# TUNELOGRADNJA U BOSNI I HERCEGOVINI
# KORIDOR Vc

## TUNNELING IN BOSNIA AND HERZEGOVINA
## CORRIDOR Vc

# TUNELOGRADNJA U BOSNI I HERCEGOVINI - KORIDOR Vc

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**UDRUŽENJE INŽENJERA GEOTEHNIČARA U BOSNI I HERCEGOVINI**
ASSOCIATION OF GEOTECHNICAL ENGINEERS IN BOSNIA AND HERZEGOVINA


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Sarajevo, mart 2023.
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# PREDGOVOR
# PREFACE

Emina HADŽALIĆ
Mehmed MESIHOVIĆ

Ideja za ovom publikacijom je nastala tokom organizacije stručnog skupa Tunelogradnja u Bosni i Hercegovini – Koridor Vc, održanog 14.03.2023. godine. Organizator skupa je bilo Udruženje inženjera geotehničara u BiH u saradnji s JP Autoceste FBiH d.o.o. Mostar.
Koridor Vc, ogranak panevropskog Koridora V, povezuje Budimpeštu sa jadranskom lukom Ploče preko Osijeka i Sarajeva, a njegova dužina kroz Bosnu i Hercegovinu iznosi oko 320 km. Izgradnja Koridora Vc jedan je od najznačajnijih i najvećih infrastrukturnih projekata u Bosni i Hercegovini. Zbog složene geološke građe i reljefa terena, na trasi Koridora Vc planirana je izgradnja 51 tunela ukupne dužine oko 60 km (120 km), što najbolje ukazuje na kompleksnost ovog projekta, kao i na važnost segmenta tunelogradnje.
Cilj ove publikacije je, na jednom mjestu, dati pregled najvažnijih podatka o svim tunelima na Koridoru Vc kroz Bosnu i Hercegovinu, u obimu u kojem je to moguće, obzirom da je značajan broj tunela još uvijek u fazi izgradnje, tenderisanja ili projektovanja. Od podataka kao karakteristične izdvojili smo metodu građenja, dužine tunelskih cijevi, maksimalnu visinu nadsloja, geološki opis i geomehaničku klasifikaciju, količine materijala za iskop i osiguranje tunela, sigurnosne karakteristike tunela (za tunele duže od 500 m), te podatke o ugovoru, projektu i učesnicima u procesu građenja.
Publikaciju planiramo iz godine u godinu unapređivati i dopunjavati s novim informacijama,

The idea behind this publication emerged during the organization of the Expert Talk on Tunneling in Bosnia and Herzegovina – Corridor Vc, held on March 14, 2023. The organizer of the event was the Association of Geotechnical Engineers in B&H in cooperation with PC Motorways of FB&H Ltd. Mostar.
Corridor Vc, a branch of the Pan-European Corridor V, connects Budapest with the Port of Ploče via Osijek and Sarajevo, and its length through Bosnia and Herzegovina is about 320 km. The Corridor Vc is one of the most significant and largest infrastructure projects in Bosnia and Herzegovina. Due to the complex geological structure and terrain relief, the construction of 51 tunnels with a total length of about 60 km (120 km) is planned on the route of Corridor Vc, which best indicates the complexity of this project, as well as the importance of the tunnel construction segment.
This publication aims to provide an overview of the most important data on all tunnels on Corridor Vc through Bosnia and Herzegovina, to the extent that this is possible, given that a significant number of tunnels are still in the construction, tendering, or design phase. From the characteristic data, we singled out the construction method, the length of the tunnel tubes, the maximum overburden, the geological description and geomechanical classification, the material quantities for tunnel excavation and support, the tunnel safety features (for tunnels longer than 500 m), and

kako bi, po završetku izgradnje Koridora Vc kroz Bosnu i Hercegovinu, ostala baza podataka o tunelima koja će služiti kako investitoru u upravljanju tunelima, tako i budućim inženjerima i istraživačima u stručnom i naučnom radu.

