

## **ANALYSIS OF CURRENT SITUATION AND DEVELOPMENT OF CONTAINER TERMINAL IN BELGRADE<sup>1</sup>**

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### **Abstract**

Incline of traffic in most of the developed countries, brings us to higher demand for new intermodal terminals, or for developing existing. This paper presents existing container terminals in Belgrade. In the paper is analysed existing cargo flows and prediction workload terminals in future. The aim of the paper is presenting the project and defining new location for container terminal in Belgrade.

***Key words - container terminal; location; Belgrade; cargo flow***

### **INTRODUCTION**

Container transport means the transport of goods in unique ISO standard containers in the complete transport chain. The application of this kind of transport allows rationalization of transportation of goods system “door to door” relative to classic transportation system with unadjusted implementation phases. Due to the high efficiency, container transport has developed into an international system for the transport of goods, which in addition to the application of ISO standard containers requires the use of special means of road, rail, water and air transport, the development of a unified information system, training of personnel at a high level and a great investment. A special place in the infrastructure of this type of transport occupies container terminals. Container terminals represent space equipped with the appropriate equipment and machinery for manipulation with container operations (loading, unloading, handling, sorting, storage, possibly filling, emptying and repair, etc.). The terminals are organized in major ports, railroad hubs, distribution and trade centres.

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<sup>1</sup> Professional paper



## EXISTING CONTAINER TERMINAL IN BELGRADE

Container terminal ŽIT BEOGRAD is located in the city centre, close to the main railway station in Belgrade, with which it is directly connected. At the time of its construction, the terminal was ideally located considering that enables easy and efficient distribution of containerized goods to end users. It should have in mind that the people on the territory of Belgrade were mostly located in the narrow central part of the city.

Intensifying the total traffic flow in the urban area of the city, there is a need for the introduction of emergency measures with the aim of facilitating the main road traffics of freight road vehicles, which identifies the current location of the terminal as unfavourable.

Container terminal ŽIT BELGRADE occupies an area of 12,000 square meters. Length of the terminal is 400 meters and width 30 meters. The facility to track, suspensive line and passing lines of trucks occupies an area of 600 square meters. The possibility of extending does not exist, because at the very start of construction, all possible facilities are utilized. Basic infrastructure facilities in the terminal ŽIT Belgrade are:

- checkpoint,
- administrative building,
- plateau for storage containers,
- workshops for maintenance and repair of containers,
- road traffic,
- railway tracks and
- gantry crane.

At container terminals there is only open warehouse, because the lack of space at stunned location not leave the possibility of building a closed warehouse.

The main part of the storage container is under the gantry crane. Most in the terminal can be stored empty containers. Exactly 90% of the space is used by shippers who terminal ŽIT BELGRADE used as their own authorized depot. As additional storage terminal use warehouse owned by ŽIT BELGRADE, but only for duty-paid goods.

Primary reloading tools for manipulating load units of intermodal transport is a portal crane PF 600, which is in operation since February 1988.

Crane bridges the two manipulative tracks, three traffic lanes for storing and stacking of containers and one passing lane for trucks. Overall height is 12 meters and crane range is 22 meters. Length of crane track is 180 meters. The depth of crane (the distance between the pillars) is 12 meters. Crane starts with four synchronized electric motors. Lifting height 11 meters. The capacity of the main crane hook is 400 kN, and the capacity auxiliary crane hook is 100 in. Maximum weight lifting 40 tons.

Gantry crane serves about 3,600 square meters. In three of the unloading lane, stay 216 TEU and each lane has 24 fields in which to arrange three containers in height. The crane can simultaneously serve 16 Rgs wagons or 24 wagons series Kgs. In addition to the crane largest part manipulation and reloading is done by forklifts. The terminal has three large forklift load capacity 8 t, 10 t and 12.5 t. With three forklift 3.2 t and one of 3.8 t realize all reloads, loading-unloading containers at the terminal.

The terminal is mainly manipulated with dry-box and open-top containers for bulk cargo, and is dominated by open-top containers designated for the transportation of bulk materials. Freight containers are of different sizes, height starting from the 5', 6', 8', up to 8'6". Overseas traffic goes with dry-box containers of standard size 8'6" for all types of container length 20', 40' and 45'. The last decade of the terminal largely dominated 40' HC (high cube) containers of 9'6", height of 2.90 meters, and working intensively with tank containers of 20' and 24'.

