Japan International Cooperation Agency (JICA)
Ministry of Transport and Communications (MOTC)
Klaipeda State Seaport Authority (KSSA)

No.

KLAIPEDA

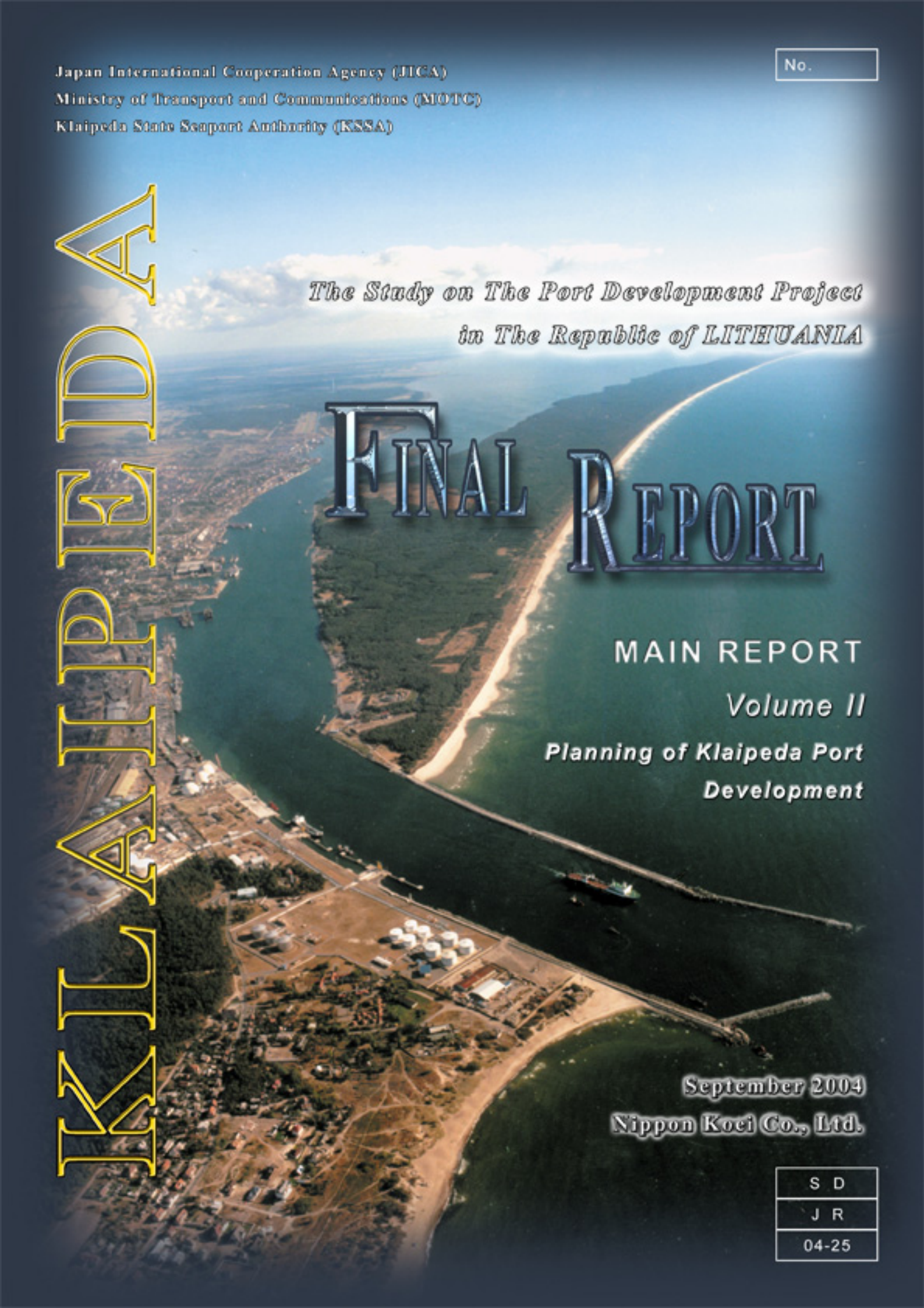
The Study on The Port Development Project in The Republic of LITHUANIA

FINAL REPORT

MAIN REPORT

Volume II

Planning of Klaipeda Port Development



September 2004
Nippon Koei Co., Ltd.

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THE PORT DEVELOPMENT PROJECT
IN THE REPUBLIC OF LITHUANIA

VOLUME II

MAIN REPORT
PLANNING OF KLAIPEDA PORT DEVELOPMENT

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ABBREVIATIONS TABLE

'E'	Road European Road Number
2K	Project K is the initial of Klaipeda Port and Kaliningrad Port
APEC	Asia Pacific Economic Cooperation
AIS	Automatic Identification System
BAF	Bunker Adjustment Fee
BBT	Baltic Bulk Terminal
BC	Belarusian Railways
B/C	Benefit/Cost
BOD	Biochemical Oxygen Demand
BOT	Build, Operate and Transfer
Bpd	Barrels per day
BSL	Baltic Sea Level
CARs	The Central Asian Republics
CD	Chart Datum
CEDA	Central Dredging Association
CFC	Standard Conversion Factor
CFS	Container Freight Station
CFSL	Conversion Factor for Skilled Labour
CFUL	Conversion Factor for Unskilled Labour
CIF	Cost, Insurance and Freight
CIM	Uniform Rules Concerning the Contract for International Carriage of Goods by Rail
CIS	Commonwealth of Independent States
CMR	Centre of Marine Research, Ministry of Environment
CNC	Compagnie Nouvelle de Conteneurs
DAP	Diammonium Phosphate
DEP	Department of Environment Protection
DGPS	Differential Global Positioning System
DIN	Deutsches Institut fur Normung e.V
DWT	Dead Weight Tonne
EBRD	European Bank for Reconstruction and Development
EC	European Communities
ECE	Economic Commission for Europe
EDI	Electronic Data Interchange
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIRR	Economic Internal Rate of Return
EIU	Economist Intelligence Unit
EPD	Environmental Protection Department
ERR	Economic Rate of Return
ESN	European Shortsea Network
ESTO	European Sea Ports Organization
ETSNG	Unified Cargo Nomenclature of CIS (Russian Abbreviation)
EU	European Union
EVR	Estonian Railway
F/S	Feasibility Study

FAO	Food & Agriculture Organisation
FEC	Federal Energy Commission
FEZ	Free Economic Zone
FIRR	Financial Internal Rate of Return
FOB	Free on Board
FSU	Former Soviet Union
GDP	Gross Domestic Product
GOJ	Government of Japan
GTA	Global Trade Atlas
HKN	Harmonized Cargo Classifier (Russian Abbreviation)
IADC	International Association Dredging Companies
IBRD	International Bank for Reconstruction and Development
ICD	Inland Container Depot
ICF	Intercontainer-Interfrigo
IEE	Initial Environmental Examination
IMDG	International Maritime Dangerous Goods
IMF	International Monetary Fund
IMO	International Maritime Organisation
IPC	Implementation Provisions of the Community
IRR	Internal Rate of Return
ISPA	Instrument for Structural Policies for Pre-Accession
ISPS	International Ship and Port Facility Security
IT	Information Technology
JICA	Japan International Cooperation Agency
KSSA	Klaipeda State Seaport Authority
KUBIS	Klaipeda Port Community Information System
KZH	Kazakhstan Railways
LAN	Local Area Network
LCL	less-than-carload
LDZ	Latvian Railway
LEI	Lithuanian Energy Institute
LG	Lithuanian Railways
LINAVA	Lithuanian National Road Carriers Association
LOA	Length Overall
LRP	Level Repayment Principle
MLA	Multi-Lateral Agreement
MOE	Ministry of Environment
MOF	Ministry of Finance
MOTC	Ministry of Transport and Communications
MTT	International Transit Tariff (Russian Abbreviation)
N/A	Not available
NATO	North Atlantic Treaty Organisation
NCC	National Container Company
NEN	North European Network
NIB	Nordic Investment Bank
NMBS	Belgian National Railways
NPV	Net Present Value
OCJD	Organization of Cooperation of Railways (Russian Abbreviation)
OD	Origin and Destination
OECD	Organization for Economic Co-operation and Development

OSJD	Organization for Railway Cooperation
PAHs	Polycyclic Aromatic Hydrocarbons
PHARE	Poland, Hungary, Aid of Economic Reconstruction
PIANC	Permanent International Association of Navigation Congresses
PTMS	Port Traffic Management System
RF	Russian Federation
Ro/Ro	Roll on Roll off
RTG	Rubber-Tire Gantry Cranes
RZD	Russian Railways
SCF	Standard Conversion Factor
SMGS	Agreement on International Goods Transports by Rail
SOLAS	Safety of Life at Sea
SPM	Single Point Mooring Buoy
TACIS	Technical Assistance of the Commonwealth of Independent States
TBT	Tributyl Tin
TEN	Trans-European Network
TEU	Twenty Foot Equivalent Unit
TINA	Transport Infrastructure Needs Assessment
TIR	Carnet TIR (Transport Internationaux Routiers:French; International Road Transport)
TOR	Terms of Reference
TRACECA	Transport Corridor Europe Caucasus Asia
UAIS	Universal Automatic Identification System
UAN	Urea Ammonium Nitrate
UIC	International Union of Railways (French abbreviation of Union Internationale Des Chemins de Fer)
UN	United Nations
USD	United States Dollars
VAT	Value Added Tax
VLCC	Very Large Crude Carrier
VTS	Vessel Traffic System
VTT	Technical Research Centre of Finland
WGS 84	World Geodetic System 1984
WTO	World Trade Organization

Abbreviation of Common Weights Measures and Technical Terms

%	Percentage
$^{0}/_{00}$	Parts per thousand
_², m², sq. m	Square e.g. square metre(s)
_^{3}, m^3, cu. m	Cubic e.g. cubic metre(s)
Bn or 10^9	Billion
GT	Gross ton(s)
HP, PS	Horsepower
hr or h	Hour(s)
Hz	Hertz
In.	Inch(es)
Kl	kilolitre(s)
knots	Marine speed measurement
Kph	Kilometres Per Hour
l	Litre
mg O/l	Milligrams of Oxygen per litre
Mill	Million
NM	Nautical mile(s)
No	Number (serial number)
no(s)	(units)
^{0}	Degrees of latitude or longitude
^{o}C	Celsius Degrees (Centigrade)
ppm	Parts per million
Psi	Pound per square inch
rpm	Revolutions per minute
W	Width

MEASUREMENT UNITS TABLE

Extent

cm^2	Square-centimetres (1.0 cm x 1.0 cm)
m^2	Square-metres (1.0 m x 1.0 m)
km^2	Square-kilometres (1.0 Km x 1.0 Km)
ha.	Hectares (10,000 m^2)

Length

mm	Millimetres
cm	Centimetres (10 mm)
m	Metres (100 cm)
km	Kilometres (1,000 m)

Currency

US$	United State Dollars
J¥	Japanese Yen
∈	EURO
Lt.	Litas (3.4528Lt/∈)

Weight

mg	Milligram (s)
g	Gram (s) (1,000 mg)
Kg	Kilogram (s) (1,000 g)
Ton, t or MT	Metric tonne (1,000 kg)

Time

sec.	Seconds
min.	Minute (60 Sec.)
hr.	Hours (60 Min.)

Standard Conversions

1 inch = 25.4 mm
1 feet = 0.3048 m

CHAPTER 1 TRAFFIC FORECAST AT KLAIPEDA PORT

CHAPTER 1 TRAFFIC FORECAST AT KLAIPEDA PORT

1.1 Present Cargo Volumes

The total cargo handling volume of at Klaipeda Port reached 19.7 million tons in 2003, and has increased at an annual rate of 4.2% over the last five years.

Tables II.1.1-1 and II.1.1-2 respectively show the total cargo handling volume and the cargo handling volume of oil products at Klaipeda Port from 1992 to 2003 and the cargo handling volumes broken down by major commodities including container cargoes and Ro/Ro cargoes at Klaipeda Port from 1992 to 2001.

Table II.1.1-1 Total Cargo Handling Volume and Cargo Handling Volume of Oil Products at Klaipeda Port from 1990 to 2003

(Units : Thousand Tons)

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Oil Products	5424	7252	4915	2729	4195	3591	2233	3915	5197	5121	6681	6640
Without Oil Products	7499	8666	9594	9980	10634	12527	12770	11056	14199	12115	13058	14552
Total	12923	15918	14509	12709	14829	16118	15003	14971	19396	17236	19739	21192

Source : KSSA

Table II.1.1-2 Cargo Handling Volume Breakdown by Major Commodities

(Units : Thousand Tons)

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Metal & Ferroalloy	1052	1699	2805	3233	3496	4304	5187	3059	4348	1563	1022	973
Scrap Metal	99	237	425	538	342	372	389	211	388	511	681	700
Fertiliser	65	744	1078	1162	1651	1885	2317	2823	2904	2840	3443	3987
Timber	175	264	534	729	536	698	562	686	681	714	944	1073
Grain & Fodder	2533	1543	556	310	440	517	379	159	707	289	745	851
Sugar	57	80	39	55	404	403	367	726	479	561	660	702
Frozen cargo	177	204	327	568	842	940	578	445	376	326	288	322
Cement	105	189	226	210	293	340	303	339	235	145	145	158
Peat	0	0	64	93	94	93	116	115	90	90	62	75
Container	21	16	86	276	385	289	279	268	395	505	731	1099
Ro – Ro	1809	2882	3279	2791	2901	3325	2378	2156	2549	2998	2556	3072
Oil Products	5424	7252	4915	2689	3956	3535	2301	3958	5198	5135	6739	6640
Total	11517	15110	14334	12654	15340	16701	15156	14945	18350	15677	18016	19652

Source : KSSA

Table II.1.1-2 shows that the three principal cargoes in 2003 were oil products (33.8% of total), fertilisers, (20.3%), and Ro/Ro (15.6%), constituting about 70% of total traffic. It also reveals that several of the main commodities have been growing significantly over the last five years, with annual growth rates in excess of 10%. This includes containers (at 32% per annum), oil products (at 23% per annum), scrap (at 13% per annum), fertilisers (at 12% per annum) and sugar (at 14% per annum).

1.2 Existing Traffic Forecasts for Klaipeda Port

Two main sets of traffic forecasts were identified for Klaipeda port and are illustrated in Figures II.1.2-1 and II.1.2-2 below. The first was prepared in April 2000 by the World Bank as part of their appraisal report into the project for the rehabilitation and extension of the port's breakwaters and the deepening of the entrance channel. The second was prepared in July 2002 by the firm PKF for the European Bank for Reconstruction and Development (EBRD) as part of their project to deepen two of the berths at the port used by the operator Bega and to provide associated terminal equipment. The former prepared forecasts by commodity up to the year 2010 and the latter to the year 2015.