Koristimo ovu priliku da istaknemo doprinos svih kolega koji svojim znanjem, iskustvom, svakodnevnim radom, trudom i zalaganjem uspješno privode kraju izgradnju jednog po jednog tunela. Također, želimo da se zahvalimo svim kolegama koji su nam nesebično pomogli u prikupljanju podataka i firmama: JP Autoceste FBiH d.o.o. Mostar, Arkus d.o.o. Sarajevo, Univerzitet u Sarajevu – Građevinski fakultet, PPG d.o.o. Sarajevo, Euro-Asfalt d.o.o. Sarajevo, JP Ceste FBiH d.o.o. Sarajevo, JP Autoputevi RS d.o.o. Banja Luka, Winner Project d.o.o. Sarajevo, Divel d.o.o. Sarajevo, Design & QC d.o.o. Sarajevo, Ipsa Institut d.o.o. Sarajevo, Trasa d.o.o. Sarajevo, Geokonzalting d.o.o. Sarajevo, Tracest d.o.o. Sarajevo i AIK-Inženjering d.o.o. Banovići. Zbog velike količine podataka koje je bilo potrebno prikupiti za sve tunele u kratkom vremenskom periodu, moguće su nenamjerne greške, koje ćemo u budućim izdanjima ispraviti.

the data on the contract, the project and the participants in the construction process.

We plan to improve the publication year after year and supplement it with new information so that, after the completion of the Corridor Vc through Bosnia and Herzegovina, there will be a database on tunnels that will serve both the investor in tunnel management, as well as future engineers and researchers in professional and scientific work.

We take this opportunity to highlight the contribution of all colleagues who, with their knowledge, experience, daily work, effort, and dedication, successfully bring the construction of one tunnel after another to an end. Also, we would like to thank all colleagues who selflessly helped us in obtaining data, and the companies: PC Motorways of FB&H Ltd. Mostar, Arkus Ltd. Sarajevo, University of Sarajevo – Faculty of Civil Engineering, PPG Ltd. Sarajevo, Euro-Asfalt Ltd. Sarajevo, PC Roads of FB&H Ltd. Sarajevo, PC RS Motorways Ltd. Banja Luka, Winner Project Ltd. Sarajevo, Divel Ltd. Sarajevo, Design & QC Ltd. Sarajevo, Ipsa Institute Ltd. Sarajevo, Trasa Ltd. Sarajevo, Gekonzalting Ltd. Sarajevo, Tracest Ltd. Sarajevo and AIK-Inženjering Ltd. Banovići. Due to the large amount of data that had to be obtained for all tunnels in a short period, unintentional errors are possible, which we will correct in future editions.

# TUNELOGRADNJA U EUROPI
## TUNNELING IN EUROPE

Davorin KOLIĆ

Izgradnja tunela u Europi je intenzivna aktivnost potaknuta stalnim razvojem transporta roba i ljudi kako u gradovima tako i kao metoda povezivanja urbanih sredina. Prometna povezanost članica Europske Unije kao i veze sa susjednim državama određene su međunarodnom mrežom prometnih koridora. Time se i projekti na izgradnji takve prometne mreže protežu kroz niz godina i njihovo financiranje uz pomoć EU je prethodno osigurano i ostvarivo.

U cestovnoj tunelogradnji najveći dio aktivnosti odnosi se na izgradnju tunela u zemljama gdje mreža autoputeva nije izgrađena, pa je tako najveći broj cestovnih tunela u gradnji u istočnoj i jugoistočnoj Europi, posebice i najviše na autoputevima u Turskoj, s preko 210 km tunela u gradnji. Također, zemlje sjevera Europe kao Norveška, Danska i Finska, kao i Švicarska ulažu nadalje u razvoj cestovne mreže s puno tunelskih sekcija u gradovima. Kao rezultat reakcije na požare u tunelima Mont Blanc, Francuska i Tauern, Austrija iz 1999 godine s brojnim žrtvama, hitno su postroženi propisi o sigurnosti u tunelima kao i donesena direktiva u 2004. godini na razini EU o unapređenju sigurnosnih mjera i puteva za evakuaciju. Prema direktivi su sve članice EU bile obavezne na svojim autocestama dograditi evakuacijske puteve i poprečne tunele između cijevi, te značajno unaprijediti sigurnosne uvjete vožnje što je izazvalo velike radove na postojećim tunelima koji traju i

The construction of tunnels in Europe is an intensive activity driven by the constant development of the transport of goods and people both in cities and as a method of connecting urban environments. The transport connectivity of the members of the European Union as well as the connections with neighboring countries, are determined by the international network of transport corridors. As a result, projects on the construction of such a transport network extend over several years, and their financing with the help of the EU is previously secured and achievable.

