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Gap Analysis & ESIA Disclosure Pack

WB20-BiH-TRA-02 Component 1

Annex F: Preliminary Construction Waste Management Plan

December 2025

COWI | IPF

Western Balkans Investment Framework (WBIF)

Infrastructure Project Facility Technical Assistance 8 (IPF 8)

Infrastructures: Energy, Environment, Social, Transport and Digital Economy

TA2018148 R0 IPA

Annex F: Preliminary Construction Waste Management Plan

December 2025

The Infrastructure Project Facility (IPF) is a technical assistance instrument of the Western Balkans Investment Framework (WBIF) which is a joint initiative of the European Union, International Financial institutions, bilateral donors and the governments of the Western Balkans which supports socio-economic development and EU accession across the Western Balkans through the provision of finance and technical assistance for strategic infrastructure investments. This technical assistance operation is financed with EU funds.

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7	31/12/2025	Preliminary Construction Waste Management Plan	Team of experts	Irem Silajdžić	Richard Thadani

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Acronym	Meaning
BiH	Bosnia and Herzegovina
BoQ	Bill of Quantities
PCWMP	Preliminary Construction Waste Management Plan
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EU	European Union
FBiH	Federation of Bosnia and Herzegovina
JPAC	Motorways of the Federation of Bosnia and Herzegovina
WMP	Waste Management Plan
ZGI	Zagrebinspekt

1 Introduction

As a part of the Urban Permit issuance procedure, according to Article 39 of *Law on Physical Planning and Utilisation of Land at the Level of the Federation of BiH* (Official Gazette of FBiH, 02/06, 72/07, 32/08, 04/10, 13/10, 45/10), and Article 8 of the *Decree on Type, Contents, Marking and Filing, Control and Validation of Investment Documentation (*Official Gazette of FBiH, 33/10), the Preliminary Construction Waste Management Plan (PCWMP) constitutes its integral part.

PCWMP will be made for the purpose of construction of the subsection: Konjic (Ovcari) – Prenj Tunnel– Mostar North, with the following lengths:

- Konjic (Ovcari) - Prenj Tunnel = 11,500 m,
- Prenj Tunnel, L=10,936 m + 1,500 m of the route before the tunnel + Southern Connection to the Main Road M17 L=3,535 m,
- Prenj Tunnel - Mostar North, L=12,400 m.

In accordance with Article 11 (3) *Rulebook on construction waste* (Official Gazette of FBiH, 93/19), regulates that in addition to the request for urban permit, the PCWMP is also submitted, and its content is defined by Para 2 depending on type and quantity of construction waste and level of processing.

During the preparation of the PCWMP for the Konjic (Ovcari) - Prenj Tunnel - Mostar North motorway subsection, the data from the following documentation were used:

- Environmental impact study for the Konjic (Ovcari interchange) - Mostar North section, Zagrebinspekt "ZGI" d.o.o. Mostar, September 2016,
- Waste management plan for the Konjic (Ovcari interchange) - Mostar North section, Zagrebinspekt "ZGI" d.o.o. Mostar, September 2016,
- Preliminary Design of the motorway on Corridor Vc; section: Konjic – Mostar North, Divel d.o.o. Sarajevo, 2016
- Analysis of the Preliminary Design of the motorway on Corridor Vc; section: Konjic – Mostar North; Preliminary Design for Tunnel T3 (Prenj) – variant II, Divel d.o.o. Sarajevo, 2016
- Design and technical documentation for the motorway on Corridor Vc; section: Konjic – Mostar North, Depositing at recommended sites, Zagrebinspekt "ZGI" d.o.o. Mostar, September 2016.
- Preliminary Design for the Konjic (Ovcari) - Prenj Tunnel section (2023), AiK Inzenjering d.o.o. Banovici
- Preliminary Design for the Prenj tunnel - Mostar North section (2023), IPSA Institut d.o.o. Sarajevo.

The procedures of construction waste management are interconnected and cannot be viewed separately. The construction waste management plan has the key role in achieving sustainability of waste management system. Its basic aim is to present waste streams and possibility for its final disposal in a manner that the environmental impacts are reduced to minimum. In other words, the Construction Waste Management Plan has to define the framework for the following aspects of waste management system:

- Harmonisation with the requirements of the waste management policy specified primarily by domestic legislation and strategic planning in view of the aims defined by the European Union,
- Review of all the waste streams, as well as the quantities of the waste generated on the site, and all aimed at establishing compatibility of types of waste with the mechanisms required for their treatment,
- Planning process is continuous process aimed at review of the achieved and improvement of the current situation of certain components of the system, while the planned activities are implemented according to schedule specified in a way to systematically monitor the implementation of pre-defined aims.

From the past experience of construction waste management in municipalities many irregularities have been recognised and problems among which we can sort out the following:

- there is no quality record of the sources, quantity, and streams of construction waste although there is a legislative framework which is not applied,
- construction waste is dumped without control, creating, with other types of waste, illegal landfills,
- the quantity of construction waste from new buildings and demolition are extremely big,
- construction waste is disposed on sanitary landfills of municipal solid waste without control,
- separation of construction waste on the site where it is created is not applied,
- hazardous waste and waste polluted by hazardous substances is not separated from the construction waste,
- use of the environmentally friendly materials and recycling of the materials is not stimulated,
- in the stage of designing of buildings the construction waste issue is disregarded, and it is not effectively regulated by rulebooks and responsibilities of designers,
- there is no established market between waste producers and users, that is, companies authorised to collect, recycle, and market recycled products,
- there is no communication among all the participants in the process of construction waste management,
- there is no elaborated system of fostering of the recycled materials building in,
- there is no standardisation of recycled materials,
- there is no implementing regulation which would regulate construction waste treatment and rights and obligations of the participants in the construction waste management system.

The main goal of the PCWMP is establishment of the sustainable construction waste management system, monitoring quantities, types, and composition of the waste, avoiding, and preventing generation; decreasing the quantities which are disposed, recycled; adoption of regulations and separation and disposal of all the types of construction waste with hazardous substances.

In addition to the main goal, this Plan has to achieve the following goals:

- review of the current situation of construction waste treatment as the basis for planning of the activities,
- identification of the optimum technologies for construction waste disposal,
- forming the most efficient waste streams from the point of generation up to the end user,
- making proposals for adoption of new and amendments to the existing regulations,
- making proposals for education and raising public awareness in order to support the entire construction waste management policy.

2 Legal and Institutional Framework for Construction Waste Management

This chapter presents the legal and institutional framework relevant for the development of the PCWMP for the construction and operation of the Konjic (Ovcari) - Prenj Tunnel - Mostar North subsection of the motorway.

Given the approximation of Bosnia and Herzegovina (BiH) to EU membership, the Waste Management Plan draws particular attention to the basic EU directives defining this area.

2.1 The Legal Framework for Waste Management in the EU

Directive 2008/98/EC on waste and repealing certain Directives, as amended by Directive (EU) 2018/851 establishes a legal framework for waste management in the EU. The Directive contains definitions of key terms and sets out the main principles in waste management. In addition, this Directive introduces basic requirements for waste management, in particular the obligation for an institution or undertaking carrying out waste management operations to have a permit or be registered, and the obligation to draw up waste management plans to reduce waste that is finally disposed of. The Directive focuses on waste prevention and sets new goals that will help the EU on its way to its ultimate goal, a recycling society.

This Directive required Member States to launch national waste prevention programmes by 2013.

According to the requirements of the Directive, any uncontrolled waste disposal or waste disposal in a way that can threaten the environment and human health is prohibited. In addition to waste management, the Directive treats hazardous waste and waste oils and, as a rule, prohibits the mixing of different categories of hazardous waste, or in other words, the mixing of hazardous and non-hazardous waste as well as the separate collection of waste oils. If hazardous waste has already been mixed with other waste, substances, or materials, it must be separated if technically feasible or economically viable.

Other EU Directives (Directive 1999/31/EC on landfill of waste, as amended by the Directive (EU) 2018/850) referring to the construction waste, treatment and disposal facilities have to be taken into consideration in elaboration of the construction management plans.

2.2 Legal Framework for Construction Waste Management

In accordance with the requirements of the EU legislation, six framework laws regulating environmental protection were adopted at the level of the Federation of Bosnia and Herzegovina (FBiH) in 2003. Terminology in the field of waste

management is defined in laws and by-laws and laws that address waste management are as follows:

Law on Waste Management (Official Gazette of FBiH, 33/03, 72/09 and 92/17) establishes a general framework for all aspects of waste management, primarily:

- Waste management planning (mandate, roles and responsibilities of authorities, types of planning documents, waste management permits, financial guarantees, etc.),
- Waste management responsibilities (responsibility of waste producers, responsibility of waste retailers, responsibilities of waste producers and holders),
- Main functional elements of waste management system (temporary storage, collection, transport, recovery, recycling and/or processing and disposal),
- Main requirements for hazardous waste management,
- Transboundary movement of waste,
- Controlling waste management operations.

This framework law is supported by particular and specific by-laws and strategic and planning documents prescribed by the Law itself. By-laws adopted pursuant to the requirements defined in the Law on Waste Management that are relevant for the preparation of this Plan are as follows:

- *Rulebook on categories of waste with lists* (Official Gazette of FBiH, 9/05),
- *Rulebook on construction waste* (Official Gazette of FBiH, 93/19),
- *Rulebook on treatment of waste present in the list of hazardous waste or waste with unknown content* (Official Gazette of FBiH, 9/05).

Law on Physical Planning and Utilisation of Land at the Level of the Federation of BiH (Official Gazette of FBiH, 02/06, 72/07, 32/08, 04/10, 13/10, 45/10) - regulates the planning of utilisation of land at the level of FBiH through preparation and adoption of planning documents and their implementation, type and contents of planning documents, utilisation of land at the Federation level, supervision of the implementation of this Law, as well as sanctions for legal and natural persons.

By-law adopted pursuant to the requirements defined in the Law that is relevant for the preparation of this Plan are as follows:

- *The Decree on Organisation of Construction Site, Mandatory Documentation on the Site and Participants in Construction* (Official Gazette of FBiH, 48/09 and 75/09).

2.3 Institutional Framework for Construction Waste Management

Responsibilities of relevant authorities and participants in the construction of facilities – the obligation to plan construction waste management provides the opportunity for reduction of waste. Management of the construction waste generated during the construction works must be planned at the stage of obtaining urban and construction permits. In this particular case, the

construction permit defines the obligation of the contractor to comply with the prescribed construction waste management measures.

The urban permit, specifically the Construction Waste Management Plan, which is its integral part, prescribes the obligation of construction waste disposal. A detailed construction waste management plan also has to be enclosed with the application for construction permit and it contains a project for management of construction waste generated during the construction of the respective structure. The project should contain information and estimates of the type of waste, estimated quantities and methods of disposal. Bill of quantities and bill of costs, containing labels in accordance with the List, should specify waste types and quantities, including potential harmful impacts to the environment, based on which the plan should give recommendations for re-use, recycling and final disposal of waste, including economic and financial analysis of the options for final disposal.

3 Project Description

3.1 Project Location Description

The subsection Konjic (Ovcari) - Prenj Tunnel - Mostar North is part of the Pan-European corridor V linking the North Europe to the Adriatic Sea, and its route called "Corridor Vc" passes through BiH, ultimately making this country a part of the European international roads network. This motorway subsection is further divided and will be designed and constructed under three separate contracts as follows:

- Konjic (Ovcari) - Prenj Tunnel = 11,500 m,
- Prenj Tunnel, L=10,160 m + 1,200 m of the route before the tunnel + Southern Connection to the Main Road M17 L=2,500 m
- Prenj Tunnel - Mostar North, L=12,400 m.

The following figure shows the location of the entire subsection:

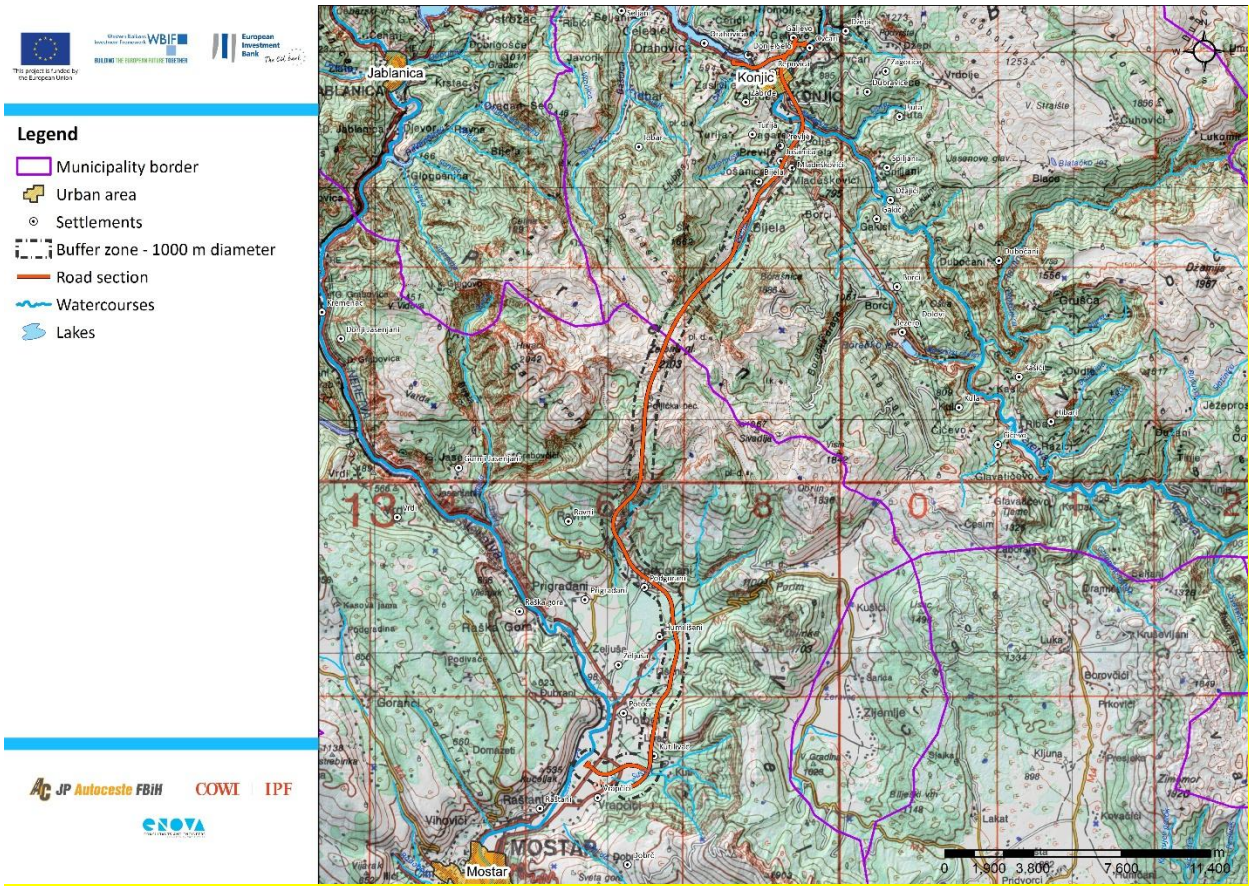

Figure 1: Location of the Konjic (Ovcari) - Prenj Tunnel - Mostar North subsection on the topographic map

Main Motorway Alignment

The subsection Konjic (Ovcari) - Prenj Tunnel - Mostar North (Vrapcici) starts on the north in the Ovcari settlement.

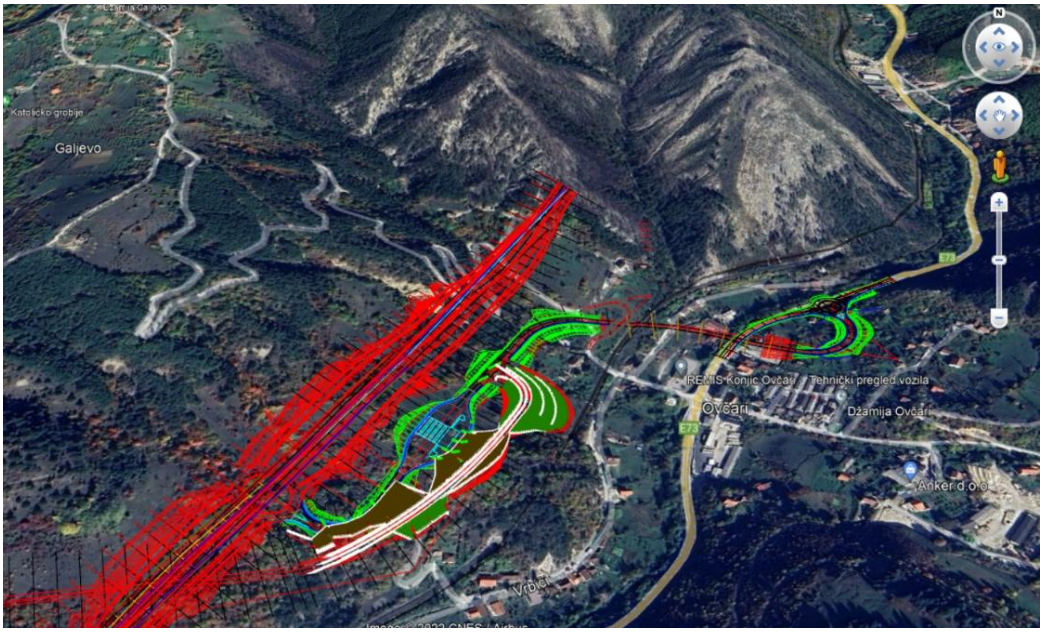

Figure 2: Interchange Ovcari (source: Google Earth)

At the northern entrance to the City of Konjic, after the interchange, the motorway crosses the Sipad industrial zone. Further ahead, the subsection passes through slopes where steep cuts are envisaged up to km 1+300.00, and where Viaduct 3 over river Tresanica was designed to cross to the opposite side of the M17 into the Zlatar mountain.

Immediately after the end of Viaduct 3, the route enters the slope which passes through two tunnels - Tunnel T1 and Tunnel T2.

Figure 3: Viaduct 3 over Tresanica, Tunnel 1 and Tunnel 2 (source: Google Earth)

After exiting Tunnel T2, the route crosses over the Neretva River and the local road with Viaduct 4 to the Bijela settlement. Crossing to the opposite side, the motorway continues along the slopes at the rear of the Bijela settlement up to the Mladeskovici settlement, where the Konjic South Interchange is positioned. The interchange is designed to connect the settlements on the south with the

motorway and the existing regional road R435a Konjic-Borci which leads to Boracko Lake.

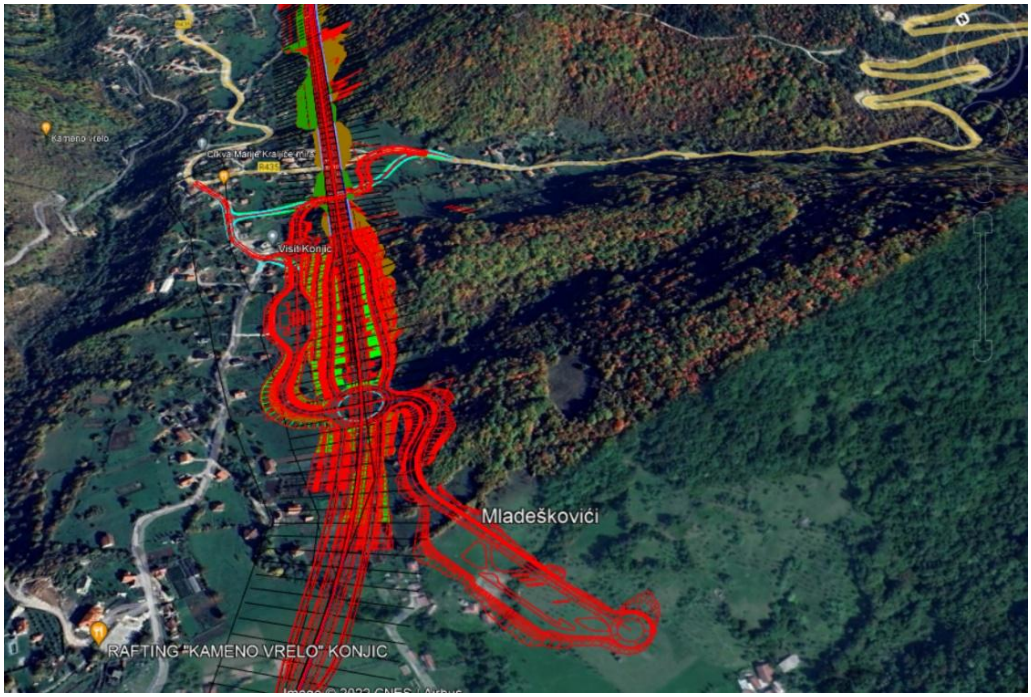

Figure 4: Interchange Konjic South (source: Google Earth)

Further on, the motorway route is laid at the foot of the slope above the settlements of Bijela and Gornja Bijela all the way to the end of the section. The route further runs along the slopes parallel to the Rakov Laz shooting range of the company Igman d.d. and continues through the uninhabited green landscape to the slopes of Prenj Mountain, where the tunnel under Prenj (Tunnel T3) begins and ends on the territory of the City of Mostar.

After exiting the tunnel through the Prenj mountain, the motorway route traverses mountain curves towards the south and the City of Mostar, through a system of cuts and bridges through uninhabited mountain areas. At the exit from the Prenj mountain range, the road crosses the valley on a 300 m long embankment and enters the Klenova Draga Tunnel (Tunnel T3A) on the western cliffs of the gorge. This tunnel practically bypasses the high cliff slopes of the homonymous valley.

Figure 5: Location of the motorway in the Klenova Draga gorge (source: Google Earth)

After the Klenova Draga Tunnel, the next viaduct begins and turns into the Tunnel T4, which terminates some 300 m away from the last houses of the Podgorani settlement. The viaduct over Badnjena Draga near Seliste, which stretches parallel to the settlement, also begins here.

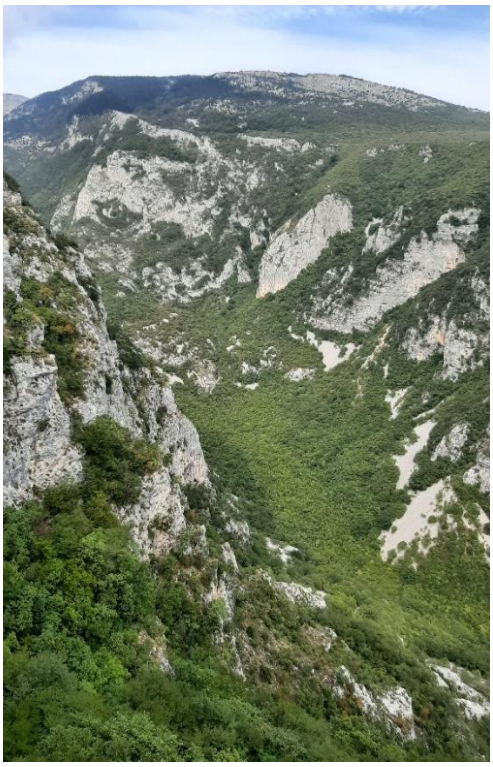

Figure 6: Klenova Draga gorge

Figure 7: Steep cliffs of the Klenova Draga gorge

The route continues northeast of the settlement and extends along the edges of the hill north of Podgorani, where the bridge over Seocka Draga begins and leads the route to Dolac, north of Humilisani. Further, the route continues in a slight semicircle around the settlement of Humilisani along the slopes of Porim, approx. 800 m away from the inhabited area. Below Humilisani, the route runs south and under Sljemen, it enters the 2,200-m-long Tunnel T5, and exits into the Kuti area, the point where the Mostar (north) exit ramp is designed. The interchange is positioned approx. 1 km east of the Mostar municipal solid waste landfill Uborak-Budjevci in an uninhabited area.

