t..	10.000
97	Toyota FLT 10 t..	2.000
56	Toyota FLT 4 t..	5.000
212	Komatsu Wa 220	3.000
213	Komatsu Wa 220	5.000
219	Bobcat 843	15.000
220	Bobcat 843	15.000
Subtotal		2.915.000
10% Contingency		291.000
Total		**3.206.500**

Phase II

Phase II should follow directly after completion of Phase I with priority repairs of the forklift trucks (FTL).

Asset No	Type of equipment	Rehabilitation costs in USD
24	Ganz crane 5 t.	400.000
30	Albatros 10 t.	600.000
31	Albatros 10 t.	600.000
38	Toyota FLT 1.5 t.	15.000
54	Toyota FLT 1.5 t.	10.000
55	Toyota FLT 1.5 t.	10.000
57	Toyota FLT 1.5 t.	10.000
62	Toyota FLT 1.5 t.	10.000
214	Bobcat 843	15.000
215	Bobcat 843	15.000
Subtotal		1.485.000
10% contingency		148.500
Total		**1.633.500**

2.5 Required Rehabilitation Measures by Type of Equipment

In the port of Batumi only one crane can be repaired at present time. The crane must be removed from the quay side to allow uninterrupted operation. The cranes cannot move freely between the Berths 6 and 9. And 5 t. Ganz

From the existing port handling equipment following units should be rehabilitated:

2.5.1 Cranes, manufacturer: Ganz

Asset No	Year of construction	Rehabilitation cost in USD	Priority
No 21	1965	380.000	last priority
No 24	1967	400.000	second priority
No 26	1968	380.000	first priority
No 27	1968	380.000	first priority
No 28	1968	380.000	first priority
No 29	1978	380.000	first priority
Subtotal Ganz Cranes		**2.300.000**	

Crane No 22, from 1985 damaged by a ship and dismantled should be repaired by the Port itself, as spare parts are already with the Port and a contract between the port of Batumi and Ganz for rehabilitation is existing. A downpayment for spare parts $ 140.000 was paid and $ 500.000 remains for payment.

The Ganz cranes are needed for general cargo handling, especially bagged cargo.

Cranes No 21 has low priority and should be replaced by Ganz No 22.

The Ganz cranes have a lower power consumption than the Albatros cranes have during handling of less than 5 t general cargo.

2.5.2 Cranes, Manufacture Takraf Eberswalde:

Asset No	Type of equipment	Year of construction	Rehabilitation cost in USD	Priority
No 25	Abus 10 t.	1968	650.000	last priority
No 30	Albatros 10/32m.	1977	600.000	second priority
No 31	Albatros 10/32m.	1977	600.000	second priority
No 32	Albatros 10/32m.	1982	650.000	first priority
No 33	Albatros 10/32m.	1990	650.000	first priority
Subtotal Takraf			**3.150.000**	

Crane No 33 should be repaired first and then shifted to berth No 7 to have 4 x cranes for operation there.

2.5.3 Pneumatic Grain Unloader, Manufacture Hartman:

Asset No	Type of equipment	Year of construction	Rehabilitation cost in USD	Priority
No 11	150t/h	1975	300.000	last priority
No 12	150t/h	1975	300.000	last priority
Subtotal Grain Unloader			**600.000**	

The grain unloader should be kept alive, but receive no complete overhaul as their productivity with grain is only 85 t/h each , which is less than the 120 t per hour of the Albatros cranes with grab operation achieve with less investment and power consumption.

The upgrading to 150 t/h grain or more would require a complete overhaul which would range by approximately $ 1.0 mio. per crane. Increase of grain handling above the level of 1995 according to the traffic forecast is only expected in Phase III 2008 - 2012. In this case new pneumatic unloader combined with a large buffer silo inside the port would ease the grain handling operation.

The other possibility would be the replacement of the pneumatic unloaders by Albatros type cranes allowing handling of general cargo and grain on berth No 8.

In addition the cranes which were rehabilitated in Phase I will need a new rehabilitation after ten years.