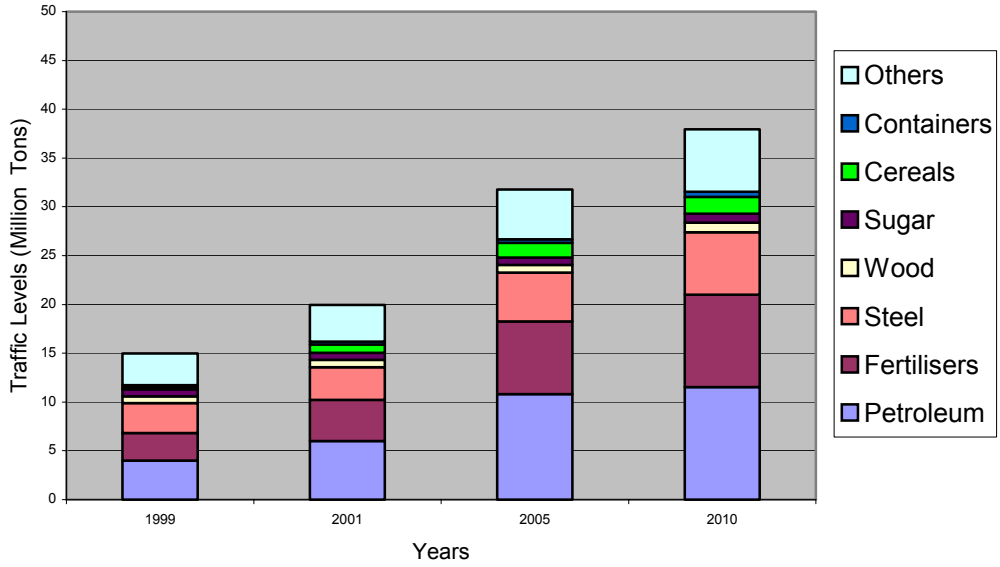


Figure II.1.2-1 Summary of World Bank Forecasts for Klaipeda Port

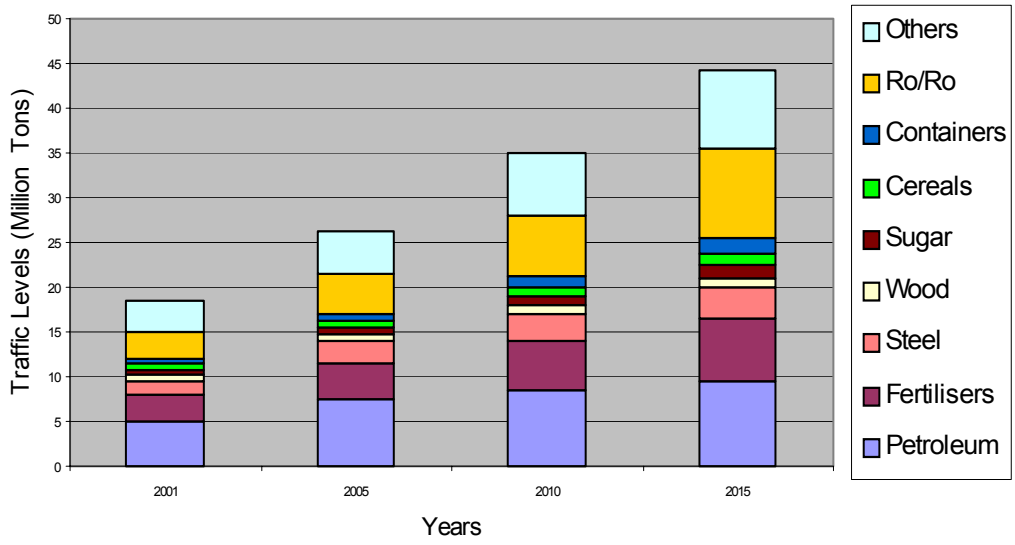


Figure II.1.2-2 Summary of PKF Forecasts for Klaipeda Port

Both sets of forecasts predict similar totals for 2010, with the World Bank forecasting 38.0 million tons and PKF forecasting 34.9 million tons. Using the underlying growth trend in the World Bank's forecasts from 2005 – 2010 (3.61% per annum) to extend their forecasts to 2015 produces an even closer match. The World Bank's forecasts would have predicted a total of 45.3 million tons and the PKF forecasts predicted 44.3 million tons.

Whilst both forecasts predicted a growth in all the major commodities the World Bank forecasts are more optimistic. The underlying annual growth in the World Banks forecasts is 8.8% per annum, compared with 6.4% in the PKF forecasts. The other main difference with the PKF forecasts is that they have separately identified Ro/Ro traffic as a commodity category whereas Ro/Ro cargo was subsumed within the other major commodities of the World Bank forecasts.

Since both sets of forecasts were prepared there have been some changes which have affected the growth in cargo through Klaipeda, in particular the introduction in 2001 of the preferential railway tariffs by the Russian railways which has diverted some of the transit traffic away from Klaipeda to Russian ports. This has affected several of the main commodities, in particular steel traffic.

1.3 Demand Forecasting Overview

For the preparation of the traffic forecasts freight commodities were sub-divided into four separate categories :-

- Lithuanian import traffic
- Lithuanian export traffic
- Inbound transit traffic passing through Lithuania to hinterland CIS countries
- Outbound transit traffic passing through Lithuania from hinterland CIS countries

Where appropriate the ten principal freight commodities were subdivided into these categories and forecasts prepared for each before aggregating the results. The methodology for forecasting imports/exports and for forecasting transit traffic is described separately below.

Two separate scenarios (Cases) were prepared for the forecast of each commodity and for each of the four separate cargo categories described above. Case One scenario represents the pessimistic (low) scenario. Case Two scenario represents the optimistic (high) scenario. The reasons for the variability between the two scenarios depend on the nature of each individual commodity. The main forecast was prepared as an average of the Case One and Case Two scenarios for each commodity.

The study's Terms of Reference required that traffic forecasts should be prepared consistent with the Short Term Development Plan for the year 2015 and Master Plan for the year 2025. Therefore forecasts for each commodity were prepared for the target years 2015 and 2025 against the base traffic levels in 2001 which were the most detailed data available during the forecasting process.

Therefore the freight traffic forecasts consisted of the aggregation of a matrix of 240 individual traffic flows which involved:-

- 10 principal freight commodities

- Lithuanian import/exports and inbound/outbound transit traffic
- Case One (Low) and Case Two (High) scenarios

For the target years 2015 and 2025 against the base year of 2001.

In comparison the forecasts of passenger traffic were relatively simple consisting of arriving and departing passengers for the years 2015 and 2025 against the base of 2001. No separate low/high cases were analysed for passenger traffic.

1.4 Lithuanian Foreign Trade (Exports/Imports) Volume at Klaipeda Port

1.4.1 Procedure of Freight Cargo Forecast

The procedure for forecasting Lithuanian's foreign trade cargoes at Klaipeda Port was:-

1) To set up economic indicators such as GDP and population of Lithuania in the target years which affect the demand for imports and exports
2) To select the major commodities for exports and imports based on the past data of Klaipeda Port
3) To estimate the volumes of the major commodities of Lithuanian's total foreign trade handled by Klaipeda Port in the target years, for both exports and for imports
4) To estimate cargo volumes for each major commodity for exports and imports in the target years

1.4.2 Socio-Economic Indicators in Lithuania

Economic indicators for GDP and population in Lithuania for the target year of the Short Term Plan (2015) were based on forecasts prepared by the OECD and the Lithuanian Ministry of Finance (MOF), and are illustrated in Tables II.1.4-1 and II.1.4-2 below. For the Case One scenario a constant growth rate after 2015 was assumed. For the Case Two scenario it was assumed that the Lithuania's GDP growth rate will slowly accelerate after joining the EU up to 9.8% per annum by 2018, allowing Lithuania's per capita GDP to increase from 39% of the EU average in 2001 to reach 60% of the average by 2025. Several of the more recent members of the EU such as Spain and Portugal experienced significant real growth in GDP following their membership of the EU in the 1980s.

Whilst Table II.1.4-2 shows that Lithuania's population declined by 5.7% between 1991 and 2001 the annual rate of decline has been slowing. With the economic conditions in Lithuania steadily improving and the opportunities provided by the membership of the EU from 2004 it is anticipated that the net out-migration of people over the last 10 years will be reversed. It is assumed therefore that Lithuania's population will slowly increase up to the target years of 2015 and 2025 at 0.5% per annum which was the long term (1950 – 2000) historical population growth rate for the three Baltic States.

Table II.1.4-1 GDP and Population in Target Years

Year	GDP			Per Capita GDP			Population
	Case 1	Estimated by MOF	Case 2	Case 1	Estimated by MOF	Case 2	
	(US$ Million)	(US$ Million)	(US$ Million)	(US$)	(US$)	(US$)	(Million)
2001	7,513	7,513	7,513	2,155	2,155	2,155	3.487
2015	13,237	17,375	17,719	3,616	4,746	4,840	3.661
2025	19,593	32,650	43,542	5,143	8,570	11,429	3.810

Source : Ministry Of Finance and Estimate by the JICA Study Team

The growth rate of GDP from 2001 to 2025 is shown in Table II.1.4-2.

Table II.1.4-2 Annual GDP Growth Rate

Year	Case 1	Case 2
2001 – 2009	4.2%	6.0%
2010 – 2016	4.0%	6.9%
2016	4.0%	7.5%
2017	4.0%	8.5%
2018 – 2025	4.0%	9.8%

Source : OECD and Estimate by the JICA Study Team

1.4.3 Selection of Major Commodities for Import and Export at Klaipeda Port

(1) Foreign trade cargoes in Lithuania

Major Lithuanian export commodities are petroleum and its products, foodstuffs, fertilisers, timber and its products, grains, scrap metal, and others. Major import commodities are natural gas (by pipeline), foodstuffs, fertilisers and its raw materials, and others.

According to the interviews with forwarding agents, the past records of Klaipeda Port and UN Statistical Data, all import and export bulk commodities, timber its products, scrap metal and containers for Lithuanian foreign trade pass through Klaipeda Port. Those commodities which do not pass through Klaipeda port are crude oil (by pipeline) and Lithuania's trade with the CIS countries and with the other Baltic States.

The principal trading partners for the major export commodities are as follows :-

- Petroleum and its products to Great Britain, Latvia, Ukraine, Poland and Estonia
- Foodstuffs to Northern Europe, Germany and Denmark, Great Britain and Russia
- Fertilisers to Western Europe, Germany and Denmark, Southern Europe, Poland and Great Britain
- Timber and its products to Germany and Denmark, Western Europe, America, Great Britain and Southern Europe
- Grains to Belarus, Central Europe, Russia, Germany and Denmark
- Scrap metal to American, Northern Europe, West Asia, Germany and Denmark, and Russia.

Other export cargoes are feeding stuffs for animals, and miscellaneous goods including industrial goods.

The principal trading partners for the major import commodities are as follows :-

- Foodstuffs from Germany and Denmark, Northern Europe, Western Europe and Great Britain
- Fertilisers and their raw materials from Belarus, Russia, Finland, Northern Europe, Germany and Denmark.

The other major import cargoes are miscellaneous goods including industrial goods and feeding stuffs.

(2) Major commodities of Lithuanian foreign trade cargoes at Klaipeda Port

From the records own records, the major export commodities of Lithuanian foreign trade at Klaipeda Port are:-

- Oil and its products
- Foodstuffs
- Fertilisers
- Timber and its products
- Grains
- Scrap metal,
- Containerised cargoes
- Ro/Ro cargoes
- Others.

The major import commodities through the port are :-

- Oil and its projects
- Foodstuffs
- Fertilisers and their materials
- Containerised cargoes
- Ro/Ro cargoes
- Others.

Whilst containerised cargoes and Ro/Ro cargoes are not a specific commodity category they have been treated as such within the forecasts due to the difficulty of discovering the precise type and volumes of commodities contained within them.

1.4.4 Estimation of Lithuanian Foreign Trade Cargoes at Klaipeda Port by Commodity

(1) Foodstuffs

Exports

The exports of foodstuffs through Klaipeda, including containerised cargoes, for the target years of 2015 and 2025 were estimated using the growth rates of the population and per capita GDPs of the two major trading partners for this commodity (Sweden and Denmark) which received approximately 85% of the total exports of foodstuffs in 1999 and 2000. The Case 1 (low) scenario was matched with the actual population growth rate from 1991 – 2001, and the Case 2 (high) scenario was matched with the increase in per capita GDP 2001 – 2010 from the OECD growth rate. These are illustrated in Tables II.1.4-3 and II.1.4-4 below. The export volume (and also import volume) of foodstuffs for conventional ship cargoes was estimated by subtracting the containerised cargo volume from the total estimated volume of foodstuffs.

Tables II.1.4-3 and II.1.4-4 show the economic indices of trading partners and the results of the estimation.

Table II.1.4-3 Annual Growth Rate of GDP and Population in the Trading Partners

Country	Population Growth	GDP Growth
Sweden	0.3%	2.1%
Denmark	0.4%	2.9%

Source : OECD and Estimate by the JICA Study Team

Table II.1.4-4 Forecast Export Volume of Foodstuffs

Units: Thousand Tonnes

Cargo Category	2001	2015	2025
Total Foodstuffs (Case 1)	44	125	129
* Containerised Cargo	-	66	68
* Conventional Style Cargo	-	59	61
Total Foodstuffs (Case 2)	44	157	197
* Containerised Cargo	-	83	104
* Conventional Style Cargo	-	74	93

Source : Estimate by the JICA Study Team

Imports

The import volume of foodstuffs was estimated by major components such as sugar, vegetables/fruits, perishable food products, vegetable oils and other food products.

Except for sugar, imports of foodstuffs were forecast by correlating the volume of foodstuffs imports at Klaipeda Port with the population of Lithuania or by multiplying the average per capita import volume of foodstuffs at Klaipeda Port from 1998 to 2001. Projections for the target years used the future population of Lithuania. Table II.1.2-5 shows the volumes of major components of import foodstuffs from 1997 to 2001.

Table II.1.4-5 Volumes of Major Components of Import Foodstuffs from 1997 to 2000

(Units : Thousand Tons)

Commodity	1997	1998	1999	2000	2001
Vegetable/Fruit	199	117	114	131	97
Food Products		887	1050	725	796
Sugar	402	331	665	411	523
Perishable food products	336	343	278	237	217
Other food products	216	211	106	76	53
Vegetable oil		26	28	13	47
TOTAL	1153	1915	2241	1593	1733

Source: KSSA

Sugar imports through Klaipeda Port were estimated by multiplying the forecast population of Lithuania in the target years with the per capita consumption of sugar. The latter was estimated from past data of CIS and neighbouring countries correlating the per capita GDP and per capita consumption of sugar, as illustrated in Table II.1.4-6 below.

Table II.1.4-6 Per Capita Sugar Consumption and Per Capita GDP

Country	Per Capita Consumption (Kg/Year)	Per Capita GDP (US$)
Armenia	20	1068
Azerbaijan	13	457
Belarus	33	1494
Bulgaria	29	1579
Estonia	32	4666
Georgia	20	526
Hungary	50	5540
Kazakhstan	23	1720
Kyrgyzstan	13	416
Latvia	31	2837
Moldova	27	677
Poland	43	4274
Romania	25	1570
Russia	43	2607
Slovakia	40	4292
Tajikistan	15	402
Turkmenistan	17	1629
Uzbekistan	10	497

Source: Estimate by the JICA Study Team

Table II.1.4-7 shows the results of forecasts of import foodstuffs in the target years.

Table II.1.4-7 Volume of Import Foodstuffs in the Target Years

(Units : Thousand Tons)

Cargo Category	2001	2015	2025
Total Foodstuffs (Case 1) • Containerised Cargo • Conventional Style Cargo	1733	2199 1305 894	3162 1856 1306
Total Foodstuffs (Case 2) • Containerised Cargo • Conventional Style Cargo	1733	2695 1611 1084	3820 2075 1745

Source: Estimate by the JICA Study Team

(2) Oil products

Exports

Over the last five years there has been a significant change in the source of oil products passing through Klaipeda port. In 1997 3.5 million tons were exported, 93% of which was transit traffic from Belarus and Russia. By 2001 exports had grown to 5.1 million tons but the transit cargo share had fallen to 55%. The two main factors behind this are:-

- The privatisation of the Mazeikiai refinery in the late 1990s and their subsequent agreement with Yukos oil company which has improved the reliability of oil supplies to the plant, along with technical improvements to the refinery itself
- The declared preference of the Russian government to concentrate cargoes at Russian ports, including the new oil terminal at Primorsk

Because of the political nature of the export of oil and oil products it was decided to derive the forecasts of export volumes for oil products in the Short Term Plan (2015) and the Master Plan (2025) on the capacity of the Mazeikiai oil refinery in Lithuania and the recent growth in world oil consumption.

The export volume of oil products for the Short Term Plan was estimated by the availability of supply for export of oil products through Klaipeda Port from Mazeikiai Oil Refinery. For the Short Term Plan exports of 7.0 million tons per year were forecast based on the result of interview with Mazeikiai Nafta which discussed the capacity of oil refinery, the internal oil consumption in Lithuania, the export volume to neighbouring countries by land transportation, and the future supply for export through Klaipeda Port.

For the Master Plan the export volume of Lithuanian oil products at Klaipeda Port in 2025 was estimated at 8.0 million tons assuming the annual growth rate of 1.3%, which corresponds to the growth in world oil consumption from 1990 to 2001. Transit traffic was estimated to grow slowly at the same growth rate and mainly relates to traffic from refineries in Belarus.

Table II.1.4-8 shows the result of estimation for export of Lithuania's oil products. No differentiation was made for Case 1 and Case 2 scenarios.

Table II.1.4-8 Outbound Volume of Oil Products in Target Years

(Units : Thousand Tons)

Oil Products	2001	2015	2025
Lithuanian Oil	2327	7000	8000
Transit	2808	3350	3800
Total	5135	10350	11800

Source: Estimate by the JICA Study Team

Imports

Almost of all the import oil in Lithuania comes from a Russia oil company by pipelines. According to KSSA, the Lithuanian government's recent police for oil are to import a large share of its import from South American countries such as Venezuela rather than from the Russian company.

The volume of oil consumption in Lithuania in target years has been estimated based on the relation between per capita consumption of oil and per capita GDP in European and CIA countries, of which major parts of land are located north of latitude 46°N. Table II.1.4-9 shows the per capita GDP and the per capita oil consumption in countries mentioned above.