South Connection to Main Road M17

The beginning of the South connection to main road M17 ("the Konjic bypass") is in the Ovcari settlement on the right side of the main road M17 heading south from Sarajevo to Konjic, 550 m before the Ovcari Interchange. The road passes through the settlements of Vrbici, Galjevo, Repovica and Donje Selo. The viaduct starts in the Donje Selo settlement, crosses the Neretva River and ends in Drecelj. In the Drecelj settlement, the roundabout connects the settlement with the road M17 and the planned motorway.

The figure below shows the location of the Konjic Bypass.

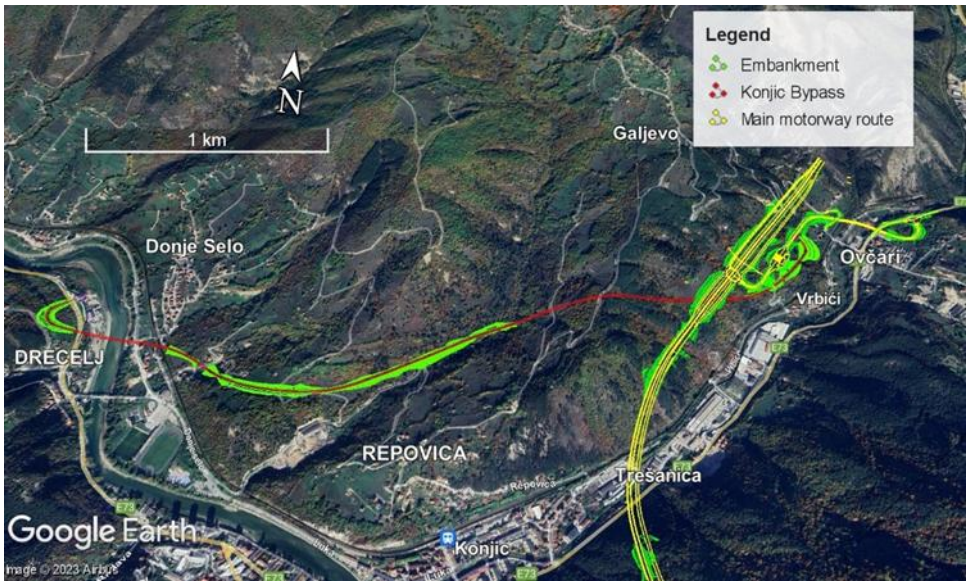

Figure 8: Konjic Bypass passing through the settlements of Ovcari, Vrbici, Repovica, Donje Selo and Drecelj

Access Roads to the Prenj Tunnel

The Prenj Tunnel's northern access road runs through the Bijela settlement and is divided into two sections, NR1 and NR2. NR1 starts at the intersection of the R435 regional road that connects Konjic to Odzaci. This section passes through populated area of Bijela and Gornja Bijela before transitioning into section NR2. Section NR2 begins just before the Igman Konjic company's shooting range and runs through an uninhabited forest road until it reaches the planned operational plateau.

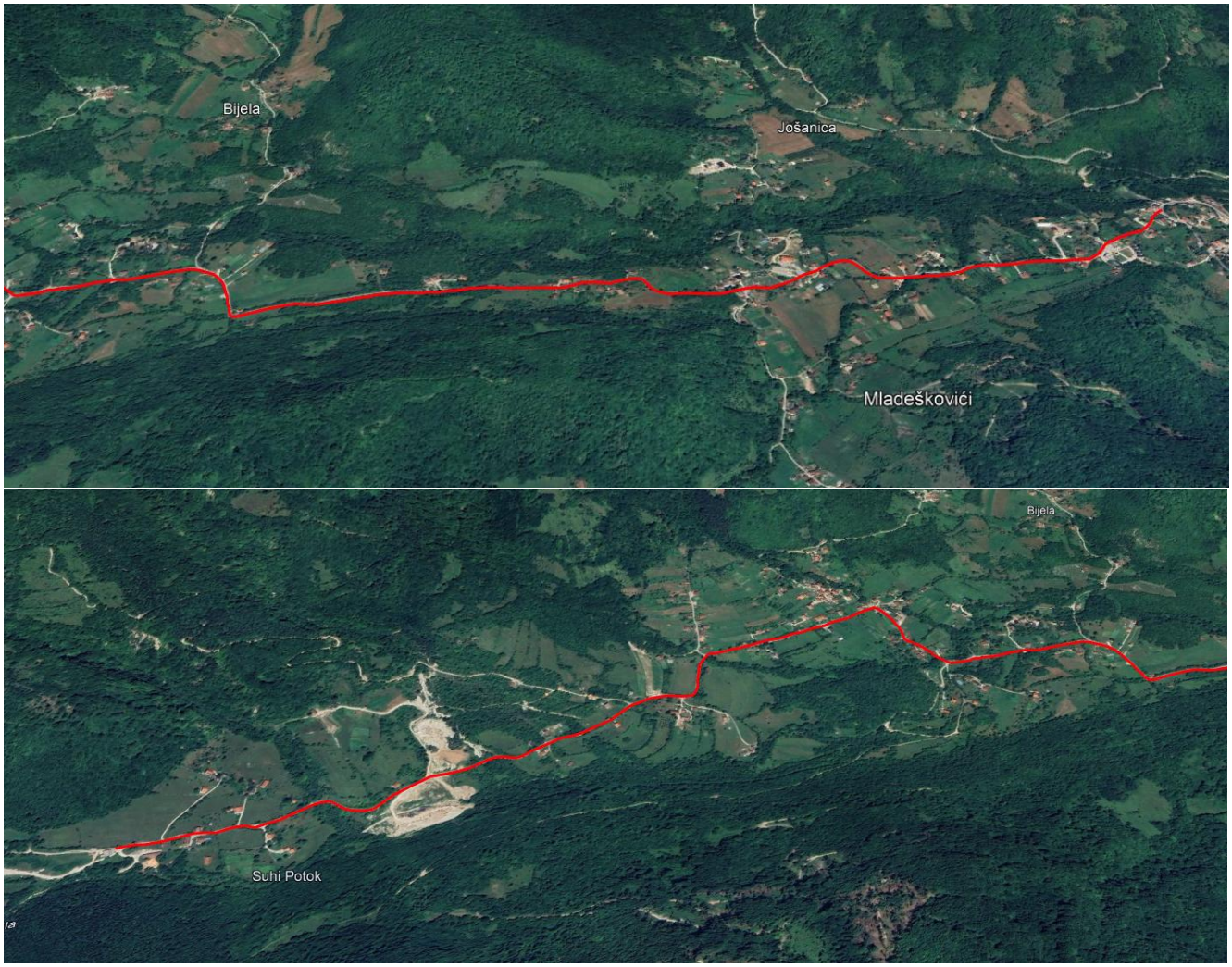

Figure 9: Overview of the access road to the Prenj Tunnel on the northern side

The southern access road to the Prenj Tunnel is divided into six sections (SR1, SR2, SR3, SR4, SR5 and SR6) according to the position and technical solutions.

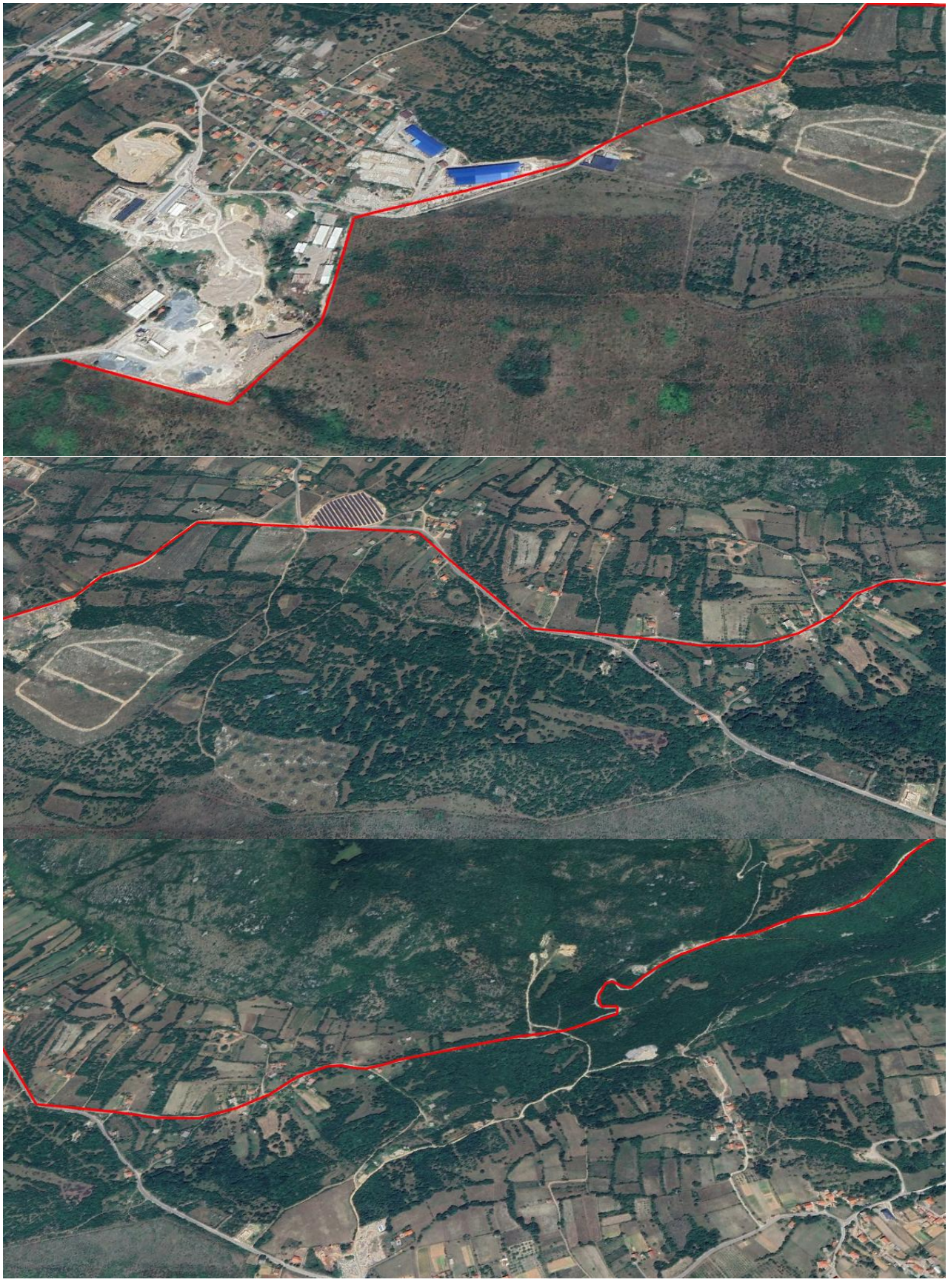

Figure 10: Overview of the access road to Prenj Tunnel on the southern side

Section SR1 represents an access construction road that connects to the existing main road M17 and HP Investing industrial area. The beginning of SR1 is at the interchange directly in front of the gate of HP Investing. The beginning of section SR2 is also the end of section SR1 and passes through a settlement Prigradjani. Section SR3 consists of two parts: the first one represents a relocated stretch of the existing road, while the second one passes through a populated settlement Podgorani. Section SR3 ends immediately before the beginning of the section SR4. SR4 represents a newly designed access construction road which is partly located on the existing roadway. The end of the section SR4 also represents the beginning of section SR5. SR5 is located in an uninhabited area between SR4 and SR6, which is characterised by an operational plateau. Section SR6 passes through an uninhabited area and there was no road at this location before.

3.2 Project Components

3.2.1 Structures on the Subsection Ovcari Interchange - Prenj Tunnel

According to the technical description from 2022, the subsection Ovcari Interchange-Prenj Tunnel has 5 viaducts, 2 tunnels, two interchanges and two toll stations. The list of all structure in order of their appearance along the route is as follows:

- Viaduct No. 1, L=463.50 m (both roadways)
- Ovcari interchange with side toll station "Ovcari"
- Viaduct No. 2, L=60 m (both roadways)
- Viaduct No. 3, L=480 m (both roadways)
- Tunnel T1, L=682 m (left roadway), L=580 m (right roadway)
- Tunnel T2, L=1,171.30 m (left roadway), L=1,160 m (right roadway)
- Viaduct No. 4, L=540 m (left roadway), L=605,20 m (right roadway)
- Konjic South interchange with side toll station "Konjic"
- Viaduct No. 5, L=560 m (left roadway), L = 610 m (right roadway)
- Rest area Konjic

The route begins in Ovcari, where it fits into the previous section of the motorway Ivan - Ovcari. The first structure on this subsection is **Viaduct No. 1** at the chainage km 0+010.50 on both roadways. The initial chainage of the

route is km 0+000.00. The Ovcari interchange is planned at the chainage km 0+670.

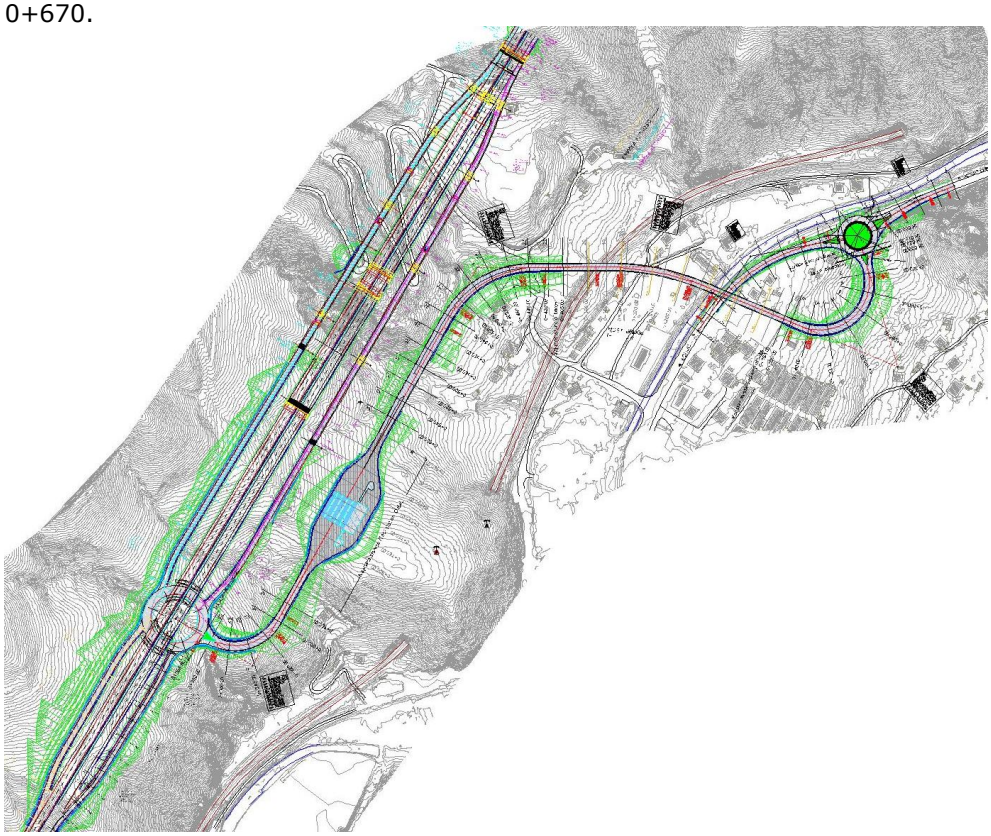

Figure 11: Beginning of the subsection Ovcari - Prenj Tunnel with Ovcari interchange

The Ovcari interchange, including the toll collection facility, is designed to connect the motorway route with the main road M17, specifically the City of Konjic and the motorway on Corridor Vc. The Ovcari interchange, which will provide access to the motorway for the City of Konjic, is located at the Ovcari-Borovci site.

The intersection is located under the motorway's structure at the chainage from km 0+670.00 to km 0+740.00. The intersection has an inner radius of R=25 m, with two 2 x 4.5 m wide traffic lanes inside the intersection. At the inner side of the rotor, the driving area with the total width of 1.84 m is planned. The access road is fitting into the intersection at approx. km 0+038.00 and approx. 90-degree angle. From the point of intersection with the main road, the access road turns with a radius R=45 m for Vr=40 km/h and in a straight line crosses the existing main road and railway line with a structure that is approx. 200 m long.

The Ovcari interchange includes a motorway and 4 ramps (arms) which are divided as follows:

- The ramp 1 is an entrance arm to the motorway from the direction of Konjic towards Sarajevo. The overall length of the ramp 1 is L= 688.13 m.
- Ramp 2 from the direction Sarajevo-Konjic fits into the motorway route at km 0+000.00 with total length of L=698.65 m.
- The ramp 3 is a descending ramp from the direction of Mostar towards Konjic, with total length of L=248.50 m.

> The ramp 4 is an entrance ramp at the motorway in the direction to Mostar. The overall length of the ramp 4 is L=259.89 m.

The Ovcari interchange is in the shape of a rhombus with a roundabout, and all connections are grade-separated with the entrance and exit lanes of maximum length. As part of the Ovcari interchange, the toll collection facility "Ovcari" is designed.

The side toll station "Ovcari" is located at the access road which connects the existing main road and motorway. The toll station has the total length of L=180 m. Five passing lanes (3+2) from which one is a reversible lane, are planned through the toll station. Also from the left side, a road for oversize passage is planned. The traffic lanes width is b=3.50 m, while the lane for oversized vehicles is b=6.0 m wide. At the toll station, 10 parking places are planned, from which 2 are for persons with disabilities. The length of an island through the toll station is 30 m, and 2.5 m wide. The longitudinal slope before the toll station is i=6.5%, in the pay toll zone it is 2.5%, and behind the pay toll it is 3.3% at the length of approx. 100 m. Almost the entire length of the toll station is located inside the cutting where the maximum height is in the level line of approx. 7.0 m.

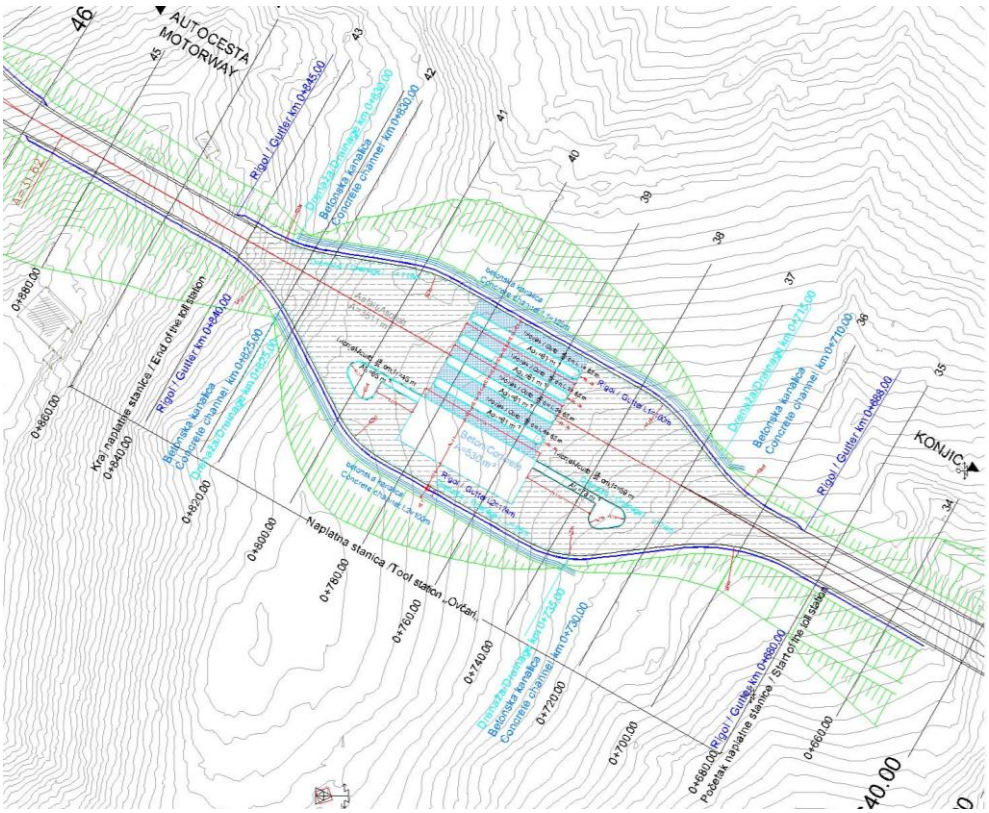

Figure 12: Design of the "Ovcari" toll station

The planned circular intersection is located approx. 300 m in front of the existing road connection, and it is positioned towards the slope so it can enter in the existing riverbed as minimal as possible. The circular intersection is projected as a single-lane intersection with an internal radius R=15 m and lane width of 5.50 m. The width of the inner part of the circular intersection is 2.00 m. The main

road which is leading from Mostar towards Sarajevo will be reconstructed in the length of approx. 184.50 m. The arm of the road leading from Sarajevo towards Konjic will be reconstructed in the length of approx. 91.50 m. The access road goes over the existing main road, riverbed, and railway. After crossing the railway, it turns with the radius of R=100 m with L=25 m transitions and then it continues in the direction of the side toll station. At the end, the access road connects to the Ovcari Intersection. The access road crosses the local road for which a deviation is made, and it returns to the existing road under the bridge. The overall length of the access road is 988.85 m with the designed speed of 40 km/h.