2.5.4 Forklifts

The existing equipment should be rehabilitated, new equipment should only be purchased after the completion of the civil construction.

Asset No	Type of equipment	Year of construction	Rehabilitation cost in USD	Priority
No 38	1989	Toyota 1.5 t	15.000	second priority
No 39	1989	Toyota 1.5 t	15.000	last priority
No 40	1989	Toyota 1.5 t	15.000	last priority
No 41	1989	Toyota 1.5 t	15.000	last priority
No 47	1989	Toyota 1.5 t	15.000	last priority
No 54	1989	Toyota 1.5 t	10.000	second priority
No 55	1991	Toyota 1.5 t	10.000	second priority
No 57	1991	Toyota 1.5 t	10.000	second priority
No 62	1983	Toyota 1.5 t	10.000	second priority
No 89	1993	Toyota 1.5 t	5.000	first priority
No 90	1993	Toyota 1.5 t	12.000	first priority
No91	1993	Toyota 1.5 t	10.000	first priority
No 92	1993	Toyota 1.5 t	3.000	first priority
No 93	1993	Toyota 1.5 t	3.000	first priority
No 94	1993	Toyota 1.5 t	2.000	first priority
No 56	1991	Toyota 4 t	5.000	first priority
No 95	1993	Toyota 4 t	5.000	first priority
No 96	1993	Toyota 4 t	10.000	first priority
No 97	1993	Toyota 10 t	2.000	first priority
Total FTL			172.000	

2.5.5 Wheel loader

Asset No	Type of equipment	Year of construction	Rehabilitation cost in USD	Priority
No 212	1994	Komatsu Wa 200	3.000	first priority
No 213	1994	Komatsu Wa 200	5.000	first priority
No 214	1988	Bobcat 843	15.000	second priority
No 215	1988	Bobcat 843	15.000	second priority
No 219	1990	Bobcat 843	15.000	first priority
no 220	1990	Bobcat 843	15.000	first priority
Total Wheel Loader			**68.000**	

Komatsu can be used for civil works inside the port during the demolishing and reconstruction which is to be realised by the Port itself.

The Bobcats are used inside the grain ships to collect the remaining grain for grab handling to increase productivity

2.6 New Port Handling Equipment

2.6.1 Phase I 1998 - 2002

Units	Type of equipment	Purchasing price in USD	Total price in USD
10	FLT 2.5 t.	35.000	350.000
6	FLT 2.5 t.	37.000	222.000
4	Bobcat 0.4 m3	40.000	160.000
1	FLT 10t.	85.000	85.000
5	Elec. hand pallet truck 1.5 t.	5.000	25.000
1	Spare parts item 1 - 5/10 %	85.000	84.000
Total			**926.200**

The equipment shall only be delivered after the completion of the civil constructions along **Berth** 9+8. The FLT 10t. will be used for heavy lifts and internal transportation of platforms. In addition the FLT could be used on the multipurpose terminals for stacking the empty containers with telescopic side frame spreaders. Optional price is $ 20.000.

The electrical hand pallet trucks shall be used inside the railway wagons for palletised cargo and/or inside the warehouse for single transportation.

For the crane operation modern stevedoring equipment should be purchased for increasing the productivity i.e. C -hooks, pallet cages etc.

2.6.2 Phase II 2003 - 2007

Units	Type of equipment	Purchasing price in USD	Total price in USD
4	FLT 2.5 t.	35,000	140,000
2	FLT 2.5 t 4m.	37,000	74,000
1	FLT 10 t.	85,000	85,000
5	Elec. Handpallet Truck	5,000	25,000
1	Terminal tractor	100,000	100,000
4	Roll trailers	25,000	100,000
1	Spare parts 1-6/10%	52,400	52,400
Total			**576,400**

The terminal tractor and the roll trailers will be used to transport general cargo from Berths No 8,6 to a new warehouse at the Berth No 9. The number of FLT are increased to cope with the increase of the indirect cargo handling.