Table II.1.4-9 Per Capita GDP and Per Capita Oil Consumption in 2001 and 2002

Countries	2001		2002	
	Per capita consumption of oil	Per capita GDP constant 1995 US$	Per capita consumption of oil	Per capita GDP constant 1995 US$
	(Tons)	(US$)	(Tons)	(US$)
Austria	1.57	33,172	1.60	33,480
Belarus	0.59	1,502	0.58	1,579
Czech Republic	0.81	5,574	0.80	5,691
Denmark	1.83	38,710	1.82	39,211
France	1.61	30,492	1.56	30,667
Finland	2.02	32,121	2.10	32,575
Germany	1.60	32,813	1.54	32,807
Hungary	0.66	5,540	0.63	5,735
Iceland	3.19	32,060	3.17	31,835
Ireland	2.34	29,401	2.24	30,157
Kazahstan	0.46	1,717	0.44	1,893
Netherland	2.74	31,333	2.71	31,160
Norway	2.15	38,298	2.07	38,843
Poland	0.50	3,716	0.51	3,762
Romania	0.47	1,541	0.49	1,611
Russia	0.84	2,609	0.85	2,734
Slovenia	1.61	11,978	1.66	12,326
Sweden	1.71	31,627	1.68	32,117
Switzerand	1.81	47,064	1.72	46,993
United Kingdom	1.31	22,697	1.31	23,015
Ukraine	0.26	986	0.26	1,038

Source: EIA

The trend of relations between the per capita consumption of oil and per capita GDP in European and the CIA countries in 2001 and 2002 are very similar according to Table II.1.4-9.

In this study, the per capita oil consumption of Lithuania in the target years has been estimated using the relation between the per capita consumption of oil and per capita GDP in 2001 because the correlation coefficient in 2001 (0.90) is slightly higher than 2002 (0.89).

The oil consumption excluding oil used as low materials for export oil products in Lithuania in the target years has been estimated by multiply the per capita oil consumption and the population in the target years in Lithuania.

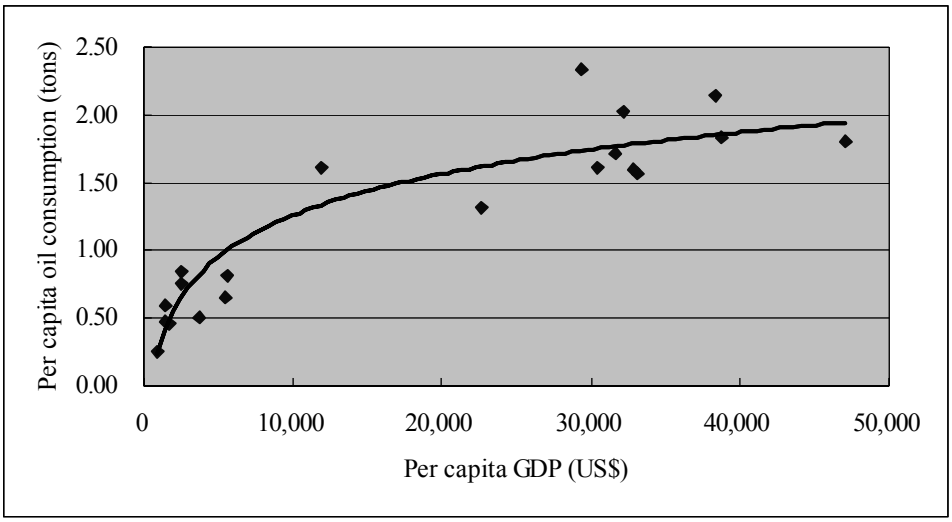


Figure II.1.4-1 The Relation between the Per Capita Consumption of Oil and the Per Capita in 2001 and the Regression Curve

Figure II.1.4-1 shows the relation between the per capita consumption of oil and the per capita GDP in 2001 and the regression curve.

The equation of the regression curve is as follows:

$$Y = 0.442 \text{ Log}_e X - 2.8197$$

Where Y: Per capita consumption of oil (tons/person)

X: Per capita GDP (US$/person)

The import volume of oil except the oil used as raw materials for export oil products in Lithuania in the target years has been estimated by the following formula:

Import volume of oil except oil used as raw material for export oil products	=	Consumption volume of oil except oil used as raw material for export oil products	-	Production volume of Lithuanian oil

If it is assumed that almost all of oil consumption except oil used as raw material for export oil products in the target years is imported from South American countries through Klaipeda Port, and the estimated volume of import oil at Klaipeda Port in the target years are as follows:

Table II.1.4-10 Inbound Volume of Oil at Klaipeda Port

(Units: Thousand Tons

		2001	2015	2025
Import	Case 1	-	1,970	2,540
	Case 2	-	2,350	3,620
	Average	-	2,160	3,080

Source: Estimate by the JICA Study Team

(3) Fertilisers

Exports

For the Case 1 scenario the estimate is determined by the total annual volume imported by consuming countries, and Lithuania's share of this total market. The export volume of fertilisers is principally affected by imports from Western and Northern European countries which take approximately 90% of Lithuania's fertiliser exports. As the total annual consumption volume of fertilisers in these countries does not fluctuate much an important factor will be the market share achieved by Lithuania's exports.

The annual consumption volume in Western and Northern Europe was set at 18.6 million tons, which was estimated from the average consumption volume of fertilisers throughout the area from 1991 to 2001. The maximum share of import volume of Lithuanian fertilisers in this region was derived from the trend in market share and set at 26.5% for both the Short Term Plan to 2015 and the Master Plan to 2025.

For the Case 2 scenario the estimate is determined by the expected growth rate in Lithuania's fertiliser production and the proportion of this exported. According to information from a major fertiliser supplier, the overall annual growth rate of production volume of fertilisers in Lithuania is approximately 3.9% from 2003 to 2015 (13% between 2003 and 2006). The supplier also stated that Klaipeda Port accounts for about 90% of the production volume in Lithuania, so it is reasonable to assume that the growth through the port will mirror the annual growth rate of export volume of fertilisers.

The results of the estimation under the above conditions are shown in Table II.1.4-11.

Table II.1.4-11 Cargo Handling Volume for Export Fertiliser at Klaipeda Port in Targets Years

(Units : Thousand Tons)

Year	Case 1	Case 2
2001	2374	2374
2015	5200	5600
2025	5200	6100

Source: Estimate by the JICA Study Team

Imports

The total import volumes of phosphates and apatite were estimated by combining the forecast fertiliser export volumes in the target years with the ratio of phosphates/apatite imports to total fertiliser exports as shown from past records. Imports from CIS countries were excluded as they are unlikely to pass through Klaipeda Port. Table II.1.4-12 below show the results of estimating the import volume of fertilisers at Klaipeda Port in the target years.

Table II.1.4-12 Import Volume of Fertilisers at Klaipeda Port in the Target Years

(Units : Thousand Tons)

Commodity	2001	Case 1		Case 2	
		2015	2025	2015	2025
Potash	12	33	33	35	51
Apatite	827	1775	1775	1911	2799
Total	839	1807	1807	1946	2850

Source: Estimate by the JICA Study Team

(4) Timber and Timber products

The volume of timber exports from Lithuania was estimated as the difference between domestic production and domestic consumption for the target years. Production was based on the projected forestry cutting area in the target years relative to those areas designated for forest preservation. Consumption was based on per capita timber consumption estimated from past data. It was assumed that forest preservation will place a limit on the volume of timber production and that it will not expand beyond the volume reached in the Short Term Plan in 2015.

Table II.1.4-13 shows the result of estimation for the export volume of timbers and their products at Klaipeda Port in the target years.

Table II.1.4-13 Export Volume of Timbers and Their Products at Klaipeda Port in Target Years

(Units : Thousand Tons)

Commodity	2001	Case 1		Case 2	
		2015	2025	2015	2025
Timber	714	1138	1138	1195	1195

Source: Estimate by the JICA Study Team

(5) Grain

The average volume of wheat exports from Lithuania over the last four years was used to estimate the export volumes at Klaipeda Port in the target years. According to the statistics data of the Agriculture Department of US the export volume of wheat (the major component of export grains in Lithuania) has actually been declining at 6.0% per year between 2001 and 2003. Almost all the trading partners of Lithuanian grain exports are Western and Central European countries.

Table II.1.4-14 shows the export volumes from 1999 - 2003 and the results of the forecasts.

Table II.1.4-14 Export Volume of Grains from Lithuania in Target Years

(Units : Thousand Tons)

	Actual					Estimated	
Year	1999	2000	2001	2002	2003	2015	2025
Volume	145	102	340	150	100	167	167

Source : Agriculture Department of US and Estimate by the JICA Study Team

(6) Scrap Metal

In general, scrap metal is generated by the growth in the economy. The growth rate in the volume of scrap metal is assumed to have increased with the steady growth in the Lithuania economy since 1994.

Therefore, the average growth rate of the export volume from Klaipeda Port was set at 2.35% which was used to obtain the export volumes of scrap metal through Klaipeda Port in the target years as shown in Table II.1.4-15.

Table II.1.4-15 Export Cargo Handling Volume of Scrap at Klaipeda Port

(Units : Thousand Tons)

	Actual					Estimated	
Year	1997	1998	1999	2000	2001	2015	2025
Volume	372	389	211	388	511	700	900

Source: KSSA and Estimate by the JICA Study Team

(7) Ro/Ro

As shown by Table II.1.1-2, Ro/Ro traffic from 1993 to 2001 through Klaipeda Port has increased slightly but with some large fluctuations. The forecasts for the target years were based on the trend of Ro/Ro traffic and the relationship with the GDP growth in Western Europe/Scandinavia which are the destinations of the principal ferry services. The amplitudes in traffic have been used to determine the Case 1 (low) and Case 2 (high) scenarios. It is anticipated that Ro/Ro traffic through Klaipeda will continue to increase but there are clearly a wide range of political and economic factors which influence this traffic and account for the significant and rapid changes in volumes which have occurred. It is also anticipated that the growth in traffic will gradually tail off due to the rapid increase in containerised traffic which is described below.

Table II.1.4-16 shows the estimated volumes of Ro/Ro cargoes in the target years.

Table II.1.4-16 Volumes of Ro/Ro Cargoes

(Units : Thousand Tons)

	Case 1			Case 2		
Year	Export	Import	Total	Export	Import	Total
2001	635	2363	2998	635	2363	2998
2015	764	2708	3472	893	3167	4060
2025	764	2708	3472	894	3171	4065

Source: Estimate by the JICA Study Team

(8) Containers

Most of the container cargo trade is with various European countries. The estimation of the container cargo volumes in the target years at Klaipeda Port was obtained as follows:-

- For export container cargos, the volume was obtained by correlating the per capita GDP of the EU with the container cargo volume to Western Europe
- For import container cargo, the volume was obtained by a correlation with Lithuania's per capita GDP
- Lithuania's container cargo volumes for 2015 and 2025 were converted into TEUs. This was achieved using a relationship between per capita GDP and the total export/import container units (TEU) which was obtained from data of various countries regarding their per capita GDP and TEU. This correlation shows that there is a maximum limit to the total TEU volume.
- The estimated TEUs of Lithuania for 2015 and 2025 were confirmed by the correspondence with the relationship of per capita GDPs and volume of TEUs from various countries around the world.

Table II.1.4-17 below shows the estimated volumes of containerised cargoes in the target years.

Table II.1.4-17 Volume of Containerised Traffic at Klaipeda Port in Target Years

(Units : Thousand Tons)

Containers	2001	Case 1		Case 2	
		2015	2025	2015	2025
Exports	184	580	760	780	1180
Imports	227	1420	2028	2890	3440
Total	411	2000	2788	3670	4620

Source: Estimate by the JICA Study Team

(9) Other Cargoes

In this study, other cargoes is composed the difference between the total cargo volume (refer to Table II.1.1-1) and total major cargo volumes (refer to Table II.1.1-2) except cement and peat.

Other cargoes is estimated using the ratio between the total cargo volume without oil and the other cargoes volume because the almost of the contents of other cargoes are not cleared and difficulty of confirmation.

The estimation of the ratios is performed for the export, import, outbound and inbound transits using the source data of KSSA statistics.

Table II.1.4-18 shows the other cargoes for estimated the target years.

Table II.1.4-18 Other Cargo Volumes

(Thousand tons)

Year	Export		Import	
2000	485		799	
2001	427		1,302	
Estimated				
	Case 1	Case 2	Case 1	Case 2
2015	15,910	16,750	9,409	12,248
2020	17,316	18,910	11,090	15,823

Source: Estimate by the JICA Study Team

1.5 Transit Cargo Volumes

1.5.1 Basis

1) The past data of Klaipeda Port since 1997 was used to select the relevant the hinterland countries to be included

2) The specific transit traffic cargoes were chosen with reference to the principal foreign trade cargoes of the hinterland countries, their trade partners for these cargoes, and the data at Klaipeda Port since 1997.

3) The pattern of trade partners in the hinterland area is assumed to be substantially the same as current.

4) The routes for transit cargoes were selected considering their respective operating costs, and the competitiveness of the sea routes and ship sizes in the Baltic and Black Seas.

1.5.2 Methodology

The transit cargo volumes at Klaipeda Port in the target years were estimated by the following procedure:-

- Definition of the hinterland area
- Identifying the major trade cargo items which may pass through Klaipeda Port as transit cargoes (major transit cargo items) broken down by the hinterland countries and identifying their trade partners.
- Estimating the volumes of major transit cargo items by individual country
- Selecting the transport route for major transit cargo items by individual country
- Totalling the volumes of major transit cargoes passing through Klaipeda Port

(1) Selection of hinterland countries

According to the past data transit cargoes at Klaipeda Port principally come from four countries - Kazakhstan, Ukraine, Belarus, and Russia. Because of their geographical location these countries were designated to be the hinterland countries of Lithuania in this study for the estimation of transit cargo volumes.

Estimations by IMF, OECD and other international agencies were used to establish the economic indices (mainly GDP and population) of these hinterland countries in the target years. Where long term estimates of GDP and population were not

available (mainly for 2025), those which were (mostly up to 2015) extended by trend analysis.

For cargo volume estimations in this study, the transport costs between the origin and destination of each major commodity were obtained for countries neighbouring Lithuania and those in the hinterland areas. As for other countries, they were grouped geographically, and the transport costs were obtained for each group.

(2) Transit cargoes and identifying trading partners

The major trade cargo volumes of hinterland countries and their trade partners were identified from their Origin-Destination pattern of their data and from data at Klaipeda Port

1) Kazakhstan

Exports

- Grains: Russia, West Asia, CIS countries, countries on the east coast of the Black Sea
- Crude iron: Middle Europe, West Europe, Russia, West Asia, American Continent

Imports

- Sugar: American Continent, South Africa and North Europe

2) Ukraine

Exports

- Fertilisers: West Asia, South Asia, East Asia, Southern Europe
- Crude iron: South Asia, East Asia, North Africa, American Continent, Southern Europe, West Asia, Balkan area
- Semi-finished and finished steel products: South Asia, East Asia, Russia, Balkan area, North Africa, Central Africa, American Continent

3) Belarus

Exports

- Petroleum products: three Baltic States, CIS countries, Russia, Europe – Germany and Denmark
- Fertilisers: CIS countries, West Asia, American Continent, South Asia, East Asia

Imports

- Sugar: American Continent, Russia and Poland.
- Sundries (container cargoes) : From a variety of countries.

4) Russia

Exports

- Grains: Countries along the east coast of the Black Sea, West Asia, South Europe, East Asia, North Africa
- Iron and Steel: South Asia, East Asia, West Asia, American Continent, UK and Ireland, North Africa

(3) Estimation of the trading volumes of major transit cargo items broken down by hinterland countries

1) Kazakhstan

Exports

- Grains : The annual average export growth rate was calculated from the past export data of Kazakhstan grain, and the export volumes for the target years were derived using this growth rate. Volumes were distributed among trade partner countries according to their export records.
- Crude iron : Using the correlation between the actual production volume and GDP the production volumes for the target years were estimated. It was possible to estimate the domestic consumption in Kazakhstan for the target years by combining the per capita consumption of crude iron with an elasticity value of per capita GDP. Differences between the production and the consumption were deemed to be the export volume, which was then distributed amongst trade partners according to the actual records.

Imports

- Sugar : The forecast of imported sugar in the target years are performed using the correlation between per capita import volume and per capita GDP and multiplying the estimated population in the target years with the per capita supply of sugar. The per capita supply volume was estimated based on the past record of the neighbouring countries, CIS countries and major European and North American countries, as illustrated in the following Figure.