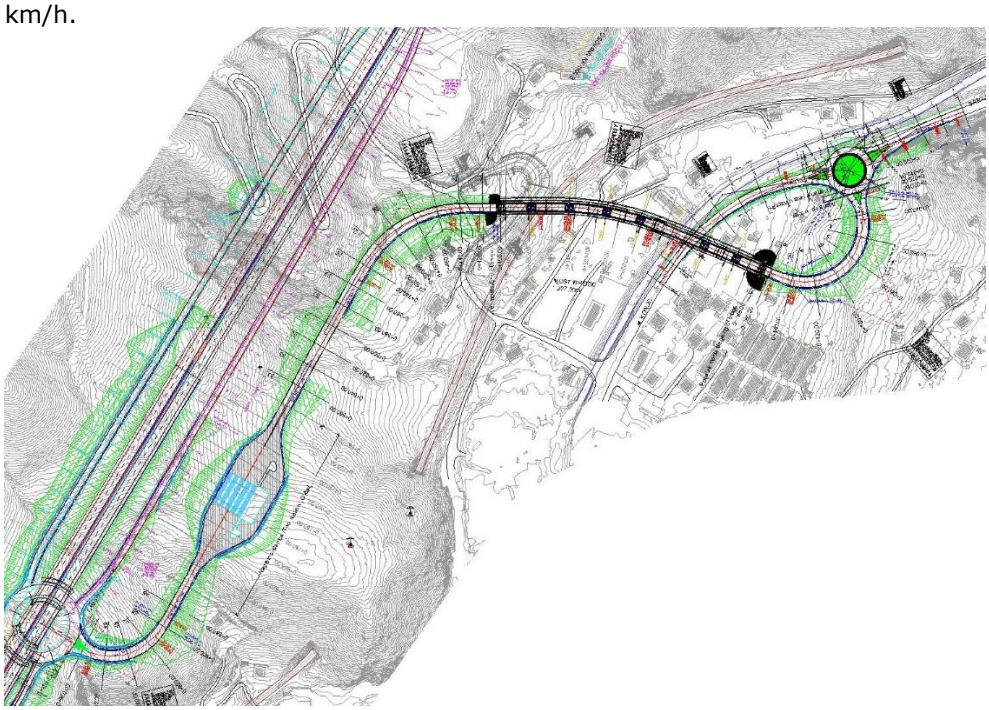

Figure 13: Situation of the designed access road

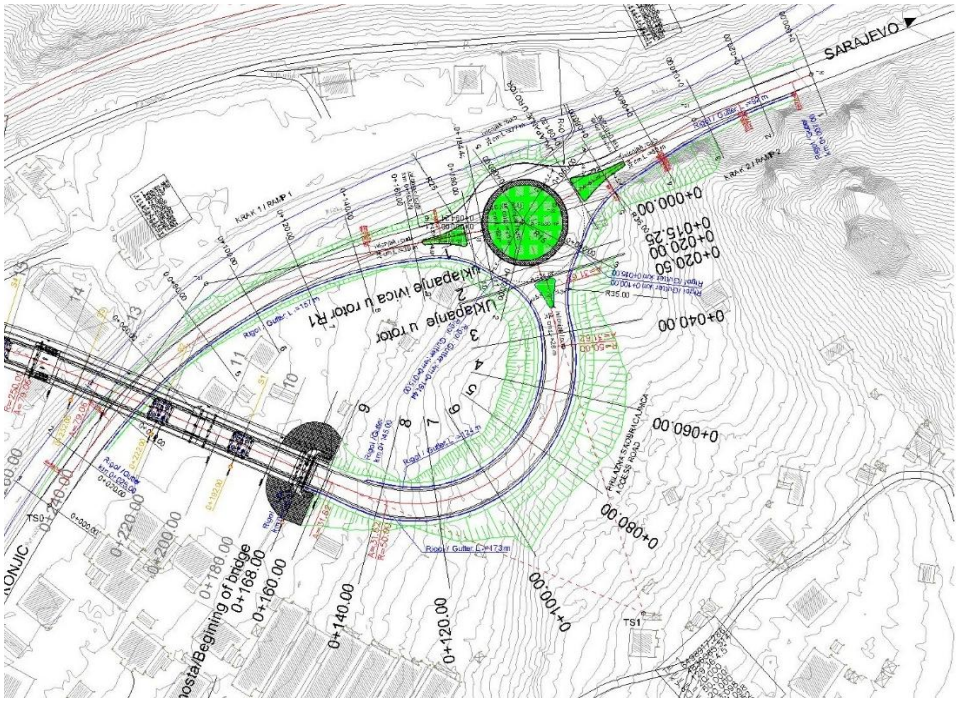

Figure 14: Situation of the designed circular intersection on the access road

At the km 1+025.007 the second **Viaduct No. 2** begins with the total length of approx. 60 m. Further away, the route continues and crosses the existing railway, riverbed, and main road M17. In this part, from km 1+300.825, it is planned to build **Viaduct No. 3** of 480 m length at maximum height of 84 m (Figure 15). The model of Viaduct 3 is given in Figure 15.

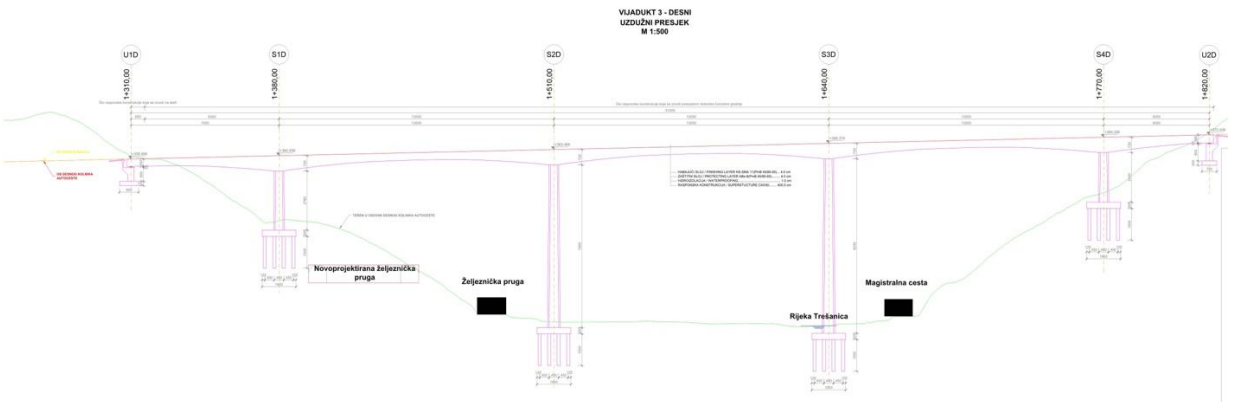

Figure 15: Model of Viaduct 3 over the Tresanica river

In order to avoid construction of pillars inside the Tresanica riverbed, the river training in length of 140 m will be done. The training structure will be made of stone lining laid on a 10 cm thick gravel filter layer under which a 200 g/m^2 geotextile layer will be placed. The banks above the slope will be grassed over a layer of humus and fertile soil. The stone lining ends with a transition section. The typical cross-section (Figure 16) is trapezoidal provided to clean the riverbed and protect eroded banks and concave curves. The structure will be able to drain high waters of 1/100 years occurrence.

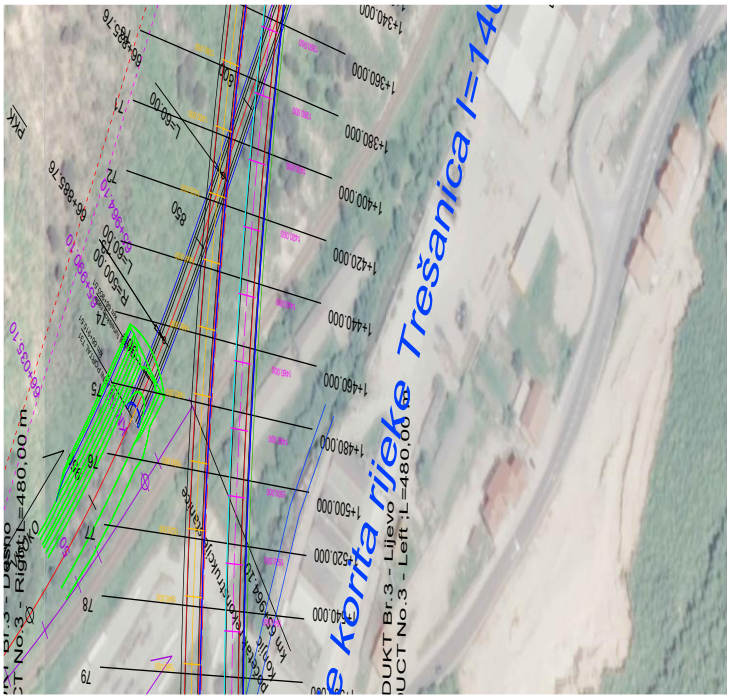

Figure 16: Training of the Tresanica River (L=140 m)

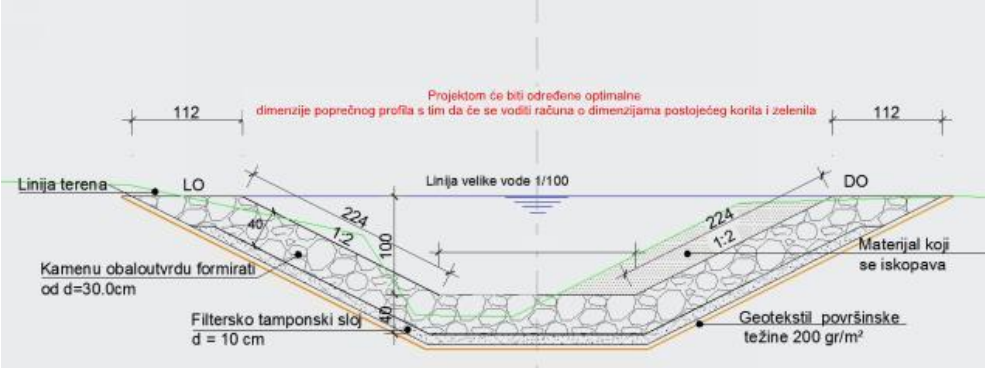

Figure 17: Typical cross section of training structure

Right after the Viaduct No. 3 the route enters **Tunnel T1**, L=682 m (left roadway) and L=580 m (right roadway) and **Tunnel T2** L=1,171.30 m (left roadway) and L=1.160 m (right roadway).

After exiting Tunnel T2, the route crosses the Neretva riverbed where a **Viaduct No. 4** of L=540 (left roadway) and L=605,20 m (right roadway) is planned.

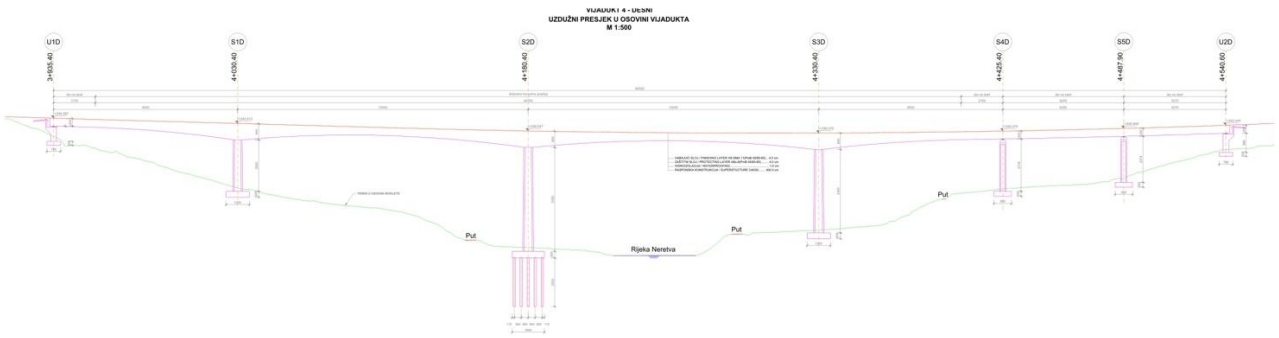

Figure 18: Model of Viaduct No. 4 over the Neretva River

After crossing the Neretva riverbed via Viaduct No. 4, the route enters a partially inhabited area that stretches from km 5+500 to km 6+200. The Konjic South interchange is planned at the chainage km 6+460.

The Konjic South interchange, including the toll collection facility, is located under the motorway's structure from the km 6+460.00 to km 6+530.00. Circular intersection with 4 ramps has an inner radius R=27,5 m, with two traffic lanes inside the circular intersection, which are 2 x 4,5 m wide. The access road, on which a side toll station is located, fits into the intersection at 90-degree angle, while the branches are located next to the motorway. The access road links to the existing regional road R435 to Boracko Lake. Since the motorway's route coincides with the existing regional road, it is necessary to relocate regional road from the existing location. At the access road at km 0+140,00 a T-connection is planned and relocation of the regional road (circa 390 m long). Regional road goes under the motorway's structure via an underpass. The access road for rest area Konjic South is connected to the intersection as well.

The following figure shows the layout of the Konjic South interchange.

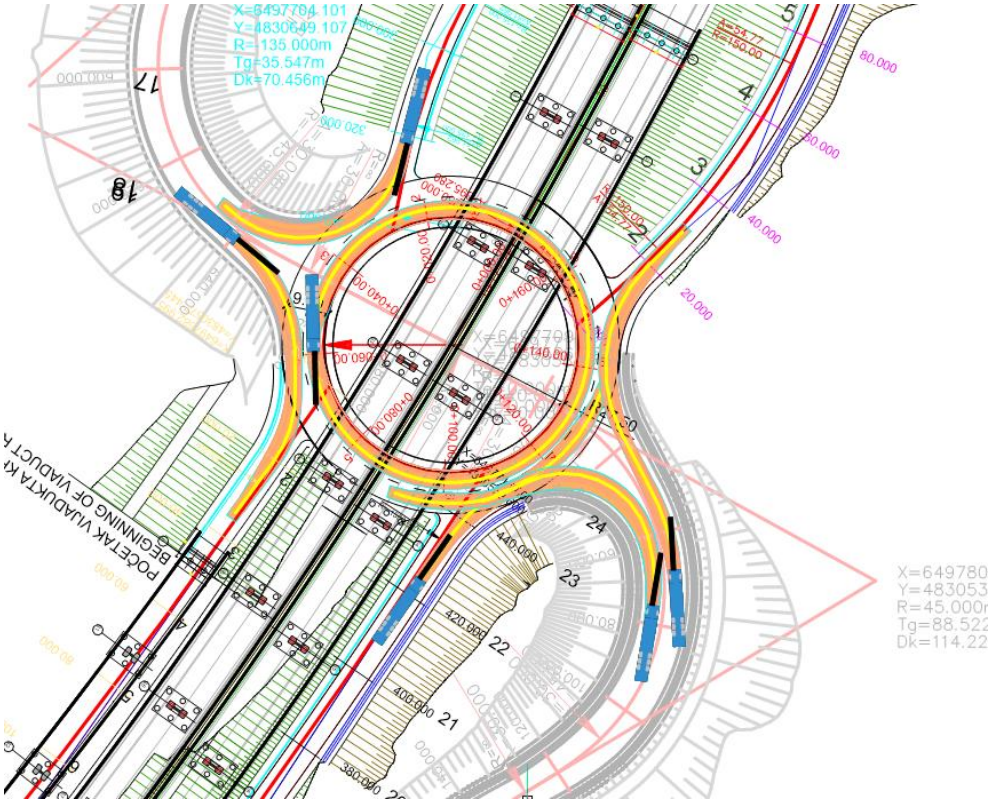

Figure 19: Design of the Konjic South interchange

At the approx. km 6+420.00 a **Viaduct No. 5** on the motorway section and goes over the Konjic South intersection and all the way to the 6+960,00. In addition to the viaduct on the main route, viaducts on ramps 3 and 4 were also designed due to the large height difference.

The Konjic rest area is located right after the Konjic South interchange in the Mladeskovici settlement and is shown in the figure below.

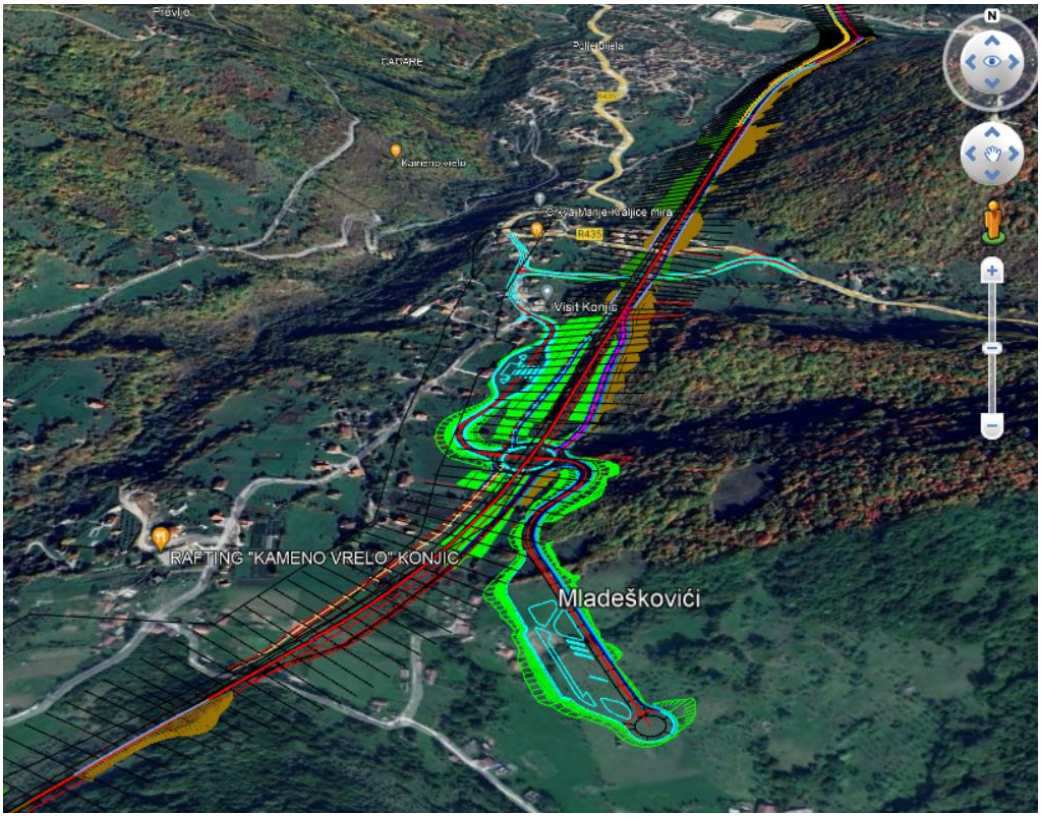

Figure 20: Konjic rest area

Further on, the motorway route is laid under the slope above the settlements of Bijela and Gornja Bijela. In order to avoid unstable ground for construction, the motorway has lowered from the steep slopes towards the Bijela river to avoid construction in cut in the unstable terrains. However, this will require for the upper section of Bijela river, called Suhi potok stream, to be trained just before entering the zone of the Rakov Laz shooting range (Figure 21). The width of the trained riverbed in the bottom is 6.0 m with a total length of trained section of 1,280 m, together with the construction of one culvert through the motorway embankment. The dimensions of the flow profile of this culvert would be approximately b x h = 10 x 3.2 m, with total length L=95 m.

For most of the route, the newly regulated Suhi potok stream would be excavated in full profile, which in principle represents a new canal that would be dimensioned to accept and transport 1/100 years of high water from this part of the Bijela river basin. The technical solution foresees construction of a stone lining with a level that follows the natural slope of the Suhi potok riverbed. The same typical cross section of the structure shown in Figure 16 is also applicable to this case. In addition, measures are planned to protect the Bijela and Gornja Bijela springs from potential impacts caused by high waters in the Bijela River. These measures include the regulation of the natural riverbed of the Bijela River over a length of approximately 600 meters. This intervention aims to prevent changes in water quality within the riverbed that could compromise the tap water supply.

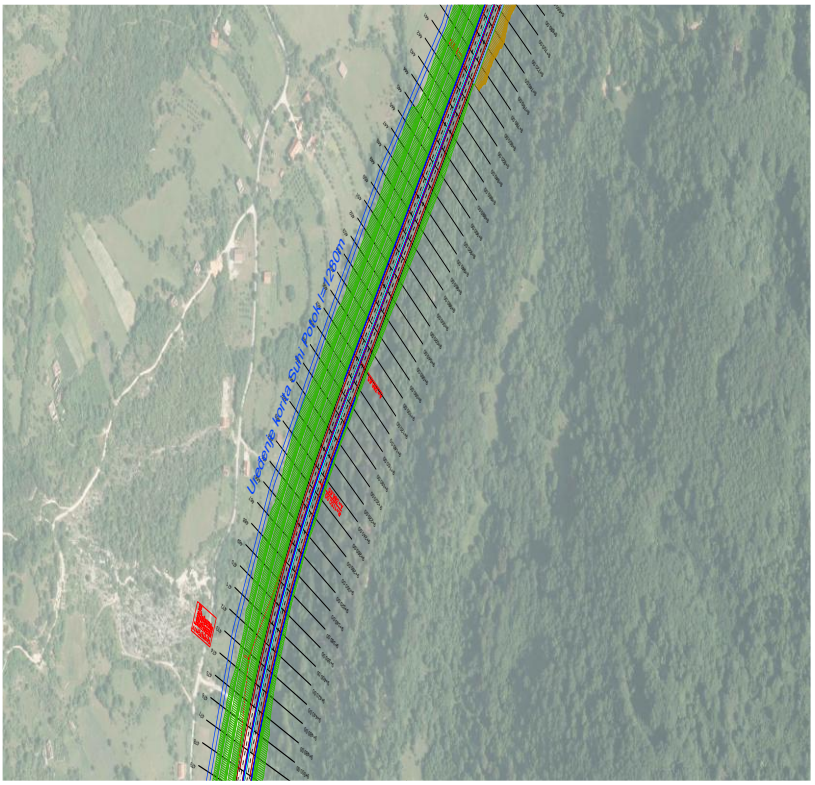

Figure 21: Training of the Suhi potok stream (L=1,280 m)

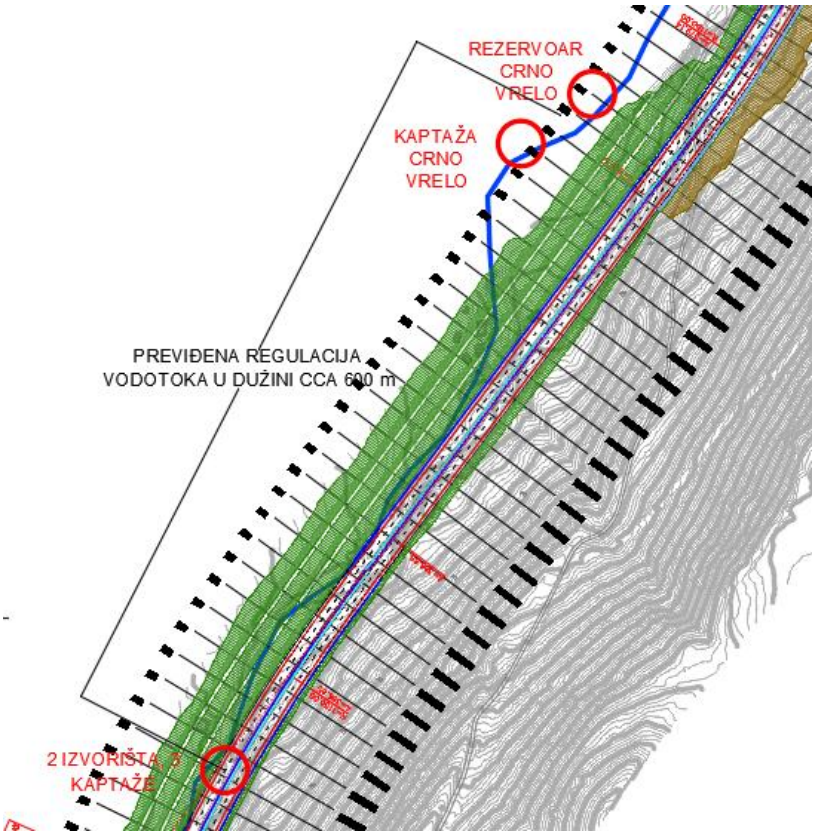

Figure 22: Regulation of the Bijela stream (L = 600 m)

3.2.2 Prenj Tunnel Structure

The Prenj Tunnel traverses the Prenj mountain range and consists of two unidirectional tunnel tubes running parallel to each other with an axial distance of 50 meters. This distance is reduced near the portals to minimise the size of the portal cuts.

The Tunnel Prenj project includes the following components (chainages refer to the left tunnel tube):

- Open section of the motorway: 0+000,00 - 1+147,048,
- Tunnel Prenj: 1+147,048 - 12+073,170,
- Open section of the motorway; 12+073,170 - 12+240.27.

The total length of the left tunnel tube is 10,926.122 meters, while the right tunnel tube measures 10,936.714 meters.

Figure 23: Plan View of the Tunnel Prenj Alignment

The tunnel is designed to be constructed according to NATM (New Austrian Tunnel Method).

