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NEW CONCEPT OF THE CONTAINER TERMINAL IN THE PORT OF RIJEKA

The port of Rijeka is a port of national interest open to national and international public traffic. It is mostly intended for the movement of goods with the container traffic playing an important role. As laid down in the Port Classification and Physical Plan of the Primorsko-goranska County, Rijeka is a port of a special international economic importance for the Republic of Croatia.

The largest part of the Croatian imports and exports of goods is realized through the port of Rijeka which is also a major transit port in Croatia for the goods from Hungary, Slovakia, the Czech Republic, Austria, Italy and Serbia. The essential factors of the port of Rijeka geotrafic position are the physical characteristics of its location and its connection with the hinterland.

The construction of the new leveled rail line from Zagreb to Rijeka, the reconstruction of the Rijeka-Zagreb motorway to a full profile highway, the canalization of the river Sava from Šamac to Sisak and the construction of the Vukovar – Šamac Canal will make Rijeka an important seaport for the flows of goods from the Danube basin to the Adriatic. In the future period, the structure of the goods flow will be marked by the growth of the container traffic which has, by today, reached the upper limit of the container terminal storage and handling capacity. If the port of Rijeka wishes to maintain its competitive ability in the North Adriatic ports catchment area, it should meet such increased transport needs by adequate expansion and new investments to be made in a short-time period.

This paper aims at focusing particularly on the container terminal Brajdica and its expansion possibilities which, contrary to other projects requiring a longer period of time for their realization and for bringing corresponding traffic solutions, include specific space and traffic predispositions.

Key words: port, port authority, container traffic, container terminal Brajdica, Gateway project.

1. INTRODUCTION

The essential factors of the traffic system of every maritime country are its sea ports which are a central point and main gateway for all traffic routes and transportation facilities. They are not only the key subsystem of every maritime and traffic systems, but also an accelerator of traffic, acting as magnet for industrial installation and other economic activities. Present-day ports are characterized by a number of distinctive features which, as a general development tendency, can be seen in almost all world ports. These are: concentration of traffic to a smaller number of larger ports, concentration of different combined economic functions in a port, efforts to generate a bigger added value (finishing operations and job processing), modern traffic connections with the hinterland and a higher degree of autonomy in the port management and control.¹

With the European market tending to expand toward Asia and Africa, the North Adriatic route, 2300 nm shorter than the North European and Baltic ports, regained its importance.

It was its geographical position, maritime tradition and nearness of the European market with traditionally strong overseas trade that helped the port of Rijeka and the associated overland -maritime traffic route, to outgrow its national context. Good traffic and infrastructure links, especially the road network and shipping lines, are essential for Rijeka to become recognized as the main transit port for the neighboring countries on the trade route towards the Mediterranean, Near and Far East and Africa. The maximum volume of dry (general and bulk) cargo passing through the port of Rijeka was realized 17 years ago when it reached the tonnage of 7.5 million. The evident come back of these cargoes with an outstanding increase of the container traffic leads us to believe that a considerable growth of the containerized and other dry cargo is to be expected in the near future.

In terms of transport, the shortage of adequate roads linking the port, situated in the very centre of the city, with the major highway network, is a considerable handicap of Rijeka. There is also a problem of the railroad connections and their inadequate capacities whose upgrading is falling behind schedule. Therefore, any serious attempt to increase the port competitive ability and help maintaining the existing traffic efficiency growth in the following period calls for such government measures which shall not only speed up the road upgrading process but also ensure the modernization of the port system, including the construction of a new and the updating of old terminals.

¹ Dundović, Č., Pomorski sustav i pomorska politika, Rijeka, Pomorski fakultet, 2003., str. 83

2. IMPACT OF THE EUROPEAN TRAFFIC POLICY AND TRAFFIC ROUTES ON THE DEVELOPMENT OF THE CONTAINER TERMINAL IN THE PORT OF RIJEKA

The Pan-European Transport Areas – PETRA encompass the most important seaports and transport routes and are an extension of the existing overland corridors.² There are four established PETRA areas: in the north – the area comprising the North Sea, the Barents Sea and North Baltic; in the south-east – the Black Sea basin; in the south – the Adriatic and Ionian Sea and, the Mediterranean as the fourth area.

With the integration of these Pan-European seas and overland transport areas, the whole Europe from the Atlantic Ocean to the Urals, the Mediterranean countries included, will be united into one integral economic and transport zone with more than thousand million inhabitants. There are three Pan-European corridors passing through Croatia: the B and C branches of the Corridor V, and Corridors VII and X. The North East Adriatic Range – NEAR, is dominated by three important ports: Trieste, Koper and Rijeka. On the North Adriatic route, the maritime traffic grows at the annual average rate of o 2.8%. Until 1990, Rijeka was an exceptionally important port within the NEAR market whose share in the market loading/discharge volume amounted to around 35%. However, with the developments taking place in the nineteen nineties, the situation changed and the port of Rijeka share was reduced to some 12%. The recovery of the port, which had started with the modernization of its infrastructure and the establishment of more favorable operating conditions, led to the gradual increase of this share which, by the year 2006, amounted to some 18.5%.³

The long term development concept of the port of Rijeka landside is closely connected with the development strategy of the traffic system in Croatia and the role which Croatia may have in connecting the Central Europe and Danube-Region with the Mediterranean and the world.

