

CETRA 2016

4th International Conference on Road and Rail Infrastructure
23-25 May 2016, Šibenik, Croatia

Road and Rail Infrastructure IV

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ENTRANCE TERMINAL OF THE PORT OF PLOCE – ENDPOINT OF THE VC CORRIDOR

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Abstract

Corridor Vc in the length of 702 kilometers stretches from Budapest via Osijek and Sarajevo to the Port of Ploce. Luka Ploce is declared as a port of special international economic interest for the Republic of Croatia, and the completion of the planned projects of its development, will enable it to accept greater amount and specific types of cargo.

Construction of the entrance terminal with a border as an endpoint Vc corridor in order to develop the competitiveness of the Port of Ploce will provide superior technological and technical design to meet the needs of businesses. The valuation of the building is to over 85 million kn. Entrance terminal of the Port of Ploce together with the southern section of the Vc corridor within which the highways A1 and A10 are located, represents infrastructure project which has a special value in understanding the process of economic and transport integration of Northern and Central Europe with the Adriatic. This paper describes the main characteristics of the subject building.

1 Introduction

Construction of new modern port terminals for containers and bulk cargo – the Bulk Cargo Terminal and Container Terminal which modernize and increase the transfer capacity of the Port of Ploce requires the construction of a new road intersection with the checkpoint and the parking lots and ancillary building construction facilities related to the functioning of border crossing.

The Entrance Terminal of the Port of Ploce requires structural unit and a communication link between office buildings, checkpoint, parking lots, main road – speed (access) road and local access roads with the road connecting the Port of Ploce with the city.

Construction of the Entrance complex is based on the premise of constructing an overpass over the railroad tracks and the access road to the town of Ploce, which is built up through investment of HAC as the end of the connection road Ploce intersection (A1) – Cevaljusa intersection – Port of Ploce.

The subject intervention with the area of 50,000 m² is located on the extremity of the southern section of the Vc Corridor. It consists of the office building, the checkpoint with the access road (the continuation of the road from the direction of Cevaljusa), external parking lots for arriving cars and vehicles, internal parking lots for departing vehicles and supporting municipal infrastructure, Figure 1.

The goal of the investment is to get facilities and infrastructure according to the needs of the port truck traffic. It ensures the quality of working conditions for all users, and the use of new management and approach control systems will enable faster and more efficient flow of cargo. With the construction of these facilities the Port of Ploce becomes a modern logistics center which will allow the opening of other markets.

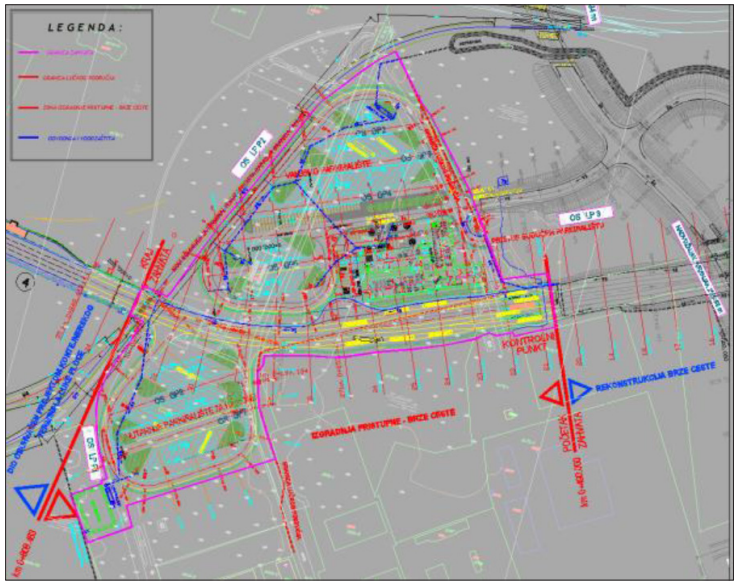


Figure 1 Overview of design solution of Entrance terminal of Port of Ploče with access road and parking lots

2 Description of the operation

2.1 Civil engineering facilities

2.1.1 Access road

Technical elements

Speed Road – Connection road CP Karamatici – Port of Ploče of total length of 9.73 kilometers in this operation continues to the Port of Ploče as access road [1] and fits to the Main port road No. 2. The total length of the intervention is 318.460 m.

Speed road connects the town and the port of Ploče with highways A1 and A10, and therefore the route of the access road is extended to the existing entrance to the Port complex, in accordance with the extract from the Plan of Dubrovnik- Neretva County.