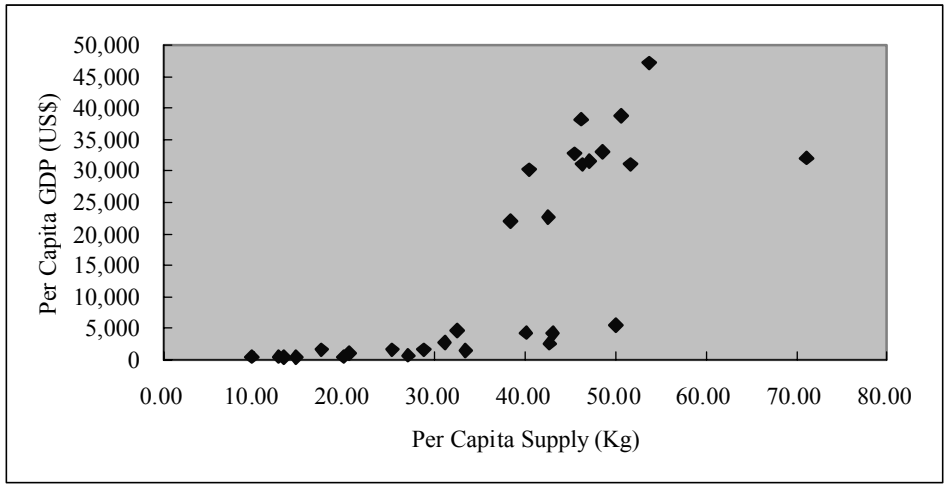


Figure II.1.5-1 Per Capita Sugar Supply and Per Capita GDP

2) Ukraine

Exports

- Fertilisers : The export volumes in the target years by Ukraine's major trade partners were estimated based on the ratio of actual imports (by major trade partners) and the export growth rate of Ukraine (by their major trade partners). Volumes were distributed amongst trade partners according to the actual records.
- Crude iron : Production in Ukraine for the target years were estimated using a correlation between actual production volume and GDP in Ukraine. Consumption in Ukraine for the target years was obtained using a correlation between per capita consumption of crude iron and per capita GDP in Ukraine. The difference between Ukraine's production and consumption was deemed to be the export volume, which was then distributed amongst trade partners according to the actual records.
- Semi-finished and finished iron and steel products : The production volume in the target years was estimated using a correlation between actual production volume and GDP in Ukraine. For the Case 1 (low) scenario the export volume of these products in the target years was obtained from the ratio between the actual growth in production and actual exports, and then distributed amongst trade partners according to the actual export records. For the Case 2 (high) scenario the export volume in the target years was estimated using a time-series analysis and distributed amongst trade partners.

3) Belarus

Exports

- Petroleum products : Destinations of Belarus' petroleum product exports are mainly to CIS and West European countries. It is assumed that the former will go overland either by pipeline or rail. It was estimated that the exports to Western Europe through Klaipeda port would grow slowly from 2.8 million tons in 2001 to 3.35 million tons by 2015 and 3.8 million by 2015.
- Fertilisers : The export volumes for the target years (by trade partners) were estimated using the ratio of actual growth rates of import fertilizers in their trade partners, and then distributed amongst partners by the actual export records.

Imports

- Sugar : The method of the import sugar estimation in Belarus is performed using the correlation between the per capita import volume of sugar and per capita GDP. The GDP in Belarus is estimated using the GDP growth rate which was projected by OECD.

4) Russia

Exports

- Grains : Import volumes in the target years of trade partners for the grain exports from Russia were estimated by time-series and using the correlation

with their population. The export volumes in the target years were estimated using Russia's grain export growth rates..

- Iron and steel : Russia's iron and steel production volume in the target years was obtained by a correlation analysis with GDP. Iron and steel consumption volumes in the target years was obtained from the ratio of the rate of per capita GDP growth to the rate of per capita iron and steel consumption growth. Having obtained the production and consumption volumes it was then possible to estimate the volume of iron and steel exports as the surplus of production over consumption.

(4) Volumes of major transit cargo items broken down by transport routes and trade partners

The transport routes for transit cargoes were selected by approximating the transport costs from the operating costs by routes and cargo format (loose, bulk, containerised, etc), and by the cargo handling costs. The traffic volumes were distributed by the different transport routes using a formula based on the relative proportion of the inverse of the total transport costs along them. As a result, the volumes by the transport distances and transport units affected the transport costs considerably. The distance of land transport largely affects the transport costs. In this study, the costs of infrastructure and time are not included.

Final distribution of cargoes by routes involved a mixture of the transport costs formula, the quality of road network conditions, the competitiveness of sea routes and ship size, and the opinions of users (such as cargo owners and operators). As part of this it was assumed that increasing congestion at the Bosporus Straits will prevent vessels above 100,000 DWT from using the Black Sea.

The unit costs differ by countries because of difference in labour costs. Sea transport costs differ considerably depending on the ship type and size. The ship types were therefore largely classified into two (container ships and bulk/general cargo).

In the stage of cost calculation, it became clear that only limited amount of information regarding Russia's labour and commodity costs was available. As Russia currently strongly has the policy of using their own transport organs and ports, and as considerable cargo volumes are expected in the future, this interim report did not include Russia's transit cargoes in its calculation. However, Russia's prospective membership of the World Trade Organisation (currently planned for 2007) will remove this bias and it is expected that some of the transit traffic to/from Russia will return to Klaipeda. This was considered in a series of different transport and growth scenarios which were tested using a transport network model as described in 1.8 below.

(5) Totalling of major transit cargo volumes at Klaipeda Port

The cargo volumes passing through Klaipeda Port under the above conditions and methods were totalled, and the result is deemed as the transit cargo volume at Klaipeda Port. A variety of totals have been produced as detailed in Tables II.1.6-1 and II.1.6-2 below. These include:-

- For each commodity (both outbound, inbound) for 2001, 2015, and 2025, and also for both Case 1 and Case 2 scenarios

- For each commodity, total for both Case 1 and Case 2 scenarios, and the average total between the two cases
- Total cargo flows (outbound, inbound, total and average) for both scenarios, for 2001, 2015, and 2025.

1.6 Cargo Volumes at Klaipeda Port in the target years

Based on the results of above estimation, the cargo volumes handled at Klaipeda Port in the target years are shown in the tables below.

Table II.1.6-1 Summary of Traffic Volumes at Klaipeda Port in Target Years

(Units : Thousand Tons)

Destination	2001	Case 1		Case 2		Average	
		2015	2025	2015	2025	2015	2025
Outbound	12,629	26,064	33,242	27,568	36,050	26,816	34,646
Inbound	5,679	9,604	11,428	12,534	16,395	11,069	13,912
Total	18,308	35,668	44,670	40,102	52,445	37,885	48,558

Source: Estimate by the JICA Study Team

Table II.1.6-2 Traffic Volumes Handled at Klaipeda Port in the Target Years

Unit for cargo: thousand ton
for passenger:person

Commodity	Year	Transit cargo						Foreign trade cargo						Total		Average(Total)		
		Outbound		Inbound		Total		Export		Import		Total				Outbound	Inbound	Total
		Case1	Case2	Case1	Case2	Case1	Case2	Case1	Case2	Case1	Case2	Case1	Case2	Case1	Case2	-	-	
Metal	2001	1,505	1,505	0	0	1,505	1,505	0	0	0	0	0	0	1,505	1,505	1,505	0	1,505
	2015	2,072	2,109	0	0	2,072	2,109	0	0	0	0	0	0	2,072	2,109	2,091	0	2,091
	2025	2,724	2,816	0	0	2,724	2,816	0	0	0	0	0	0	2,724	2,816	2,770	0	2,770
Scrap	2001	0	0	0	0	0	0	511	511	0	0	511	511	511	511	511	0	511
	2015	0	0	0	0	0	0	700	700	0	0	700	700	700	700	700	0	700
	2025	0	0	0	0	0	0	900	900	0	0	900	900	900	900	900	0	900
Fertilizer	2001	467	467	0	0	467	467	2,374	2,374	839	839	3,213	3,213	3,680	3,680	2,841	839	3,680
	2015	3,367	3,757	0	0	3,367	3,757	5,200	5,600	1,807	1,946	7,007	7,546	10,374	11,303	8,962	1,877	10,839
	2025	7,168	7,980	0	0	7,168	7,980	5,200	6,100	1,807	2,850	7,007	8,950	14,175	16,930	13,224	2,329	15,553
Timber	2001	0	0	0	0	0	0	714	714	1	1	715	715	715	715	714	1	714
	2015	0	0	0	0	0	0	1,138	1,195	0	0	1,138	1,195	1,138	1,195	1,167	0	1,167
	2025	0	0	0	0	0	0	1,138	1,195	0	0	1,138	1,195	1,138	1,195	1,167	0	1,167
Grain	2001	222	222	44	44	266	266	23	23	0	0	23	23	289	289	245	44	289
	2015	1,051	1,185	0	0	1,051	1,185	167	167	0	0	167	167	1,218	1,352	1,285	0	1,285
	2025	1,792	2,020	0	0	1,792	2,020	167	167	0	0	167	167	1,959	2,187	2,073	0	2,073
Foodstuffs	2001	388	388	0	0	388	388	44	44	843	843	887	887	1,275	1,275	432	843	1,275
	2015	304	417	0	0	304	417	59	74	894	1,083	953	1,157	1,257	1,574	427	989	1,416
	2025	442	524	0	0	442	524	61	93	1,306	1,745	1,367	1,838	1,809	2,362	560	1,526	2,086
Others	2001	0	0	0	0	0	0	427	427	1,302	1,302	1,729	1,729	1,729	1,729	427	1,302	1,729
	2015	0	0	0	0	0	0	312	341	610	812	922	1,153	922	1,153	327	711	1,038
	2025	0	0	0	0	0	0	326	382	701	1,001	1,027	1,383	1,027	1,383	354	851	1,205
Container	2001	0	0	61	61	61	61	184	184	227	227	411	411	471	471	184	288	471
	2015	0	0	195	286	195	286	580	780	1,420	2,890	2,000	3,670	2,195	3,956	680	2,396	3,076
	2025	0	0	338	572	338	572	760	1,180	2,028	3,440	2,788	4,620	3,126	5,192	970	3,189	4,159
Ro-ro	2001	0	0	0	0	0	0	635	635	2,363	2,363	2,998	2,998	2,998	2,998	635	2,363	2,998
	2015	0	0	0	0	0	0	764	893	2,708	3,167	3,472	4,060	3,472	4,060	829	2,938	3,766
	2025	0	0	0	0	0	0	764	893	2,708	3,167	3,472	4,060	3,472	4,060	829	2,938	3,766
Oil and Oil products	2001	2,808	2,808	0	0	2,808	2,808	2,327	2,327	0	0	2,327	2,327	5,135	5,135	5,135	0	5,135
	2015	3,350	3,350	0	0	3,350	3,350	7,000	7,000	1,970	2,350	8,970	9,350	12,320	12,700	10,350	2,160	12,510
	2025	3,800	3,800	0	0	3,800	3,800	8,000	8,000	2,540	3,620	10,540	11,620	14,340	15,420	11,800	3,080	14,880
Total cargo	2001	5,390	5,390	104	104	5,494	5,494	7,239	7,239	5,575	5,575	12,814	12,814	18,308	18,308	12,629	5,679	18,308
	2015	10,144	10,818	195	286	10,339	11,104	15,920	16,750	9,409	12,248	25,329	28,998	35,668	40,102	26,816	11,069	37,885
	2025	15,926	17,140	338	572	16,264	17,712	17,316	18,910	11,090	15,823	28,406	34,733	44,670	52,445	34,646	13,912	48,558
Passenger	2001	-	-	-	-	-	-	-	-	-	-					48,244	52,933	101,177
	2015	-	-	-	-	-	-	-	-	-	-					108,046	104,099	212,145
	2025	-	-	-	-	-	-	-	-	-	-					148,285	142,868	291,153

Source: Estimate by the JICA Study Team

Figures II.1.6-3 and II.1.6-4 shows the relative growth in total and individual commodities based on the average volumes between the Case 1.and Case 2 scenarios.

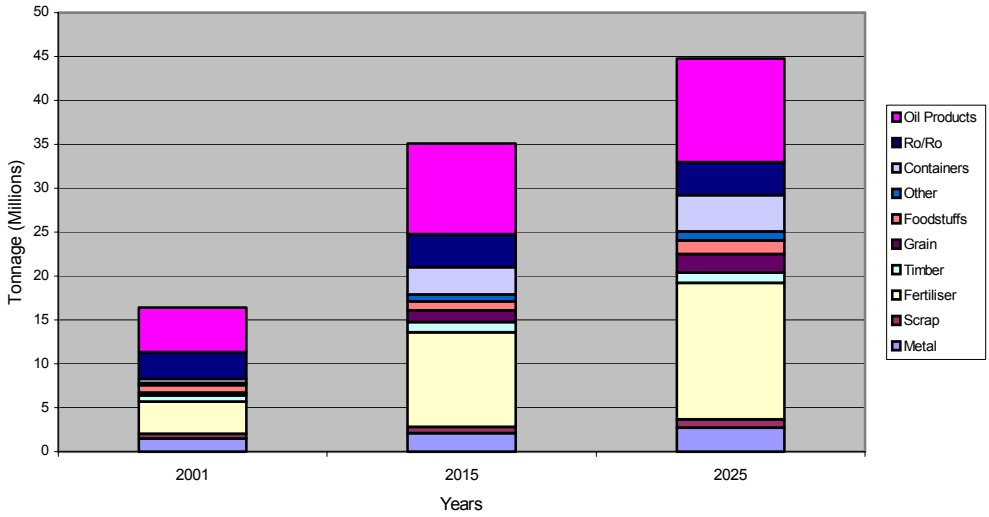


Figure II.1.6-1 Summary of Forecast Growth at Klaipeda Port

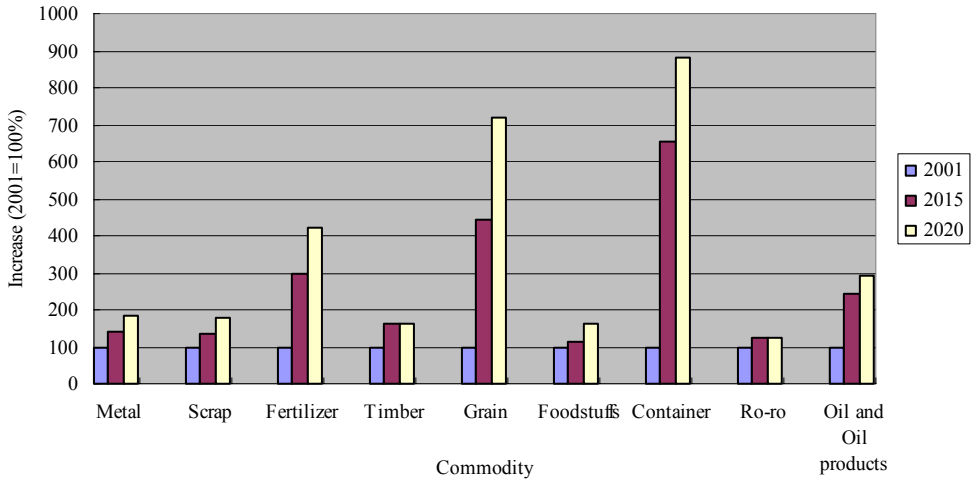


Figure II.1.6-2 Summary of Traffic Growth by Commodity 2001 - 2025

From these forecast results the following conclusions can be made:-

- Between 2001 and 2015 traffic levels are expected to more than double from 18.3 million tons to 37.9 million tons, leading to an underlying annual growth rate of between 1.1% (for Case 1) and 2.2% (for Case 2). Thereafter up to 2025 growth increases slightly and traffic volumes still increase by another 28% to 48.6 million tons. The overall annual growth rate from 2001 – 2025 ranges from 3.8% (for Case 1) to 4.5% (for Case 2).
- The principal traffic growth is in outbound transit and Lithuanian exports (especially oil products and fertilisers). Outbound traffic as a proportion of the total grows from 70% of the total in 2001 to 71% by 2025.

- Compared with the central 'average' forecasts the outbound and Inbound scenarios represent variations of +/- 7.7% (Outbound) and +/- 8.7% (Inbound).
- All commodities are forecast to increase although their growth rates vary significantly as a result of the underlying factors which determine their growth. The lowest annual growth rate is for Ro/Ro traffic (at 1% 2001 – 2025) and the highest growth rate is for containerised cargo (at 9% 2001 – 2025). The four commodities which grow at the fastest rate are containers, fertilisers, grain and 'other' (principally cement and peat).
- In terms of volume (tons), the commodities forecast to increase the most are oil products, containers, fertilisers, and grain traffic (outbound transit traffic). It is the growth in these commodities which will be the principal driving force behind the expansion of the port.