3. CONSTRUCTION OF NEW ROADS PROMOTING THE CONTAINER TERMINAL DEVELOPMENT

In terms of traffic, the port of Rijeka has a very convenient position nearby the European market and the countries with traditionally intensive overseas trade. The transport routes, foreseen in the long terms traffic development projection, start mostly in Rijeka or pass through it. Thus, no increase of the competitive ability of the port of Rijeka will be possible without the modernization of the Corridors V and X branches, both road and rail (table 1).

2 Dundović, Č., D. Rudić, Seaports and maritime shipping trade in the Primorsko-goranska County-actual situation and development concepts, Naše more, 52(2005), 3-4, str. 136.

3 Data supplied by Port of Rijeka Authority

Table 1. - Road and rail corridors passing through Rijeka

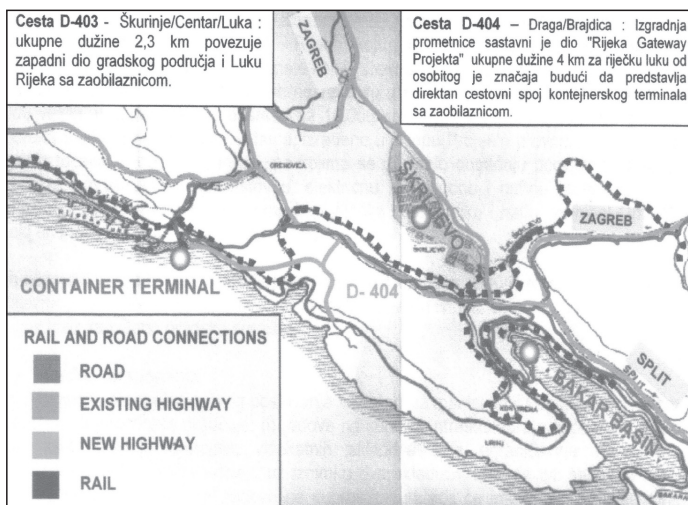
| V corridor | | | | | | |
|----------------|----------|---------------|-----------|----------|----------|--------------|
| Main direction | Venezia | Trieste/Koper | Ljubljana | Budapest | Uzgorod | Lvov |
| Vb Branch | Rijeka | | Zagreb | | Budapest | |
| X Corridor | | | | | | |
| Main direction | Salzburg | Ljubljana | Zagreb | Beograd | Skopje | Thessaloniki |
| Branch Vb | Rijeka | | | Zagreb | | |

Source: Luka Rijeka d.d

The highway Rijeka-Zagreb, as skeleton of the Croatian road traffic network, is of vital importance for the port of Rijeka and its performance. The construction of the Rijeka road traffic junction, defined as priority of the local administration, is planned to be completed by 2009 (Fig. 1). The beltway, 28.4 km long, is foreseen to spread from Jušići, through Orehovica to Križišće.. The ultimate objective of the road construction activity, being under way in Rijeka and around it, is to integrate all the key towns, outlying housing, industrial and port areas. The completion of the Rijeka road traffic junction known as the Rijeka Gateway Project is a precondition for the further development of Rijeka, its port and economic resources as a whole.

By the link-roads D-404 and D-403, "leaning against" the Rijeka beltway, the port of Rijeka gets a direct connection to the important transport routes leading to central and eastern Europe. At the same time, these new traffic arteries will make it possible for the city of Rijeka to solve the serious problem of its traffic congestion, and the port operational quays will get a direct link to the highway network.

Fig.1. The port of Rijeka road links D-404 and D-403



Source: Luka Rijeka d.d.

The Rijeka – Rupa Highway, 14.5 km long, is an important road linking the Croatian road network, with either the Rijeka – Zagreb Highway through the Orehovica junction, or the Istrian arterial road through the Matulji junction. In the future, once the Rijeka – Žuta Lokva Highway is finished, this road will provide not only for the connection to the Zagreb – Split Highway, but also to the Adriatic Highway via Maslenica. The Adriatic – Ionian Highway, from Trieste to Kalamate, 1200 km long, running along the Adriatic Coast, will provide for a direct road connection between Italy and Greece. The preparations and plans for the construction of this important international highway, known as the Adriatic – Ionian Initiative, call for a close regional economic cooperation of at least eight countries. This space and economic area stretching from the Adriatic to the Ionian Sea with some 50 million inhabitants, is of the greatest importance for Rijeka, providing its port with the opportunity to participate actively in the transport system of the European Union member countries.