In road tunnel construction, most of the activities relate to the construction of tunnels in countries where the highway network has not been built, so the largest number of road tunnels under construction is in Eastern and South-eastern Europe, especially on highways in Turkey, with over 210 km of tunnels under construction. Also, northern European countries such as Norway, Denmark and Finland, as well as Switzerland, continue to invest in the development of a road network with many tunnel sections in cities. As a result of the reaction to the fires in the tunnels of Mont Blanc, France and Tauern, Austria, in 1999 with numerous victims, safety regulations in tunnels were urgently tightened, as well as a directive passed in 2004 at the EU level on the improvement of safety measures and evacuation routes. According to the directive, all EU member states were obliged to build

danas. U tome smislu je i većina radova na tunelima po EU uz dodatno velike planove sanacije prometne infrastrukture u posebno zapadnoj Njemačkoj s budžetom od oko 280 milijardi eura.

Jedna posebnost trenutno u EU je potopljeni tunel Fehmarnbelt duljine 18 km koji se gradi između Danske i Njemačke i koji je za miješani promet s 2 cijevi s po 2 cestovne trake i 2 cijevi za jednokolosiječni željeznički promet, te 1 sigurnosnim tunelom i trebao bi biti gotov do 2029. Većina ostalih tunela u gradnji u Europi je za željeznički promet i prednjače radovi na 65 km dugom tunelu Brenner Basis u duljini od 65 km na transverzali sjever-jug koji prolazi kroz Njemačku, Austriju i Italiju. U Austriji su pri završetku i kapitalni tuneli Koralm 32 km i Semmering 26 km na pravcu Beč-Graz-Vencija. Ogroman zahvat je i projekt "Grand Paris" koji uključuje širenje 5 metro linija na obodu i kroz centar Pariza, te dodatno i produženje brze gradske željeznice RER "E" linije, a sve kako bi bile završene do početka olimpijade 2024. godine uz rad 24 TBM strojeva. Ukupna državna investicija je oko 34 milijarde eura na oko 200 km novih linija metroa i s 72 nove stanice, dok će s privatnim investitorima biti uloženo i do 80 milijardi eura. Na početku radova su i tuneli na spoju Euralpin Lyon-Turin u sklopu projekta TELT s tunelskim cijevima po 55 km, koji će se bušiti TBM strojevima. Drugi dio tunela kroz Italiju je u pripremnim radovima, a od ostalih projekata u Italiji također, su znatniji radovi na željezničkim tunelima linija Napulj-Bari, Brescia-Verona, Messina-Palermo, te metro sustavima gradova Napulja, Rima i Milana. U Njemačkoj se nakon završetka radova na brzoj pruzi Stuttgart-München i projekta Stuttgart21 više aktivnosti događa na razvoju metro sustava i gradske željeznice u Münchenu, Hamburgu, Karlsruheu i Düsseldorfu. Značajniji radovi na tunelima su i u Poljskoj i to većim dijelom na cestovnim pravcima na autocestama i oko gradova Warszawe i Lodza, ali polako raste i broj tunela na željezničkim linijama i pravcima kao Podleze-Piekielko ili u gradu Lodzu. Najveći broj željezničkih tunela u gradnji i pripremi je u ovoj dekadi svakako u Turskoj gdje je ukupna duljina tunela na

evacuation routes and cross tunnels between tubes on their highways and significantly improve driving safety conditions, which caused major works on the existing tunnels that continue today. In this sense, is most of the work on tunnels in the EU, in addition to large plans for the rehabilitation of the transport infrastructure, especially in western Germany, with a budget of around 280 billion EUR.