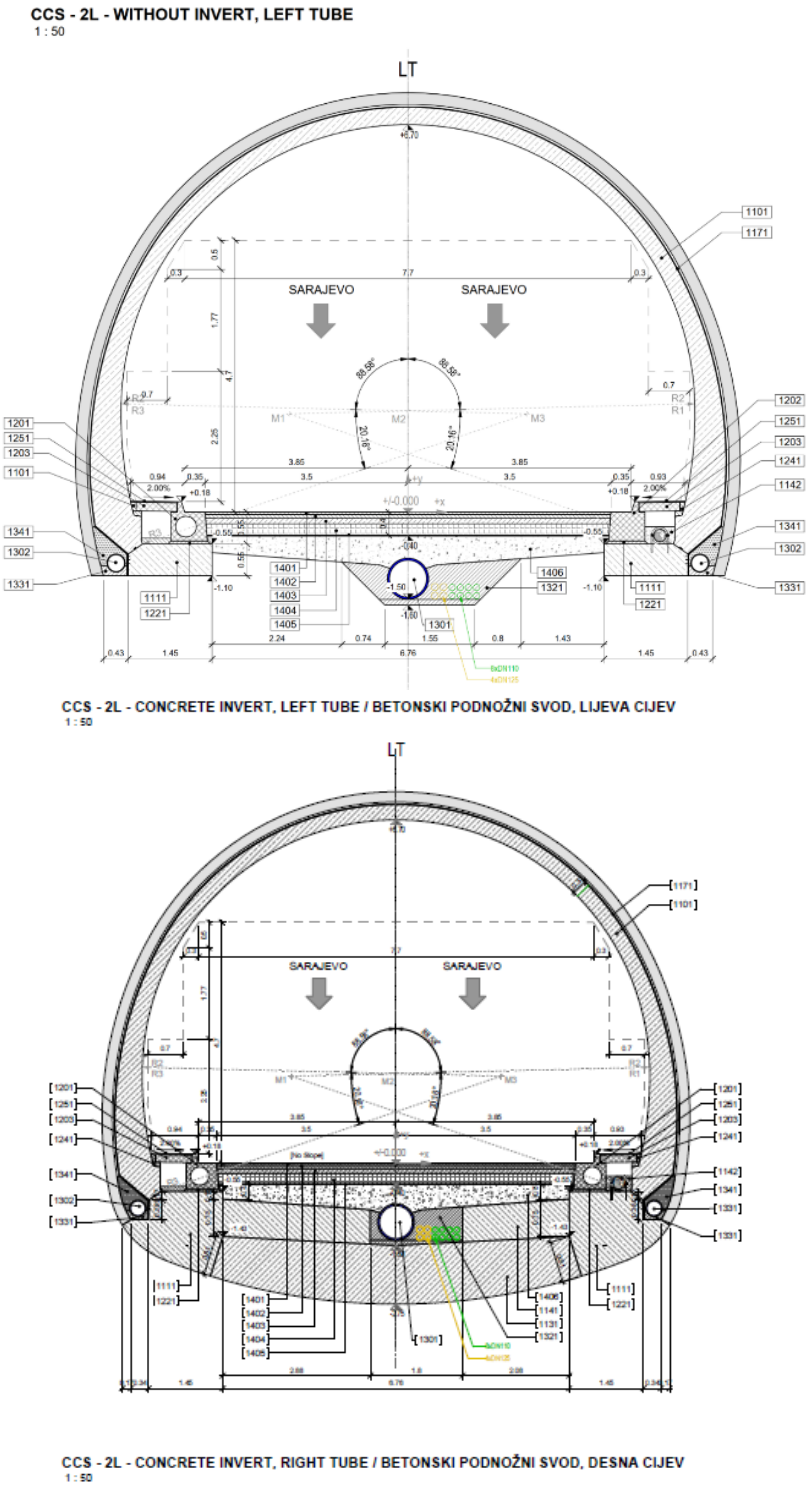

Figure 24: Normal Cross Sections of the Tunnel Prenj

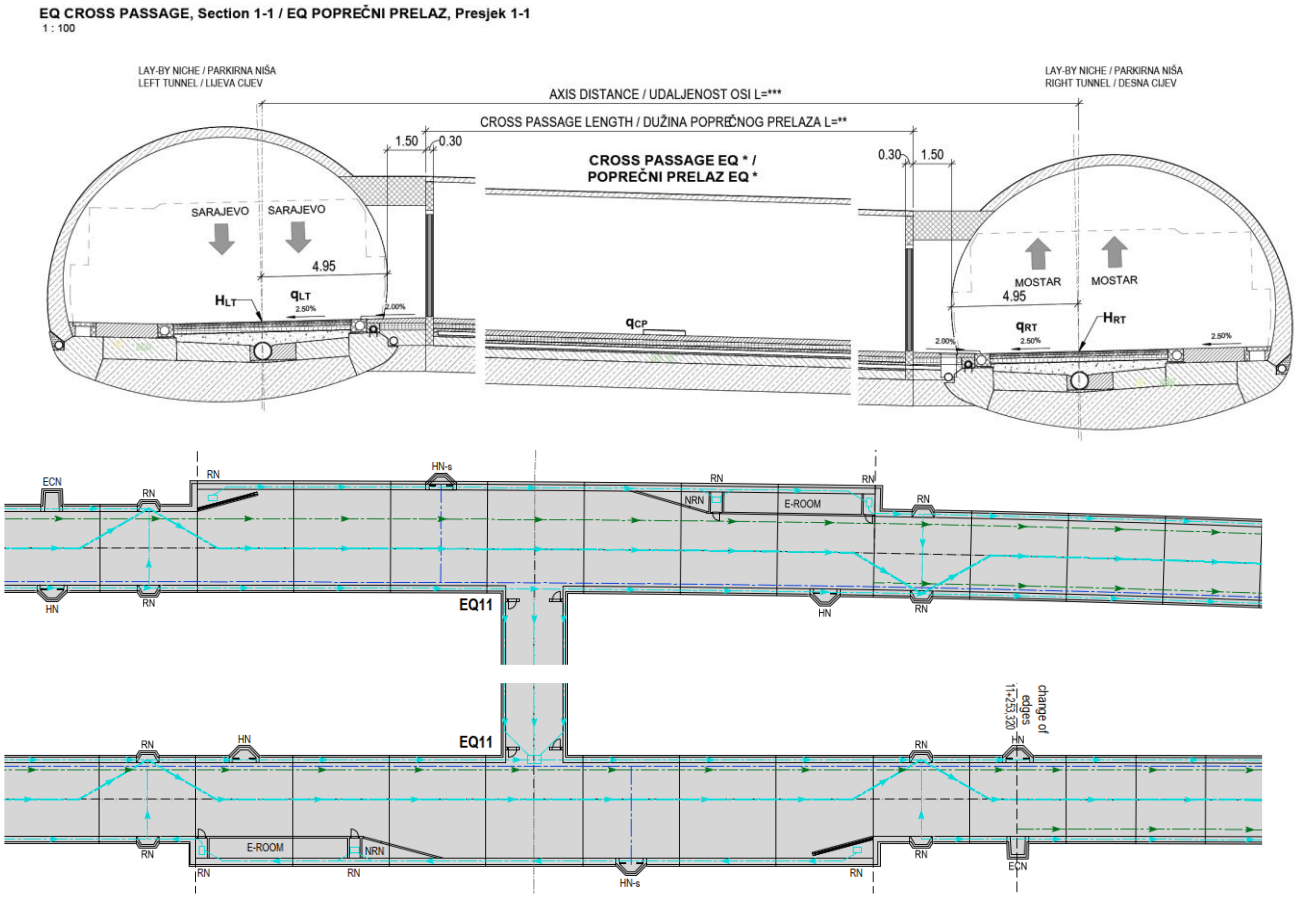

Figure 25: Plan View of Cross Passages for Emergency Vehicles with Adjacent Lay-Bys

The adopted shape and positioning of the portals are designed to integrate harmoniously with the natural terrain while also considering aesthetic aspects, with plans for a cohesive portal construction. The tunnel tubes are connected by a total of 35 walkable cross passages, including 24 pedestrian cross-links and 11 passages for emergency vehicles, spaced approximately every 303 meters. Each of the 11 emergency vehicle cross passages is accompanied by lay-by niches, each 65 meters in length.

The planned road construction consists of:

- Stone matrix asphalt 11s d=4.0 cm
- Bituminous crushed stone AGNS 22s, d=7.0cm
- Bituminous crushed stone AGNS 32s, d=9.0cm
- Cement stabilisation CS32 d = 20.0 cm
- Unbound bearing layer-crushed NNS 0/45mm, d=30.0cm.

The two-way tunnel, with a length of 10.93 km, requires exceptional safety and security measures to ensure the protection of users. Key features and protocols include:

- **Ventilation System:** The unidirectional tunnel tubes are equipped with a longitudinal ventilation system, utilising 48 jet fans in each tube to manage airflow and smoke control.

- **Supervision and Detection Systems:** The tunnel incorporates advanced monitoring systems, including CCTV cameras with integrated incident detection and a fire detection system using heat-sensitive cables.
- **Incident Detection:** In the event of a fire, the initial indication is often a traffic abnormality, such as a slow-moving or stopped vehicle. The incident detection system automatically identifies such abnormalities, often faster than detecting the fire itself, as over 90% of tunnel fires originate from vehicles. The system notifies the operator, and the corresponding video feed is displayed in the control centre.
- **Fire Alarm Activation:** If the operator visually confirms fire or smoke, they trigger the fire alarm by pressing the fire button. If the operator does not react or if the fire escalates rapidly, the fire alarm is automatically activated by the fire detection system.
- **Coordinated Safety Response:** Once a fire alarm is activated, the tunnel's safety systems respond in a predefined, coordinated manner, depending on the incident's location:
  - **Traffic Management:** Traffic behind the incident is immediately stopped by activating red traffic lights at the tunnel portal and inside the tunnel. Vehicles downstream of the burning vehicle are directed to exit the tunnel, while traffic in the adjacent tube is also halted. The unaffected tube serves as a safe haven for evacuees via cross passages.
  - **Smoke Management:** During normal operation, the movement of vehicles creates a "piston effect," generating airflow in the direction of traffic. In the event of a fire, the emergency ventilation mode is initiated. Jet fans push smoke in the driving direction at a controlled speed (2.5–3 m/sec) to prevent smoke from affecting vehicles queued behind the incident. Cross passages and the neighbouring tube are kept smoke-free through their dedicated ventilation systems.
  - **Evacuation:** Occupants of stopped vehicles in the affected tube evacuate through the nearest cross passages to the safe neighbouring tube, guided by emergency protocols.

3.2.3 Structures on the Subsection Prenj Tunnel - Mostar North

According to the technical description from 2022, the subsection Prenj Tunnel-Mostar North has 4 viaducts, 3 tunnels, 1 underpass and 1 overpass. The list of all structure in order of their appearance along the route is as follows:

- Tunnel Klenova Draga - T3A, L=742 m (left roadway), L= 785 m (right roadway)
- Viaduct No. 8, L=351 m
- Tunnel T4; L=642 m (left roadway), L= 639 m (right roadway)
- Viaduct No. 9; L=332 m (left roadway), L= 338 m (right roadway)
- Viaduct No 9A: L=148 m (right roadway only)
- Viaduct No. 10; L=360 m (left roadway), L= 445 m (right roadway)
- Rest area
- Tunnel T5; L=2,290 m (left roadway), L= 2,210 m (right roadway)

This subsection starts at the exit portal of the Prenj Tunnel, at the location of Klenova Draga, at km 22+650 and ends at km 35+260, where the Mostar North interchange begins.

At the very beginning, the subsection crosses the open route on the embankment for approx. 300 m and at the km 22+950 enters the **Tunnel Klenova Draga - T3A** on the western cliffs of the Klenova Draga gorge. With a left curve with radius R=1.000 m, the route passes through the gorge and comes out on a **Viaduct No. 8** with an approximate length of 351 m, which bridges the part above the southern approach to Klenova Draga.

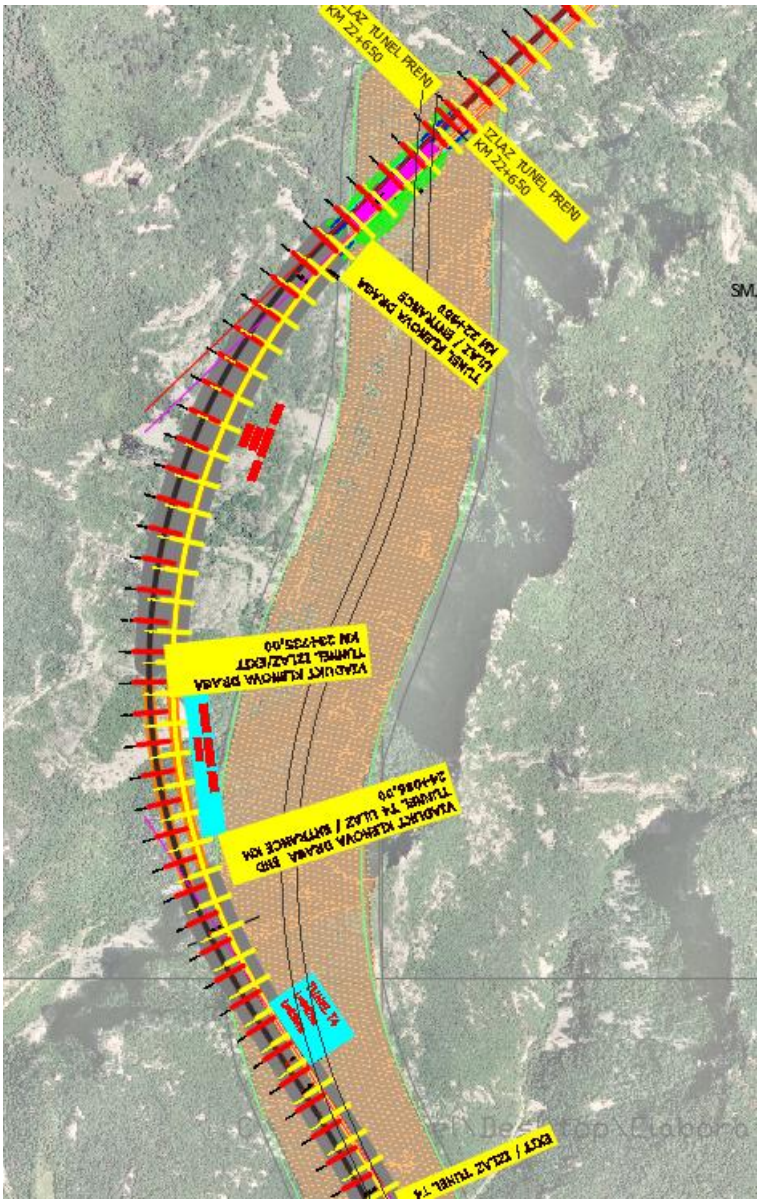

Figure 26: Beginning of the Prenj Tunnel-Mostar North subsection

In the area of Klenovo vrelo, the route consists of two facilities; an approximately 640-meter-long **Tunnel T4** and **Viaduct No. 9**. After leaving Viaduct No. 9, the route is laid in a slight cut for one km until reaching **Viaduct No. 10** of approx. 400 m in length, with the local road to Stinji dol and Prenj

passing underneath. Between viaducts No. 9 and No. 10, additional **Viaduct No. 9A** in length of 128 m was designed only on the right roadway.

After the Viaduct No. 10, the route continues on a slightly gentler slope at the Zelenika site from km 27+000 to km 28+000, where it intersects the regional road R435 towards Rujiste and several local roads. The **Mostar rest area** is planned at the location between the settlements of Podgorani and Humilisani from km 27+230 to km 28+030 in the most suitable part of the section in terms of the terrain configuration and geometric elements of the route.

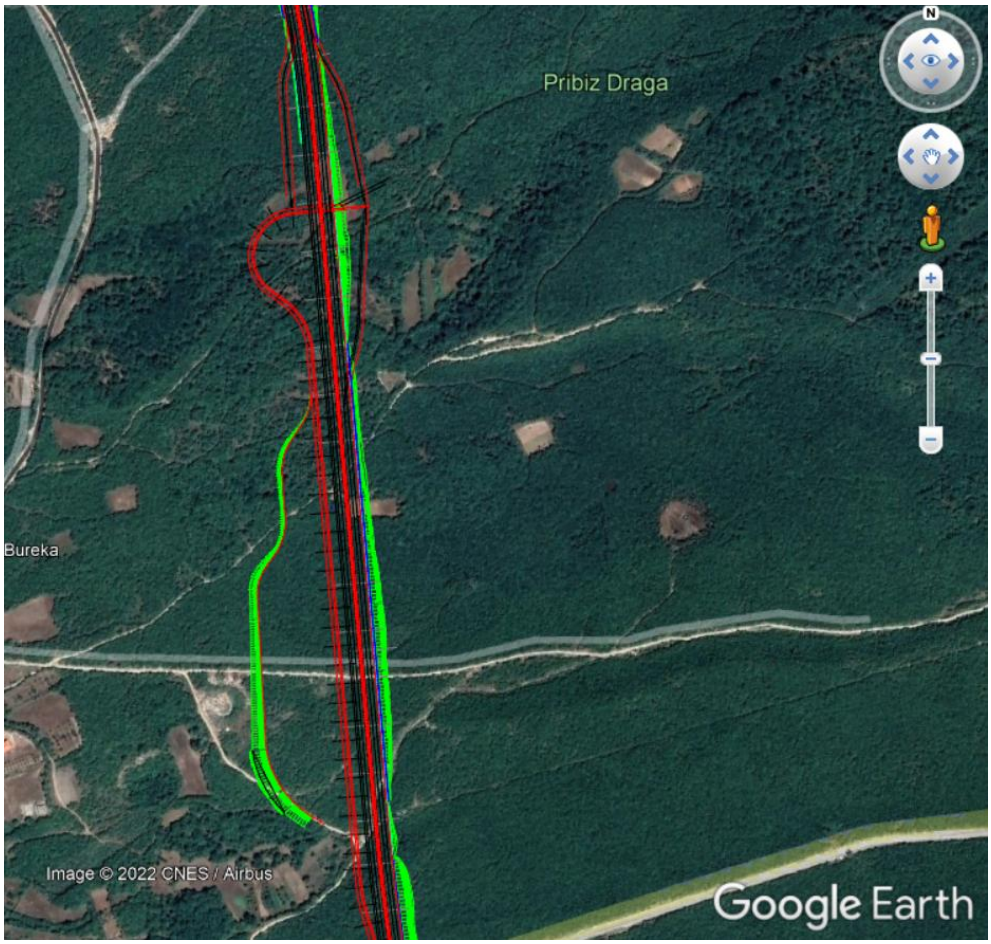

Figure 27: Design situation of the rest area (source: Google Earth)

For the next 3 km it descends towards Potoci at a 4-6% slope and enters **Tunnel T5** of approx. 2.2 km which is both the longest and the last facility on this subsection.

After exiting the tunnel, in the area of the settlement of Kuti, the route joins the Mostar North interchange at approx. km 35+260 which is the end point of Prenj Tunnel-Mostar North subsection. Mostar North interchange is part of the motorway section Mostar North-Mostar South and enables the motorway connection with the main road M17 and the City of Mostar in the area of the settlement Potoci.

Figure 28: Ending of the subsection Prenj Tunnel - Mostar North

3.2.4 Structures on the South Connection to Main Road M17

The Konjic Bypass begins with the exit from the Ovcari Interchange. The first 230 m of the route are laid in an embankment, and the next 200 m of the route is in a cut.

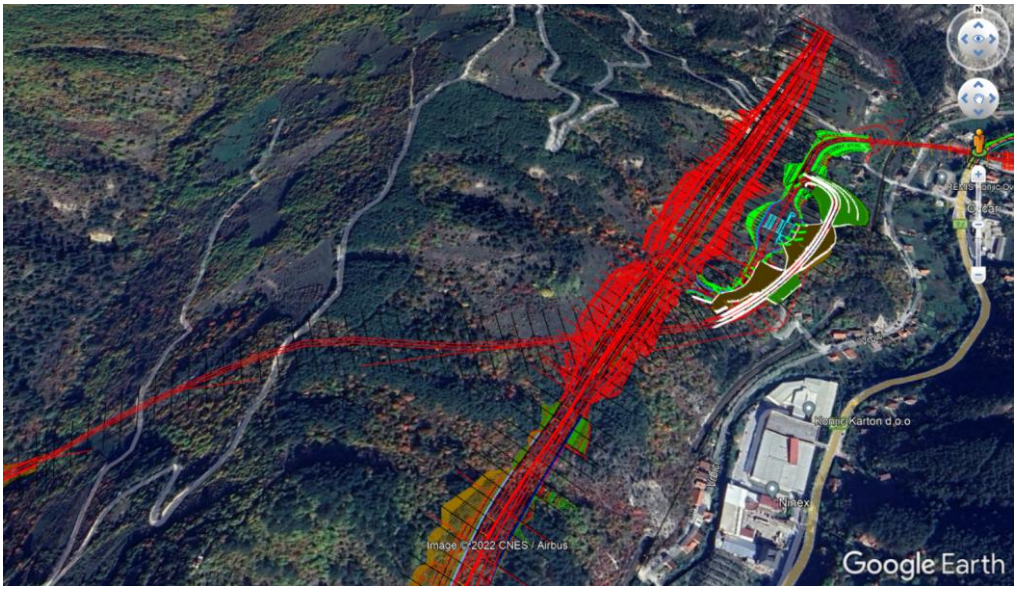

Figure 29: Connection of the Konjic Bypass to the Ovcari interchange (source: Google Earth)

After that, the road goes through the next 100 m in an embankment and reaches the first 80-m-long viaduct. After the viaduct, it enters an 800-m-long tunnel. After exiting the tunnel, the route goes for approx. 500 m through embankments and another 500 m through a cut with the highest point of approx. 30 m. The next 200 m of the route passes through embankments and cuts and reaches a 350-m-long bridge that crosses the existing Sarajevo-

Capljina railway, the Neretva River, and the main road M17. After 200 m, the Konjic Bypass connects to M17. The total length of the bypass is approx. 2.5 km, and it is designed with a maximum speed of 70 km/h.

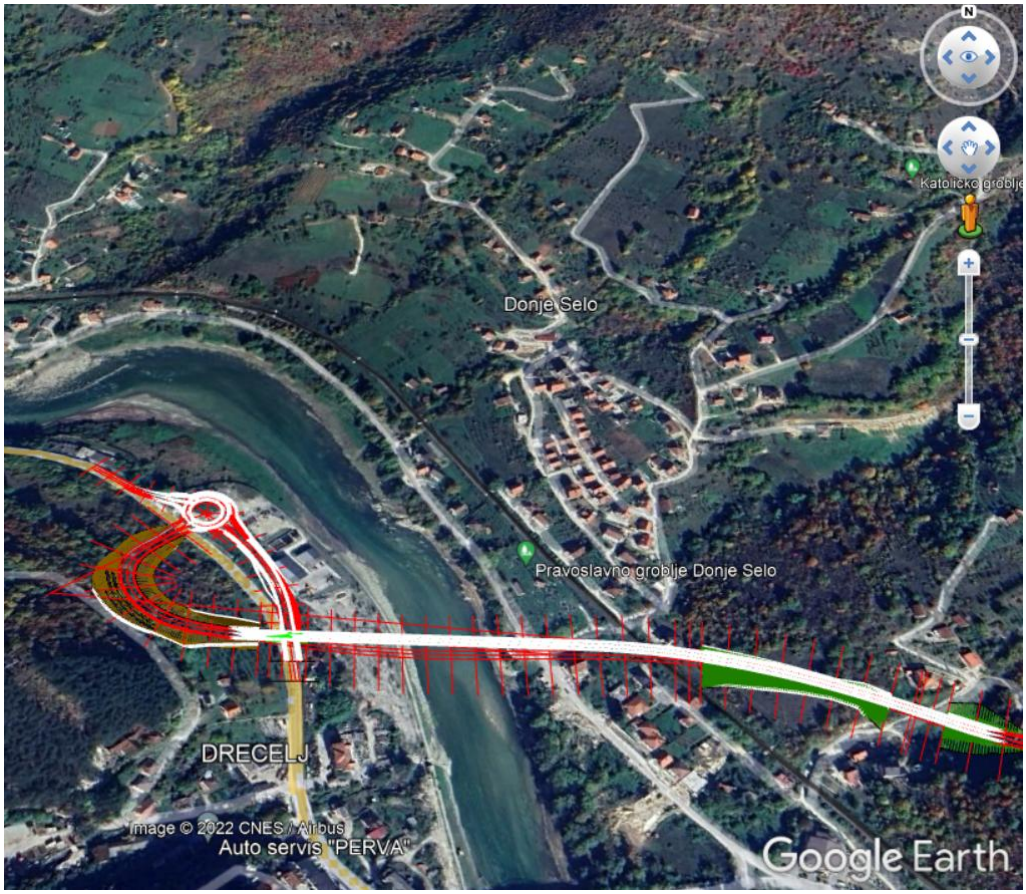

Figure 30: Connection of the Konjic Bypass to main road M17 to Jablanica (source: Google Earth)

3.2.5 Access Roads to Tunnel Prenj

Northern access road

According to the Main Design for access roads to the Prenj Tunnel[1], the northern access road (NR[2]) consists of two sections (NR1 and NR2).