The construction of the new railway bears an equal importance for the port Rijeka. In the nineteen seventies already, the existing rail line was considered as the bottleneck of the Rijeka traffic route and a limiting factor in the port development. By its technical characteristic, the railroad from Moravice to Rijeka, belongs to the category of heavy mountain-rail with no possibility to meet the needs of the growing traffic in transit. This problem and the possible solutions were dealt with by traffic experts, whereupon the two options, known as “Kupska” and “Drežnička” routes, were advanced. These are both considered as levelled rail lines, with two electric-powered tracks (25 kV, 50 Hz, AC). Although the variant called “Kupska trasa” is, in terms of construction works, more favorable (spreading through the river Kupa valley), it was decided to accept the other variant, known as “Drežnička trasa”, stretching from Karlovac to Josipdol and reaching Rijeka via Drežnice, Krasica and Škrljevo. There are three tunnels planned along this route, the longest one being 13 km long.

It is 24 km longer than the “Kupska trasa” route, with the highest elevation point higher for as much as 198 m. What’s more, its rising grounds are slightly bigger. The reason for choosing the “Drežnička trasa” route lies in its better position with respect to the future network of the fast railway service. Namely, Drežnica is the place where the section going to Dalmatia, so called Adriatic Section, is planned to branch off. The Rijeka –railroad would be longer as compared to the “Kupska Trasa” variant, but the other sections whose construction is also planned, would be shorter. As for the speeds, there would be no difference between the two routes, i.e. “Drežnička” and “Kupska Trasa.”

The second track from Karlovac to Zagreb and from Dugo selo to Botovo, would be built on the existing route, with the necessary reconstruction in terms of direction and altitude, which would make it possible to attain the speeds up to 160 km/h. With the freight train speeds, which would be almost doubled (55 km/h) and the maximum driving speed of 120 km/h, the levelled rail line will provide for a substantial increase of the annual capacity, from the actual 5 mil. to 25 mil. tons of cargo. In fact, it’s the Vb leg Botovo – Zagreb – Rijeka where the largest growth of freight traffic is expected.

The estimate ranges from 9.5 to 12.5 mil tons per year. According to the current estimates, the total value of the investments required for the construction of the levelled rail line, amounts to 8 thousand million kuna.

4. COMPATIBILITY OF THE URBAN DEVELOPMENT PLANS AND THE PORT OF RIJEKA DEVELOPMENT PLANS

There are many limiting factors both in the town itself and the larger Rijeka area, which had to be taken into consideration when deciding on the assignment of individual town

districts to a specific purpose. It is possible to identify three town areas of such kind:

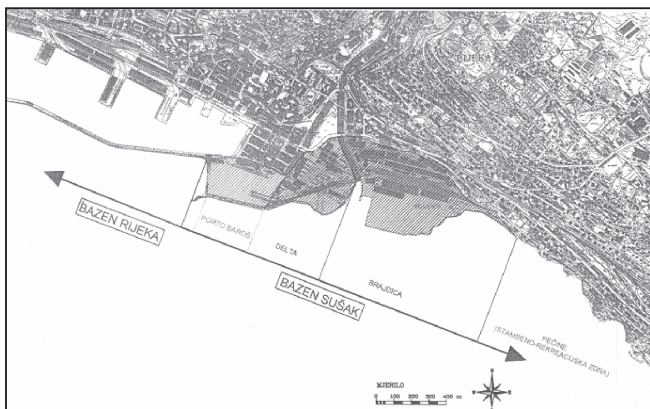
- working area along the coastal strip
- residential districts on the hills
- recreational zones along the coast

The main city-establishments and objects are located in the central town area, in the contact zone of the river Rječina delta and the residential districts. This is also the area which, full of places and city spots of historic and architectural interest, has given Rijeka its urban character. With almost entire productive sectors situated within the working area along the city coastal strip, a serious problem arises related to the technological processes lacking in rationality and adequate traffic links.

The Sušak basin of the port of Rijeka (fig.2) comprises the port –industrial complex with the container terminal Brajdica as an important part of it. It is located to the south, below the residential district, in a separated port-operational zone. The port industrial complex of the Sušak basin covers an area of 18 ha and includes the following facilities:

- part of the port "Porto Baroš" (operating on a restricted scale)
- oil terminal in the "Delta" area (out of operation)
- timber warehouse in the "Delta" area
- shunting yards
- office buildings
- container terminal Brajdica
- timber warehouse Brajdica
- covered storage in the Brajdica area

Fig. 2. The Sušak basin and its parts



There are no plans for the expansion of the port area in the Sušak basin. What is more, the town planners have in mind to have the whole area redesigned. This transformation is planned to include particularly the parts of:

- Porto Baroš
- Delta
- Brajdica terminal

As envisaged in the Project, the larger part of this area would be differently planned in terms of space and urbanization, with the aim of transforming this part of Rijeka into new and attractive city spots.

5. THE GATEWAY PROJECT AND ITS IMPORTANCE FOR THE PORT OF RIJEKA

A Loan contract was signed in 2003, by which the World Bank granted a loan of 155 mil. US\$ to the Republic of Croatia, where the Port of Rijeka Authority, Luka Rijeka d.d. and the City of Rijeka are partners aiming to realize the planned investments (the Gateway Project). The projects regarding the modernization of the existing and the extension of the new port terminals are extremely vital. However, the so called Waterfront Project is of actual importance for the City of Rijeka. As this project envisages to open the middle part of the port basin for commercial purposes and to give the citizens the chance to have access to this part of the shore, the passenger terminal, the southern Delta and Porto Baroš will be differently planned with the aim of enabling citizens to visit and use these parts of the harbour around the clock, thus creating new and attractive places in the city, more appropriate for an urban development at the Mediterranean.