Whilst the forecasts for the Master Plan period (to 2025) are very close to the long term forecasts prepared by the World Bank and by PKF for the EBRD described in section 1.2, but the time period is different. The previous forecasts reached the total of about 48.6 million tons in 2025. The current forecasts predict traffic growth of 37.9 million (with up to +/-4.2 million by Case) by 2015. There are a number of factors which account for the variation in the current forecasts from the previous:-

- In the PKF forecasts Ro/Ro traffic more than triples from 3.0 to 9.9 million by 2015. Whilst the current forecasts for the Short Term Plan and Master Plan predict some increase in Ro/Ro traffic it is considered that the substantial predicted growth in containerisation will reduce its growth. The historical statistics in Ro/Ro traffic have also shown that it is can be subject to significant changes.
- Steel/Metal traffic forecasts are lower due to the diversion of much of the Russian traffic to their own ports as a result of the railway tariff policy. The PKF forecasts predicted significant growth in steel traffic from 2001 to 2005 and volumes more than doubling by 2015. The World Bank's forecasts were even higher. The growth rate underlying this Short Term and Master Plan is significantly lower than both previous forecasts.
- Whilst both the World Bank and PKF forecasts have included a very significant volume of 'other' traffic (more than 3 million tons), the 'other' traffic for the Short Term and Master Plans is based on the cargo information revealed in Table II.1.1-2 and is significantly smaller. Even though the annual growth rates are similar to the World Bank and PKF the much lower starting volumes leads to significantly lower forecast future volumes.
- Oil products are almost midway between the higher World Bank and the PKF forecasts. Therefore there is no significant variation between the different forecasts in oil products.
- The one traffic where the traffic forecast significantly more than predicted by the PKF forecasts is for fertilisers. Whilst both sets of forecasts have similar long term underlying growth rates (6.2 – 6.6% per annum) the initial starting volume for the Short Term and Master Plan also includes the imports of raw materials for fertiliser production. It also extends over a longer period up to 2025.

1.7 Passenger Forecasts

These were forecast considering the long term trend in passenger traffic and is principally related to the growth in ferry services. Significant numbers of German visitors arrive into Klaipeda by ferry during the summer months. In addition there are a regular number of cruise ships which call at the recently refurbished terminal facilities on the edge of the old town of Klaipeda.

The forecasts adopt a growth rate of 5.4% in the Short Term Plan and 4.5% in the Long Term Plan. KSSA's passenger figures reveal a slight imbalance between arriving and departing passengers (52% arrivals against 48% departures) as a number of the visitors who arrive at the port exit Lithuania overland by another route. This imbalance has been maintained for the target years. The forecasts are illustrated in Table II.1.7-1 below.

Table II.1.7-1 Forecast Passenger Volumes

(Units : Thousand Passengers)

	2001	2015	2025
Departures	48.24	108.05	148.29
Arrivals	52.93	104.10	142.87
Total	101.17	212.15	291.16

Source: Estimate by the JICA Study Team

1.8 Impact of Transport and Growth Scenarios on Traffic Demand

Separately for the main forecasting exercise of the study, discussions were held with a transport firm in Helsinki, Finland about the suitability of using a pre-existing traffic model to assess the impact of changes to the transport network on traffic movements. The firm had previously built a road/rail traffic model of the Baltic and western CIS area for EU TACIS studies.

The Helsinki firm had built a new traffic model which incorporates Western Europe, Scandinavia, and a zonal system of western Russia. It is called the Freight Transport Model in Europe and Russia (with the acronym FRISBEE), the initial purpose of which was to investigate detailed traffic movements between Finland and Russia, and principally shows traffic movements to/from Russia. It is built in STAN which is a variant of the EMME2 transport planning software used widely around the world. The model is able to show 'plots' of the forecast traffic volumes along route links for a variety of different scenarios. Whilst it was not possible to adapt the model significantly to include other traffic flows to/from the Baltic States and other CIS countries the results did allow a number of significanct conclusions to be reached.

Six different scenarios were defined and tested:

1) With and without the Russian preferential railway tariff to/from Russian ports

2) Reduction in border crossing delays with the accession of the Baltic States and Poland to the EU next year

3) How far Poland is a bottleneck to transit traffic due to its poor roads and transit permit restrictions

4) How planned transport improvements in the Baltic States will redistribute traffic flows

5) The impact of the growth in Gross Domestic Product up to the year 2015

6) The impact of Ust Luga and Primorsk on port capacity at St Petersburg.

Whilst the results, concentrating on traffic flows to/from Russia, do not provide the full picture of freight flows through the Baltic States, the scenarios tested did reveal how traffic patterns are likely to react to the factors within each scenario. From this it is clear that the growth in GDP leads to the most significant overall increase in traffic levels. Individual factors which will have significant affects on local traffic flows through the ports are the removal of the preferential Russian railway tariffs, the reduction in border crossing delays on accession of the Baltic States and Poland to the European Union, and the localised growth in traffic to/from St Petersburg as a result of the developments in port capacity in the area.

1.9 Conclusions

It can be concluded, therefore, that Klaipeda port can anticipate a significant increase in traffic during the period of the Short Term Plan (to 2015) and the Master Plan (to 2025). Cargo traffic levels have shown a strong and consistent growth over the last few years and this is anticipated to continue to about 38 million tons by 2015 and 49 million tons by 2025. All major commodities are anticipated to grow with some, such as metal traffic and Ro/Ro traffic, growing relatively slowly whilst others, such as containerised traffic, anticipated to grow rapidly. In volume terms the largest growth is anticipated in fertilisers. Variations in traffic levels by low/high growth scenarios are only anticipated to alter volumes by a relatively small amount (5 - 7%). A similar strong growth in passenger traffic is also anticipated, increasing from about 100,000 passengers in 2001 to almost 300,000 by 2025.

CHAPTER 2 MASTER PLAN OF KLAIPEDA PORT

CHAPTER 2 MASTER PLAN OF KLAIPEDA PORT

2.1 Basic Concept of Development of Klaipeda Port

The purpose of the Master Plan for the development of Klaipeda Port (target year 2025) is to serve as a target and guideline for phase plans including the Short-Term Plan (target year 2015). Prior to making the Master Plan, the objectives of the development of the Port have been recognized as follows:

- To meet the future functional and quantitative demand to the Port,
- To back up Lithuanian industries in the international market through providing economical and efficient port services,
- To strengthen the competitiveness of the Port to neighbouring Baltic seaports so as to attract transit cargoes.

The following current bottlenecks and disadvantages have also been recognized:

- Long turnaround times in railway access to the Port

  Complicated configuration of railway sidings and direct loading/unloading from/onto railway cars on dockside causes time-consuming and long turnaround times in railway access to the Port,

- Shortage of storage areas within the existing port territory

  Compared with stevedoring capacity on dockside, storage areas are short, which causes inefficient direct loading/unloading from/onto railway cars on dockside.

- Non-existence of deepwater berths to accommodate Baltmax-type vessels

  Klaipeda Port has no deepwater berths to accommodate Baltmax-type vessels, which put the Port at a disadvantage in competitiveness to the neighbouring Baltic seaports that have already deepwater berths with a water depth of 17 m or more.

- Shortage of spacious available lands in the port territory

  There are scarcely available lands within the existing port territory to attract investment from potential investors outside the port. The existing port territory is adjacent to the urbane area of Klaipeda City and expandable areas are limited even considering lands reserved for port use. By contrast, spacious lands are prepared within their territory of the neighbouring Baltic seaports so as to attract port-related enterprises.

Taking the above aspects into account, the Master Plan has been made according to the following principles:

- To propose a port development plan within the existing port territory so as to make the most of the potential port capacity of the existing territory,
- To propose port expansion plan in case of the shortage of the existing port capacity to the future demand,

- To propose a port development/expansion plan to resolve present problems and disadvantages of the Port and to meet the future requirements for the Port considering an anticipated change in required functions.

Based on the above principles, the Master Plan has been made according to the following steps:

- First step

  The potential port capacity of the existing port territory (reserved areas are included) has been estimated and compared with the future demand in the target year. A port development plan within the existing port territory to make the most of the potential port capacity has been proposed.

- Second step

  A port expansion plan has been made to meet the future demand in excess of the potential port capacity within the existing port territory. When making the port expansion plan, two options, viz. an outer port expansion plan and an inner port expansion have been compared.

From the above, the following concept of the development of Klaipeda Port has been proposed:

- Establishment of an outer port on the north of the existing port entrance

  It has been proposed to establish an outer port on the north of the existing port entrance. The main functions of the new port are:

  - To handle cargoes to be overflowed from the existing port in the stage of the Master Plan,
  - To provide deep-sea berths to accommodate Baltmax-type vessels,
  - To provide sufficient storage areas for port cargoes so as to back up efficient cargo-handling operations both on seaside (stevedoring) and landside (railway connection),
  - To provide streamlined railway sidings enabling short turnaround time in railway access to the port,
  - To provide lands for port-related activities such as export-processing zone (FEZ) and distribution centres (logistic centres).

- Improvement of the sea channel

  It has been proposed to improve the existing sea channel so as to enable two-way navigation protected from waves penetrating from the open sea by new breakwaters.

- Conversion of the land use from reserved status into port use

  It has been proposed to convert the land use from reserved status into port use in the middle of the port territory so as to increase the existing port capacity through the preparation of additional storage areas.

- Improvement of the siding railways within the existing port territory

  It has been proposed to improve the existing siding railways so as to increase the existing port capacity through the preparation of additional lines.

2.2 Port Capacity Analysis

2.2.1 Methodology

(1) General

Based on the basic concept mentioned in Section 2.1 and the results of the demand forecast shown in Chapter 3, the Master Plan has been made through the port capacity analysis using a computer simulation model. The computer simulation reveals the complicated movements of cargoes and their transport means comprising vessels, railway cars and trucks within the Port as outlined in Figure II.2.2-1. The results of the simulation have been used to estimate potential port capacity of the existing port territory. Then, the estimated capacity has been compared with the required capacity to meet the future demand for the Port to verify whether port expansion outside the existing port territory is necessary in the future.

The potential capacity of the existing port territory is defined as the maximum capacity that could be reached with additional investment within the existing port territory and the reserved area for the port use. The additional development plan required to maximize the existing capacity is incorporated in "the Development Plan within the Existing Port Territory". The port capacity is divided into the two categories: seaside capacity (navigation and berthing) and landside capacity (storage and railway access).

(2) Seaside Capacity

The seaside capacity is determined by the combination of the capacities of access channel and berths. An auspice of saturation in the seaside capacity is found in a sharp increase in the number of ships waiting offshore. The shortage of capacity in specified berths with high berth occupancy rate causes offshore ship waiting in specified ships using the berths. On the other hand, the shortage of access channel capacity also causes offshore waiting but incurred by every calling ships. The resulting figures of the simulation reveal causes of seaside saturation.

As to the seaside capacity, there are two categories. One is the capacity adequate to keep a service level for a calling vessel at a port that is expressed the percentage of an offshore waiting time to a turnaround time from arrival to departure of a vessel at a port (hereinafter referred to as "the adequate seaside capacity"). The figure of 10% is generally used as the service level especially in the leading European ports symbolically advertising that "We don not make calling vessels wait", and in this study the figure has been used as a criterion to determine the seaside capacity. In 2025, an average service time at Klaipeda Port is estimated 34 hours and hence "10% service level" means that target of an average waiting time is less than several hours (3.4 hours).

The other is the capacity that enables the number of vessels receivable at berths to maximize during a certain period (one year), in which offshore ship waitings are on

the verge of unstable conditions indicating an auspice of a sharp increase in waiting times (hereinafter referred to as "the absolute seaside capacity").

The following conditions of the simulation related to the seaside capacity have been used:

- Access channel (the sea channel and inner channel)

  The channel conditions as of the year 2004 have been used (see Figure II.2.2-2). By the year, the on-going dredging works will have been completed by KSSA. As to the navigation rule through the channels, the current rule stipulated by the Harbour Master Office has been applied. From the first buoy to the bottom of the Port, navigating vessels are under one-way control. In the inner channel, ships with drafts less than 7 m are allowed to pass each other. There are three widened places that are used both passing places and turning basins. In the simulation, it was assumed that the minimum interval of coming vessels entering the sea channel is kept to be 10 minutes through the navigation control by the Harbour Master Office by taking account of regulated vessel speed along the channel resulting the distance of one mile between navigating vessels. The distance is considered to satisfy to keep exclusive waters around navigating vessel for preventing collision with other vessels (approximately 10 times of vessel length (LOA).). In the simulation it was also assumed that the navigation is controlled in somewhat idealistic conditions without considering some irregularities such as bad whether preventing a pilot from getting on board and delay of arranging a pilot boat. Such idealistic conditions are considered to avoid underestimation of the said channel capacity.

- Berths

  The berth conditions as shown in Tables II.2.2-1 and II.2.2-2 have been used. The on-going or planned renovation works for berths have been assumed that the works would be completed.

- Shore cranes

  Loading/unloading capacities of the existing shore cranes have been used (see Chapter 2, Section 2.2 of Part I). The installation of new cranes planned by the terminal operators has also been considered.

- Vessel arrival pattern

  In case of liners such as container and Ro/Ro ships, regular schedules referred to the present schedule by shipping routes have been used. On the other hand, in case of trampers, a random arrival pattern has been applied.

(3) Landside Capacity

On the other hand, as to the landside capacity, the capacities of storage and railway access have been assumed to be limitless in the simulation. In the case of the storage capacity, the resulting figure of the maximum storage volume at a peaking condition in the simulation period (one year) has been compared with the existing capacity in each cargo item. In case where the required storage capacity exceeds the existing capacity, then the expansion of storage capacity needs to be planned at suitable places within the existing territory, reserved areas or a new port territory.

In the case of the railway access capacity, the resulting figure of the maximum traffic volume at a peaking condition in the simulation period has been compared with the existing railway capacity in each siding railway zones: the North Zone and the South Zone. In case where the maximum traffic volume exceeded the existing capacity, then the expansion of railway capacity has been planned within the existing territory or reserved areas (see Section 2.3.4). As to cargo train arrival pattern in case of outbound cargo, it has been assumed that a train would start to bring specified cargo into the port storage before a certain period from an arrival date of a vessel to receive the cargo.