In the middle of the road on the north side the turnstile is designed for vehicles arriving into the Port of Ploče, and, which are required to leave the Port after passing the checkpoint, all according to the technological process of functioning within the port, or the requirements of the police and customs, Figure 2. The cross section is aligned with the so far constructed highway. It is planned with two carriageways without dividing strip, and each roadway has two lanes in width and 3.50 m and edge tape width 0.50 m. Within the zone of the checkpoint a central strip is extended to 6.00 m provided for vehicular balance. Verges with footpath 1.50 m wide are with total width of 2.00 m. Gradients slope embankment are predicted with 1:1.5. Clearance above the access road will be a minimum height of 4.50 m from the highest point of the pavement. The project for the access road provides the following pavement structure:

- Wearing layer of splitmastix asphalt SMA 11, thickness of 3.5 cm;
- Adhesive base layer VS 22, thickness of 7.0 cm ;
- Bituminous base layer BNS 32sA thickness of 9.0 cm;
- Mechanically compacted base layer, thickness minimum of 35.0 cm

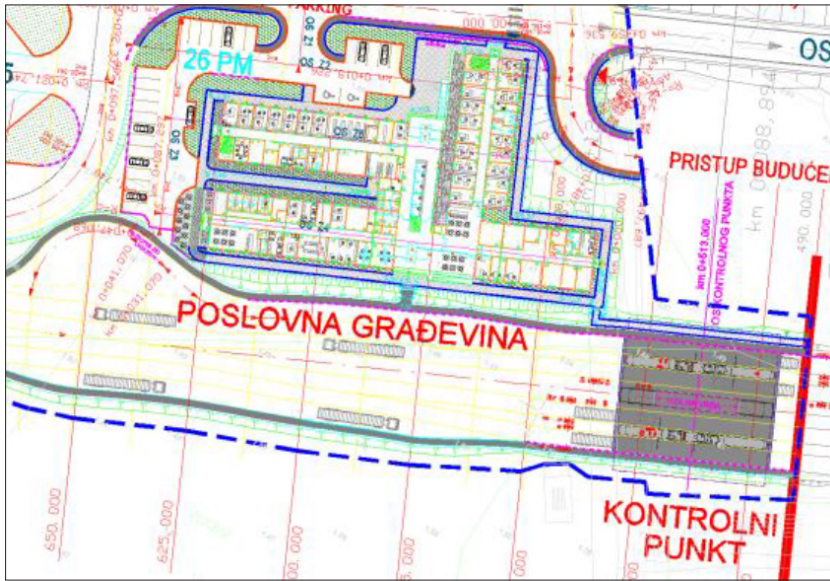


Figure 2 Access road with turnstile, office facility and checkpoint

Geotechnical conditions

The soil at the site of the road consists of from typical soft marine sediments and is extremely unfavorable geotechnical environment. For the subject road the solution [2] is applied of foundation soil by cement stabilization in a layer 40 cm below the carriageway and footpaths. In the area of the checkpoint, to ensure adequate soil bearing capacity and reducing subsidence in using an acceptable measure, derived gravel piles are constructed, with a diameter of 100 cm on which nonwoven geotextile and ballast on an extended surface 50 cm thick are applied.

2.1.2 External and internal parking lots

Within the Entrance complex the construction of external and internal parking lot [3] is planned, and also of the truck parking areas for arriving and departing as well as for passenger cars. This will provide parking space for the employees of the Port such as customs, police, agencies, freight forwarders, service control and similar.

The cross section of local roads of parking lot has two lanes in width of 3.50 m. Verges are of planned width of 1.50 m. The total width of the cross section in the crown is 10.00 m. The project for parking lots and roads in the subject zone provides the following pavement structure:

- Asphalt-concrete wearing course AB 11, thickness of 5.0 cm;
- Bituminous base layer BNS 32sA, thickness of 8.0 cm;
- Mechanically compacted base course thickness minimum of 35.0 cm.

External parking lot

In the northern zone of the intervention – external parking lot for arriving cars the space is provided for one-time accommodation for 47 cargo trucks, space for 26 passenger cars in front of the entrance to the main building (+ 2 parking spaces for the disabled) and 55 passenger cars on the north side of the building. Parking lot is appropriately fenced and equipped with all necessary facilities including control systems, supervision and toll collection and is connected informatically with the office building.