In this effect, the City of Rijeka, the Port of Rijeka Authority and Luka Rijeka d.d. have signed a Cooperation Agreement with the aim of defining their collaboration in the realization of the Rijeka Gateway Project. This Agreement lays down the terms and conditions as well as the sources of financing the preliminary preparatory stage in the Delta and Porto Baroš and the construction of the passenger terminal at the Rijeka breakwater. The contracting parties have undertaken the obligation to cooperate closely, rendering each other every possible assistance and support in the project implementation activities.

The project is a complex one: besides the modernization of the port of Rijeka and the reconstruction of the traffic route, it ensures an appropriate urban development of the city of Rijeka, creating new city spots and public infrastructures.

The Project also provides the financing of the consultants' services related to the improvement of management, to the working out of draft contracts for the building construction works, to the preparation of the BOT –based contract for the extension of the pier “Zagrebačka obala”, to the construction of the new D-404 road and to the supervision of construction works under the Project. Thanks to the increased efficiency and safety of the port operations, the offering of the port services will be considerably improved by the application of the new Electronic Data Interchange System (EDI), linking up the port administration

and the port service users. Incorporated in the Project is also the financing of the worker care program, i.e. severance wages. The introduction of an adequate financial management system and training for its application will be also financed under the Project (table 2).

Table 2. Financial structure of the port of Rijeka development components

| Component | Indicative costs (in mil. US\$) | Bank financing (in mil. US\$) |
|--|---------------------------------|-------------------------------|
| A – Restructuring and modernization of the port | 75.10 | 50.20 |
| B - Development of a border area between the port and the city | 43.20 | 24.60 |
| C- International road upgrading | 144.80 | 78.70 |
| D – Funds allocation for the pre-investment activity | 1.50 | 1.50 |
| Total funds | 264.60 | 155.00 |

Source: Port of Rijeka Authority

The project is expected to yield direct economic benefits with numerous positive effects in terms of traffic, social welfare and ecology.

These direct economic effects will lead to:

- growth in the port turnover and income
- reduction in operating cost and road traffic based delays
- growth in the transport service-based trade as well as other economic activities induced by the increased traffic in transit
- reduction in the long term state grants to the port of Rijeka
- improved port management
- rise in labour productivity
- improved operating and environmental conditions (reduced traffic jams, air pollution and noise level)
- improved traffic connections between the port of Rijeka and the Trans-European road network via the Vb corridor.

6. CONTAINER TERMINAL AND ITS ROLE IN THE DEVELOPMENT OF THE PORT OF RIJEKA

There is a constant upward trend of the container traffic share in the total traffic structure of the port of Rijeka (table 4) which is now estimated to amount to some 7%. The role of the container terminal Brajdica is particularly important for the development of the container traffic. It constitutes a separate company of the port of Rijeka named Jadranska vrata. In the past, there were considerable oscillations in the traffic volume of the terminal Brajdica which was built in 1979. The peak-traffic in the past century was realized in 1989 when it reached the volume of 52,031 TEU. However, as a result of the changed political,

economic and safety situation (the split of the former Yugoslavia and the state of war) it was drastically reduced to only 6,866 TEU in 1999 (table 3).

This overall stagnation and decline in the traffic of the container terminal Brajdica in the above stated ten-year period (1990 – 2000) led to a technical and technological setback and loss of the market. In that period the container terminal was not deficient in the cargo handling capacities but there were no investment projects and the regular maintenance was reduced to a minimum. Such drastically reduced traffic volume was the reason for a limited operational and technological use of the stacking cranes – transtainers, which were put into operation in 1991, but were never made completely functional, neither technically nor operationally. Namely, with the traffic decreased to such a low degree, that type of the cargo handling equipment would not be profitable.

However, as from the year 2000, there has been a constant growth of the traffic at the terminal Brajdica, thanks to the considerable investments in the cargo handling capacities and improved port services, in which process the following is particularly worth mentioning (table 3, graph 1):