The section NR1 has a total length of 4.6 km and represents an access road that connects to the existing regional road R435. At the location of NR1, there is already an existing road that passes through several populated areas. However, the existing road is only 3.5 to 4.5 m wide so it will have to be enlarged to suit the needs of the Project. The end of the section NR1 is located just before the shooting range of the company Igman Konjic. Section NR2 has a total length of approx. 2.0 km. The layout map consists of a service road and a plateau for the

[1] Corridor Vc – Ovcari – Tunnel Prenj – Mostar North Development of Preliminary and Main Design for Preparatory Works, Design QC, Sarajevo, August 2022

[2] „NR" is the abbreviated form of „Northern Access Road"

operation of machines with a total area of approx. 40,000 m^2. The plateau has a total length of 262 m.

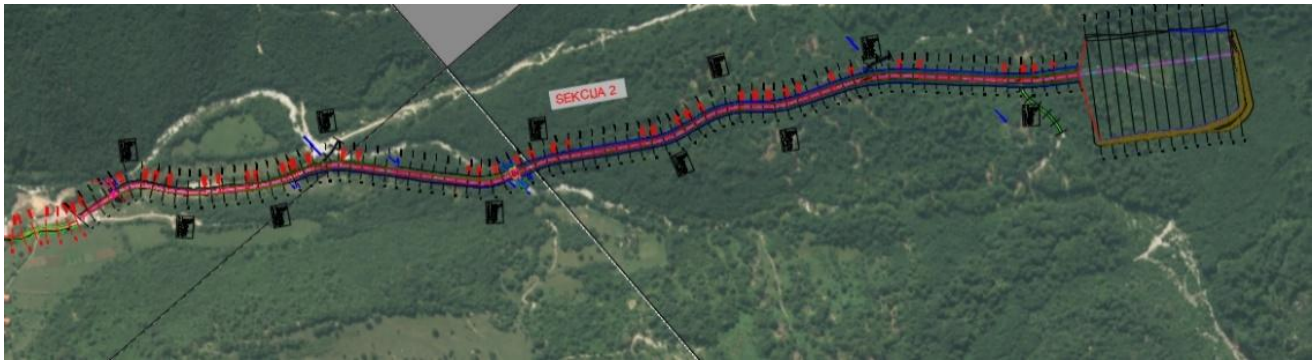

Figure 31: Design situation of the northern access road

Southern access road

The southern access road (SR[3]) to the Prenj Tunnel is divided into six sections (SR1, SR2, SR3, SR4, SR5 and SR6) according to the position and technical solutions.

Figure 32: Overview of sections SR1, SR2, SR3, SR4, SR5 and SR6 of access road to Prenj Tunnel on the southern side

Section SR1 is approx. 0.7 km long and represents an access construction road that connects to the existing main road M17 and HP Investing industrial area. The beginning of SR1 is at the interchange directly in front of the gate of HP Investing.

[3] „SR" is the abbreviated form of „Southern Access Road"

Figure 33: Design situation of the section SR1

SR2 is 1.16 km long and consists of 15 horizontal curves. The horizontal curves are roughly in line with the existing road, and the surrounding buildings, since SR2 passes through a settlement. With this approach, the roadway was fitted with a minimum applied radius of 45 m. The maximum applied radius is 1,300 m.

SR3 is approx. 1.46 km long and consists of two parts. The first part represents a relocated stretch of the existing road in the length of 330 m. It is necessary to widen of the road, so an appropriate connection in form of a T-interchange can be constructed.

Figure 34: Design situation of the section SR3, relocation of the existing road and newly designed T-interchange

SR4 is approx. 0.5 km long and represents a newly designed access construction road which is partly located on the existing roadway. The part of the roadway that is on the existing road which is approx. 2 m wide will be widened, along with modification of the longitudinal slope. SR4 is the most demanding section for access to the southern portal of the Prenj Tunnel. It is characterised by an existing steep serpentine whose elements do not meet the minimum required

width of 6 m. Therefore, it is necessary to reconstruct this section to reduce the longitudinal slope. Considering the minimum width of the access road and the extremely steep terrain, supporting structures on this part of the roadway will be necessary in the form of gabion walls, reinforced soil and reinforced concrete wall.

SR5 is in total 1.3 km long and is located between SR4, which is characterised by serpentines, and SR6, which is characterised by an operational plateau.

SR6 is 1.5 km long and is situated in a greenfield area. After a detailed site investigation, geological exploration works and review of the Preliminary Design of the motorway, it can be concluded that a collision between the motorway and the access road at the SR6 section is inevitable. Given the spatial constraints of the terrain, three operational plateaus were designed. The minimum designed horizontal radius is 110 m, while the maximum designed radius is 695 m. At the chainage km 0+060.00, on the right side, the first operational plateau is designed with an area of 1,867 m². At the chainage km 0+620.00 there is another operational plateau with an area of 3,886 m². The third operational plateau is located directly in front of the planned notch of the southern portal of the Prenj Tunnel and has an area of 9,352 m².

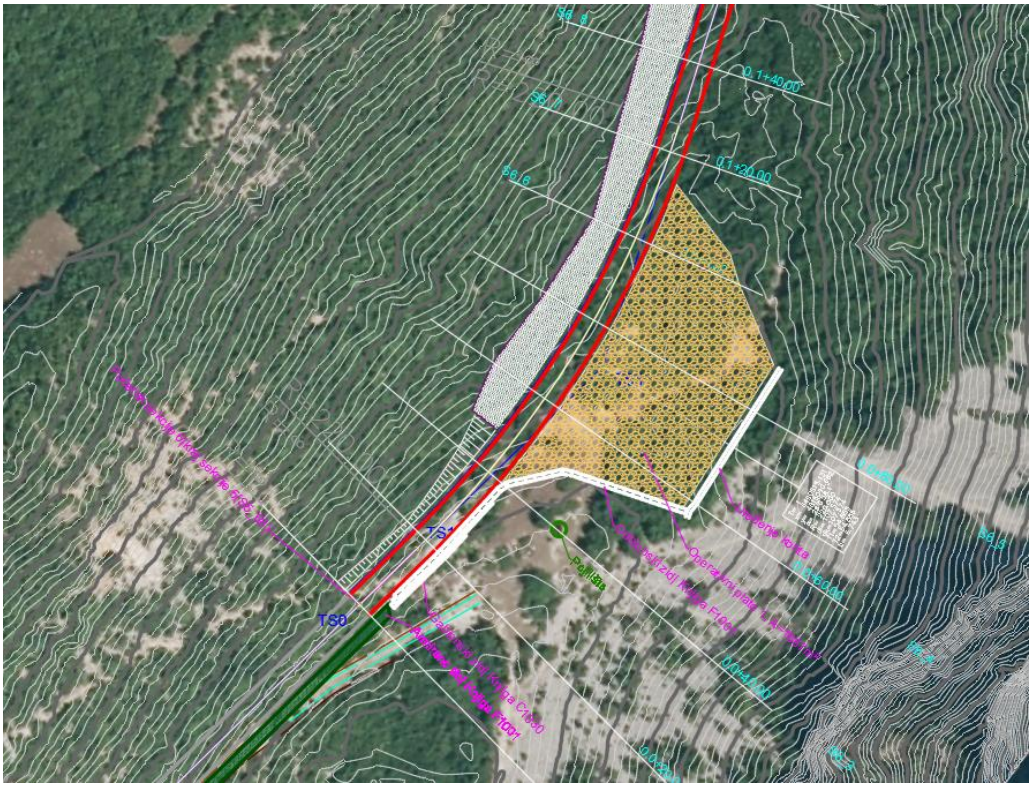

Figure 35: Design situation of the section SR6, operational plateau 1

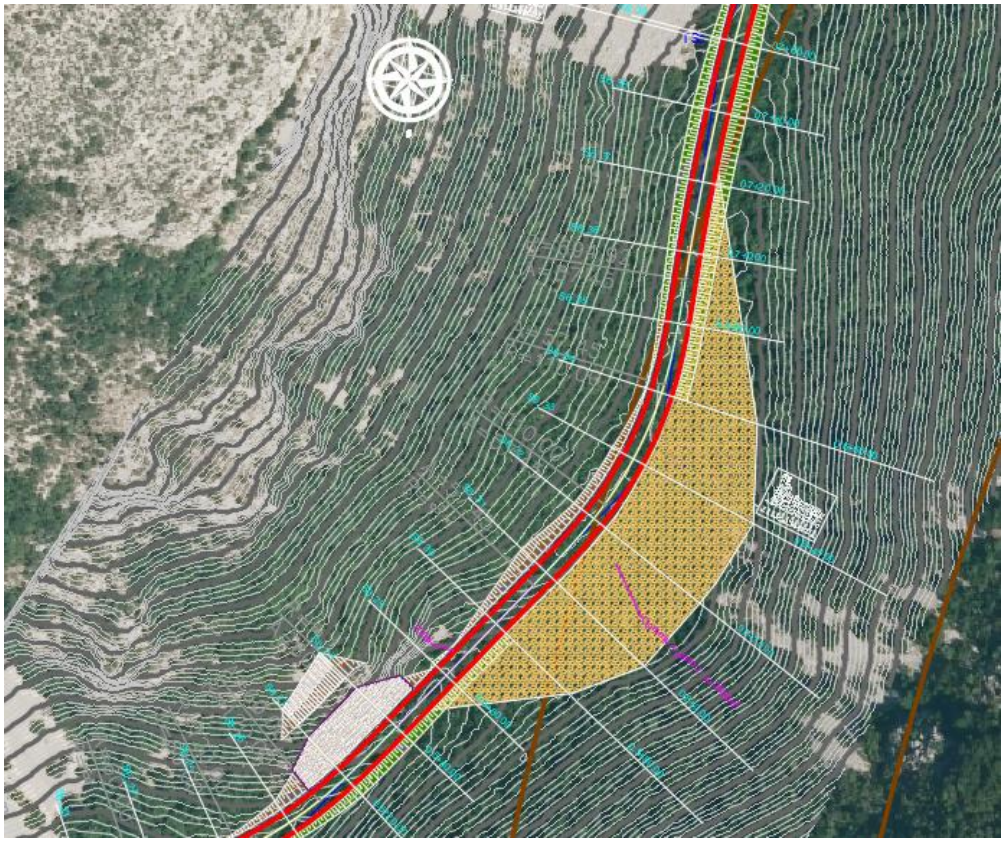

Figure 36: Design situation of the section SR6, operational plateau 2

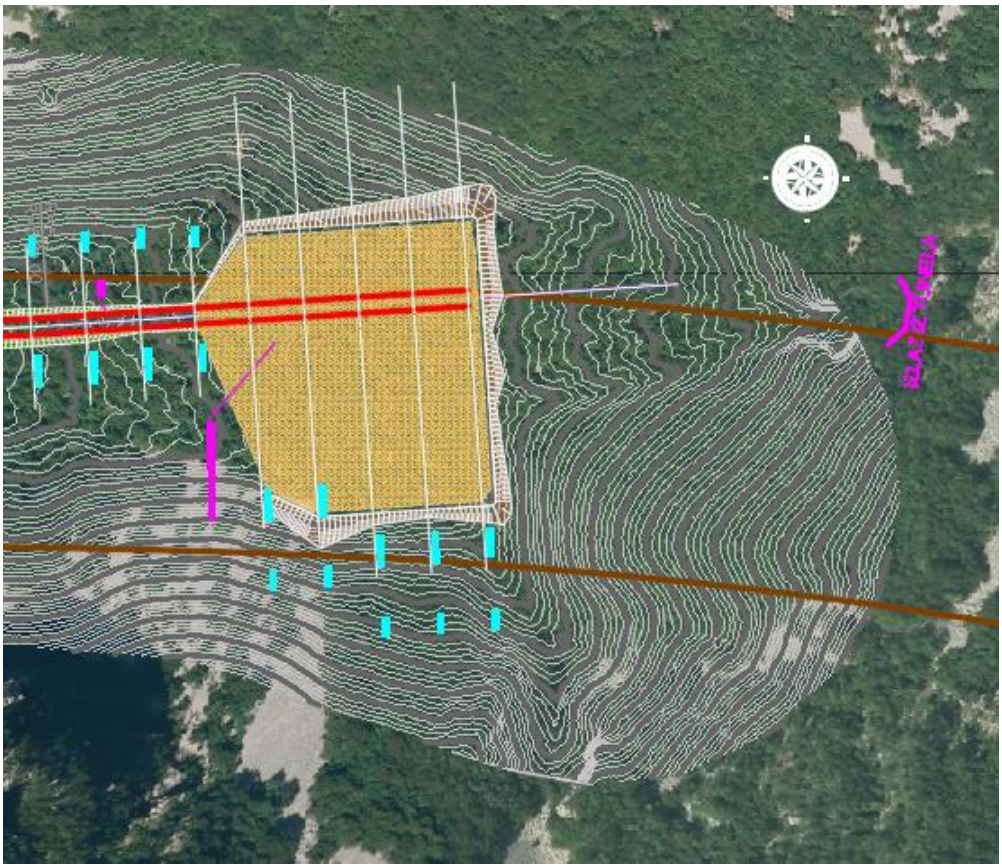

Figure 37: Design situation of the section SR6, operational plateau 3

3.2.6 Technical Elements of the Route

Main Motorway Alignment

All technical elements of the motorway are defined according to the *Rulebook on the basic requirements that public roads, their elements, and structures must meet from the aspect of traffic safety*[4].

The most important technical elements of the route are:

- Road category: Motorway
- Terrain category: Hilly-mountain
- Calculated speed: Vr=120 km/h (Vr=100 km/h)
- Minimum horizontal curve radius on the open route: Rm=700 m
- Minimum horizontal curve radius in the tunnel Rmin=1,000 m
- Maximum longitudinal slope, imax=6%
- Minimum vertical curve radius; Convex, Rks=12,000 (17,000), Concave Rkv=8,000 m

Cross-section profile

- Traffic lanes 2 x (2x3.75) m
- Edge line along median strip 2 x 0,50 m (included in the green lane)
- Edge line along emergency lane (included in the emergency lane) 2 x 0.25 m
- Median strip 3.00 m
- Emergency lanes 2 x 2.50 m
- Shoulder (stabilised part) 1.50 m
- Gutters, ditches depending on hydraulic calculation
- Banquettes 3.00 m
- Free profile
- On the motorway 4.7 + 0.10 m
- On the local road min 3.5 m

Inclinations of cutting slopes and embankments were determined based on the results of geotechnical investigation works. Based on the relevant parameters, traffic load, climatic, topographic, and geotechnical characteristics of the soil and materials in the bed, available resources (natural and artificial materials), as well as the appropriate performance technology, a design of the pavement structure dimensioning was made.

The pavement structure has been harmonised with the neighbouring sections and subsections, and the following has been adopted for the main route:

Traffic lanes of the motorway

- SMA 11s, PmB 45/80 + Er. D=4 cm x 0,42=1.68 cm
- AGNS 22s, PmB 45/80 + limestone aggregate d=7 cm x 0,35=2,45 cm
- AGNS 32s, B 35/50 + limestone aggregate d=9 cm x0.35=2.45 cm
- Cement stabilisation d=20 cm x 0.20=4.00 cm
- unbound crushed stone material 0/45 mm (d=25 cm X 0.1=2.75)

[4] Official Gazette of BiH, No.13/07

Emergency lane
- BB 11 k, B 50/70 + Kr. D=4 cm
- AGNS 22s, B 50/70 + Kr. d=7 cm
- unbound crushed stone material roadbed bearing capacity 0/45 mm (d=52 cm (0.11=2.75))
- CBR beds 10%

Interchanges
- BB 11s, PmB 45/80 + Er. d=4 cm x 0,42=1,68 cm
- AGNS 32s, B 35/50 + limestone aggregate d=10 cm x0.35=3.50 cm
- unbound crushed stone material roadbed bearing capacity 0/45 mm d=35 cm x 0.11=3.85

Regional roads
- BB 11 k B 50/70 + limestone aggregate d=4 cm
- AGNS 22s, B 35/50 + limestone aggregate d=7cm 0.2 + 6
- unbound crushed stone material roadbed bearing capacity 0/45 mm d=30 cm

Local roads
- BB 11 k B 50/70 + limestone aggregate d=4 cm
- unbound crushed stone material roadbed bearing capacity 0/45 mm d=30 cm

South Connection to Main Road M17
- maximum speed of 70 km/h

Cross-section profile
- Traffic lane width b=3.25 m
- Shoulder width b=1.50 m
- Width of gutter b=0.75 m
- Edge strip width b=0.30 m

Transverse profile
- Traffic lane width b=3.25 m
- Edge strip width b=0.30 m
- Rigol width 0.75 m
- Concrete channel width 1.0 m
- Berm width 2.82 m
- Transverse buffer drop 4.0%
- Transverse fall of berms and banks 6.0%.
- Embankment slopes 1:1.5

Access Roads to the Prenj Tunnel
Northern access road NR1

The most important technical elements of the route are:
- Traffic lane width b=3 m

- Shoulder width b=0.75 m
- Width of gutter b=0.50 m
- Width of footpaths b=0.50 m
- Maximum applied horizontal radius Rm=500 m
- Minimum applied radius Rmin=20 m

Longitudinal Sections
- Slope i=0.40%
- Maximum longitudinal slope imax=14.5% in the length of approx. 72 m
- Minimum longitudinal slope imin=0.35% in the length of approx. 107 m

Cross sections
- Slopes in the embankment 1:1.5
- Slopes in the notch 1:1
- Cross section slope ic=2.5%

Road construction
- BC 11 s wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

Road construction for local connections
- AHNS 16 load-bearing layer d=8 cm
- Roadbase layer d=35-40 cm
- Embarkment

Road construction for footpaths
- BC 11 k wear layer d=5 cm

<u>Northern access road NR2</u>

The most important technical elements of the route are:
- Traffic lane width b=3 m + extension
- Shoulder width b=0.75 m
- Maximum applied horizontal radius Rm=300 m
- Minimum applied radius Rmin=60 m
- Slopes in the notch for the main road 1:1.5
- Slopes in the notch for machines 1:1

Longitudinal Sections
- Slope at the start of the access road is=2.70%
- Maximum slope imax=12%
- Longitudinal slope on the plateau ip=4.0%

Cross sections
- Cross section slope ic=2.5%
- Maximum cross section slope cmax=4.0%

Road construction

- BC 11 k wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

Southern access road SR1

The most important technical elements of the route are:

- Technical group: D (Vdoz=50 km/h)
- Traffic lane widths: 2x3.0 m
- Shoulder width b=0.75 m
- Maximum applied horizontal radius Rm=100 m
- Minimum applied radius Rmin=35 m

Longitudinal Sections

- Slope at the start of the access road is=5%
- Maximum slope imax=5.3%
- Longitudinal slope on the plateau ip=4.0%

Cross sections

- Slopes of the scarps 1:1.5
- Cross section slope ic=2.5%
- Maximum cross section slope cmax=3.5%

Road construction

- BC 11 k wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

Southern access road SR2

The most important technical elements of the route are:

- Technical group: D (Vdoz=50 km/h)
- Traffic lane widths: 2x3.0 m
- Shoulder width b=0.75 m
- Berm width b=1 m
- Maximum applied horizontal radius Rm=1.300 m
- Minimum applied radius Rmin=30 m

Longitudinal Sections

- Slope i=5.3%
- Maximum longitudinal slope imax=8.0%
- Minimum longitudinal slope imin=1.0%
- Maximum applied radius of vertical curves is Rm=8,000 m
- Minimum applied radius of vertical curves is Rmin=500 m

Cross sections

- Slopes in the embankment 1:1.5
- Slopes in the notch 1:1
- Transverse slope it=2.5%
- Maximum cross section slope icmax=3.5%

Road construction
- BC 11 k wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

Southern access road SR3

The most important technical elements of the route are:
- Technical group: D (Vdoz=50 km/h)
- Traffic lane widths: 2x3.0 m
- Shoulder width b=0.75 m under normal conditions; b=1 m on the part of the relocation of the existing road; b=1.5 m on the part of the relocation of the existing road with a high embankment
- Maximum applied horizontal radius Rm=467 m
- Minimum applied radius Rmin=15 m

Longitudinal Sections
- Slope at the start of the access road is=4.8%
- Maximum longitudinal slope imax=12% in the length of approx. 75 m
- Minimum longitudinal slope imin=1%
- Maximum applied radius of vertical curves is Rm=10,000 m
- Minimum applied radius of vertical curves is Rmin=300 m

Cross sections
- Slopes in the embankment 1:1.5
- Slopes in the notch 1:1
- Cross section slope ic=2.5%
- Maximum cross section slope icmax=4.1%

Road construction
- BC 11 k wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

Southern access road SR4

The most important technical elements of the route are:
- Technical group: D (Vdoz=50 km/h)
- Traffic lane widths: 2x3.0 m
- Shoulder width b=0.75 m
- Berm width b=1 m
- Maximum applied horizontal radius Rm=496.47 m

- Minimum applied radius Rmin=17 m

Longitudinal Sections
- Maximum longitudinal slope imax=12.5%
- Minimum longitudinal slope imin=5%

Cross sections
- Slopes in the embankment 1:1.5
- Slopes in the notch 1:1
- Cross section slope ic=2.5%
- Maximum cross section slope icmax=5.0%

Road construction
- BC 11 k wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

Southern access road SR5

The most important technical elements of the route are:
- Technical group: D (Vdoz=50 km/h)
- Traffic lane widths: 2x3.0 m
- Shoulder width b=0.75 m under normal conditions; b=1 m under designed reinforced soil
- Maximum applied horizontal radius Rm=650 m
- Minimum applied radius Rmin=73 m

Longitudinal Sections
- Maximum longitudinal slope imax=14%
- Minimum longitudinal slope imin=2%

Cross sections
- Slopes in the embankment 1:1.5
- Slopes in the notch 1:1
- Cross section slope ic=2.5%
- Maximum cross section slope icmax=4%

Road construction
- BC 11 k wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

Southern access road SR6

The most important technical elements of the route are:
- Technical group: D (Vdoz=50 km/h)
- Traffic lane widths: 2x3.0 m

- Shoulder width b=0.75 m
- Berm width b=1 m
- Maximum applied horizontal radius Rm=695 m
- Minimum applied radius Rmin=110 m

Longitudinal Sections

- Maximum longitudinal slope imax=11% in the length of approx. 531 m
- Minimum longitudinal slope imin=4%
- Maximum applied radius of vertical curves is Rm=8,000 m
- Minimum applied radius of vertical curves is Rmin=800 m

Cross sections

- Slopes in the embankment 1:1.5
- Slopes in the notch 1:1
- Cross section slope ic=2.5%
- Maximum cross section slope icmax=4%

Road construction

- BC 11 k wear layer d=4 cm
- AGNS asphalted wear bearing layer d=8 cm
- Roadbase layer d=40 cm
- Final layer of embarkment

3.2.7 Wastewater Treatment System

Runn-off water from asphalt surfaces needs to be collected by an enclosed drainage system of the motorway and treated in the oil separator as recommended by JPAC's Technical Specifications for design of the motorway (2005). The purpose of oil and grease separators is to separate oils and grease and prevent their release into the environment.