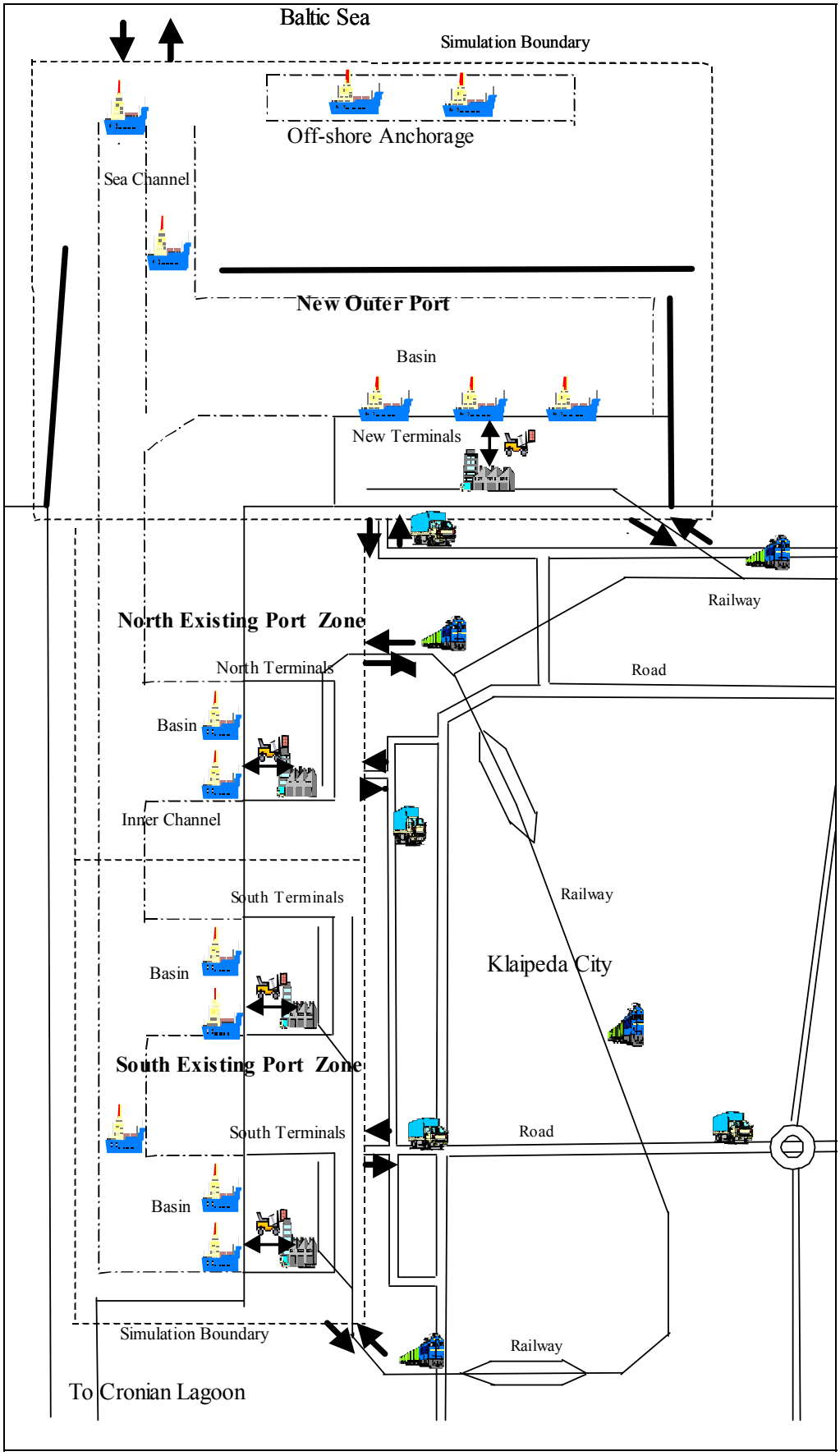


Figure II.2.2-1 Movements of Cargoes within the Port

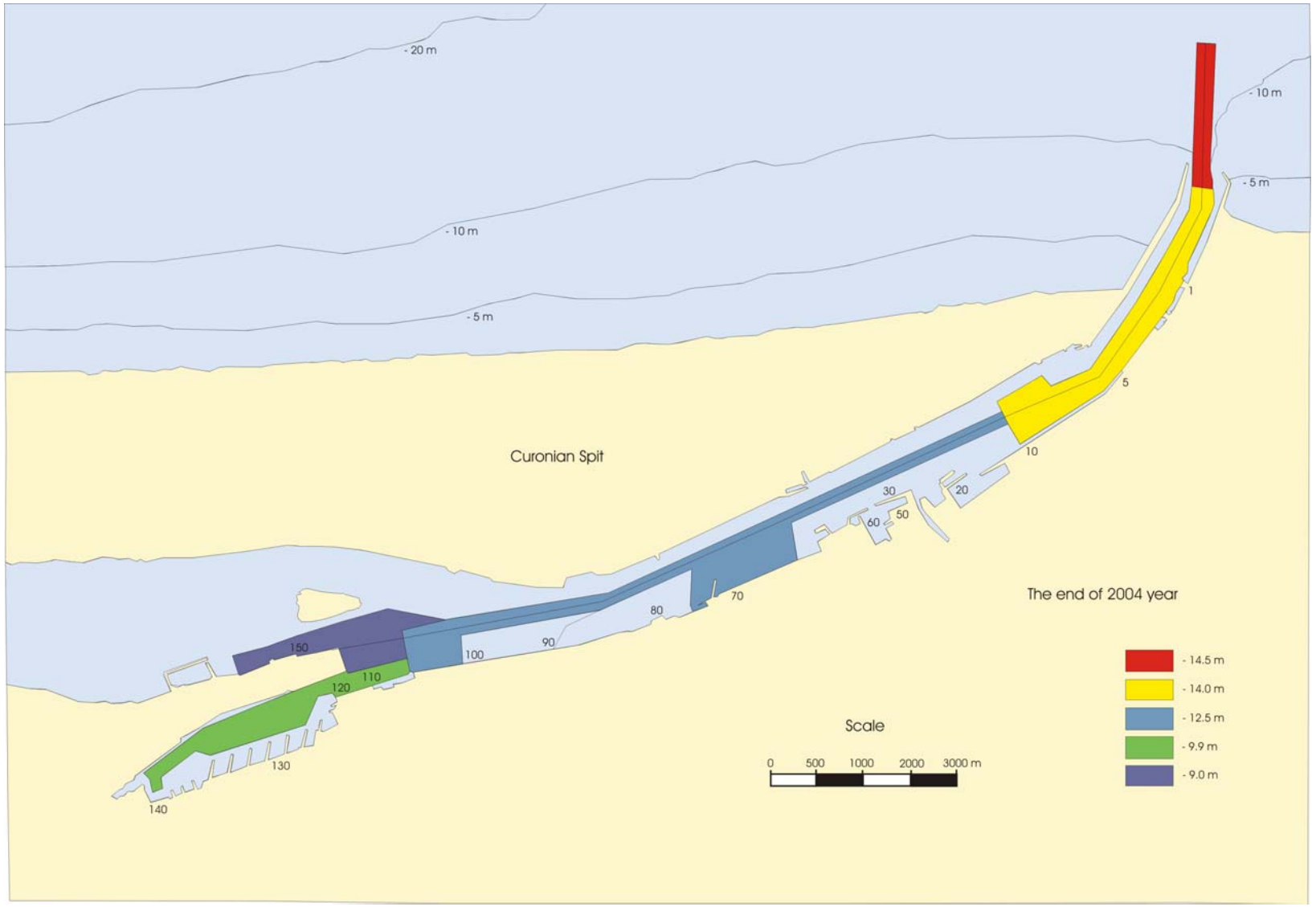


Figure II.2.2-2 Channel Conditions of the Port (as of year 2004)

Table II.2.2-1 Berth Allocation Conditions Used in Simulation (1) - Master Plan

Port Zone	Ship Category No.	Cargo Item	Storage		Actual Cargo-Handling Productivity (tons/hr.)	Allocated Berth No.											
North	1	Ferro alloys	Public	1	94	3	6	7	8								
	2	Ammonium nitrate	Public	2	88	11	13	14	15	16							
	3	Steel products	Public	3	82	3	7	8									
	4	Steel Products	Public	4	56	3	6	7	8								
	5	Fuel oil	Dedicated	1	816	1	2	48									
	6	UAN solution (1)	Dedicated	2	564	4											
	7	Gasoline	Dedicated	3	675	1	2	48									
	8	DAP(1)	Dedicated	4	600	5	6										
	9	Wheat(1)	Dedicated	5	540	4											
	10	Jet Fuel	Dedicated	6	493	1	2	48									
	11	Diesel oil	Dedicated	7	631	1	2	48									
	12	Apatite(1)	Dedicated	8	265	5	6	7									
	13	Raw sugar (1)	Dedicated	9	110	6	7	8									
	14	Frozen Fish (1)	Dedicated	10	34	9	10	12									
South	15	Fruit	Public	1	44	25	26	27									
	16	Scrap	Public	2	66	26	27	28	40								
	17	Timber	Public	3	96	19	26	27	28	29	30	36	37	38	39	40	41
	18	Miscellaneous	Public	4	50	29	30	31	32	40							
	19	Cement	Public	5	79	20	26	27	28								
	20	Fish Meal	Public	6	27	28	29	30									
	21	Stones	Public	7	71	26	27	28									
	22	Scrap	Public	8	46	26	27										
	23	UAN solution (2)	Dedicated	1	564	22											
	24	Potash	Dedicated	2	350	22	23	33	35								
	25	DAP(2)	Dedicated	3	350	21	22	23									
	26	Wheat(2)	Dedicated	4	540	25											
	27	Urea	Dedicated	5	93	21	33	35									
	28	Other dry fertilizer	Dedicated	6	350	21	23	33	35								
	29	Rapeseed	Dedicated	7	61	18											
	30	Ammonium sulphate	Dedicated	8	176	20	21	23									
	31	Apatite (2)	Dedicated	9	265	19	20	21									
	32	Raw sugar (2)	Dedicated	10	110	19	20	21									
	33	Frozen Fish (2)	Dedicated	11	34	28	29	30									
	34	Malt	Dedicated	12	52	28	29	30									
	35	Frozen Meat	Dedicated	13	20	28	29	30									
	36	Frozen food	Dedicated	14	21	28	29	30	31								
	37	Molasses	Dedicated	15	79	24											
Outer Port	38	Ferro alloys(3)	Public	1	400	52											
	39	Steel products (load) (3)	Public	2	200	52											
	40	Fuel oil(3)	Dedicated	1	816	1	2	48									
	41	UAN solution (3)	Dedicated	2	900	49											
	42	DAP(3)	Dedicated	3	1,500	50	51										
	43	Wheat(3)	Dedicated	4	900	49											
	44	Apatite(3)	Dedicated	5	265	50	51										
	45	Raw sugar (3)	Dedicated	6	400	50	51										
	46	Potash (3)	Dedicated	7	1,500	50	51										
	47	Urea(3)	Dedicated	8	1,500	50	51										
	48	Ammonium sulphate(3)	Dedicated	8	1,500	50	51										
	49	Orimulsion (3)	Dedicated	9	1,180	1	2	48									

Source: The JICA Study Team

Table II.2.2-2 Conditions Used in Simulation (2)

Berth No. in Simulation	Actual Berth No.	Terminal Operator	Water Depth (m)
1	No. 1	Klaipeda Nafta	14.0
2	No. 2	Klaipeda Nafta	14.0
3	No. 3	Cargo Terminal	14.0
4	No. 4	KLASCO	14.0
5	No. 5	KLASCO	14.0
6	No. 6,7	KLASCO	14.0
7	No. 7,8	KLASCO	13.0
8	No. 8,9	KLASCO	13.0
9	No.10	KLASCO	9.0
10	No. 11	KLASCO	9.0
11	No. 12	KLASCO	10.0
12	No.13,14	KLASCO	8.0
13	No. 15	KLASCO	8.0
14	No. 16	KLASCO	8.0
15	No. 17	KLASCO	8.0
16	No. 18	KLASCO	8.0
17	No. 66	BEGA	6.0
18	No. 67	BEGA	6.0
19	No. 67,68	BEGA	12.0
20	No. 68,69	BEGA	12.0
21	No. 70	BEGA	12.0
22	No. 71	BEGA	12.0
23	No. 72	BEGA	12.0
24	No. 80	Molasses	10.0
25	No. 82	Smelte	12.0
26	↓	Smelte	12.0
27	↓	Smelte	12.0
28	↓	Smelte	12.0
29	↓	Smelte	12.0
30	↓	Smelte	12.0
31	↓	Smelte	12.0
32	No. 100	Smelte	12.0
33	No. 101	Smelte	12.0
34	↓	Smelte	12.0
35	No. 104	Smelte	12.0
36	No.118	Peat	7.5
37	No. 127	Klaipeda Terminal	7.5
38	No. 128	Klaipeda Terminal	7.5
39	No. 130	Klaipeda Terminal	7.5
40	No. 140	Western Ship Yard	10.0
41	No. 141	Timber Terminal	10.0
42	No. 143	Eurogate (KLASCO)	10.0
43	No. 144	Eurogate (KLASCO)	10.0
44	No. 146	Eurogate (KLASCO)	10.0
45	No. 147	Eurogate (KLASCO)	10.0
46	No. 150	Ro/Ro Terminal	8.0
47	No. 151	Ro/Ro Terminal	8.0
48	Outer No.1	Petroleum Jetty	17.0
49	Outer No.2	Grain Terminal	17.0
50	Outer No.3	Fertilizer terminal	17.0
51	Outer No.4	Fertilizer Terminal	15.0
52	Outer No.5	General Cargo Terminal	15.0
53	Outer No.6	Container Terminal	15.0

Source: The JICA Study Team

2.2.2 Seaside Capacity (Navigation and Berthing)

According to the results of the simulation, the annual cargo throughput of the Port would reach the adequate capacity (10% service level) in 2010 with the throughput of 27 million tons per annum and then absolute capacity in 2017 with the throughput of 34 million tons per annum, generating the absolute saturation caused partly by the shortage of berth capacity and partly by the shortage of the channel capacity. In the stage of the Master Plan with the target year 2025, even if the port is expanded deep inside the port so as to increase the berthing capacity to receive excess cargo overflowed from the existing port saturated in 2017 the Port will not be able to meet the whole demand due to the limitation of channel capacity that will saturate before the year 2025 despite the low berth occupancy rates (see Table II.2.2-3 and Figures II.2.2-3 to II.2.2-5).

Table II.2.2-3 Cargo Throughput and Service Level

Development Case	Year	Cargo throughput (million tons)	Service level at the whole port
Without development case	2002	20	5%
	2010	27	10%
Existing port development (A) only	2015	32	20%
	2017	34	26%
	2019	37	57%
(A) + Inner port expansion	2025	48	611%
(A) + Outer port expansion	2025	48	7%

Source: Estimate by the JICA Study Team

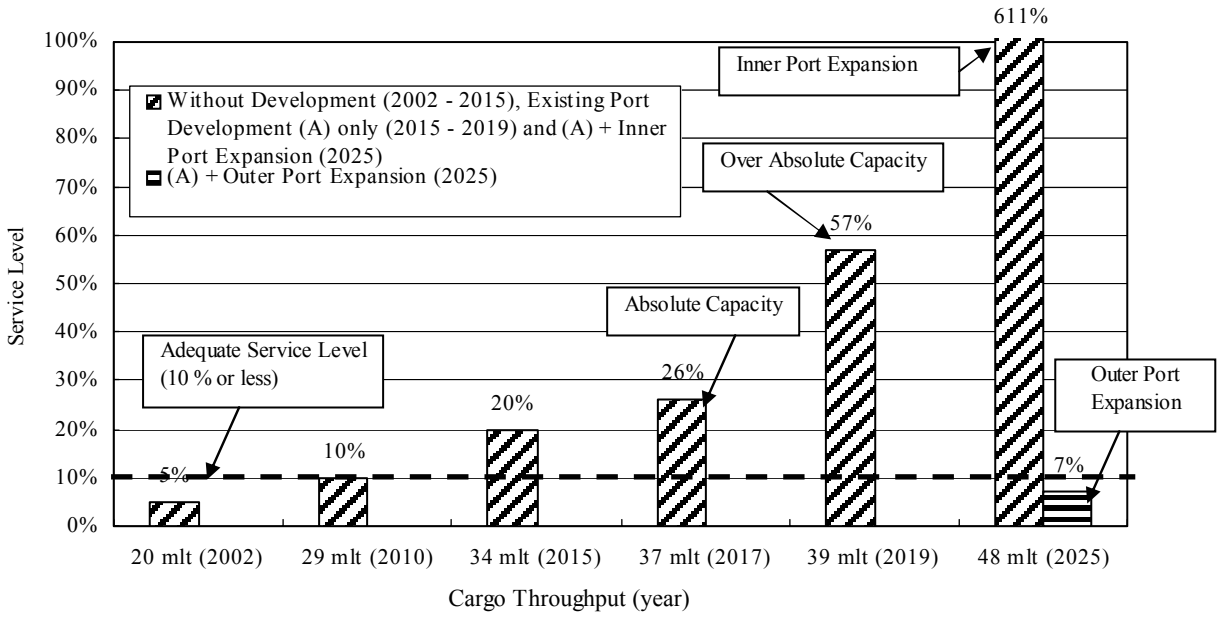
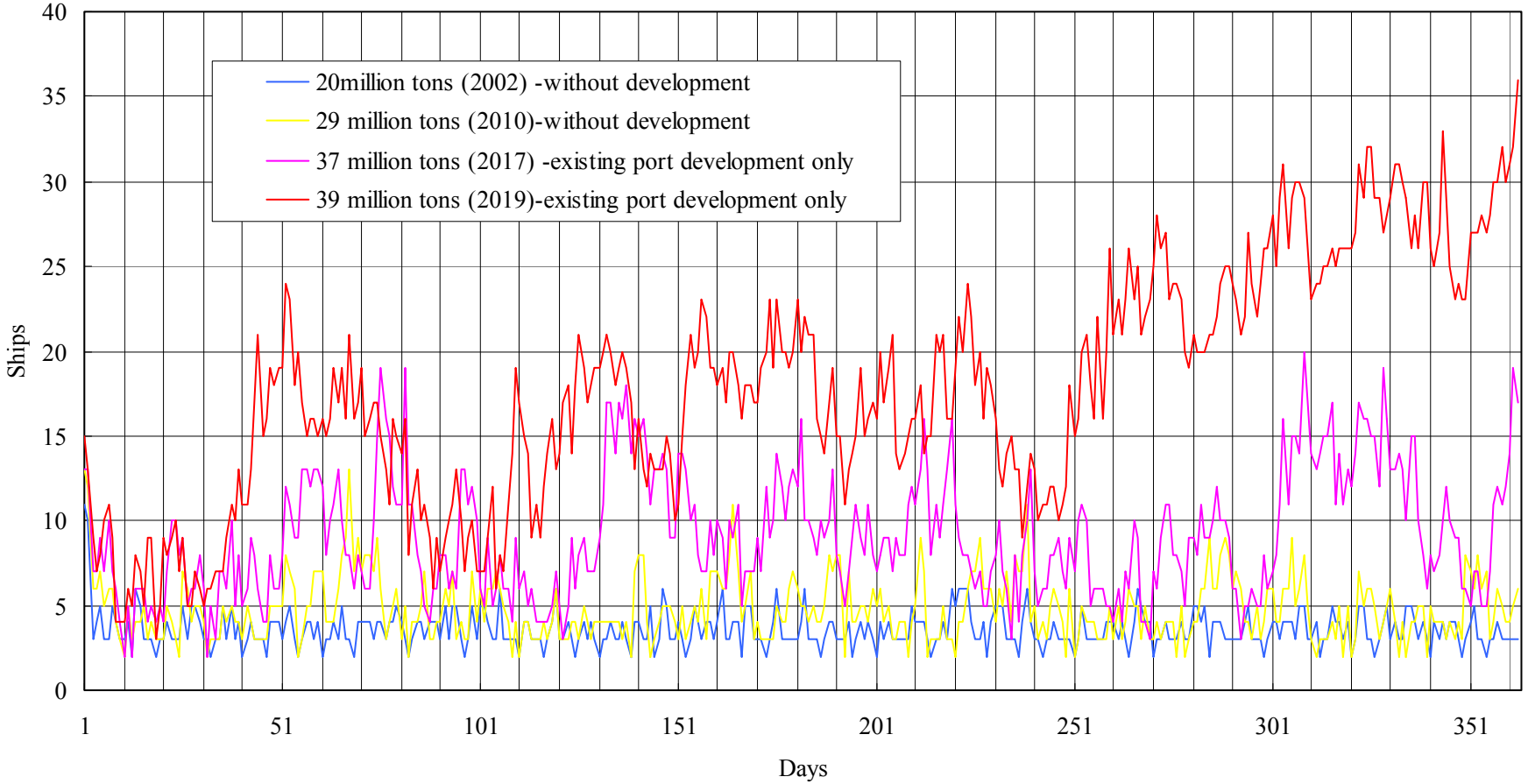
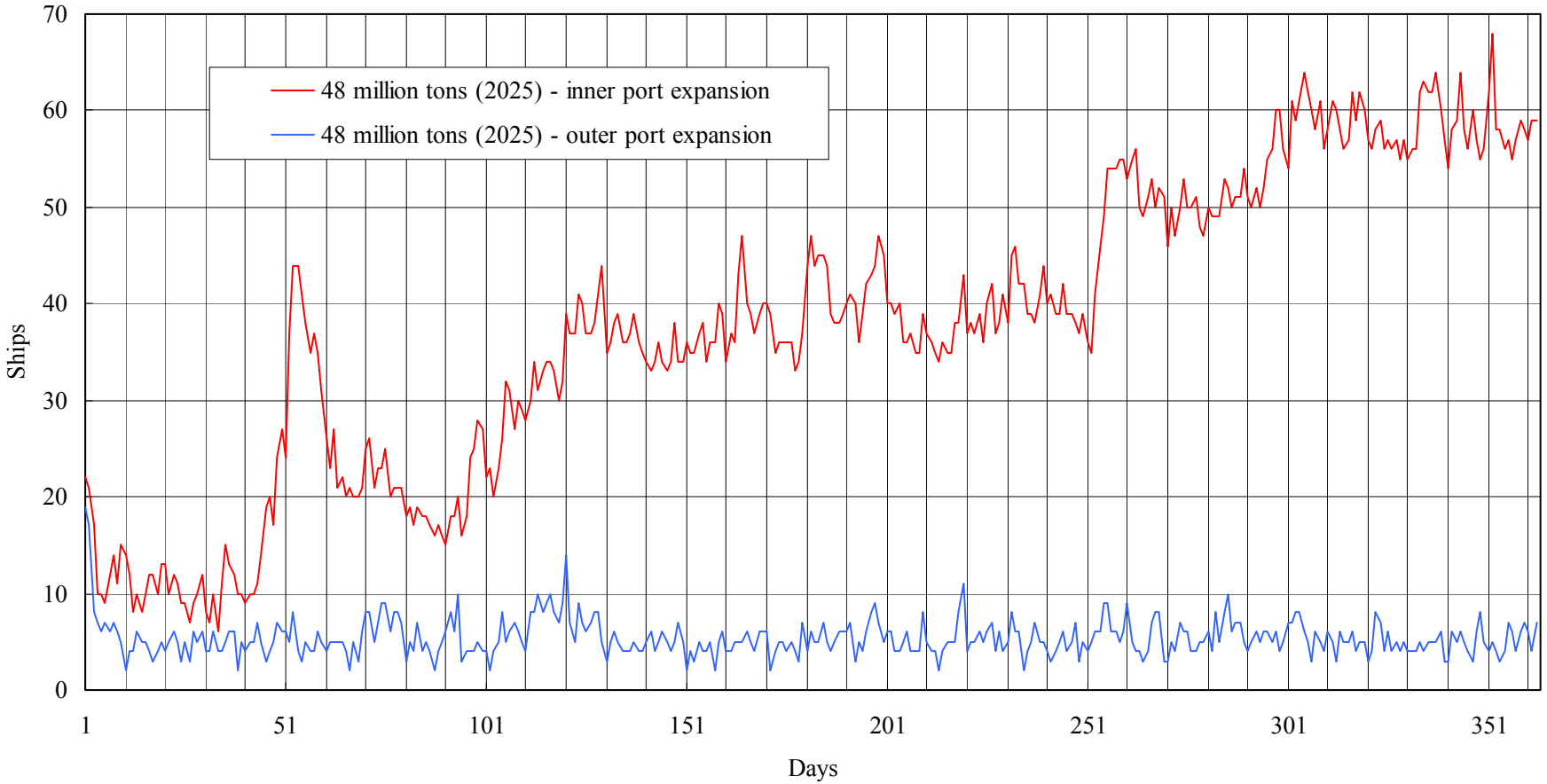