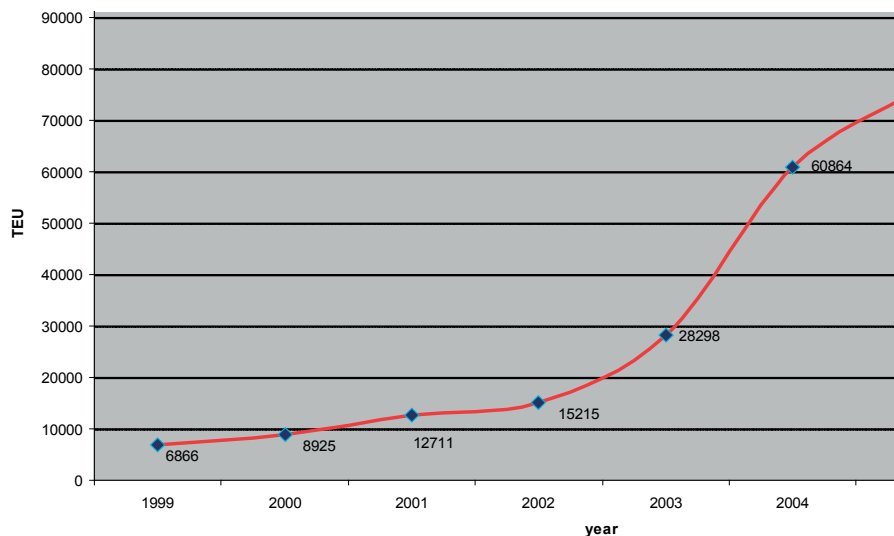
1. Purchase and installation of two new container gantries Samsung which together with the existing ones, type “Metalna” and “Liebherr”, made it possible for the port of Rijeka to have the port mechanical equipment able to handle larger vessels and bring the terminal productivity up to the competing North Adriatic ports.
2. Setting up of the feeder service with the most important Mediterranean ports (Gioia Tauro, Malta), with regular weekly services agreed upon with the world container liners (ZimLine, CMA-CGM).
3. Container throughput in 2006 was increased and totalled 94,390 TEU showing a tendency toward further growth.
4. Purchase of two “Belotti Triton” stockyard mobile cranes.
5. The D404 road linked Brajdica directly with the Rijeka – Zagreb highway.
6. The purchase of new stockyard equipments (Ro-Ro tractors, various types of trailers, empty and full container lifters) is under way.

Table 3. Total container throughput (TEU) realized in the port of Rijeka from 1999 to 2006

| Year | Throughput (TEU) |
|------|------------------|
| 1999 | 6,866 |
| 2000 | 8,925 |
| 2001 | 12,711 |
| 2002 | 15,215 |
| 2003 | 28,298 |
| 2004 | 60,684 |
| 2005 | 76,258 |
| 2006 | 94,390 |

Source: Port of Rijeka Authority

Graph 1 - Container traffic in the port of Rijeka from 1999 to 2006



Source: Port of Rijeka Authority

Table 4. Structure of the traffic realized in the port of Rijeka (2006) (in 000 t)

| Cargo structure | Year 2006 |
|-----------------|------------|
| General cargo | 854,490 |
| Bulk cargo | 3,19,707 |
| Timber | 236,438 |
| Containers | 718,507 |
| Crude oil | 5,87,906 |
| Total | 10,887,048 |

Source: Port of Rijeka Authority

Today, the container terminal Brajdica covers an area of 125,843.5 m² of which 60,950 m² was rearranged as a container stacking yard. The entrance area, maintenance shops, shelters and warehouse 46, cover a total area of 34,893.5 m². The part of the terminal not built up as yet, serving as an empty container yard, partly made of an embankment under construction, covers an area of 30,000 m².

The existing container terminal wharf is made up as follows:

RO-RO ramp 59 m

Brajdica - west 164 m

Brajdica - south 295 m

In the second stage of the construction, the existing south wharf should be extended eastward by 328 m with a draft depth of 14.5 m. Once extended, the south wharf will reach a total length of 623 m. The container stacking yard, now covering 60,950 m², will be further developed and expanded by additional 61,239 m², so that, at the end, it will comprise an area of 122,189 m².

The new entrance – exit complex, is envisaged to comprise an area of 9,215.5 m², where an office building containing all necessary facilities required for the operations of the customs office, police, forwarding agents, security services and port administration is planned to be built. This entrance –exit complex, will provide the terminal with a direct link, through the existing east gate and new road, to the Croatian highway network.

There are plans to have a railway station – shunting yard, arranged in the second stage within the terminal area, so that containers may be loaded/discharged from wagons. There are also plans, depending on the traffic volume and traffic trends, for further expansion of the terminal to the current railway station Sušak. The space intended for the emptying and stuffing of the containers will, according to needs, remain within the warehouse 46, while the remaining space in this part of the terminal should be redesigned and adapted to the needs of various maintenance-repair shops.

According to the physical planning documents and construction site permit in force, disposed of by the Port of Rijeka Authority, the total area intended for container handling at Brajdica totals to 167,469.05 m².

When the container terminal current state and the need for its expansion are at stake, the following technical characteristics should be taken into consideration:

| | |
|---|------------|
| 1. CURRENT STATE | m2 |
| - Container stacking yard | 60,950.00 |
| - Maintenance-repair shops, entrance and similar spaces | 34,893.50 |
| - Part of terminal not built up (embankment and the like) | 30,000.00 |
| TOTAL | 125,843.50 |
| 2. THE SECOND STAGE OF CONSTRUCTION –TERMINAL COMPLETELY FINISHED | |
| - New wharf (328 m) and container stacking yard | 61,239.00 |
| - Entrance – exit complex | 9,210.05 |
| - Container rail station | 15,000.00 |
| - Container stuffing-emptying yard | 21,250.00 |
| - Existing wharf and container stacking yard | 60,950.00 |
| TOTAL | 167,649.05 |

As for the container terminal Brajdica, the Port of Rijeka Authority development plans provide for the expansion of the existing terminal capacities.