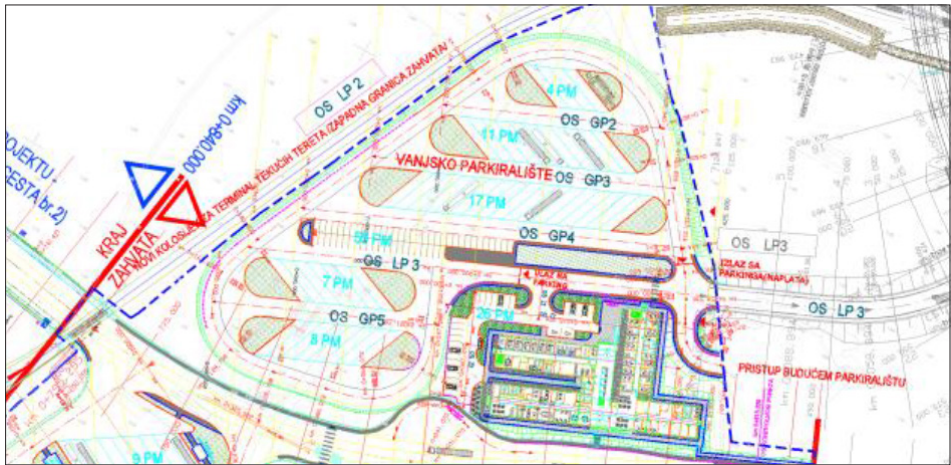


Figure 3 External parking lot

Internal parking lot

For departing vehicles, within the fence of the Port, in the southern zone of the intervention, an internal parking lot (Figure 4) is provided for vehicles awaiting an exit procedure. This project provides parking area that can accommodate 27 trucks and 20 cargo trucks. Parking is equipped with all necessary facilities provided for control of the entire area, which is surrounded by a fence of the Zone. After leaving the parking lot, vehicles are directed to the access (speed) road and to the checkpoint, and further via “Ceveljusa” intersection by connection road toward the A1 motorway.



Figure 4 Internal parking lot

Geotechnical conditions

The soil is saturated with groundwater that is, the level of groundwater is constant throughout the year around the ground surface, a minimum of about 50 cm below the surface of the flooded area, and the daily fluctuations are affected by tides.

Based on the experience gained during and after the construction of Ceveljusa intersection and the terminal in the Port of Ploče, which are located in the immediate vicinity, as a logical solution to improve soil and acceleration of consolidation improvement of the soil gravel piles with a diameter of 100 cm below the office building is applied [4] with the installation of prefabricated vertical drains of polypropylene and preload in excess of 30 % of ultimate load object for a period of 4 months .

For parking locations [5] the soil improvement using vertical drains with mounting nonwovens for separation of earth and stone material and preload in excess of 30 % of ultimate load for a period of 4 months is applied .

2.2 Building construction structures

2.2.1 Office building

Purpose and organization of the building

Office building of the Entrance terminal of the Port of Ploče [6] has a gross area 3776.00 m² distributed on two floors. Ground plan of the building has an irregular shape. From the central common space rectangularly shaped four rectangular branches (pavilions) go out, one north, one east and two west (north and south). The northern branch and the western (northern) branch are of the height of P + 1, while the eastern branch and the western (southern) branch are of the height P. The main entrance to the building is on the north side of the central part of the common space – the central hall. The side entrance is in the central part of the common area on the southern side and also leads to the central hall.

In the central part of the central hall the main reception area of the building is located, with the service information, receptions, post office, bank and currency exchange office. In the southern part of the central hall are vertical communications, evacuation elevator and single staircase, and a coffee bar, which has a terrace in the covered part of the south facade . Winter Garden is a landscaped outdoor area.

The entrance on the north facade through the windshield leads into the central hall. On the floor of the central hall is a restaurant, with a separate room for smoking, and the expansion of hall in front the main conference room.

The central hall and the ground floor and the first floor has the necessary sanitary block. The northern branch of the building, with the height of P + 1 has freight forwarding service organized. The eastern branch of the building, with the height of P, has police service organized. The western branch of the building with the height of P in the first half of its length has customs service organized and is entered through a central hall. The other half of the length of the hall is organized as truckstore which has an entrance from the outside, from the west.

In truckstore there are: an entrance hall, vault room, coffee bar with an uncovered terrace, storage and restrooms with dressing room for employees, kitchenette, toilet facilities for men, three bathrooms, a cleaners and laundry machine rooms. The western branch of the building with the height of P + 1 across its surface has a space for offices of the Port Authority. The ground floor and first floor are arranged for services of the Port authority according to the requirements of investors. On the floor of the west wing, at the junction with the Central Hall, there is a kitchen with office and aerial platform for food. The lifting platform connects ground and upper floor office.

Structure

Office building is of ground plan indented shape, but in terms of altitude is composed of two floors. Structurally it is one unified unit. Branches of the building (west – south branch and western – northern branch) are with ground plan dimensions 13.30 x 42.00 m. The eastern branch of the building is with ground plan dimensions 13.30 x 26.40 m while the northern branch of the building has dimensions of 13.30 x 36.45 m. The central hall is L-shaped with dimensions of 28.95 x 10.65 branches and connects all branches of the building. The branches with the height of P + 1 (northern branch and the west-northern branch) have a height of 8.90 m, a height of arms P (eastern extension of the west – southern branch) have a height of 5.10 m above the finished surrounding terrain. The central hall has a height of 8.90 m above the finished surrounding terrain.