One feature currently in the EU is the Fehmarnbelt submerged tunnel of 18 km length, which is being built between Denmark and Germany and which is for mixed traffic with 2 tubes, each with 2 road lanes, and 2 tubes for single track rail traffic, and 1 safety tunnel, which should be finished until 2029. Most of the other tunnels under construction in Europe are for rail traffic, and the work on the 65 km long Brenner Basis tunnel in the length of 65 km on the north-south transversal that passes through Germany, Austria and Italy is at the forefront. In Austria, the capital tunnels Koralm 32 km and Semmering 26 km on the route Vienna-Graz-Venice are nearing completion. The "Grand Paris" project is also a huge undertaking, which includes the expansion of 5 metro lines on the periphery and through the center of Paris, and additionally the extension of the high-speed city railway RER "E" line, all to be completed by the start of the Olympics in 2024 with work 24 TBM machines. The total state investment is about 34 billion EUR on about 200 km of new metro lines and 72 new stations, while up to 80 billion EUR will be invested with private investors. The tunnels at the junction Euralpin Lyon-Turin as part of the TELT project with tunnel tubes of 55 km each, which will be drilled with TBM machines, are also at the beginning of the works. The second part of the tunnel through Italy is in preparatory work, and of the other projects in Italy, there are more significant works on the railway tunnels of the Naples-Bari, Brescia-Verona, Messina-Palermo lines, and the metro systems of the cities of Naples, Rome and Milan. In Germany, after the completion of the Stuttgart-Munich high-speed railway and the Stuttgart21 project, more activity is taking place on the development of the metro system

brzim prugama preko 1500 km, a na metro linijima preko 100 km, no pitanje je kada će za sva gradilišta biti osigurana sredstva za financiranje.

and urban rail in Munich, Hamburg, Karlsruhe and Düsseldorf. Significant works on tunnels are also in Poland, mostly on road routes on highways and around the cities of Warsaw and Lodz, but the number of tunnels on railway lines and routes such as Podleze-Piekielko or in the city of Lodz is slowly growing. The largest number of railway tunnels under construction and preparation in this decade is certainly in Turkey, where the total length of tunnels on high-speed lines is over 1500 km, and on metro lines over 100 km, but the question is when funding will be provided for all construction sites.

# TUNELOGRADNJA U BOSNI I HERCEGOVINI
## TUNNELING IN BOSNIA AND HERZEGOVINA

Mehmed MESIHOVIĆ

Bosna i Hercegovina ima dugu tradiciju u tunelogradnji s tunelima i podzemnim objektima koji datiraju još iz srednjeg vijeka. Dolaskom Austrougarske u Bosnu i Hercegovinu započinje intenzivna izgradnja putne i željezničke infrastrukture. Izgradnjom željeznica nametnula se potreba za izgradnjom velikog broja tunela. Samo na 161,5 km dugoj "Istočnoj pruzi" Sarajevo – Vardište bilo je izgrađeno 99 tunela. Pruga više nije u upotrebi, ali neki tuneli su rekonstruisani u cestovne tunele. U istom periodu započinje i izgradnja trenutno najdužeg jednokolosječnog željezničkog tunela Križevići (4 912 m) na pruzi Tuzla – Višegrad. Izgradnja je krenula pred I svjetski rat, nastavila se u periodu između I i II svjetskog rata i konačno je završen 1991. godine.

Na željeznicama u Bosni i Hercegovini trenutno je u upotrebi 177 tunela, dok se trenutno projektuje 30 novih tunela ukupne dužine preko 40 km. Na pruzi Sarajevo – Ploče nalazi se 106 tunela ukupne dužina 36,6 km. Za veliki broj ovih tunela potrebno je izvršiti sanaciju, a za neke tunele poželjna je i rekonstrukcija. Tokom remonta pruge Sarajevo – Bradina izvršena je djelomična rekonstrukcija tunela Ivan.