Figure II.2.2-3 Port Service Levels in Master Plan



Source: The JICA Study Team

Figure II.2.2-4 Number of Offshore Waiting Ships at Klaipeda Port (Existing Port Development Only)



Source: The JICA Study Team

Figure II.2.2-5 Number of Offshore Waiting Ships at Klaipeda Port (Port Expansion with Existing Port Development)

2.2.3 Landside Capacity (Storage and Railway Access)

(1) Storage

According to the results of the simulation, the required storage capacities would exceed the existing capacity in the year 2015 as the target year of the Short-Term Plan with the shortage of the storage area of 9 ha for the existing port irrespective of the outer port expansion. Then in the year 2025 as the target year of the Master Plan with the shortage of the storage area of 34 ha as a total: 10 ha within the existing port territory and 24 ha at the Outer Port area (see Table II.2.2-4 and Figure II.2.2-4).

It has been estimated that within the existing port territory and the reserved area behind berths, approximately 19 ha could be converted for port cargo storage use. Thus, in this study towards the year 2025, it has been planned to gradually convert the area reserve for port use into the lands mainly for cargo storage for the existing port (10 ha). The remaining 24 ha storage area required for the Outer Port has been planned to place just behind their deepwater berths (see Section 2.4).

Table II.2.2-4 Required Storage Capacities in Master Plan

Year	Port territory	No.	Category	Annual throughput (unit: '000 t, '000 TEUs)	Storage Capacity (unit: '000 t)				Additionally required storage area (Unit: ha)
					Type of storage	Existing	Required	Balance	
2015	Existing port	1	Petroleum	9,333	Tank	485	582	-98	1.2
		2	Dry fertilizer	6,768	Warehouse	252	375	-123	2.7
		3	Liquid fertilizer	2,490	Tank	177	138	40	-
		4	Grains	1,285	Silo	80	120	-40	0.4
		5	General cargo	6,762	Open yard	178	57	121	-
					Warehouse	63	26	37	-
		6	Frozen food	334	Cold storage	25	40	-15	1.5
		7	Containers	350	Stacking yard	82	124	-42	4.2
2025	Existing port	1	Petroleum	12,000	Tank	485	683	-198	2.4
		2	Dry fertilizer	7,555	Warehouse	252	362	-110	2.4
		3	Liquid fertilizer	2,500	Tank	177	167	10	-
		4	Grains	924	Silo	80	101	-21	0.2
		5	General cargo	7,593	Open yard	178	55	123	-
					Warehouse	63	55	8	
		6	Frozen food	334	Cold storage	25	40	-15	1.5
		7	Containers	290	Stacking yard	60	102	-42	4.2
	Outer Port	2	Dry fertilizer	2,564	Warehouse	-	309	-309	6.9
		3	Liquid fertilizer	1,466	Tank	-	143	-143	1.1
		4	Grains	1,149	Silo	-	165	-165	1.8
		5	General cargo	1,297	Open yard	-	33	-33	3.3
					Warehouse	-	10	-10	1.0
		7	Containers	290	Stacking yard	-	95	-95	9.5

Source: Estimate by the JICA Study Team
Note (1): Required storage capacities of general cargo and containers are expressed in '000 sq. m

(2) Railway Access

The existing railway capacity has been broadly evaluated zone by zone as briefed below. Railway capacities of the main terminals are shown in Table II.2.2-5.

1) North Zone

The freight volume forecast for the year of 2025 at Klaipedos Nafta and Klasco are approximately 12.0 million tones or 740 wagons per day and 8.7 million tones or 520 wagons per day, respectively. According to the results of calculation, Klasco handling volume is exceeding maximum capacity of 8.8 million tones due to the current condition of access line which restrict transport capacity. Recently LG has started to overhaul this section to replace of all existing concrete and wooden sleepers by prestressed concrete sleepers, and laid on crushed rock ballast. Furthermore, they are planning to replace existing 12m rail by new 25m rail in the near future. In that case, maximum capacity will be 9.3 million tonnes which can handle till the year of 2025 as the target year of Master Plan. As for the Klaipedos Nafta, maximum capacity is 10.0 million tonnes. Therefore it will be exceed in the year of 2021.

2) South Zone

The freight volume forecast for the year of 2025 at BEGA and Smelte are approximately 5.1 million tones or 310 wagons per day and 3.1 million tones or 190 wagons per day, respectively. The transport capacity of this line has been examined through caluculation. Since the amount of handling volume is extended so far, with improvement of operation and management to be performed, it will exceed in the year of 2012. Therefore, it is necessary to construct the additional access line for the South Zone and new yard for Smelte.

3) Marshalling Yard

Since Klaipeda and Draugyste Marshalling Yard have sufficient capacity, they can handle forecast freight volume in the year of 2025 as the target year of the Master Plan. However, examination for the main line transport capacity should carried out in the future. Because number of freight and passenger train which depart and arrive from each station will be increase. Especially, between Klaipeda and Pauoscio Yard section which conflict with freight train to the terminals and passenger or freight train to the station. It is necessary to have careful examination for train movement also.

Table II.2.2-5 Railway Capacity of Terminal and Access Line

Zone	Terminal Operator	Year	Handling Volume per year (tonne)	Handling Wagon per day (wagon)
North	Klasco	Maximum Handling Volume	9,300,000	550
		2002 Handling Volume	4,800,000	300
		2015 Handling Volume	9,300,000	550
		2025 Handling Volume	8,700,000	520
	Access Line (Klasco)	Maximum Transport Capacity	9,300,000	550
	Klaipedos Nafta	Maximum Handling Volume	10,000,000	630
		2002 Handling Volume	5,900,000	350
		2015 Handling Volume	7,800,000	470
		2025 Handling Volume	12,000,000	740
	Access Line (Klaipedos Nafta)	Maximum Transport Capacity	16,200,000	970
South	BEGA	Maximum Handling Volume	6,200,000	370
		2002 Handling Volume	2,200,000	130
		2015 Handling Volume	4,700,000	280
		2025 Handling Volume	5,100,000	310
	Smelte	Maximum Handling Volume	4,800,000	290
		2002 Handling Volume	1,800,000	100
		2015 Handling Volume	2,400,000	150
		2025 Handling Volume	3,100,000	190
	Access Line (BEGA&Smelte)	Maximum Transport Capacity	6,200,000	370

Source: Estimate by the JICA Study Team

2.3 Port Development Plan within Existing Port Territory

Port development plan within the existing territory has been proposed herein that has made by using the results of the port capacity analysis as mentioned in Section 2.2. On-going or planned projects by KSSA or terminal operators have been incorporated in this proposal.

2.3.1 Expansion Plan of Berthing Capacity

KSSA has renovated the existing berths by deepening water depths along berths including Berths No.5 and No.6 with a water depth of 14m (infra-structures were completed in 2003 and super structures are under construction as of February of 2004). In addition, the renovation of Berths No. 82 – 100 is planned to deepen up to 12 m. In this study, it has been assumed that those on-going or planned projects would be completed.

2.3.2 Expansion Plan of Stevedoring Capacity

(1) Bulk Cargo Handling

Behind the berths under renovation or with a plan of renovation mentioned above, it has been assumed that the following loaders would be installed:

- Berth No. 5 – 6: Two units of loaders with rated capacity of 1,000 tons/hr for shipping dry fertilizer
- Berth No. 82: a unit of loader with rated capacity of 900 tons/hr for shipping grains
- Berth No. 101: a unit of loader with rated capacity of 1,000 tons/hr for shipping dry fertilizer

(2) Container Handling

To meet the demand for handling containers of 290,000 TEUs at the existing container terminal behind berth Nos. 143 and 144 in the year 2025, the required types and additionally required numbers of main container-handling machines are listed below:

- 3 units of RTGs

2.3.3 Expansion Plan of Storage Capacity

(1) Conventional Cargo Storage

As mentioned in Section 2.2.3 (1), in the year 2025, required cargo storage area for conventional cargo at the existing port is 7 ha in total. Categories and places of the required storage area are shown in Table II.2.3-1. As shown in the table, the required lands for the storage facilities could be obtained from the existing port land or reserved area (see Figures II.2.3-1 and II.2.3-2).

Table II.2.3-1 Storage Expansion Plan for Existing Port in Master Plan (2025)

Zone	Connected berths	Stored cargo category	Storage type	Required area (ha)	Source of land acquisition
North	Inner Port (Nos. 1, 2) and Outer Port (No.1)	Petroleum	Tank	2	Reserved area
South	Nos. 70 - 72	Dry fertilizer	Warehouse	2	Reserved area
	Nos. 82 -83	Grains	Silo	1	Reserved area
	Nos. 92 -100	Frozen food	Cold storage	2	Existing port area
Total area				7	

Source: Estimate by the JICA Study Team

(2) Container Storage

The required container storage area for the demand in 2025 at Eurogate Terminal has been estimated as 10 ha in total for stacking containers. The required area will exceed the existing storage area of 6 ha at the container terminal. Hence, the currently reserved area on the south of the terminal needs to be used for an additional container yard mainly for empty container storage.

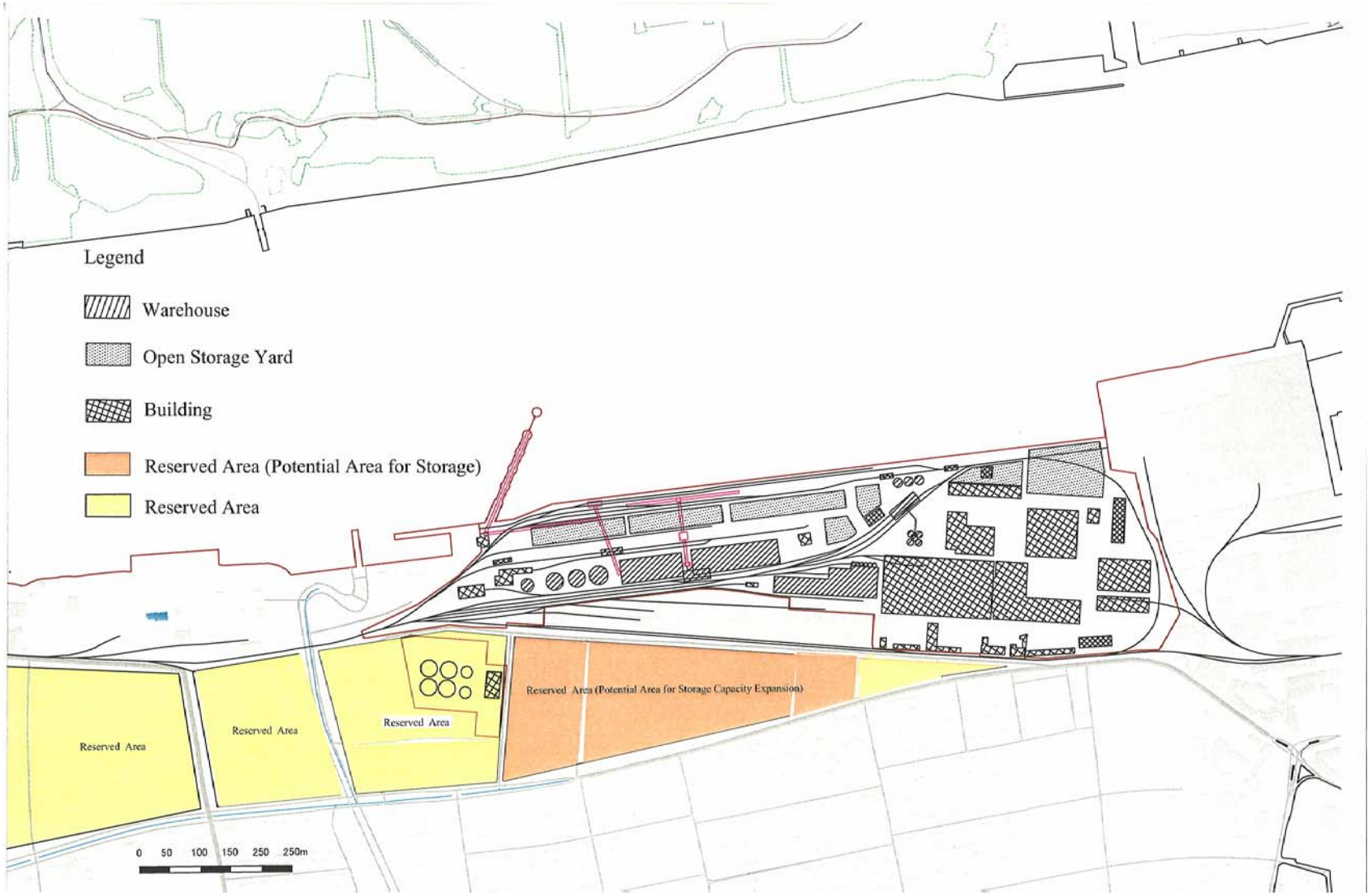


Figure II.2.3-1 Potential Area for Storage Capacity Expansion behind Bega Terminal