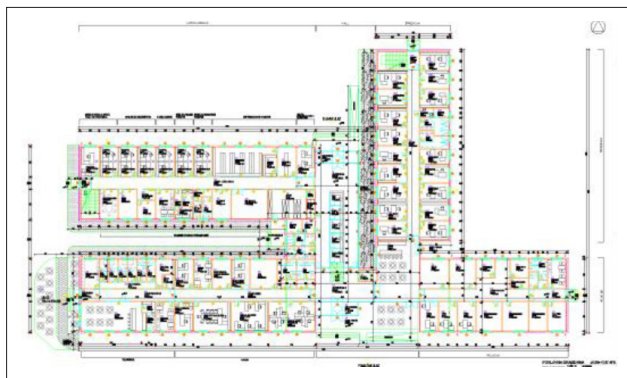


Figure 5 Ground plan of office building

Constructive solution provides a combination of monolithic and assembly design building construction. Assembly design of a structure includes: the performance of vertical and horizontal wall panels and performance of ceiling and roof structures.

2.2.2 Checkpoint

Within the Entrance complex, at the beginning of the route of the access road the construction of checkpoint building is planned [7]. It consists of a canopy, control facilities and vehicular balance. Checkpoint is also the border crossing to be used for control of goods and sealing of containers. Under the canopies are facilities for customs, police and security services and vehicular balance. Canopy with ground plan dimensions of 33.80 x 33.80 m covers the four traffic lanes, the islets are with two check boxes. One is intended for customs and another for the police and security guards.

In the checkpoint zone is lane with the width of 6.0 m to place vehicular balances. It is anticipated to install the vehicular balance with loading capacity of 60 tons (min. 15 tons of axle load) with dimensions of 18.0 m x 3.0 m. The maximum height of the canopy is 7.35 m and the maximum height of the control box is 3.20 m. The light passage under the canopy is 5.35 m, while the light height of check box is 2.80 m. The project for the checkpoint provides concrete pavement structure with the total thickness of $d_{uk} = 62.0$ cm:

- Unreinforced concrete slab with the thickness of 22.0 cm, and the width of 3.50 m with the transverse dividing lines at a distance of 5.00 m;
- Base layer of crushed stone granular material stabilized with cement, with the thickness of 20.0 cm;
- Mechanically compacted base course with the thickness of 20.0 cm.

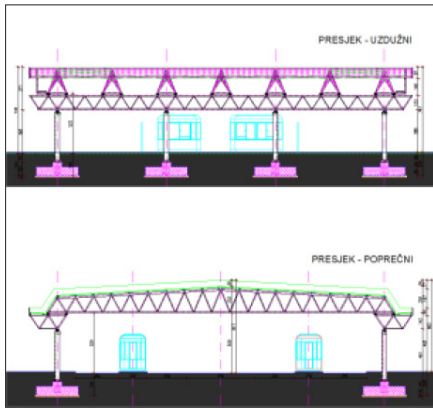


Figure 6 Checkpoint – longitudinal and cross section

2.3 Drainage and water protection

Design solutions for drainage and water protection [8] defines the system of structures whose function is controlled collection of pavement water, its purification and final safe disposal as a natural resource. Defining the relevant data for a particular area is estimated using ITP curve for MS Ploče. Drainage system as a closed system consists of collectors and grease traps. For the functionality of the drainage system of internal parking for discharging water from the retention the reconstruction of collector 'Maintenance – Channel Vlaska “ is planned, which is not the subject of this project. The drainage system of the external parking lot is connected to the retention by the lateral channel that will be built as part of the neighboring intervention of the “Croatian motorways”.

3 Conclusion

Building the Entrance Terminal of the Port of Ploče as an endpoint of the Vc Corridor represents an additional contribution to improved connection of northern and central Europe with the Adriatic. The Entrance terminal of the Port of Ploče with the southern section of the Vc corridor within which the highways A1 and A10 are, which extend from the Ploče intersection to the border of Bosnia and Herzegovina and the northern section of Corridor Vc in our country (motorway A5 Beli Manastir – Osijek – Svilaj) presents two major infrastructural projects, which complement each other and have exceptional value in understanding the process of economic and traffic integration of the Central European area. The Entrance complex will certainly contribute to the growth and development of the Port of Ploče as a major economic power in this part of Croatia.

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