Sredinom prošlog vijeka u Bosni i Hercegovini se radi na planiranju i početku izgradnje velikih hidroenergetskih projekata, čija je realizacija još uvijek u toku. Radi se o projektu Gornji horizonti koji, pored izgradnje hidroelektrana, brana i akumulacijskih bazena, uključuju i izgradnju hidrotehničkih tunela. Neki od značajnih tunela na ovom projektu su: dovodni

Bosnia and Herzegovina has a long tradition of tunneling, with tunnels and underground facilities dating back to the Middle Ages. With the arrival of Austria-Hungary in Bosnia and Herzegovina, the intensive construction of road and railway infrastructure began. With the construction of railways, emerged the need to build a large number of tunnels. Only on the 161,5 km long "Eastern Railway" Sarajevo – Vardište 99 tunnels were built. The railway is no longer in use, but some tunnels have been reconstructed into road tunnels. In the same period, the construction of the currently longest single-track railway tunnel Križevići (4 912 m) on the Tuzla - Višegrad line also began. Construction started before World War I, continued in the period between World War I and II, and was finally completed in 1991. Currently, 177 tunnels are in use on the railways in Bosnia and Herzegovina, while 30 new tunnels with a total length of over 40 km are currently being designed. On the Sarajevo-Ploče railway, there are 106 tunnels with a total length of 36,6 km. Many of these tunnels need to be rehabilitated, and some require reconstruction. During the overhaul of the Sarajevo – Bradina railway tracks, a partial reconstruction of the tunnel Ivan was carried out.

In the middle of the last century in Bosnia and Herzegovina, work was being done on the planning and beginning of the construction of large hydropower projects, the implementation of which is still ongoing.

tunel Fatničko polje – akumulacija Bileća (15 650 m) i dovodni tunel HE Dabar (11 085 m) prečnika 4,6 m.

Na cestama u Bosni i Hercegovini trenutno je u upotrebi preko 80 tunela. To su većinom jednocijevni tuneli, s tim što se posljednih godina uz tunele koji su duži od 500 m izvodi i servisna cijev, kao što su tuneli Karaula (902 m) na dionici Olovo – Kladanj i tunel Žaba (975 m) na dionici Neum – Stolac. U toku je izgradnja tunela Novi (899 m) na južnoj zaobilaznici Mostara. Pored izgrađenih tunela, u fazi izrada projektne dokumentacije su tunel Brdo Talaluša (600 m) i tunel na obilaznici Kiseljaka (600 m). Uporedo sa izgradnjom novih tunela vrši se i sanacija postojećih cestovnih tunela: Crnaja, Jasen, Vranduk II, Ormanica, Barevo III, Ivan, Karaula, Užljebić, itd. Pored ovih tunela, pri rekonstrukciji cesta u narednom periodu, izvodit će se i novi tuneli: Vlasinje, Dubrave, Bogatići, Cvitkovac, Vrbas i Torlakovac. U sklopu Prve transverzale u Sarajevu započeta je izgradnja dvocijevnog tunela Kobilja Glava (680 m). Izgradnjom ovog tunela očekuje se smanjenje gužvi na sjevernom ulazu u Sarajevo.

U posljednjih 20 godina, tuneli se grade prema smjernicama koje se temelje na austrijskim smjernicama za projektovanje i građenje tunela. Svi novi tuneli su projektovani poštujući najviše standarde za sigurnost i u skladu sa Direktivom 2004/54/EZ Evropskog parlamenta i Vijeća od 29. aprila 2004. godine o minimalnim sigurnosnim zahtjevima za tunele u transevropskoj cestovnoj mreži.

Prvi tuneli na autocestama u Bosni i Hercegovini izgrađeni i pušteni u promet su tuneli Klašnice (477 m) i Laktaši (391 m) na dionici autoceste Banja Luka – Gradiška. Na Koridoru Vc kroz Bosnu i Hercegovinu izgradnja tunela je započela 2008. godine i to na Sarajevskoj obilaznici izgradnjom tunela Oštrik i Vukov Gaj (prethodno Ožega). Nedugo zatim, započinju radovi na izgradnji tunela 1. mart (prethodno Vijenac), koji je probijen 2013. godine. Tunel 1. mart je pušten u promet 2014. godine i trenutno je najduži tunel u upotrebi na autocestama u Bosni i Hercegovini (2 949 m). Iste godine završava se izgradnja i puštanje u promet tunela na dionici Vlakovo – Tarčin: Gaj, Igman, Vis, 25. Novembar i Grab. Pored

Namely, the Gornji Horizonti project, which, in addition to the construction of hydroelectric power plants, dams, and reservoirs, also includes the construction of hydrotechnical tunnels. Some of the significant tunnels on this project are: the supply tunnel Fatničko polje – reservoir Bileća (15 650 m) and the supply tunnel HP Dabar (11 085 m) with a diameter of 4,6 m.