#### ANALYSIS OF EXISTING CARGO FLOW AND PROGNOSIS OF VOLUME IN THE NEXT PERIOD

ŽIT BELGRADE, container terminal start receiving the first containers in July 1988. It practically represented pioneer start and it took time, work and a lot of marketing to inform the public and to gain confidence. Real beginning with a complex business and a significant amount of work is related to the year 1989, when the intermodal transport in Serbia, as well as containerization gain in importance. Large shippers and companies, owners of containers, container terminal ŽIT BELGRADE authorizes depot for its containers. This effectively meant that with this terminal could be carried on each distribution container, both empty and full. In the following years the quality of work and services increases greatly thereby gained the trust of clients. This trend growth remained until 1992, when starting wars in the former Yugoslavia come practically to a standstill transportation of containers in international transport. The introduction of sanctions was the end of expansion and conquest of new markets and fight the competition.

Until the 2004 it appears again flows of containers in international traffic when slowly begins to revive the trade situation Serbia via the Adriatic ports. As a new start can be considered as 2005, when the port of Rijeka moved aggressively to conquer the Serbian market and the region. The peak in the volume of transport after the war was reached in 2007, followed by appearances global economic crisis that has hit almost the entire world market and has significantly affected the volume of trade situation in the world. But in 2009 began a new arrest and fall within the scope of the terminal, and then in 2011, the greatest scope of work in this period. Number

of manipulations of the container terminal ŽIT BELGRADE by years and months is shown in Table 1:

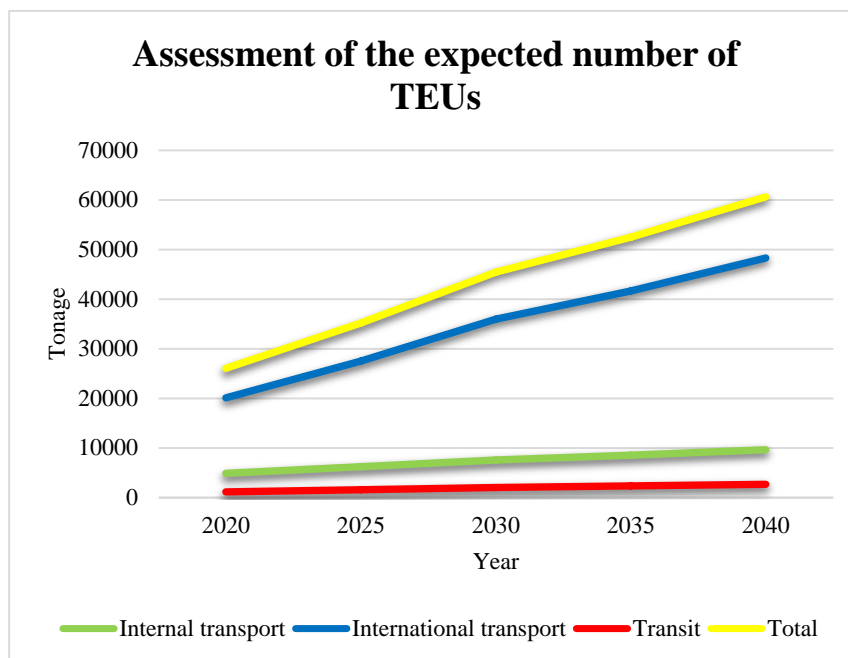
Table 1. Work at ŽIT BELGRADE container terminal by age

Work on container terminal					
Year	Internal transport (TEU)	International transport (TEU)	Work on containerization		Total
			TEU	Tone	
2009	3842	8612	708	13867	13162
2010	4502	8931	751	14226	14184
2011	5712	9964	10042	16842	25718
2012	4006	13916	854	17745	18776
2013	4244	15764	870	15834	20878

Table 2. Assessment of the expected number of TEUs

Work on container terminal (TEU)				
Year	Internal transport	International transport	Transit	Total
2020	4846	20059	1107	26012
2025	6184	27483	1517	35184
2030	7524	35919	1982	45426
2035	8513	41640	2298	52451
2040	9632	48272	2664	60568

It is estimated that in this container terminal in 2020. will be overload about 26,000 TEUs, and in 2040 about 60,000 TEUs, with a win over transit flows, the volume of work could increase significantly.



Graph 1. Assessment of the expected number of TEUs

## DEFINITION OF LOCATIONS AND PROJECT OF NEW CONTAINER TERMINAL BELGRADE

### Container terminal in Batajnica

Intermodal terminal in Batajnica was the first planned terminal of this type in Serbia in Batajnica, near the railway station, in an area, master plan of the city of Belgrade is defined as an area intended traffic. One of the reasons for selecting this location is well connected with road and rail European corridors passing through Serbia. The intermodal terminal through the service road of the Belgrade bypass road is linked to the traffic loop Batajnica, which is part of corridor X. The terminal is connected to the industry track railway station Batajnica which is also part of the railway corridor X.

Intermodal terminal in Batajnica was designed with several functional parts:

- administration and control part (parking),
- road and rail access,
- transfer sidings,
- lanes for loading/unloading trucks and bypass lane and
- handling and the storage part.