2.6.3 Phase III 2008 - 2012

Units	Type of equipment	Purchasing price in USD	Total price in USD
10	FLT 2.5 t. stuffer	35,000	350,000
6	FLT 2.5 4m.	37,000	222,000
4	Bobcat 0.4 m3	40,000	160,000
1	FLT 10 t .	85,000	85,000
5	Elec. Handpallet Truck	5,000	25,000
1	spare parts 1-5/10%	84,200	84,2000
Total			**926,200**

Depending on the utilisation of the following equipment purchased in Phase I i.e. FLT 2.5 t., FLT 10 t, Elect. Hand-pallet Trucks and Bobcats will reach their theoretical end of lifetime and have to be replaced during Phase IIII.

2.7 Port Fleet Batumi

The Port fleet consists of fleet of 13 ships and 1 barge.

Two ships are used for tourist passenger trips along the coast. These ships can not be recognised as related to port business. Therefore no M+R costs should be spent out of a EU budget. Another passenger boat was sold by the port after the evaluation phase.

The following ships should receive M+R directly in 1998:

1) MS Ushba, Tugboat needs minor repair jobs especially bowthrustor, painting, renewing of Class and foam liquid for FiFi.
2) MS Metekhi, Tugboat needs minor repair jobs, propeller, renewing of Class and foam liquid for fire fighting.
3) MS Tsiskari, ballast water tankship needs minor repair jobs
4) MS Aisi ballast water tankship needs minor repair jobs
5) MS Fauna, oil pollution fighting ship needs minor repair jobs

Summary Of Rehabilitation Costs of the Port Fleet

Phase I 1998

Name of the vessel	Type of equipment	Rehabilitation costs in USD
MS Ushba	Tugboat	200.000
MS Metekhi	Tugboat	185.000
MS Tsiskari	Ballast tank ship	30.000
MS Aisi	Ballast tank ship	35.000
MS Fauna	Oil pollution fighter	45.000
Subtotal		495.000
10 % Contingency		49.500
Total		**544.500**

No Phase II is required.

2.8 Multi Purpose Terminal

2.8.1 Phase I after construction

The following equipment is required for cargo handling operation.

Unit	Type of equipment	Purchase cost in USD	Total cost in USD
2	Reachstacker	370.000	740.000
4	FLT 2.5t	35.000	140.000
1	Terminal tractor	100.000	100.000
4	Roll tailor 40/60 t.	18.000	72.000
4	Container Chassis 40'/38 t.	25.000	100.000
1	Spare Part items 1-5	115.200	115.200
1500	Pallets 2 t. hanse	50	75.000
1	Workshop equipment	100.000	100.000
1	Gooseneck + Stand	10.000	10.000
Total			**1.542.200**

In theory one Reachstacker would be enough to handle the quantity of containers as predicted in the traffic forecast. In case of M+R or downtime no container handling on the Multipurpose terminal would be possible. In the port is no alternative equipment. For this reason the quantity was doubled.

2.8.2 Phase II 2003-2007

Unit	Type of equipment	Purchase cost in USD	Total cost in USD
1	Reachstacker 40t	370.000	370,000
2	FLT 2.5t	35,000	70,000
2	Terminal tracktor	100,000	200,.000
8	container chasses 40/38 t.	25,000	200,000
1	Spare parts item 1-3/10%	84,000	84,000
1500	Hanse Pallets	50	75,000
Subtotal Phase II			**999,000**

2.8.3 Phase III 2008-2012

Unit	Type of equipment	Purchase cost in USD	Total cost in USD
2	Reachstacker	370,000	740,000
4	FLT 2.5t	35,000	140,000
1	Terminal tractor	100,000	100,000
1	Spare parts item 1-3/10%	98,000	98,000
1500	Pallets 2 t Hanse	50	75,000
Subtotal Phase III			**1,153,000**

Depending on the utilisation of the following equipment purchased in Phase I will reach their theoretical end of lifetime and the equipment have to be replaced during Phase III.

The remarks concerning the mobile Harbour crane and the Empty Container handling for Phase II also apply to phase III.