Over 80 tunnels are currently in use on the roads in Bosnia and Herzegovina. These are mostly single-tube tunnels, however, in recent years, for tunnels that are longer than 500 m, a service tube has also been built, such as the tunnel Karaula (902 m) on the section Olovo – Kladanj and the tunnel Žaba (975 m) on the section Neum – Stolac. The construction of the tunnel Novi (899 m) on the southern bypass of Mostar is underway. In addition to the built tunnels, the tunnel Brdo Talaluša (600 m) and the tunnel on the Kiseljak bypass (600 m) are in the design stage. Along with the construction of new tunnels, the rehabilitation of the existing road tunnels is being carried out: Crnaja, Jasen, Vranduk II, Ormanica, Barevo III, Ivan, Karaula, Užljebić, etc. In addition to these tunnels, during the reconstruction of roads in the coming period, new tunnels will also be built: Vlasinje, Dubrave, Bogatići, Cvitkovac, Vrbas, and Torlakovac. As part of the First Transversal in Sarajevo, the construction of the double-tube tunnel Kobilja Glava (680 m) began. The construction of this tunnel is expected to reduce congestion at the northern entrance to Sarajevo.

In the last 20 years, tunnels have been built according to guidelines based on the Austrian guidelines for the design and construction of tunnels. All new tunnels are designed respecting the highest safety standards and in accordance with Directive 2004/54/EC of the European Parliament and the Council of April 29, 2004, on minimum safety requirements for tunnels in the trans-European road network.

The first tunnels on highways in Bosnia and Herzegovina built and opened for traffic are the tunnels Klašnice (477 m) and Laktaši (391 m) on the section Banja Luka - Gradiška. On Corridor Vc through Bosnia and Herzegovina, tunnel construction began in 2008, namely on the Sarajevo bypass with the construction of

ovih tunela, izgrađeni su i u upotrebi i tuneli na Zeničkoj zaobilaznici: Hum, Pečuj, Ričice i Klopče, tunel Ivan na dionici Tarčin – Konjic i tunel Bijela Vlaka na dionici Počitelj – Bijača. Trenutno se izvode radovi na izgradnji tunela Golubinja, Vranduk, Zenica i Počitelj, a ubrzo se očekuje i početak intenzivnijih radova na izgradnji tunela Putnikovo Brdo 1, Putnikovo Brdo 2 i Hrastik. Generacijski projekat izgradnje tunela na Koridoru Vc predstavlja izgradnja tunela Prenj dužine veće od 10 km, koji će, kada bude izgrađen, biti deseti najduži cestovni tunel u Evropi. Trenutno se nalazi u fazi tenderisanje, a izgradnju finansiraju EBRD, EIB i EU-WBIF.

Prije nekih 15 godina, na Koridoru Vc kroz Bosnu i Hercegovinu, planirana je izgradnja 57 tunela. Izmjenama trase, broj tunela je smanjen na trenutnih 51. Dužina izgrađenih tunelskih cijevi iznosi oko 26,5 km, trenutno je u izgradnji oko 22 km tunelskih cijevi, a ukupna dužina tunelskih cijevi planirana za izgradnju iznosi oko 120 km, što projekat izgradnje Koridora Vc u Bosni i Hercegovini sasvim sigurno čini jednim od najvećih infrastrukturnih projekata na ovim prostorima. Pored tunela na Koridoru Vc, planirana je izgradnja preko 100 km tunela na cestama, autocestama i željeznici.