The most important part of the manipulation area in a terminal, consisting of:

- 3 tracks: 2 transfer sidings for loading and unloading of containers and 1 extra handling track for locomotive
- 4 lane for the passage of trucks: 1 passing, 1 loading-unloading, 1 spare lane and 1 lane for emergency exit,
- Container storage: 3 container line for temporary storage of containers, frigo-containers, exchangeable transport tanks and containers with dangerous goods.

The realization of this project was abandoned for now.

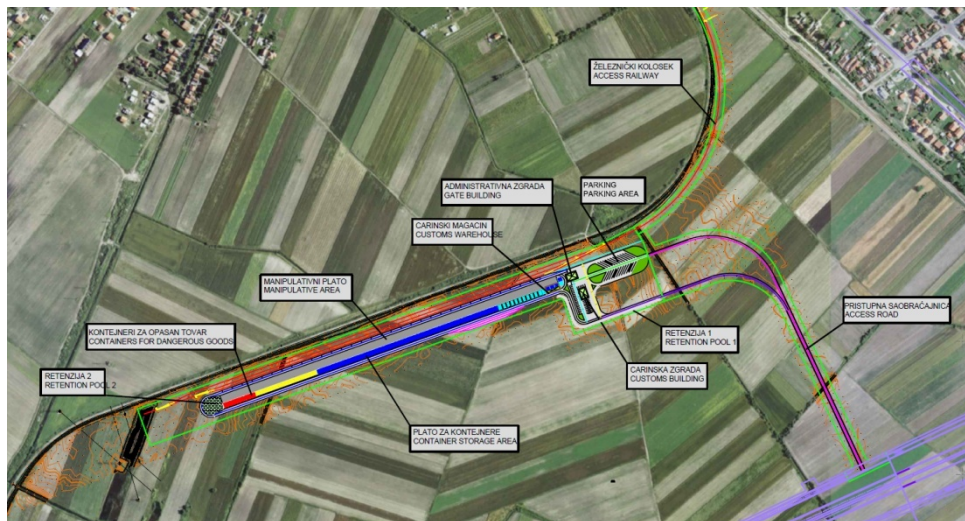


Fig. 1. Container terminal Batajnica

### **Container terminal at the station Belgrade - marshalling yard**

Container terminal at the station Belgrade Marshalling is planned in the field of classification – departure yard of station, from 60 to 77 tracks in the V and VI group, in its final size.

The preliminary design phase is foreseen construction of container terminals in three phases.

#### **Phase 1a**

In this phase are planned following activities at the container terminal:

- at the entrance of cargo transportation center facility where they will be carried control inputs and outputs, which also is used for video surveillance and fire alarm,
- the access and internal roads that should provide easy access to the

- container terminal and easily shunting within it,
- 2 new transfer siding 1 and 2, for handling operations with a cargo of container units by means of manipulators,
- existing tracks 75, 76, 77 and 78 for side tracking, formation and splitting up of shunting trains,
- lanes for road vehicles,
- handling areas enough capacity to accept the load during the movement of loaded road vehicles and reloading container manipulators,
- storage area with three lanes on which you can dispose of about 1,000 TEUs, while empty containers and those that will be a long time in the terminal along storage terminal for at least 1,000 TEU, as well as connections for 20 frigo containers,
- part handling and storage area provided for manipulation and accommodation around 60 containers for the transport of dangerous goods (except classes 1 and 7 RID),
- parking for reloading machinery, commercial vehicles and passenger cars,
- services and workshop,
- Customs duty office.

For pension administration and administrative staff of container terminal is planned ground floor annex of the existing office buildings, and a renovated warehouse building dock to accommodate the staff of terminals and warehouses.

Each vehicle that approaches the complex will perform registration or revocation at the reception. Containers are transported by road trailer or rail car. Reloading is performed container manipulator (reach stacker) on manipulation area, with tracks 1 and 2 or directly from railroad cars to road vehicles and vice versa.

In Phase 1 and, after completion of transfer and possible customs clearance, is made from forwarding containers of container terminal rail car or road vehicles. Customs inspection of goods can be carried in the vehicle, in container or in the warehouse, on the border crossing is the only passport control staff accompanying or driver.

If there is no direct transfer, containers are unloaded from railroad cars or road vehicles in the appropriate part of one of the lane to leave until their loading. Containers that require loading or unloading, storage is also an open store. For their manipulation of the terminal is planned telescopic forklift. The containers in which there is a demand for servicing, repair or washing transported to the workshop. Empty containers after unloading cleaned, washed, disinfected, repaired immediately or stored, immediately loaded



with goods are delivered or the next user.