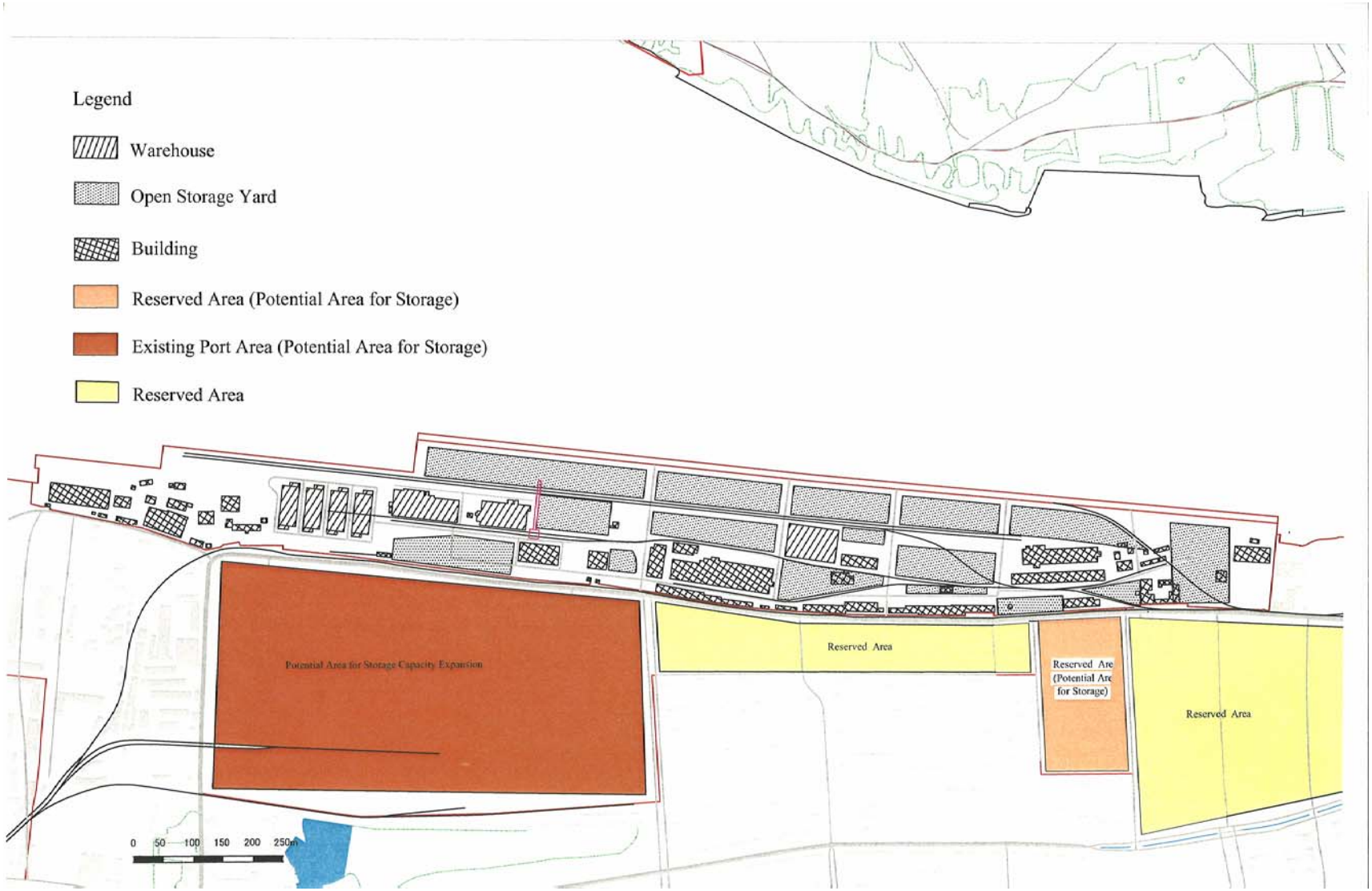


Figure II.2.3-2 Potential Area for Storage Capacity Expansion behind Smelte Terminal

2.3.4 Improvement Plan of Railway Access to the Port

(1) North Zone

1) Construction of Additional Track in Klaipedos Nafta

As mentioned in Section 2.2.3 (2), Klaipedos Nafta handling volume exceeds existing capacity from the year of 2021. To meet the demand of handling cargos at terminal, one additional loading/unloading track with handling facility is required. Place for additional track could be next to the existing loading/unloading tracks in the port territory. The required length of track and equipments are listed below:

- Track Length: 600m
- Handling Equipment: Discharging oil product facility for 30 wagons

(2) South Zone

1) Construction of Additional Access Track in South Zone

As mentioned in Section 2.2.3 (2), to meet the demand of handling volume for BEGA and Smelte, construction of additional access line is required to increase transport capacity between Draugyste Station and BEGA. There are two alternative plans for location of additional track (see Figure II.2.3-3).

Alternative 1

Additional track will be laid parallel to the existing access track, which branch off from existing track at Taikos Street flyover near the Draugyste Station and connected to the existing access track just before the railway bridge located at Vilnaus Street near BEGA. There are two option of train operation for the existing and additional track. One is double track operation (Alternative 1-1) and other is to use additional track as private line for BEGA and existing track for Smelte (Alternative 1-2).

Alternative 2

Additional track layout is same as Alternative 1 except for the location behind Smelte area. In this area, additional track is way out from existing track near the Senoji Smilteles Street and laid in the east side of reserved area and return back to the parallel near the Naikupes Street. There are also two option of train operation for the double track same as Alternative 1. One is double track operation (Alternative 2-1) and other is to use additional track as private line for BEGA and existing track for Smelte (Alternative 2-2).

a) Selection of Additional Track Location

For Smelte cargo handling in the port, when the reserved area has been used as open yard or shed for storage, terminal trucks and forklifts etc. have to cross the access line. In the case, Alternative 1-1, 1-2 and 2-1, BEGA and Smelte freight trains are obstructing the cargo handling movement inside the Smelte territory. It is difficult and undesirable to stop the freight train only for the purpose of Smelte trucks and forklifts to cross the railway track especially train to/from BEGA. On the other hand, Alternative 2-2 is less obstructing against cargo handling movement because only to/from Smelte train is on this

track and it is possible to control train schedule by terminal operator in case of emergency. There are no conflict movement for BEGA freight train.

From the above point of view, Alternative 2-2 has been selected.

b) Required Structures and Facilities

Required Railway structures and facilities are listed below:

- Track: 4.1 km
- Turnout: 2 set
- Embankment section: 2.4 km
- Reinforced concrete bridge: 20 m
- Level crossing facility: 4 locations (automatic crossing control with crossing barrier)
- Signalling facility: 1 unit

2) Construction of New Yard in Smelte Territory

This yard is required to enable Smelte handle cargos smoothly for the future demand. Smelte has been handled many type of cargo in there territory but has no arrival/departure and storage tracks. Wagons for loading/unloading tracks are transported directly to/from the access line. It will cause time consuming for operation in the territory and also obstructing train movement of access line. Recommendation would be construct yard to avoid above mentioned matters. In addition, if the freight train consist of both terminal wagons it can drop off or pick up at this yard. Location of yard and layout are shown in Figure II.2.3-4.

Required Railway structures and facilities are listed below:

- Track: 3.7 km
- Turnout: 11 set
- Control Centre and signalling facility: 1 unit

Railway alignment and structures for the Master Plan are based on the Lithuanian Railways standard and regulations. Main parameters for track structure, construction gauge and typical cross section are referred to Appendix C.

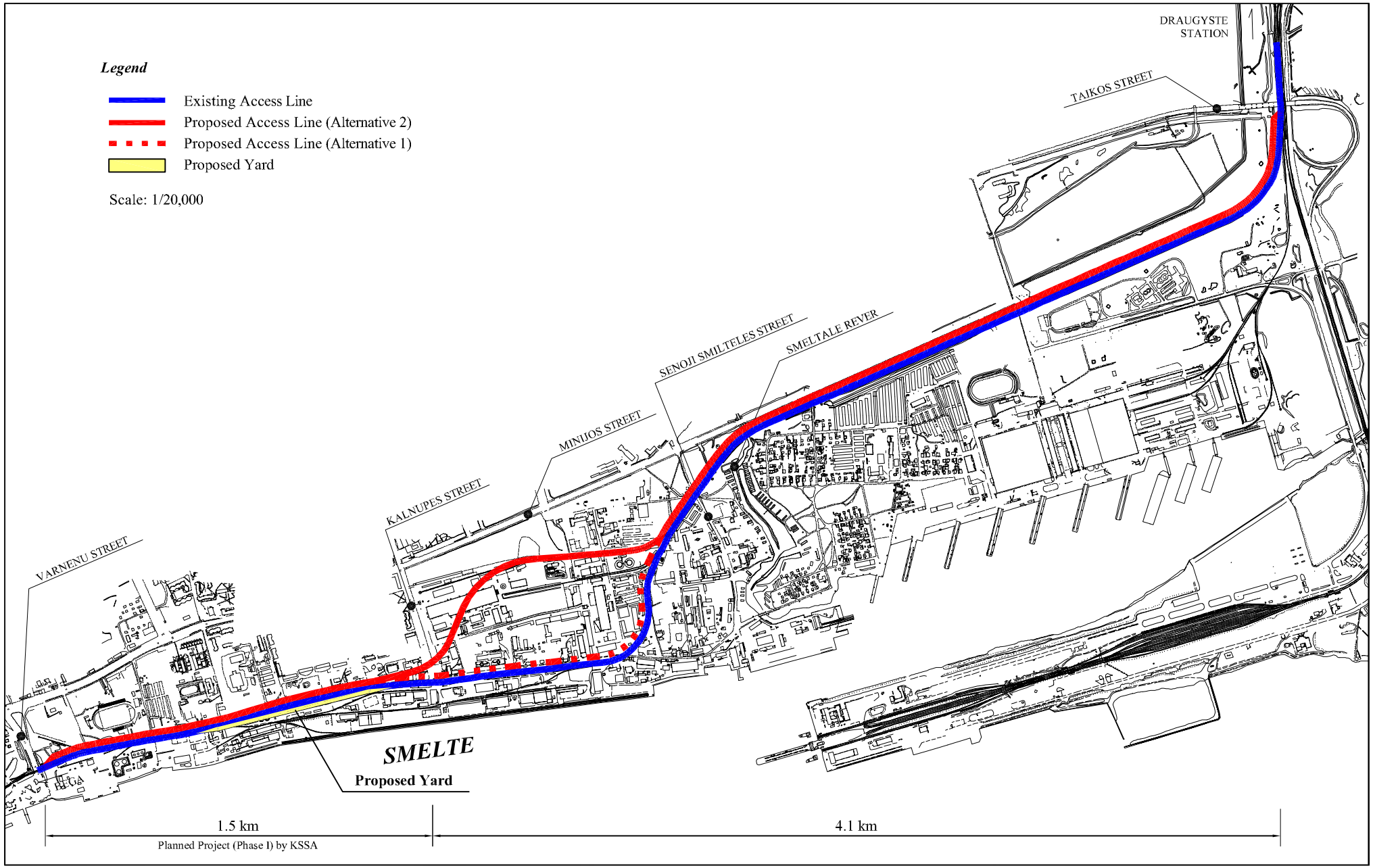


Figure II.2.3-3 Proposed Additional Access Line in South Zone

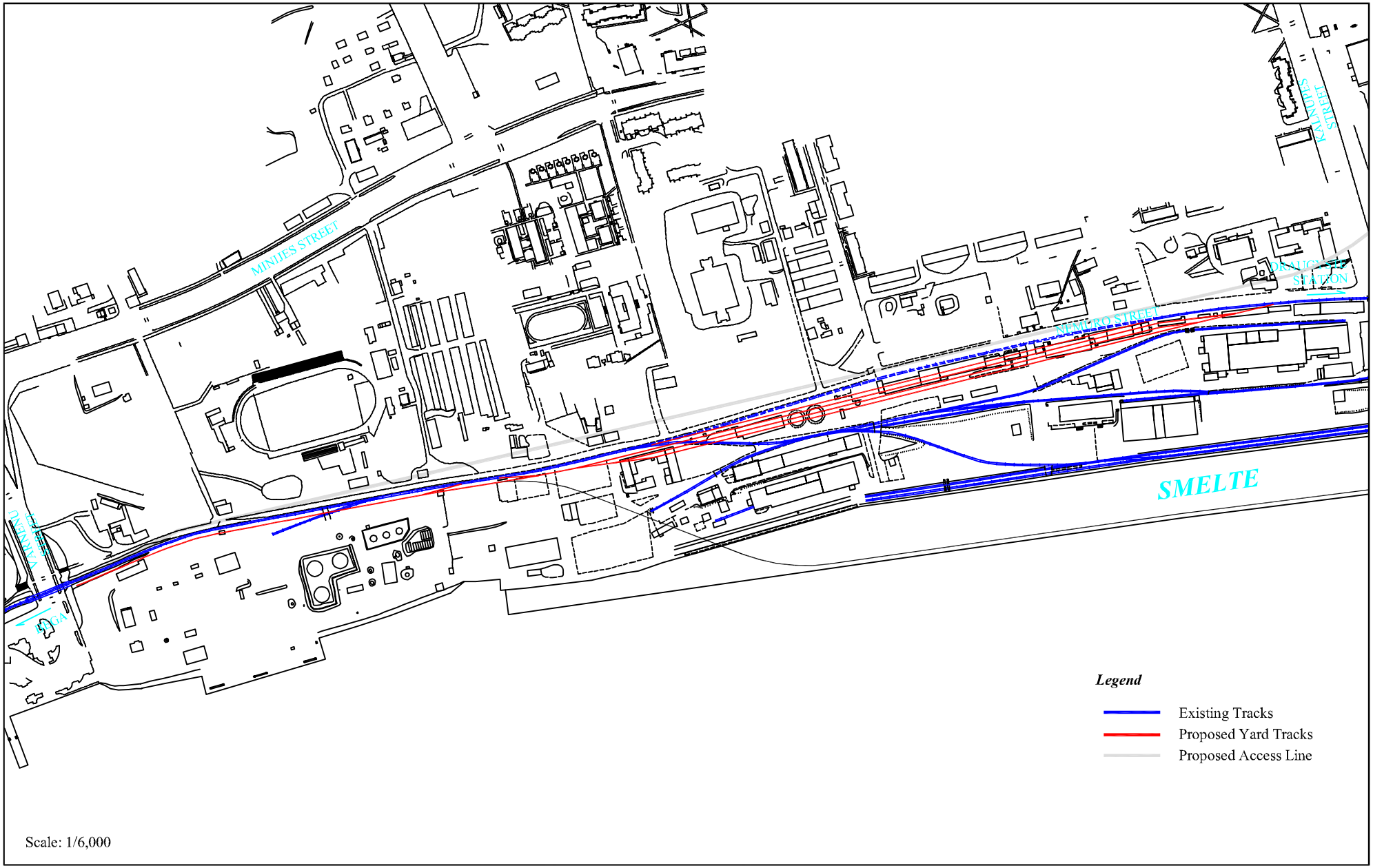


Figure II 2.3-4 Proposed Yard Layout in SMELTE Territory

2.3.5 Improvement Plan of Road Access to Port

There are no major problems for the access road to the port from the main road. Most of them are improved by widening and renovating the pavement to be a standard condition.

2.3.6 Land Use Plan of Reserved Areas

It is proposed that the reserved areas behind the berths Nos. 69 – 96 be gradually integrated to the port territory towards the stage of the master Plan with the target year 2025. The required land use would be mainly port cargo storage and site for port access railway as mentioned as mentioned in Sections 2.3.2 and 2.3.3. In addition, the land uses for port utility services such as inside port road, parking lots, port related offices, etc. are listed for the required land use. The said portion of the reserved area is 15 ha in total (see Figures II.2.3-1 and II.2.3-2).