The risk zone through which the motorway route passes is taken as the basis for determining the method of implementing water protection, while the water protection measures are aligned with the risks and possible ways of reducing them. Solutions and locations for oil and grease separators and water disposal are chosen compared to terrain, hydrogeological, and other relevant conditions. In the phase of defining water outlets and water disposition is foreseen so that the natural water regime should be preserved as best as possible, and minimally disturbed.

Wastewater treatment in the zone of low risk of pollution

In low risk of pollution zones, it is planned that the water collected from the asphalt is transported through the storm sewer system, treated with prefabricated separators for oil and light liquids in a ratio of 1/10, and purified according to EN858. The rest overflows into the bypass line.

The location of the separator is foreseen in the extension of the berm of the plateau, with a purpose-designed separator plateau whose dimensions correspond to the size of the device.

The separators contain a coalescing cartridge (filter) with a float/valve for automatic closing, which can be separately removed and cleaned without emptying the separator itself. It is foreseen that separators must ensure the required quality of the purified water at the outlet, which according to the EN 858 and DIN1999 standards, prescribes the maximum content of oily particles of 5 mg/l.

Wastewater treatment in zones of moderate and high risk of pollution

In the zones of moderate and high protection (e.g., near or inside the water protection zones), it is foreseen that water is purified in grease and oil separators, dimensioned in accordance with the calculated expected amount of water. 100% purification of wastewater in oil and grease separators is foreseen. For this level of liquid purification, separators of the NG type are foreseen, with an integrated precipitator for the separation of solid particles, in which the grease level drops to 100 mg/l of oily particles, which can be separated using only gravity.

In case of accidental pollution caused by the spilling of light liquids, a collector is provided with the volume adopted in accordance with JPAC's Technical Specifications for design of the motorway. In the event of an accidental liquid spill, the wastewater from the separation shaft first flows into the separator designed according to EN BAS 858, which should lower the concentration of oily particles to 5-10 mg/l. When the capacity of the separator is filled, the rest of the accidental spilled liquid flows out into the sump. The tank is emptied using an equipped vehicle, if necessary.

The effluent from the treatment device must meet the limit values prescribed by applicable legislation, *Decree on Conditions for Discharge of Wastewater into Environment and into the Public Sewerage System*[5]. After treatment, the treated effluent is discharged into the environment. The limit values of effluent quality are stipulated by the mentioned Decree.

[5] Official Gazette of FBiH No. 26/20

4 Construction Phase

4.1 Construction Waste

The type and scope of works on the construction of the motorway and ancillary facilities, which include excavation, concreting, installation works, transport of materials and equipment, will dictate the types and quantities of waste generated.

Projections of types and quantities of waste can be seen through the dimensions of the planned facilities given in the Preliminary Design[6] (Bill of Quantities) and comparison, or projection with similar motorway construction projects throughout BiH, while one of the basic types of waste that will occur during the construction of the motorway is construction waste.

Construction waste may contain hazardous substances, in which case this type of waste must be treated as hazardous waste.

Construction waste includes:

- earth, sand, gravel, clay, loam, stone as a result of earthworks and excavation,
- bitumen (asphalt) or cement-bound material, sand, gravel, crushed stone as a result of construction of civil engineering structures,
- concrete, bricks, mortar, gypsum, aerated concrete, natural stone as a result of the construction of buildings,
- wood, plastic, paper, cardboard, metal, cables, paint, varnish, and other mixed waste on the construction site as a result of other construction operations.

Indicative composition of construction waste:

- excavation material 90% (including non-inert organic waste 5%),
- demolition and construction waste 5%,
- asphalt and concrete 5%.

For the most part (95%) construction waste is inert waste (earth and stones from excavation, plaster, broken concrete, iron, steel, metals, wood, plastic, paper, etc.), and may be hazardous, for example, asphalt binder or waste containing asbestos, which requires special control and treatment. The remaining 5% of the waste is non-inert organic waste usually being wood, timber, vegetation, mixed municipal waste, packaging waste, etc.

Currently, there is no final version of the design and technical documentation for the new route, so the consultant made preliminary estimates of the generation and quantity of construction waste based on the Preliminary Design (2023) and experience in the development of the same and / or similar projects.

[6] Preliminary Design of the motorway on Corridor Vc; section: Konjic – Mostar North, Divel d.o.o. Sarajevo, 2016

During the preparatory works on the construction of the motorway route due to the removal of humus, shrubs and trees with trunks, waste from forest exploitation will appear (plant waste, shrubs, stumps…). Clean-up and preparation of the terrain includes cutting shrubs and trees of all sizes, cutting branches, cutting trees and thick branches to lengths suitable for transport, removing roots, shrubs and old stumps and stumps of newly cut trees, transporting shrubs, branches, logs, and stumps to the landfill designated by the supervising engineer. Clean-up also includes removing any unnecessary material left behind after these works. The total quantity of waste from the removal of bushes and shrubs is calculated per square meter of cleared overgrown area.

Cut trees and stumps should be disposed of along the route in places accessible for the trees to be removed by the competent authorities and where it will not disturb the works. The Contractor will temporarily place this waste at a sufficient distance from the watercourse. In the preparatory phase of the project implementation, the competent (local) forestry authority will cut and remove this waste.

Construction of structures requires ground excavation and removal of extra quantities of excavated soil and removal of bad quality soil from the construction site (marl soil, soil containing high percent of biodegradable material). Granular materials – broken stone, crushed stone and sand are used for filling works and lining for road laying. Cement, concrete, steel, and wood are materials that will be most frequently used in structure construction. Estimates of types and quantities of waste can be made based on dimensions of structures and bill of quantities given in the 2023 Preliminary Design.

The Bill of Quantities from the Preliminary Design provides the quantities of excavated materials on the open part of the route, i.e., during the excavation, while the quantities of excavated materials generated by tunnel penetration.

According to the Preliminary Bill of Quantities (BoQ) prepared in the framework of Preliminary Designs for this motorway subsection, the total quantity of excavated materials will be around **6.9 million m^3**.

Table 1: Estimated quantities of excavated materials that will be generated during construction of the route Konjic (Ovcari) - Prenj Tunnel - Mostar North

Subsection	The amount of excavation (m^3)
Konjic (Ovcari) - Prenj Tunnel	1,731,500
Prenj Tunnel	2,980,00
Prenj Tunnel - Mostar North	2,184,000
Total	**6,895,500**

The BoQ for construction of the access roads to Prenj Tunnel[7] estimates that the total amount of excavated materials from the northern access road will be **150,000 m^3**, and for the southern access road **80,000 m^3**.

[7] Tunnel Prenj T3, Preliminary design, Divel d.o.o. Sarajevo, 2016

The BoQ also estimates that the total amount of material required for construction of embankments along the route is around **3.4 million m³**. Since the excavated spoil can be used for construction of the embankments, the final disposal will be required for **3.5 million m³** of spoil that will be generated in excavation activities. Part of the spoil material will be disposed on the disposal sites which will be designed and used for this purpose, and part will be used for landscaping activities.

Based on its origin (excluding natural disasters), construction waste can be classified in following groups:

- construction waste from total or partial demolition of buildings and/or infrastructural structures,
- construction waste resulting from the construction of new buildings and/or infrastructural structures (destroyed unused material, extra varnish, sealing materials, half-empty gas bottles, packaging material, etc.),
- earth material, stone, brushes to be removed during preparation of construction site, construction of base pit and foundations of structures, and preparation of surrounding terrain,
- construction waste resulting from regular maintenance of transport network, mainly roads.

In terms of aggressiveness, construction waste is classified in several groups described below.

4.1.1 Aggressive and Potentially Aggressive Material

This group includes:

- Materials containing aggressive components (asbestos, lead, tar, protective coating, adhesives, binders, some types of plastic),
- Materials becoming aggressive after long periods in aggressive areas (for example industrial facilities where chemicals are produced or used for production of chemicals),
- Materials that are aggressive if they are not purified from aggressive admixtures and/or are subsequently mixed with them (one typical example is paint with added lead dumped carelessly on a pile of brick of concrete blocks).

Aggressive and potentially aggressive components present in modern structures:

- concrete admixtures containing solvents,
- waterproofing,
- adhesives,
- emulsions containing tar,
- materials containing asbestos,
- Insulation materials
- some paint and coatings,
- technologically processed wood,
- resins,
- plastered slabs,

- empty or partially empty gas bottles (used during cutting, welding, etc.)

Aggressive and potentially aggressive components present during demolition of structures:

- materials containing asbestos,
- wood protected with coating,
- insulation material
- electrical equipment containing toxins,
- materials containing CFC from refrigerators,
- materials containing CFC from fire equipment,
- radionuclides,
- biological agents,
- empty or partially empty gas bottles (used during cutting, welding, etc.).

4.1.2 Inert (Mineral) Group of Construction Material

This group includes materials which do not have properties of aggressive materials, such as brick, tiles, concrete, etc. There are usually high quantities of these materials which can be recycled and reused.

4.1.3 Non-inert Group of Construction Material

This group includes materials which, when installed, do not have characteristics of aggressive materials, but may acquire such characteristics depending on the method of their disposal. For example, technologically processed wood, when incinerated, emits toxins. The same is the case with plastic and textile construction waste. Also, when plaster is disposed on landfills, hydrogen sulphide is transformed in harmful (acid) gas. This reaction may compromise the quality of aggregates in case of large quantities of plaster on landfill. Other members of this group include plastic, metals, wood linings, doors, windows, especially those with PVC frames.

4.2 Categorisation of Waste

During the construction of the planned motorway, waste will be generated, and according to the *Rulebook on waste categories with lists* (Official Gazette of FBiH, 9/05) it is classified by the characteristics and activities from which it originated.

Pursuant to the Rulebook, waste groups and individual waste names are marked with six-digit key numbers where the first two digits indicate the activity from which the waste originates, the other two indicate the process in which the waste was generated, and the last two digits indicate the part of the waste process. Hazardous waste in the Rulebook on categories of waste with lists is marked with an asterisk (*).

The categorisation of waste in relation to the origin according to the Rulebook on categories of waste with lists is given in Table 2.

Table 2: The categorisation of waste in relation to the origin according to the Rulebook on categories of waste with lists

Code	Waste Name
01 00 00	Wastes resulting from exploration, mining, quarrying, physical and chemical treatment of minerals
02 00 00	Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing
03 00 00	Wastes from wood processing and the production of panels and furniture, pulp, paper, and cardboard
04 00 00	Wastes from the leather, fur, and textile industries
06 00 00	Wastes from inorganic chemical processes
07 00 00	Wastes from organic chemical processes
08 00 00	Wastes from the manufacture, formulation, supply, and use (MFSU) of coatings (paints, varnishes and vitreous enamels), sealants and printing inks
09 00 00	Wastes from photographic industry
10 00 00	Wastes from thermal processes
11 00 00	Wastes from chemical surface treatment and coating of metals and other materials; non-ferrous hydrometallurgy
12 00 00	Wastes from shaping and physical and mechanical surface treatment of metals and plastics
13 00 00	Oil wastes and wastes of liquid fuels (except edible oils, 05 and 12)
14 00 00	Waste organic solvents, refrigerants, and propellants (except 07 00 00 and 08 00 00)
15 00 00	Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified
16 00 00	Wastes not otherwise specified in the list
17 00 00	Construction and demolition wastes (including road construction waste)
18 00 00	Wastes from human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care)
19 00 00	Wastes from waste management facilities, off-site wastewater treatment plants and the preparation of water intended for human consumption and water for industrial use
20 00 00	Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions0,

4.3 Description of Construction Waste Generated During the Construction of the Motorway

The types of waste that can be generated during the construction of the motorway are shown in Table 3.

Table 3: Categorisation of waste that will be generated during construction of the motorway

17	**Construction and demolition wastes (including excavated soil from polluted/contaminated sites)**
17 01	Concrete, bricks, tiles and ceramics

17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 06*	Mixtures or separate fractions of concrete, bricks, tiles, and ceramics containing dangerous substances
17 01 07	Mixtures of concrete, bricks tiles and ceramics other than those mentioned in 17 01 06
17 02	Wood, glass and plastic
17 02 01	Wood
17 02 02	Glass
17 02 03	Plastic
17 02 04*	Glass, plastic, and wood containing or contaminated with dangerous substances
17 03	Bituminous mixtures, coal tar and tarred products
17 03 01*	Bituminous mixtures, coal tar and tarred products
17 03 02	Bituminous mixtures containing other than those mentioned in 17 03 01
17 03 03*	Bituminous mixtures, coal tar and tarred products
17 04	Metals (including their alloys)
17 04 01	Copper, bronze, brass
17 04 02	Aluminium
17 04 03	Lead
17 04 04	Zink
17 04 05	Iron and steel
17 04 06	Tin
17 04 07	Mixed metals
17 04 09*	Metal waste polluted/contaminated with hazardous substances
17 04 10*	Cables containing oil, (coal) tar and other dangerous substances
17 04 11	Cables other than those mentioned in 17 04 10
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 03*	Soil and stone containing dangerous substances
17 05 04	Soil and stones other than those mentioned in 17 05 03*
17 05 05*	Dredging spoil containing dangerous substances
17 05 06	Dredging spoil other than those mentioned 17 05 05

17 05 07*	Railway gravel containing dangerous substances
17 05 08	Railway gravel other than those mentioned in 17 05 07
17 06	Insulation materials and asbestos-containing construction materials
17 06 01*	Insulation materials containing asbestos
17 06 03*	Other insulation materials composed of or containing dangerous substances
17 06 04	Insulation materials other than those mentioned in 17 06 01 or 17 06 03
17 06 05*	Asbestos - containing insulation materials
17 08	Plaster-based construction materials
17 08 01*	Plaster-based construction materials polluted/contaminated with dangerous substances
17 08 02	Plaster-based construction materials other than those mentioned in 17 08 01
17 09	Other construction and demolition waste
17 09 01*	Construction and demolition waste containing mercury
17 09 02*	Construction and demolition waste containing PCB
17 09 03*	Other construction and demolition wastes (including mixed wastes) containing dangerous substances
17 09 04	Mixed construction and demolition waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03

The list of waste codes with the composition, quantity, place of origin and collection, types of shipment to the temporary and/or final disposal site as well as the place of final disposal of all categories of waste generated during the construction of the motorway, is shown in Table 4.

Table 4: Estimated types and quantities of waste in the motorway construction phase with guidelines for the management of individual types of waste

1[1]	2[1]	3[1]	Waste	Composition of waste	Quantity during construction	Place of origin	Place of collection	Type of shipment to place of temporary and final disposal	Place of final disposal, authorised company, producer
17	02		Wood, glass and plastic						
17	02	01	Wood	Wooden boards, poles, wooden scaffolding, wooden pads	Demolition: approx. 150 m^3 and during construction approx. 40 m^3	Demolition of buildings, installation of equipment, concrete works, works on the route, construction of all structures	Temporary landfill	Transport vehicles	Authorised company and/or handover to third parties
17	02	02	Glass	Window and door glazing - demolition of buildings	approx. 200 kg	Demolition of existing structures	Selective waste containers	Transport vehicles	Authorised companies
17	02	03	Plastic	Thermal contraction branch, insulation from pre-insulated pipes, PVC bags, warning tapes, foils, PVC pipes, cables	Demolition: approx. 38/200), and during construction approx. 400 kg	Demolition of buildings, construction of structures and routes	Selective waste containers	Transport vehicles	Authorised companies
17	02	04*	Glass, plastic and wood containing or	Mixtures of mentioned materials	approx. 500 kg	Demolition of buildings, installation of equipment, concrete	Temporary storage of	Transport vehicles	Authorised company

			contaminated with dangerous substances			works, works on the route, construction of all structures	hazardous waste		
17	03		Bituminous mixtures, coal tar and tarred products						
17	03	01*	Bituminous mixtures, coal tar and tarred products	Plastic anti-corrosion tapes, waste asphalt	approx. 1,000 m^2	Route construction, existing road barriers, structures	Temporary storage of hazardous waste	Transport vehicles	Authorised companies
17	03	02	Bituminous mixtures containing other than those mentioned in 17 03 01*	Mixtures based on bitumen, cardboard	approx. 300 m^2	Route construction, existing road barriers, structures	Selective waste containers	Transport vehicles	Authorised companies
17	04		Metals (including their alloys)						
17	04	05	Iron and steel	Mounting accessories, damaged steel and iron parts, wire, marking poles, barriers, sheet metal, grounding strip	Demolition: approx. 130 kg and during construction approx. 70 kg	Construction of buildings, installation of equipment on the route, disassembly of old wire on barriers, preparation of poles, road crossings,	Selective waste containers	Transport vehicle	Authorised companies
17	04	07	Mixed metals	Electronic equipment, residue of welding electrodes, cables	Demolition: approx. 80 kg and during construction approx. 30 kg	Installation of equipment in ancillary structures including electronic equipment	Selective waste containers	Transport vehicle	Authorised companies
17	05		Soil (including excavated soil from contaminated sites), stones and dredging spoil						
17	05	04	Soil and stones other than those mentioned in 17 05 03*	Dredge spoil, stones, sand, lime sand, gravel	3.5 million m^3	Excavation works along the route, mining works, preparation works along the route,	Temporary disposal sites	Transport vehicle	Construction waste landfill (surplus that will not be used as construction material)

						sand filling on the route, macadam roads, road crossings, tunnels and structures			
17	05	06	Dredging spoil other than those mentioned 17 05 05*	Dredge spoil, humus resulting from preparation works in a layer of thickness d= 20 cm	approx. 50,000 m^3	Excavation works along the route, drilling works, preparation works along the route, road crossings, structures	Temporary disposal sites	Transport vehicle	Construction waste landfill
17	06		Insulation materials and asbestos-containing construction materials						
17	06	01*	Insulation materials containing asbestos	Insulation materials	Demolition: approx. 100 kg	Construction of all structures and demolition of residential buildings	Temporary storage of hazardous waste	Transport vehicles	Authorised companies
17	09		Other construction and demolition waste						
17	09	03*	Other construction and demolition wastes (including mixed wastes) containing dangerous substances	Mixed construction hazardous waste	approx. 500 kg	During demolition of existing structures on the entire planned route	Temporary storage of hazardous waste	Transport vehicles	Authorised companies
17	09	04	Mixed construction and demolition waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	Mixed construction waste	approx. 1,000 m^3	During demolition of existing structures on the entire planned route	Temporary disposal sites	Transport vehicle	Construction waste landfill

*1^1 - activity from which the waste originates, 2^1 - the process in which the waste was generated, 3^1 - the process from which the waste originates; * -hazardous waste*

4.4 Spoil Disposal Sites

Reasoning behind disposal strategy

Earthworks quantities are based on the latest available designs for subsection Konjic (Ovcari)-Tunnel Prenj, subsection Tunnel Prenj-Mostar North, Tunnel Prenj, Konjic Bypass, and Access roads to Tunnel Prenj and corresponding analyses following geotechnical missions G1 and G21 where completed.

It has been assumed that the Prenj Mountain constitutes a physical barrier to any material being transported from the south side (where there is an excess) to the north side in case there is a need. The two subsections (each incorporating half of Prenj Tunnel material) are therefore considered as separate from a mass haul point of view. The transfer of material between the north and south sections should not be accepted for the following reasons:

- Any temporary access road over/around the mountain itself is environmentally undesirable, costly and will be subject to the limitations of winter conditions.
- Using the existing M17 to transport such material over a distance of approx. 50 km is costly and should not be accepted given that lorries will need to cross existing agglomerations such a Jablanica. The deterioration of the existing infrastructure and issues of road safety are also important negative factors.
- An alternative may be to transport such material through a constructed tube of Prenj Tunnel itself. However, this is not consistent with the procurement strategy of the Beneficiary who intends to commence tendering of the works for all sections early 2023. On the basis of 3 m of progress per day, (one sequential cycle being installations, explosives, excavation, support), the opening of 1/2 single tube of Prenj Tunnel may take up to 5 years to complete before transport through the tube may be considered. Such transportation may then hinder the continuation of construction of Prenj Tunnel itself.

Quantities arising from the excavation of Prenj Tunnel have been assumed to be evacuated evenly to the north and south on the assumption of concurrent excavation of the four faces.

A factor of 1.2 for swelling/compaction factor has been assumed for excavated material that will be placed either under the motorway or in waste/landscaped areas.

Earthworks for Konjic bypass have been considered separately as have been both accesses to Prenj Tunnel and Mostar North Interchange, the latter being addressed under a separate Environmental and Social Impact Assessment (ESIA) process.

Konjic (Ovcari) to Prenj Tunnel

On the basis that 50% of Prenj tunnel excavation being "removed" on the north side, the following table summarises the quantities by section of the alignment.

Table 5: Quantities of earthworks of the section Konjic (Ovcari) – Tunnel Prenj

Section Konjic (Ovcari) - Prenj Tunnel / Prenj Tunnel	Start (km)	End (km)	Total excavation (m^3)	Unsuitable for disposal (m^3)	Topsoil (m^3)	Excavated material available for embankment (m^3)	Embankment fill (m^3)	Material Excess / Deficit by section (m^3)	Comments
Interchange Ovcari			314,000	31,400	4,000	334 320	15,000	319,320	
Access road interchange			49,000	4,900	5,000	46,920	81,000	(34,080)	
Toll Station Ovcari Interchange			31,000	3,100	2,000	31,080	8,000	23,080	
Ovcari Interchange to Bridge 3	0+440	1+300	226,000	22,600	11,000	230,880	59,000	171,880	
Tunnel 1	1+820	2+487	126,000			151,200	-	151,200	
Motorway between Tunnel 1 and Tunnel 2	2+487	2+680	37,000	3,700	2,500	36,960	54,000	(17,040)	
Tunnel 2	2+680	3+840	234,000			280,800	-	280,800	
Motorway Tunnel 2 to Neretva Bridge 4	3+840	3+969	23,000	2,300	1,500	23,040	20,000	3,040	Konjic Municipality Landfill
TOTAL			**1,040,000**	**68,000**	**26,000**	**1,135,200**	**237,000**	**898,200**	
Neretva Bridge 4 to Konjic South Interchange viaduct 5	4+499	6+418	502,000	50,200	23,000	514,560	273,000	241,560	
Interchange Konjic South			74,000	7,400	4,000	75,120	165,000	(89,880)	
Toll Station Konjic south + access			2,000		2,000	-	13,000	(13,000)	
Rest area Konjic South			3,500		3,500	-	80,000	(80,000)	
Motorway from Viaduct 5 to cut off point	6+418	9+940 approx.	75,000	15,000	35,000	30,000	885,000	(855,000)	Hypoth Equilibrium Prenj Tunnel – can be used for motorway
TOTAL			**656,500**	**72,600**	**67,500**	**619,680**	**1,416,000**	**(796,320)**	

Section Konjic (Ovcari) - Prenj Tunnel / Prenj Tunnel	Start (km)	End (km)	Total excavation (m^3)	Unsuitable for disposal (m^3)	Topsoil (m^3)	Excavated material available for embankment (m^3)	Embankment fill (m^3)	Material Excess / Deficit by section (m^3)	Comments
Motorway cut off point to Prenj Tunnel Entrance	9+940 approx.	11+500	35,000	7,000	25,000	3,600	1,300,000	(1,296,400)	embankment completely
Prenj Tunnel 50% length - 2 tubes			1,300,000	-		1,560,000	100,000	1,460,000	Full reuse incl. 30% treatment
TOTAL Prenj Tunnel	-	-	1,335,000	7,000	25,000	1,563,600	1,400,000	163,600	
Total Motorway			**3,031,500**	**147,600**	**118,500**	**3,318,480**	**3,053,000**	**265,480**	
Access Road to Prenj Tunnel								150,000	
Southern Junction with M17	0+000	3+150	350,000	60,000	40,000	300,000	200,000	100,000	Figures from Concept Design

Note: Pointer shows that material needs to be transported from North of Neretva to South of Neretva

On the basis of the present studies and conclusion of the corresponding geotechnical studies, there is an overall need to dispose:

- 148,000 m^3 of unsuitable material (silt, organic material, etc.) and 265,000 m^3 of excess cut for the motorway,
- 160,000 m^3 for Konjic Bypass,
- 150,000 m^3 for the north access road.