If the containers transported by railway car in the homogenous trains, and the recipient has an industry track, containers are shipped directly to him, and if you they drive like a car or group of cars in mixed trains, going first in the marshalling yard, and from there the industry railway track of the recipient. Dispatching of containers of container terminal will be done with the railway wagon or road semi-trailers.

#### **Phase 1b**

According to the preliminary design, at this stage it is planned that the container terminal, also in the area of group VI-track classification – departing yard, set gantry crane with overhang, range of 29.25 meters, the length of the crane track 350 meters in whose area of work is located 4 tracks 2 lanes for road vehicles and 3 lanes for storage containers.

Phase 1b gantry crane used for operations of vertical loading in the useful length of the track. In the second half of the track to the exit of the park "B" transshipment container carries a manipulator (Reach stacker).

Tracks 1 and 2, which are located beneath the crane, as well as the reconstructed tracks 75 and 76 who are under the overhang gantry crane used for transshipment operations. It is planned that the reconstructed tracks 77 and 78 are used for side tracking, formation and splitting up of shunting trains and for weighing wagons is planned track 78.

When the load units at the terminal for long, their storage is planned on one of warehousing lanes out of the action gantry crane. These and other necessary manipulations are performed container manipulator (Reach Stacker).

#### **Phase 2**

In this stage crane path will be an extended to 650 meters and will set up another gantry crane, achieving the capacity to handle that exceeds the estimated volume of work on the terminal. Unloading and loading operations are performed on the entire length of new reloading tracks 1, 2, and on the tracks 75, 76 and on tracks 77 and 78, will be performed side tracking and formation and splitting up of shunting trains. It is planned to construct a new track 78a for side tracking.

At this stage manipulative area in group V classification – departing yard is intended for movement Reach Stacker and storage of containers, parking of passenger and freight road vehicles, trailers and semi-trailers, as well as to set the open and roofed enclosures for housing and other makeshift workshop with tools and accessories.

#### **Container terminal under the RTC BELGRADE**

In the "Master Plan of Belgrade 2021" was defined locations for construction of RTC BELGRADE, in the area of the Makes fields, an area of

170 hectares which will be an integral part of the container terminal (Figure 2).

Container terminal is composed of four tracks in the classification-departure yard, four rail track under the crane tracks, roads and storage containers in the area of the crane.

The terminal will be performed transshipment of transport equipment by technology B and C by two cranes capable of lifting 40 tons, at the one-half of the total length of the terminal. Crane track "Gantry", length 750 m and is mounted on a reinforced concrete foundation.

Containers which are less retained in the terminal will be deposited in the storage area under the crane with a capacity of 2,500 TEUs in stacking the three levels in height.

For empty containers and those that will be a long time on the terminal is provided with a storage terminal for at least 1,000 TEU, with 36 ports for frigo-containers.

**RoLa terminal** will be an independent part of which will perform the loading and unloading of vehicles with an escort, according to the technology A (cars are slipway onto wagons self-propelled), and consist of two tracks useful lengths of at least 550 m at a distance of 6 m.

At the ends of track is needed to build manipulative surface, in length of 110 m on each side, where the tracks to be drowned, to allow loading of vehicles onto wagons.

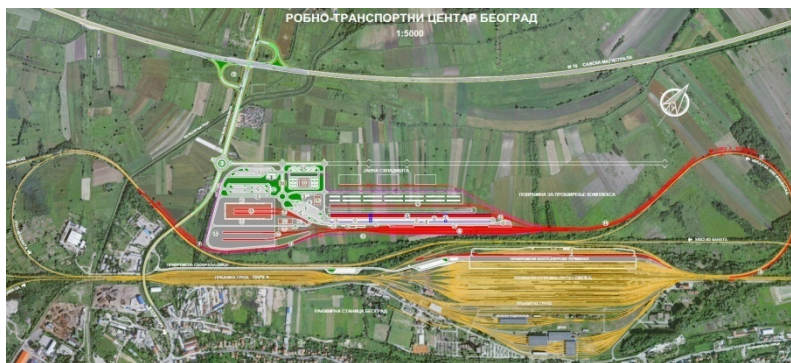


Fig. 2. Cargo transport center Belgrade

## CONCLUSION

The development of intermodal transport in Serbia directly increases the volume of work of container terminal directly or indirectly depends on several factors, such as industrial development, the level of competitiveness of products on the market, the size of the international exchange of goods and so on. Detailed analysis of the location of container terminals was considered and the

impact of the cost of construction and development of terminals at the locations shown, relative to the available infrastructure which is necessary to build. The relocation of container terminal ŽIT BELGRADE from the existing location at the station Belgrade Marshalling yard, will come to relieve traffic congestion in the city and divert a large number of road vehicles which they do not belong.. Also, the existing space will be used for continuation of construction work on the project "Belgrade waterfront", which is of great importance for the city of Belgrade.

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