The aim of the planned vital improvements in the terminal infrastructure and its reconstruction, is to make the terminal capable, in terms of technical-technological and organizational aspects, of achieving a throughput of around 200,000 TEU.

The realization of this objective requires the corresponding reconstruction projects based on:

- construction of another coastal berth and extension of the existing wharf, from 328 to 624 m of total length with the quay way depth of 14.5 m
- construction of a storage facility at the back of the quay Kostrensko pristanište provided with corresponding infrastructure and superstructure.

7. REASONS FOR THE EXPANSION OF THE CONTAINER TERMINAL “BRAJDICA” AND ITS NEW SPACE CONCEPT

Bearing in mind the traffic upward tendency in the last few years, there is every reason for the expansion of the terminal. There are a number of events essential for the development of the container traffic in the port of Rijeka, which can be summarized as follows:

- Feeder service was introduced in March 1999 by m/v LIPA of Lošinjska plovidba d.d..
- In October 2001 Lošinjska plovidba d.d. introduced another feeder liner, its ship the m/v LOŠINJ
- In October 2002, the container shipping company CMA-CGM became a part of the feeder service
- New container cranes were put into operation in February 2003
- The shipping company ZIM LINE joined the feeder service in August 2003
- Mother-ships joined the service in September 2003
- In November 2003 the container operator LLT/CMA-CGM introduced its feeder service
- In April 2004 the third ship – m/v SUSAK of Lošinjska plovidba joined the feeder fleet
- As from May 2005, ZIM LINE is not calling at the port of Rijeka any more
- In February 2006, X Press Container Line joined the feeder service.

In 2006, the various shipping companies had different shares in the total throughput of the terminal which, in comparison to the year 2005, was considerably higher (tables 5 and 6).

Table 5. Container throughput in the port of Rijeka - January - December 2005/2006 (TEU)

| Months | January – December 2005. | January – December 2006. | Index (2006/2005) |
|--------------------|-----------------------------|-----------------------------|----------------------|
| January | 5,629 | 5,231 | 93 |
| February | 5,192 | 5,605 | 108 |
| March | 6,264 | 6,546 | 105 |
| April | 5,709 | 7,527 | 132 |
| May | 6,862 | 8,842 | 129 |
| June | 6,616 | 7,867 | 119 |
| July | 5,674 | 7,674 | 135 |
| August | 6,137 | 7,140 | 116 |
| September | 7,786 | 10,004 | 128 |
| October | 7,071 | 8,242 | 117 |
| November | 5,943 | 10,670 | 180 |
| December | 7,375 | 9,042 | 123 |
| January – December | 76,258 | 94,390 | 124 |

Source: Port of Rijeka Authority

Table 6. Port of Rijeka –total container throughput per container operator/user (in TEU)

| Operator/year | YEAR | | | | | | | | |
|------------------------|-------|-------|--------|--------|--------|--------|--------|--------|---------|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Total |
| Hapag-Lloyd | 1,360 | 2,225 | 3,714 | 3,580 | 4,742 | 4,294 | 4,107 | 5,213 | 29,235 |
| Jadroplov-Canmar | 641 | 0 | 0 | 0 | 0 | 409 | 351 | 0 | 1,401 |
| Italia marittima | 472 | 866 | 1,578 | 2,672 | 1,181 | 5,336 | 10,283 | 14,570 | 36,958 |
| Evergreen marine Corp. | 0 | 0 | 0 | 13 | 1,291 | 10,852 | 19,615 | 25,349 | 57,120 |
| CMA – CMG | 145 | 862 | 2,830 | 4,184 | 12,454 | 19,060 | 19,192 | 26,658 | 85,385 |
| Lošinjplov | 28 | 670 | 1,730 | 959 | 762 | 597 | 242 | 428 | 5,416 |
| MAERSK | 48 | 2 | 13 | 226 | 1,746 | 5,805 | 11,024 | 16,694 | 35,558 |
| ZIM | 0 | 0 | 2 | 2 | 1,111 | 6,830 | 3,346 | 338 | 11,629 |
| P&O Neddlloyd | 0 | 47 | 448 | 493 | 874 | 478 | 626 | 10 | 2,976 |
| Senator Co. | 0 | 0 | 0 | 686 | 1,352 | 369 | 688 | 516 | 3,611 |
| Hanjin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UASC | 47 | 107 | 619 | 856 | 1,079 | 1,507 | 1,010 | 1,461 | 6,686 |
| Ostali | 4,125 | 4,146 | 1,777 | 1,544 | 1,706 | 515 | 1,656 | 2,935 | 18,404 |
| Sermar Line | 0 | 0 | 0 | 0 | 0 | 68 | 2 | 1 | 71 |
| Norasia | 0 | 0 | 0 | 0 | 0 | 3,460 | 3,497 | 8 | 6,965 |
| APL | 0 | 0 | 0 | 0 | 0 | 825 | 619 | 185 | 1,629 |
| Safmarine | 0 | 0 | 0 | 0 | 0 | 459 | 0 | 24 | 483 |
| TOTAL | 6,866 | 8,925 | 12,711 | 15,215 | 28,298 | 60,864 | 76,258 | 94,390 | 303,527 |