The need for borrow pits seems limited to materials for pavement courses. However, the figures stated above are based on the fact that full reuse and transport is possible by considering the following programming issues and major constraints, otherwise, additional waste areas and borrow pits will be required:

- The excess excavated material north of Neretva River from Ovcari Interchange and the two tunnels will need to be transported and reused south of the river. Given that Konjic Municipality do not wish for construction traffic to traverse the town, it is important that Viaducts No. 3 and No. 4 be constructed as soon as possible to transport approx. 900,000 m^3 of material. Contractor should be set the constraint to construct these bridges first within the tender documentation. Construction of tunnels T1 and T2 north of the river will also need to be programmed to allow for transport of excess material.
- A hypothetical "cut off point" has been identified at approx. km 9+900 where material from Prenj Tunnel (including 30% following treatment/stabilisation that will be confirmed during detailed design) can be fully placed in embankment thus representing an equilibrium. Given that the tunnel excavation may be completed in 5 years, embankment construction may also take the same time. As a result, programming/procurement of the construction works may need to be considered to allow for complete reuse.

Given the characteristics of the project and nature of the terrain, with the motorway located at the foot of the side slopes, **it is now proposed that landscaped areas be constructed as extensions of the exiting motorway embankments**. For technical reasons these will be made of both excess cut and unsuitable organic material. The key objective for landscaping these areas is to make provisions for ramps in case of brake failure in the zone with a 6.0% longitudinal slope. Upon completion of the landscaping, a thorough evaluation of the external drainage system will be carried out.

The parts of the route that are planned for landscaping are situated at the following sections:

- Landscaping section 1: km 7+480.00 to km 7+920.00; capacity – 24,656.00 m^3,
- Landscaping section 2: km 8+080.00 to km 8+540.00; capacity – 4,838.00 m^3,
- Landscaping section 3: km 9+380.00 to km 10+140.00; capacity – 203,330.00 m^3,
- Landscaping in the relocation zone of the regional road; capacity – 32,500.00 m^3.

In total, the capacity of these areas is **265,324.00 m³**.

Landscaping sections 1 and 2 are located in Gornja Bijela, on the left side of the motorway route. Section 3 is where the largest landscaping project will take place, utilising approximately 203,330.00 m³ of excavation material from the route. It is located near the beginning of the Prenj Tunnel section. By reshaping the left side of the highway route, the embankment's height will be less visible and will better blend in with the surrounding environment.

The material required for constructing the landscaping embankments can be sourced from excavated material that is not suitable for the embankment construction. Once the landscaping is completed up to the final elevation, the areas will be greened to blend with the surrounding environment.

These areas will be designed and constructed in such a way to ensure their perennity, i.e., having considered geotechnical and hydraulic constraints including drainage measures.

The remaining excess cut material of approx. 150,000 m³ will be required for sub-base and crushed aggregate bases of the pavement.

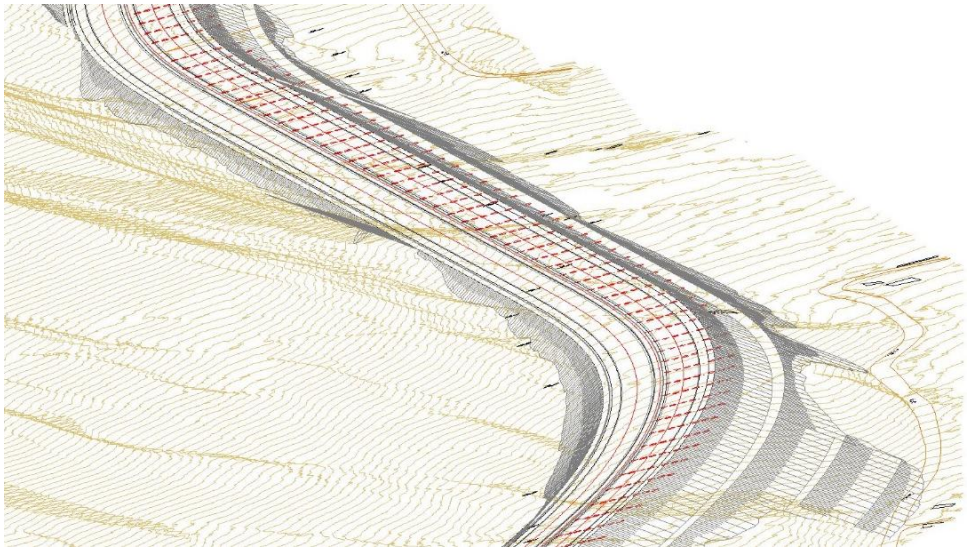

Figure 38: 3D model of Sections 1 and 2

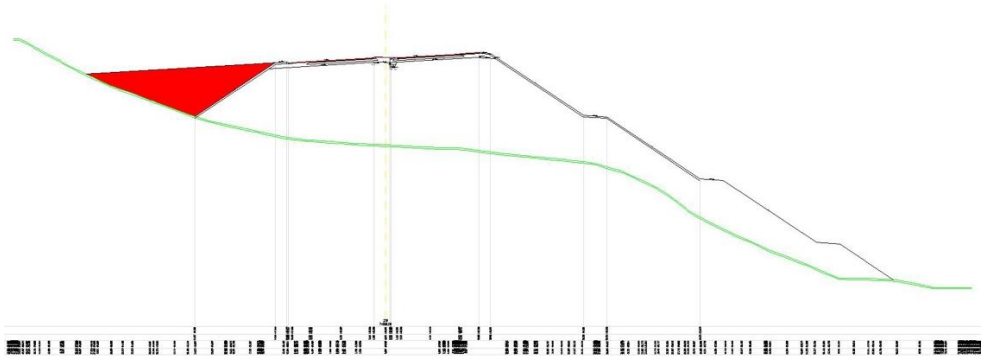

Figure 39: Embankment profile on Section 1 and 2

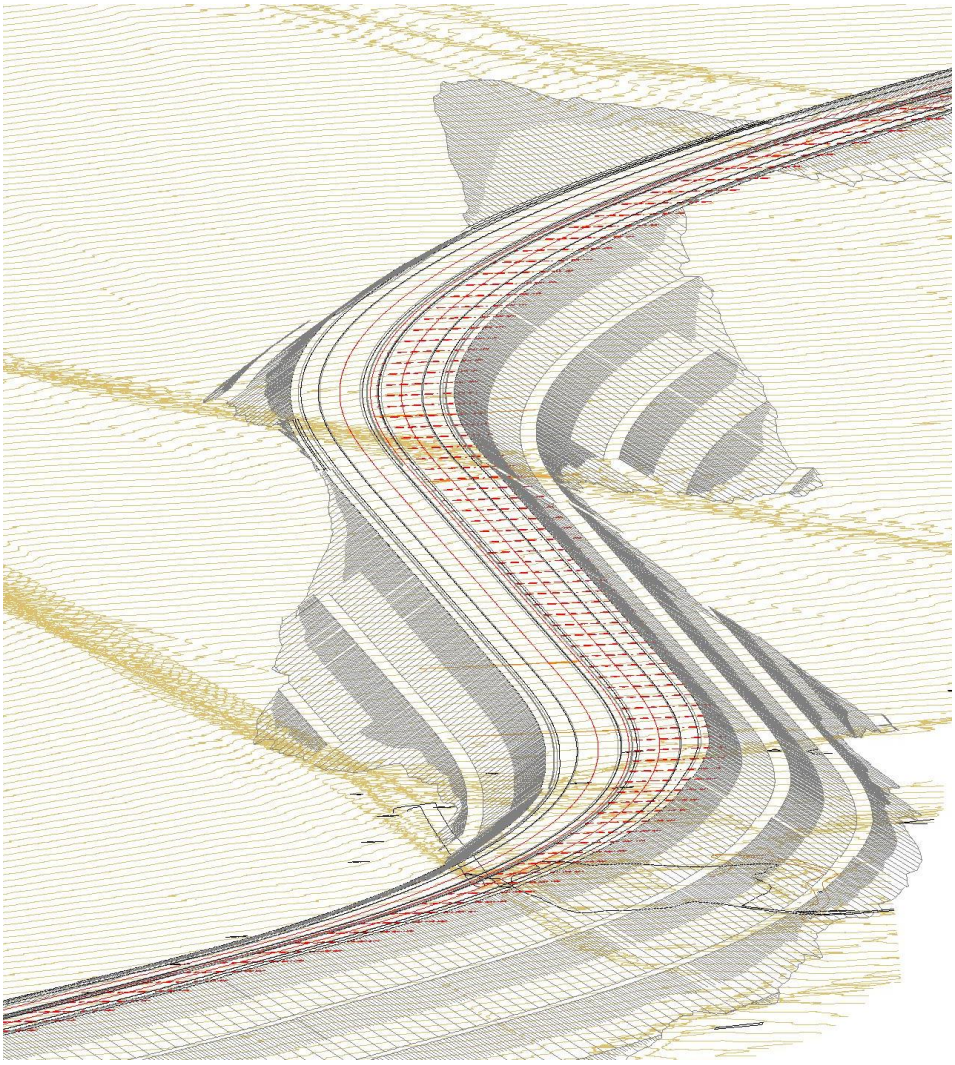

Figure 40: 3D model of Section 3

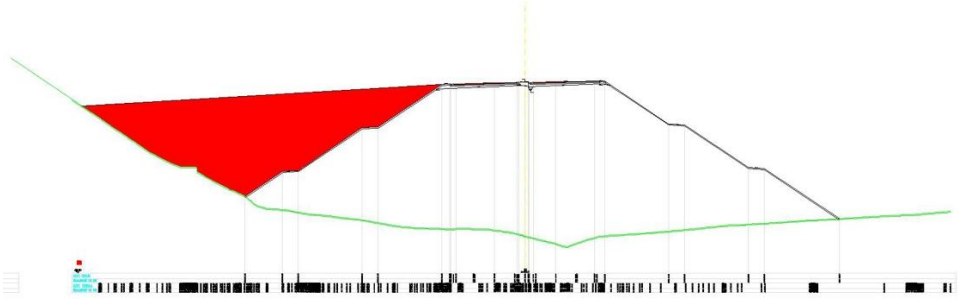

Figure 41: Embankment profile on Section 3

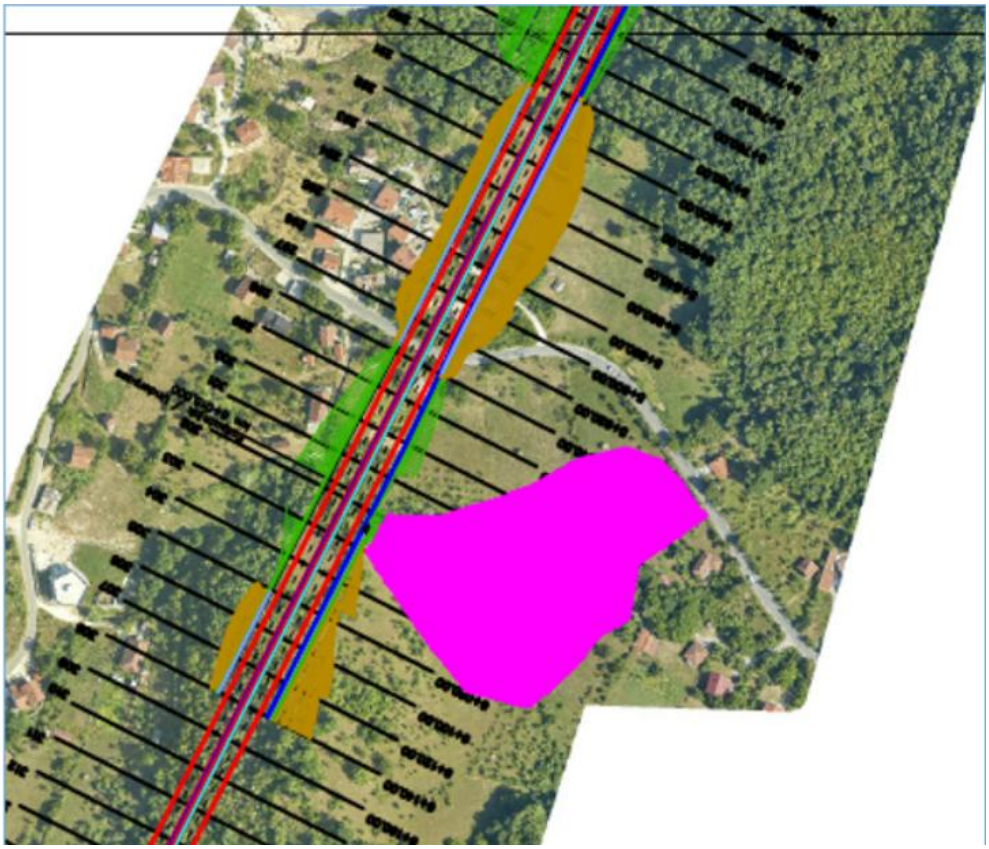

Figure 42: Landscaping area between regional road diversion and motorway

Prenj Tunnel to Mostar North Interchange

The following table summarises the quantities of earthworks of the section. The material "unsuitable" is considered as unusable even for treatment and includes any material containing vegetable or organic matter such as peat, or organic silts. Topsoil for reuse has been identified separately.

Table 6: Quantities of earthworks of the section Tunnel Prenj – Mostar North

Prenj Tunnel / Section Prenj Tunnel - Mostar North Interchange		Start (km)	End (km)	Total excavation (m^3)	Unsuitable for disposal (m^3)	Topsoil (m^3)	Excavated material available for embankment (m^3)	Embankment fill (m^3)	Material Excess / Deficit by section (m^3)	To Landfill Area (m^3)	Comments
Prenj Tunnel	50% length - 2 tubes			1,300,000		-	1,560,000	40 000	1,520,000	1,520,000	
Prenj-T4	Motorway			36,000	2,000	-	40,800	13 000	27,800	1,230,800	
	Tunnel Klenova Draga	**0+031.00 0+042.00**	**0+872.00 0+843.00**	131,000	9,000	-	146,400	-	146,400		
	T4	**1+2251+ 170.00**	**1+910.50 1+854.50**	107,000	7,000	-	120,000	-	120,000		
M9-Mostar north slip road	Motorway	**2+273.00**	**9+796.00**	1,547,000	101,000	117,000	1,735,200	1 253 000	482,200		
	T5	**9+796.00 9+781.50**	**11+923.00 11+945.50**	336,000	22,000	-	376,800	-	376,800		
	Motorway	**11+923.0 0**	**12+339.00**	27,000	2,000	6,000	30,000	124 000	-94,000		
TOTAL				**3,484,000**	**143,000**	**123,000**	**4,009,200**	**1,430,000**	**2,579,200**	**2,750,800**	
Mostar North interchange				58,000				175,000	-175,000	-175,000	Covered under separate ESIA
Access Road to Prenj Tunnel							-		-	80,000	

Approximately 2.8 million cubic meters of material will therefore require disposing of:

- 1.5 million m^3 from Tunnel Prenj.
- 1.2 million m^3 from the construction contract for the motorway.
- With respect to Mostar North Interchange, this will require additional fill material that will come from either the construction works of this section or from those for the subsequent section Mostar North – Mostar South.
- Excess material from access roads construction is approximately 80,000 m^3.

One location in Humilisani is proposed for disposal site on southern side that should accept waste from the construction of section Tunnel Prenj - Mostar North, half of material from the Tunnel Prenj generated on the Mostar side and access roads to the Tunnel Prenj, also on the Mostar side. The location of the proposed landfill is located outside the boundaries of water protection zones and of future natural protected areas, along the left side of the motorway, approx. from km 5+700 to km 6+300, and next to the regional road R435a.

Given that it is located approx. in the middle of the Tunnel Prenj - Mostar North section, the transport lengths are approximately equal on both sides. Thus, from the exit of the Prenj Tunnel as well as from the beginning of the Tunnel Prenj - Mostar North section, the transport length is approximately 9 km, and the distance to the landfill from the junction with the Mostar North interchange (exit from tunnel T5) is approx. 9.5 km.

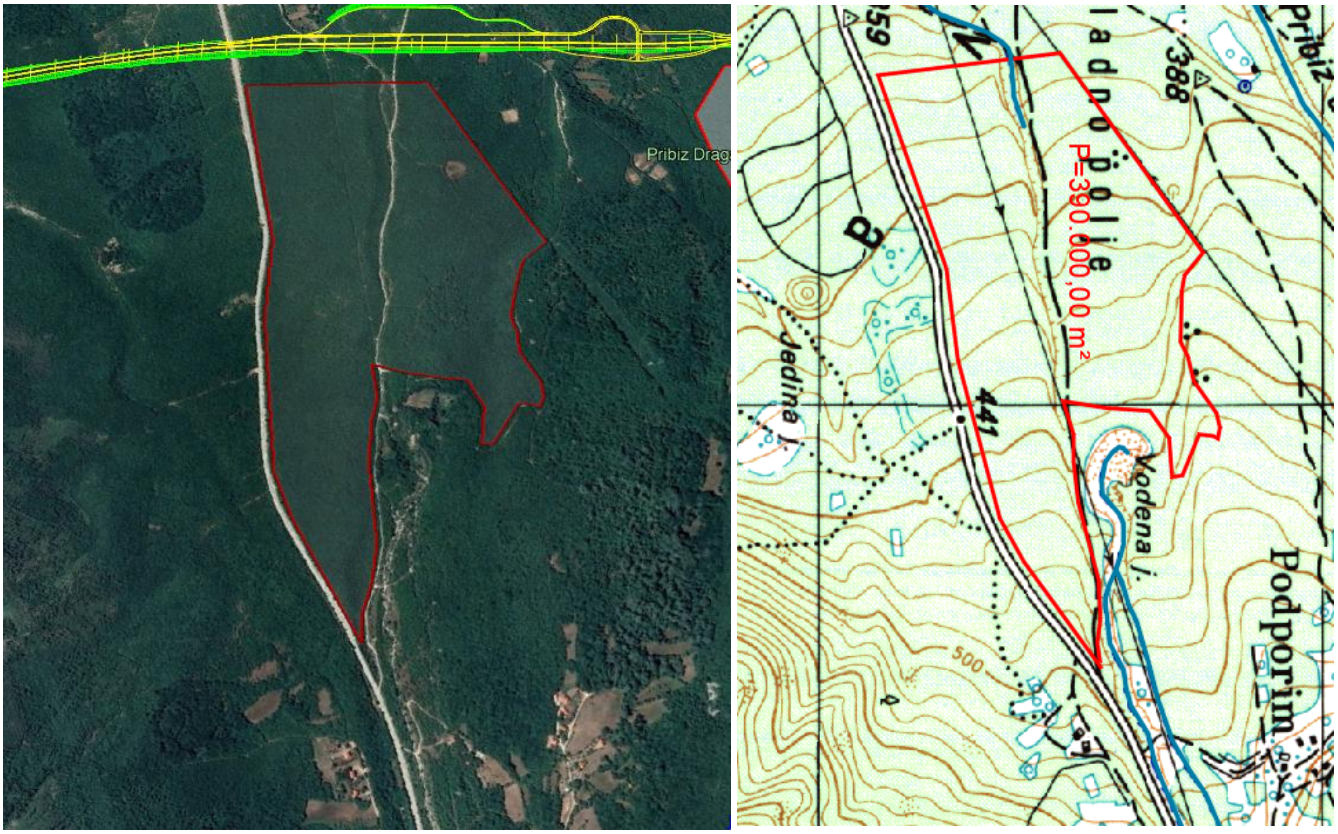

Figure 43: Location of the Humilisani disposal site (source: Google Earth)

Mitigation works will need to be foreseen, however:

- the acquisition of one private land plot will be required,

- hydrotechnical facilities will be designed to allow for unhindered passage of watercourses,
- the proposed location of the landfill is not in conflict with the route of the transmission line but ends just before the transmission line,
- waste areas should be constructed in such a way to ensure their perennity, i.e., having taken into account geotechnical and hydraulic constraints. They shall also be landscaped and topsoiled,
- specific studies will be undertaken to ensure integration within the surrounding environment.

This sole area has the capacity to accept the 2,800,000 m^3 of excess fill including material from the construction of the access roads.

Southern Connection to the Main Road M17 (Konjic bypass)

This section, according to the current studies, will generate an excess of material for placing in waste areas of 160,000 m^3. It is foreseen that the excess material be placed in the Konjic Municipal Solid Waste disposal site that is located adjacent to the project and is located outside any future protection areas.

Particular constraints should be imposed on the contractor to avoid traffic crossing Konjic.

Figure 44: Location of the Konjic Landfill

Considering the different types of materials brought within the disposal sites, it is necessary to plan the transport and unloading of different materials. Materials will be brought by dump trucks or tippers. Machines for spreading, planning and compaction of imported excavated material should be provided at the sites. Material compaction will be done in layers with vibro rollers. Filling of the material should be done up to the projected slopes, while respecting the projected slopes which will ensure the drainage of the landfill surfaces. When excavation works are done, the sites will be flattened and closed.

After the formation of the disposal sites, it is necessary to carry out humification. For this process, removed humus will be used (deposited from the site) along with new humus if necessary. It is planned to carry out humification the slope in a layer of 20 cm.

Along the perimeter of the disposal sites, peripheral ditches are planned for the reception of external rainwater and rainwater from the closed part of the sites, which drain the water to the nearest recipient. On the other side, the projected ditch follows the edge of the sites and fits into the drainage ditch along the path of the existing road to the recipient. In places where the slope of the ditch is higher than 4%, it is necessary to line the ditch with concrete elements. During transport, trucks should be covered with a tarpaulin, and the wheels should be washed before using the main road.

The areas of the landfill closing plateau are projected horizontally. The slope of the scarp between the two layers is given in a slope of 1:2 so that the scarp of each subsequent surface is pulled by 2.00 m towards the middle of the landfill due to the shedding of material and the stability of the scarp.

5 Management of Special Categories of Construction Waste

Construction waste which contains or is polluted/contaminated with dangerous substances should be cleaned from dangerous substances and/or decontaminated on the place of origin or the place of collection in accordance with the applicable regulations and laws in order to prevent harmful impact on environment, collection, reuse, disposal and other related activities.