Source: The Port of Rijeka Authority

There are two limiting factors standing in the way of the container terminal Brajdica further development. These are: inability to accommodate larger vessels (with draft exceeding 12.5 m) and an inadequate area. The second construction stage should be therefore entered upon immediately with the aim of providing for the following facilities:

- a new 328 m long wharf able to accommodate vessels up to 60,000 DWT. This new wharf will provide for the berthing of either one ship of the stated deadweight capacity or two half the size ships
- new stacking and handling areas (around 1.4 ha) which will make it possible for the terminal to improve its performance and achieve a throughput of around 150,000 – 200,000 TEU per year.

The transport and stacking area shall be provided with an open space to be used for the trans-shipment, loading and discharging containers from ships to the quay apron and vice versa, and loading and discharging containers between ship – wagon and vice versa, ship –

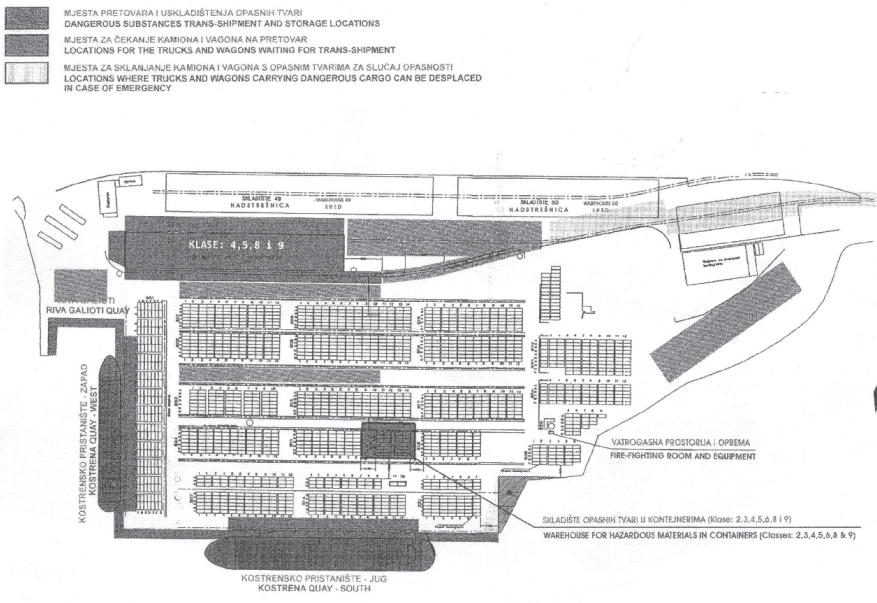
truck and vice versa, wagon – truck and vice versa and finally container yard-wagon -truck. A part of the space is intended for the ancillary buildings and objects of the traffic and public service infrastructure.

The landside of the terminal needs to be developed as a functional complex in accordance with the technological requirements. The complex can be divided into five zones, with specific types of construction and land development planned for each of them:

- I. Port-operational areas –these are planned to be arranged as an open storage space for the handling and stacking of containers
- II. Wharf with a back-up area – for container loading and discharge by RO-RO ramps
- III. Roads and infrastructure facilities – there are plans to construct new lines of communications within the terminal (roads and railway) and upgrade the access roads and railway passing through the port area
- IV. Covered storage –will be constructed to allow for container stuffing and emptying operations
- V. Ancillary facilities – as planned there will be a building serving for the control and protection of the main entrance with parking lots for freight vehicles and cars and maintenance –repair shops located nearby.

In view of the enormous quantity of material required to fill up the sea and create new storage facilities, a much better solution would be to have a part of the current timber storage adapted for the needs of the container terminal. Locations for dangerous substances transshipment and storage should be also provided for in that area (fig.3).

fig.3



The terminal will allow for an annual turnover of some 150,000 to 200,000 TEU of which about 30% is supposed to be transported by train and the remaining 70% by truck.

For the loading and discharge of the rail wagon, it is planned to introduce a number of new track connections from the shunting yard Brajdica which is located in the close vicinity of the Rijeka port area in the Sušak basin.

As for the road traffic, there will be a new main entrance to the Sušak basin for trucks which will be connected with the Croatian highway network, via the recently built national road D-404.

In addition to this main entrance, several other back entrances should also be made available, either to connect the port with the shunting yard Brajdica or serve as entrance to the port for the service vehicle and port employees' cars.

The traffic within the terminal is planned to proceed as follows:

- There will be a principal peripheral collecting multi-lane communication line located between the open and covered storage facilities with a number of internal transversal roads routed toward it, whose position depends on the cargo handling technology.
- As for the parking lot, its location is envisaged within the port area, by the main entrance to the terminal. It will be large enough to accommodate about 30 cars (20 employees' and 10 port service users' cars).

No increase of the terminal performance and productivity can be expected before the competent authorities establish the current factual state of the railway siding (tracks) and their capacity and specify the works to be done. It's about the following:

- Construction of a new drawing-out siding of 274 m useful length,
- Construction of new port tracks for the rail transport of containers,
- Purchase of a necessary number of transtainers and other port equipments to handle cargo loading/discharge at the railway terminal,
- Construction of a container receiving plateau and appropriate road accesses,
- Port of Rijeka and Croatian Railway Authorities should make arrangements about the use of the 12th and 13th tracks for the cargo handling operations at the container terminal,
- Providing for a necessary number of engines and workers for the needs of shunting operations at the terminal,
- Providing for a necessary number of plateau carts (Rga and Kgs) for the container transport
- Ensuring early supply of a necessary number of engines for "marche-route" trains,
- Making provisions for a regular drive.

In order to improve the container handling efficiency at the new terminal wharf, it would be necessary to install two new container cranes. Moreover, the warehousing and stacking operation require new portal cranes (transtainers), freight lifters and straddle carriers.

The costs related to the realization of the new conception of the container terminal Brajdica are assessed as follows:

| | |
|---|------------------------|
| 1. Wharf structure | 9,600,000.00 € |
| 2. Geotechnical and research works | 310,000.00 |
| 3. Storage facilities and roads | 11,200,000.00 |
| 4. Railway tracks in the terminal | 782,000.00 |
| 5. Water supply and drainage | 1,980,000.00 |
| 6. Electrical installation | 2,445,000.00 |
| 7. Architectural and building design projects (terminal facilities) | 6,890,000.00 |
| TOTAL | <u>30,962,000.00 €</u> |

8. CONCLUSION

The rapidly growing traffic at the container terminal of the port of Rijeka, needs an equally rapid construction of adequate port facilities. With the existing terminal having already reached its maximum capacity of some 100,000 TEU and the construction of the new terminal at the pier Zagrebačka obala not brought to completion as yet, the need arises for a new quay capable of accommodating larger containerhips to be constructed as soon as possible. As for the new storage capacities, these can be obtained by extending the existing storage area to the location currently used for timber warehousing.

It's the construction of the new operational quay and adequate storage facilities, as well as the supply of new container cranes and warehouse cargo handling equipments that will make the current container terminal capable of accommodating larger vessels and achieving a container throughput of 150,000 to 200,000 TEU. Consequently, until the construction of the new terminal at the pier Zagrebačka obala is completed, the existing container terminal Brajdica, after going through the necessary superstructure and infrastructure interventions, can completely meet the needs of the port of Rijeka .

BIBLIOGRAPHY

- [1] Dundović, Č., Lučki terminali, Rijeka, Pomorski fakultet, 2002.
- [2] Dundović, Č., Pomorski sustav i pomorska politika, Rijeka, Pomorski fakultet, 2003.
- [3] Environmental Risk Assessment – II Construction Phase of the Container Terminal Brajdica in the Port of Rijeka, Rijeka, Rijekaprojekt d.o.o., 2004.
- [4] Container Terminal Expansion – Technological Study, Rijeka, RO „Luka” Rijeka, 1984.
- [5] Data furnished by the Port of Rijeka Authority and Port of Rijeka.

NOVA KONCEPCIJA KONTEJNERSKOG TERMINALA U LUCI RIJEKA

SAŽETAK

Luka Rijeka je luka državnog značaja otvorena za domaći i međunarodni javni promet. Namijenjena je pretežito teretnom prometu u čijoj strukturi važnu ulogu ima kontejnerski promet. Razvrstajem luka i prostornim planom Primorsko-goranske županije određeno je da je luka Rijeka luka od osobitog, međunarodnog gospodarskog značaja za Republiku Hrvatsku.

Hrvatska ostvaruje najveći dio svog uvoza i izvoza roba preko riječke luke koja je ujedno i najveća tranzitna hrvatska luka za robe iz Mađarske, Slovačke, Češke, Austrije, Italije i Srbije. Bitni činitelji geoprometnog položaja luke Rijeka su fizičke značajke njene lokacije i prometna povezanost luke sa zaleđem.

Izgradnjom nove ravničarske pruge od Zagreba do Rijeke, dogradnjom punog profila autoceste Rijeka – Zagreb, kanaliziranjem Save od Šamca do Siska, te izgradnjom kanala Vukovar – Šamac, riječka luka postat će važna luka za robne tokove od Podunavlja do Jadrana. U strukturi robnih tokova u budućem razdoblju posebno će biti izražen rast kontejnerskog prometa koji je već danas dostigao krajnje granice prostornih i prekrcajnih kapaciteta kontejnerskog terminala. Povećani promet zahtijeva odgovarajuće proširenje i nove investicije u kratkoročnom razdoblju, ukoliko se želi zadržati konkurentnost u gravitacijskom području sjevernojadranskih luka.

U ovome radu posebno su istražene mogućnosti proširenja kontejnerskog terminala Brajdica s obzirom da već postoje određene prostorne i prometne predispozicije u odnosu na druge projekte koji zahtijevaju duže razdoblje i odgovarajuća prometna rješenja.

Ključne riječi: luka, lučka uprava, kontejnerski promet, kontejnerski terminal Brajdica, Gateway projekt

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