Construction waste polluted with dangerous substances includes in particular:

- 17 02 04- Glass, plastic and wood containing or contaminated with dangerous substances
- 17 03 01 – Bitumen mixtures containing coal tar
- 17 03 03 – Coal tar and tarred products
- 17 04 09 - Metal waste polluted/contaminated with dangerous substances
- 17 04 10 - Cables containing oil, (coal) tar and other dangerous substances
- 17 05 03 – Soil and stone containing dangerous substances
- 17 05 05 – Dredging spoil containing dangerous substances
- 17 05 07 – Gravel containing dangerous substances
- 17 08 01 – Plaster-based construction materials polluted/contaminated with dangerous substances
- 17 09 01 – Construction and demolition waste containing mercury
- 17 09 02 – Construction and demolition waste containing PCB
- 17 09 03- Other construction and demolition wastes (including mixed wastes) containing dangerous substances.

5.1 Asbestos as Construction Waste

Special attention should be paid to management of construction and demolition waste that could be polluted with asbestos (17 06). Products which may contain asbestos are:

- asbestos cement products;
  - pipes (plumbing, sewage, chimney)
  - water resistant plates
  - fire resistant plates
- asbestos mixed with resins, rubber, and plastic for different purposes,
- friction materials (coverings for breaks and clutches),
- paper and felt paper for thermal and hydro insulation,
- sealants and packaging materials,
- covers and curtains,
- fire and acid-resistant clothing fabric

Asbestos is found in two basic forms:

- free asbestos, which is not bound to any other substance,
- asbestos bound in asbestos cement products.

FBiH currently does not have legislation regulating the disposal of asbestos resulting from construction activities.

EU Member States have the obligation to ensure prevention of emission of asbestos to air and water, as well as crude asbestos waste at the pollution source. Air pollution limit values are defined. Liquid leaking from asbestos cement and paper and cardboard has to be recycled. If recycling of asbestos cement is not cost effective, asbestos content in waste must not exceed 30 g/ m^3.

Asbestos cement processed materials can be disposed only on inert waste landfills. Generally, re-processing of asbestos in recycled materials is prohibited in Europe (for example, Germany), because it cannot be further used as raw material or material.

Asbestos producers of processors must ensure all required measures to prevent pollution with asbestos fibres in accordance with special legislation and also users of products containing asbestos must ensure all required measures in accordance with special legislation to ensure that activities involving use of products containing asbestos do not cause environmental pollution with asbestos fibres and dust.

5.2 Classification of Construction Waste Based on Collection, Separation, Reuse, Recycling and Construction Waste Recycling

Construction waste can be divided in main groups immediately at the place of origin:

- **Homogenous construction wastes** whose reuse or recycling is simpler in technical and technological terms and recycled materials are technically applicable without any special limitations, classified as follows:

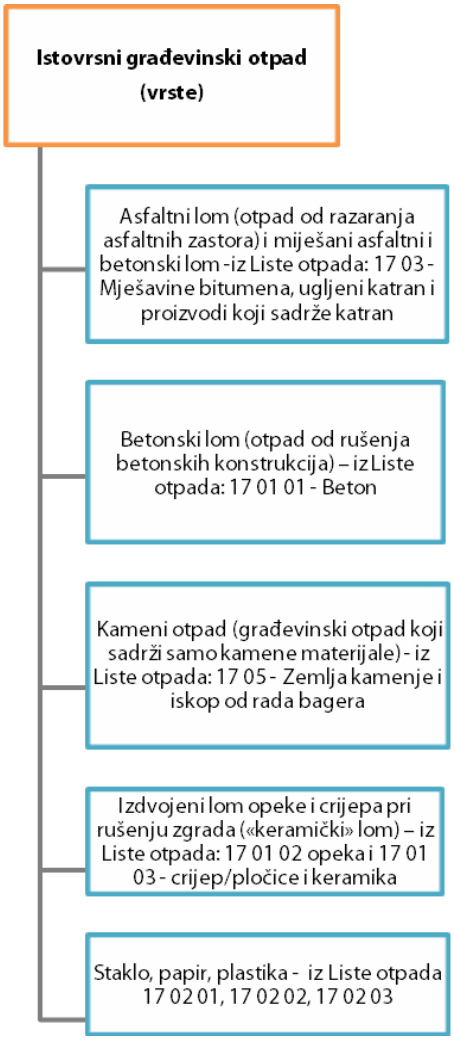

Figure 45: Homogenous construction waste classification

- **Mixed construction wastes** whose reuse or recycling is complex in technical and technological terms and recycled materials are technically applicable with pre-defined limitations, classified as follows:

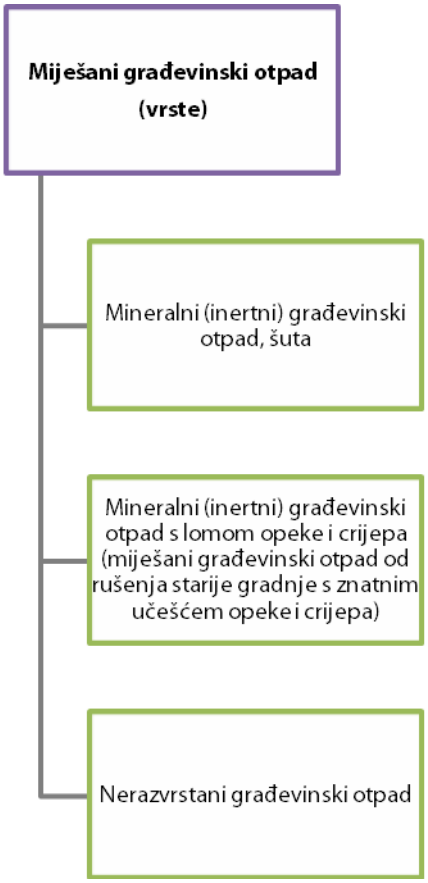

Figure 46: Mixed construction waste

- **Mineral (inert) construction waste**, rubble (mixed inert construction waste of mineral composition resulting from demolition of new structures without significant content of brick) – Waste List: 17 01 06* – Mixtures or separate fractions of concrete, bricks, tiles and ceramic containing dangerous substances, or 17 01 07 – Mixtures or separate fractions of concrete, bricks, tiles and ceramic other than those mentioned in 17 01 06
- **Mineral (inert) construction waste including brick and tile rubble** (mixed inert construction waste of mineral composition resulting from demolition of new structures with significant content of brick and tiles) – Waste List: 17 01 06* – Mixtures or separate fractions of concrete, bricks, tiles and ceramic containing dangerous substances, or 17 01 07 – Mixtures or separate fractions of concrete, bricks, tiles and ceramic other than those mentioned in 17 01 06 and 17 08 Plaster-based construction materials.
- **Unsorted construction waste** (mixed construction waste resulting from construction and demolition of different composition with possible partial presence of non-mineral components) –Waste List: 17 09 Other construction and demolition waste.

5.2.1 Measures for Homogenous and Mixed Construction Waste

Methods and procedures of disposal, reuse, and storage of these types of construction waste are regulated in special Construction Waste Management Plans issued by the Federation and the cantons. Construction waste may be disposed as follows:

Homogenous construction waste:

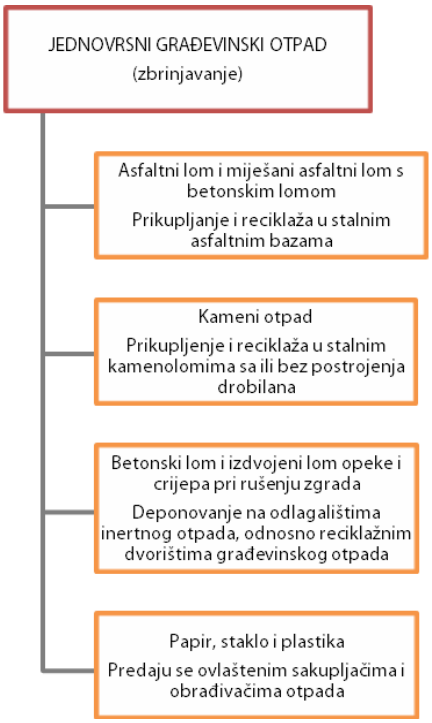

Figure 47: Homogenous construction waste disposal

Mixed construction waste:

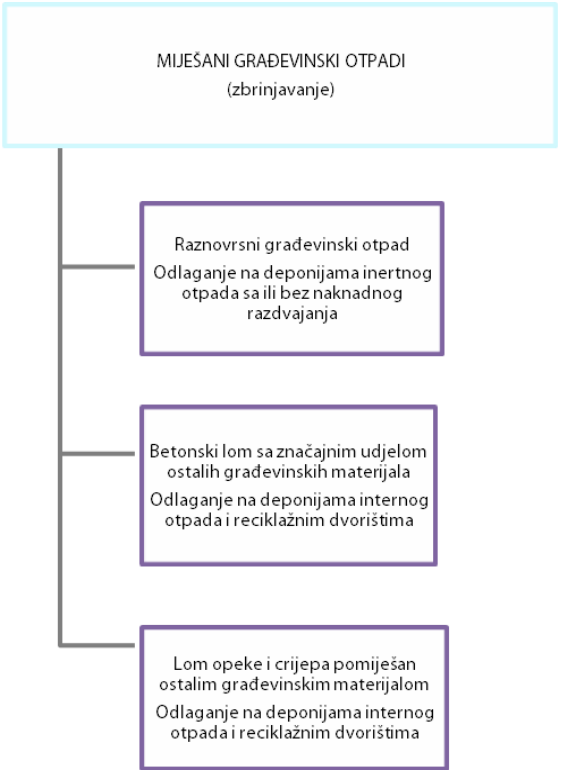

Figure 48: Mixed construction waste disposal

All types should be shipped to permanent construction waste landfills or recycling yards.

Construction waste management plan in the observed region should ensure conditions and location for construction of waste disposal sites in order to implement prescribed measures for construction waste management.

5.2.2 Measures for the Disposal of Packaging (Construction) Waste

In addition to sorting of construction waste, it is necessary to ensure adequate disposal of packaging waste resulting from construction materials.

Separation, collection, recycling, and reuse of packaging waste is performed through separate collection at the point of origin and after that packaging waste is treated in accordance with regulations related to this type of waste. Exceptionally, where such separation is environmentally and economically not feasible, this waste does not have to be separated and is collected in common containers to be separated in waste sorting plants.

Measures related to achievement of goals of recycling and reuse of construction material depend on basic types of materials which may be present in construction waste and on the possibility of their use. Basic types of materials that may be present in construction waste depending on construction works are

shown in the following table (Table 7). Also, Table 8 shows some of the options for reuse of construction material resulting from civil engineering after recycling.

Table 7: Types of materials which may be present in construction waste

Earthworks/ground excavation	Civil engineering	Mixed construction waste
Soil (peat) **Sand, gravel** **Clay, loam** **Stone**	Bitumen (asphalt) or cement bound material Sand, gravel, crushed stone	Wood Plastic Paper, cardboard Metal Cables Paint, varnish Rubble

Table 8: Options for reuse of construction waste

Type of material	Origin	Use
Mineral waste	Industrial engineering, building construction	Filling, construction of sport grounds – drainage
Recycled sand	Industrial engineering, building construction	Base for pipes for infrastructure (gas, water, etc.)
Asphalt rubble	Motorway engineering	Unbound surface courses, unbound base courses, bound surface courses, construction of agricultural roads, additional materials for asphalt production
Concrete rubble	Motorway engineering, bridge engineering, industrial engineering	Unbound surface courses, unbound base courses, bound surface courses, construction of agricultural roads, additional materials for concrete production, drainage layers
Mixed asphalt/concrete rubble	Motorway engineering, parking lots, bridge engineering	Unbound surface courses, unbound base courses, bound surface courses, construction of agricultural roads

After recycling, certain amount of "useless materials" (waste) remains that could be used for filling of the terrain that should be levelled or shaped, also for road base, especially for field roads and for construction of embankments for noise protection for some roads.

6 Measures to Prevent Waste, with Particular Focus on Hazardous Waste

In order to minimise waste resulting from the construction of the motorway, it is necessary to take measures to prevent construction waste. One of the objectives of waste management includes controlled disposal, prevention of irresponsible waste management, controlled procurement of agents and materials that become waste, awareness raising about waste handling and safe disposal, including required measures for protection of human health and environment.

The disposal of waste which will be generated in construction is going to be the responsibility of the Contractor, defined under the contract, and in tender documentation which will be prepared by the Investor (JPAC).

Waste from construction activities will be minimised by an appropriate project term of reference and adherence to proper waste management measures during motorway construction. All resources and consumables will be adequately protected, stored and maintained to minimise waste generation (e.g., use of part of construction waste as bulk material). According to the Preliminary Design (Bill of Quantities) the total quantity of excavated material to be recycled, that is, reused for embankment is approx. 4,5 million m^3.

The space where the unloading, disposal and warehousing of construction materials will be performed must be accessible in order to be able to work smoothly during the manipulation of construction materials.

In order to prevent the generation of waste during construction works it is necessary to:

- Mark the direction of movement with a sign and traffic signs,
- Use the following for transport of materials on the construction site: freight motor vehicles, loading and unloading machinery and handcarts.

Only functional vehicles whose shape corresponds to the type and weight of the material may be used for the transport of construction materials on the construction site. Before loading or unloading, the breaks must be put on and the sides of the box should be opened by two workers at the same time. If loading or unloading takes place along a platform or ramp, the vehicle must be placed next to the platform.

Internal transport by motor vehicles must be supervised. This is especially true of reversing vehicles. The internal transport of materials, prefabricated elements and heavy objects performed by the crane must be organised in such a way that:

- The load is transferred from the place of loading to the place of unloading as carefully as possible and that the load is never transferred above the workers. Attaching the load at the place of loading as well as its reception and removal at the place of unloading must be entrusted to persons who are familiar with the manner of proper operation, sources and protection measures in such operations (signalmen).

- Plant fibre ropes (hemp, manila, cotton) and synthetic fibre ropes can be used to tie and hang loads that do not have sharp edges.

- Each rope used for carrying, tying and hanging loads must be marked with the permissible load capacity. If the temperature is lower than - 10°C the permissible load is reduced by 50%.

Table 9 gives an overview of all waste streams with a description of waste management practices, which the Contractor is obliged to carry out during the construction and exploitation of the motorway, and a comparison with applicable regulations in FBiH.

The following chapter describes the management of waste that will be generated during the construction of the motorway

Table 9: Waste management at the location of the motorway and comparison with the applicable regulations in FBiH

No.	Emission	Description of waste stream management practices	Final disposal	Comparison with the applicable regulations in FBiH
1.	Construction waste (excavated materials that cannot be used in any other way, waste generated during construction and demolition of buildings - concrete, brick, tile, stone, etc.)	Develop a Detailed Construction Waste Management Plan Adherence to the prescribed measures listed by the Contractor in the detailed construction waste management plan Temporarily store separately at the location of works until the moment of final disposal Adequate transport (without raising dust during loading, transport and unloading) with the use of tarpaulin during transport to the nearest construction waste landfill Prevent uncontrolled disposal of construction waste on municipal solid waste landfills, etc. Educate and inform all participants in the construction waste management process, Ensure that maximum quantities of construction waste are recycled. Separate construction waste (especially	Contractor Final disposal of construction (non-hazardous) waste at the location of the newly designed landfill for construction waste Hazardous construction waste is transferred to the authorised company which is licensed to accept hazardous construction waste	In accordance with the *Law on Waste Management* (Official Gazette of FBiH, 33/03, 72/09 and 92/17) In accordance with the *Rulebook on Construction Waste* (Official Gazette of FBiH, 93/19)

		hazardous waste) from other types of waste Keep records of the types and quantities of transported construction waste with adequate transport documentation.		

7 Separation of Waste, with Particular Focus on Hazardous Waste

All different types of waste that will be generated at the location of the motorway must be collected separately and stored properly until the moment of taking over the waste by a legal entity authorised to manage certain types of waste.

Below are basic instructions for waste separation and temporary storage of waste, especially hazardous waste.

Waste material must be stored safely and securely in appropriate containers. Waste intended for delivery to different legal entities for waste management must be separated. Separately collected waste should not be mixed as such a procedure would interfere with or prevent recovery activities of most or all of the waste.

Waste that is collected according to the system of selective waste collection must be previously separated from the rest of the generated waste.

Waste that causes chemical reactions in contact with each other must be stored separately.

Waste transported to another authorised person, if necessary, requires packaging in a container or packaging previously agreed with the transporter, considering the type of vehicle and means of transport so that the waste material is safe and does not spill or scatter during transport.

Hazardous waste transported to another authorised person is packed in an adequately closed container that can withstand the load of daily use and moderate storage conditions, and which prevents the waste from coming into contact with the environment.

Packaging and labels used for waste collection must be made of material that is not reactive with hazardous waste. Warnings on mandatory selective waste disposal will be posted at selective waste collection sites.

If waste for which the content is unknown is stored, measures should be taken that include testing and analysis to determine the characteristics of the waste. Until the characteristics are determined, the waste is treated as hazardous waste and, in accordance with the Rulebook on categories of waste with lists, it has an asterisk (*).

Waste that is stored in closed containers or that cannot be visually identified should be marked with an inscription (label) of the contents.

The manner of separation, selection and final handover for disposal will be elaborated in detail for all organisational units through the procedures and instructions of the Investor. The stated procedures and instructions should be

adopted by the Investor within two years after obtaining the environmental permit.

The final disposal of certain types of waste needs to be resolved under contracts with companies authorised for this type of business.

Before transferring, transporting, recovering components or disposing of waste, it is necessary to ensure that the waste is stored and, if necessary, packed in the following way:

- waste must not be spilled or scattered as a result of inadequate treatment of waste or natural phenomena,
- liquid waste and leachate must not be discharged into drains, watercourses or surrounding land,
- waste must be insured against vandalism, theft, handling by unauthorised people and animals or any other type of trouble,
- waste must not leave negative consequences on the environment, nor must it be a cause of disturbance due to the development of unpleasant odours or disturbance of aesthetic characteristics and values of the landscape.

8 Waste Disposal

Waste must not be disposed, or knowingly be allowed to be disposed, on any location if there is no adequate permit for disposal.

Waste may be transferred to third parties, if that person is authorised to transport, store, restore or dispose of waste of the specified type or composition.

Transporter will take measures to ensure:

- That waste shipped in separate containers is not mixed,
- That labels remain readable until handover or shipment to the recipient of waste.

PCWMP includes measures related to reduction of allowed quantities of construction waste disposed within certain time periods.

In the course of the works on the construction of the motorway, it will be necessary to define locations for temporary and permanent construction waste landfills.

For the purpose of selection of locations of construction waste landfill, the following was taken into consideration:

- Distance from the source of potable water.
- No underground waters on the location to prevent contamination.
- Location should be of sufficient size to allow disposal of total estimated quantity of construction waste.
- Location must be accessible and located in the nearest possible vicinity of construction waste sources.
- Current condition of the location and its future purpose.
- Avoid establishment of landfills in the vicinity of settlements.

9 Other Measures for Construction Waste Management

In waste management activities, the Contractor, or the persons engaged in the maintenance of the motorway are obliged to implement other measures presented below.

9.1 Records of Waste

Hazardous and non-hazardous waste will be generated during the construction works of the motorway.

The waste recording system is explained below.

Records of (non-hazardous and hazardous) waste should contain the following information:

- record date,
- data on generated waste (type and quantity of waste, waste code),
- method of waste storage,
- the name of the authorised operator to whom the waste has been delivered,
- responsible person.

A record sheet should be prepared for each shipment of non-hazardous and hazardous waste. The record sheet is made in two copies, one of which is handed over to the authorised company to which the waste is handed over, and one is kept in own archive. Based on the stored documents, the quantity of delivered waste can be determined. Samples of record and transport sheets are given in Annex 1 and Annex 2 herein. As already mentioned, in accordance with the Regulation on selective collection, packaging and labelling of waste, it is mandatory to fill in the transport documentation for the transported waste.

Contract with the Contractor will define Contractor's obligation to keep these records on waste, to ensure disposal of all waste generated in the course of the construction, and to submit confirmation of final disposal of waste to the responsible person. These records will be submitted to the relevant authorities.

9.2 Person Responsible for Waste Management

Pursuant to Article 20 of the *Law on Waste Management*, the Investor (JPAC), will appoint on behalf of the Investor a person who will be responsible for waste management, updating and implementation of the Waste Management Plan. The responsible person will be appointed subsequently.

By the Contract (which will be the subject of the tender documentation), the Investor will oblige the Contractor to appoint a person responsible for waste management during the execution of works on the Konjic (Ovcari) - Prenj Tunnel-Mostar North subsection of the motorway.

This Construction Waste Management Plan has to be updated every five years or following a significant change of the motorway design (changes which might significantly influence type and quantities of generated waste).

10 References

Environmental impact assessment study for the Konjic (Ovcari) - Mostar North section, Zagrebinspekt "ZGI" d.o.o. Mostar, September 2016,

Waste management plan for the Konjic (Ovcari) - Mostar North section, Zagrebinspekt "ZGI" d.o.o. Mostar, September 2016,

Preliminary Design of the motorway on Corridor Vc; section: Konjic – Mostar North, Divel d.o.o. Sarajevo, 2016

Analysis of the Preliminary Design of the motorway on Corridor Vc; section: Konjic – Mostar North; Preliminary Design for Tunnel T3 (Prenj) – variant II, Divel d.o.o. Sarajevo, 2016

Design and technical documentation for the motorway on Corridor Vc; section: Konjic – Mostar North, Depositing at recommended sites, Zagrebinspekt "ZGI" d.o.o. Mostar, September 2016

Preliminary Design for the Konjic (Ovcari) - Prenj Tunnel section (2023), AiK Inzenjering d.o.o. Banovici

Preliminary Design for the Prenj Tunnel - Mostar North section (2023), IPSA Institut d.o.o. Sarajevo

Appendix A - Sample record sheet

WASTE RECORDING SHEET

Date	Waste code	Waste quantity	Type of disposal	Name of the authorised operator for transport and treatment of waste
Total:				
Notes:				

Date:

Responsible person:

Signature:

Appendix B - Sample transport sheet

Shipment documentation no:_____

Information about shipment

1. Waste specified below is removed from (name, address, municipality)

2.Waste is to be shipped to (address)

3. □ Individual shipment □Multiple shipment Please specify.....

4. Expected date/time of removal.....

5. Name ..... On behalf of (company).....

Signature.....

6. Telephone 7. Producer of waste (if different from the above)

Description of waste

1. Waste is..... 2.Classification.....

3. Physical form. □Liquid. □Powder. □Sludge. □Solid. □Mixed

4. Total quantity to be removed: Quantity..... (kg/m^3/ton) No. of units.....

5. Type, size and number of containers

6. Chemical/biological components determining hazardous properties.....

.....

Description Six-digit code Quantity No. of units

Transporter's confirmation

I hereby confirm that today I collected a shipment and that information under A1,A2 and B5 is accurate.

Name…… On behalf of company (name and address) ……

Signature…… Date……at…… hours.

Sender's confirmation

I hereby confirm that information under B and C is accurate, that the transporter is registered and familiar with relevant precautionary measures.

Name….. On behalf of company……

Signature…… Date……

Recipient's confirmation

1. I received waste ……at…….hours. 2.Vehicle registration plates No……

3. Received quantity: Quantity……..(kg/m^3/ton)No. of units:……

4. Method of waste treatment……

5. I hereby confirm that this company is licensed to receive and treat this waste based on waste management license

No…..

Name…… On behalf of company……

Signature…… Date……