the tunnels Oštrik and Vukov Gaj (previously Ožega). Not long after, work began on the construction of tunnel 1. mart (previously Vijenac), with a tunnel breakthrough in 2013. Tunnel 1. mart was opened for traffic in 2014 and is currently the longest tunnel in use on the highways in Bosnia and Herzegovina (2 949 m). In the same year, the tunnels on the section Vlakovo - Tarčin: Gaj, Igman, Vis, 25 Novembar, and Grab, were built and opened for traffic. In addition to these tunnels, tunnels on the Zenica bypass: Hum, Pečuj, Ričice, and Klopče, the Ivan tunnel on the section Tarčin - Konjic, and the tunnel Bijela Vlaka on the section Počitelj - Bijača, are also built and in use. At the moment, the works are being carried out on the construction of the tunnels Golubinja, Vranduk, Zenica, and Počitelj, and more intensive works on the construction of the tunnels Putnikovo Brdo 1, Putnikovo Brdo 2, and Hrastik are expected to begin soon. The generational tunnel construction project on Corridor Vc represents the construction of the tunnel Prenj, with a length of more than 10 km, which, when built, will be the tenth longest road tunnel in Europe. It is currently in the tendering phase, and the construction is financed by the EBRD, the EIB, and the EU-WBIF.

Some 15 years ago, the construction of 57 tunnels was planned on Corridor Vc through Bosnia and Herzegovina. Due to route changes, the number of tunnels has been reduced to the current 51. The length of built tunnel tubes is about 26,5 km, currently, about 22 km of tunnel tubes are under construction, and the total length of tunnel tubes planned to be built is about 120 km, which the project Corridor Vc in Bosnia and Herzegovina certainly makes one of the biggest infrastructure projects in this region. In addition to the tunnels on Corridor Vc, the construction of over 100 km of tunnels on roads, highways, and railways is planned.

# **PANEVROPSKI KORIDORI**
## PAN-EUROPEAN CORRIDORS

# KORIDOR Vc KROZ BOSNU I HERCEGOVINU
## CORRIDOR Vc THROUGH BOSNIA AND HERZEGOVINA


IZGRAĐENO/BUILT

U IZGRADNJI/UNDER CONSTRUCTION

TENDER U TOKU/TENDER IN PROGRESS

PROJEKTOVANJE U TOKU/DESIGN IN PROGRESS

# DIONICE I PODDIONICE NA KORIDORU Vc
## SECTIONS AND SUBSECTIONS ON CORRIDOR Vc

**Svilaj – Odžak/ Vukosavlje**
**Odžak/ Vukosavlje – Johovac**
**Johovac – Rudanka**
**Rudanka – Putnikovo Brdo**
**Medakovo – Ozimica (Žepče sjever)**
**Ozimica (Žepče sjever) – Poprikuše (Žepče jug)**
**Poprikuše – Zenica sjever (Donja Gračanica)**
- Poprikuše – Nemila
- Nemila – Vranduk
- Vranduk – Ponirak
- Ponirak – Vraca (tunel Zenica)
- Vraca (tunel Zenica) – Zenica sjever (Donja Gračanica)*

**Zenica sjever (Donja Gračanica) – Zenica jug (Drivuša)**
- Zenica sjever (Donja Gračanica) – Klopče
- Klopče – Zenica jug (Drivuša)

**Zenica jug (Drivuša) – Sarajevo sjever (Jošanica)**
- Zenica jug (Drivuša) – Kakanj
  - Zenica jug (Drivuša) – Gorica
  - Gorica – Lašva
  - Lašva – Kakanj
- Kakanj – Visoko
  - Kakanj – Dobrinje
  - Dobrinje – Visoko
- Visoko – Sarajevo sjever (Jošanica)
  - Visoko – Podlugovi
  - Podlugovi – Sarajevo sjever (Jošanica)

**Sarajevo sjever (Jošanica) – Sarajevo zapad (Vlakovo)**
- Sarajevo sjever (Jošanica) – Butila (Lot 1)
- Butila – Sarajevo zapad (Vlakovo) (Lot 3a)

**Sarajevo zapad (Vlakovo) – Tarčin**
- Sarajevo zapad (Vlakovo) – Lepenica
- Lepenica – Suhodol
- Suhodol – Tarčin

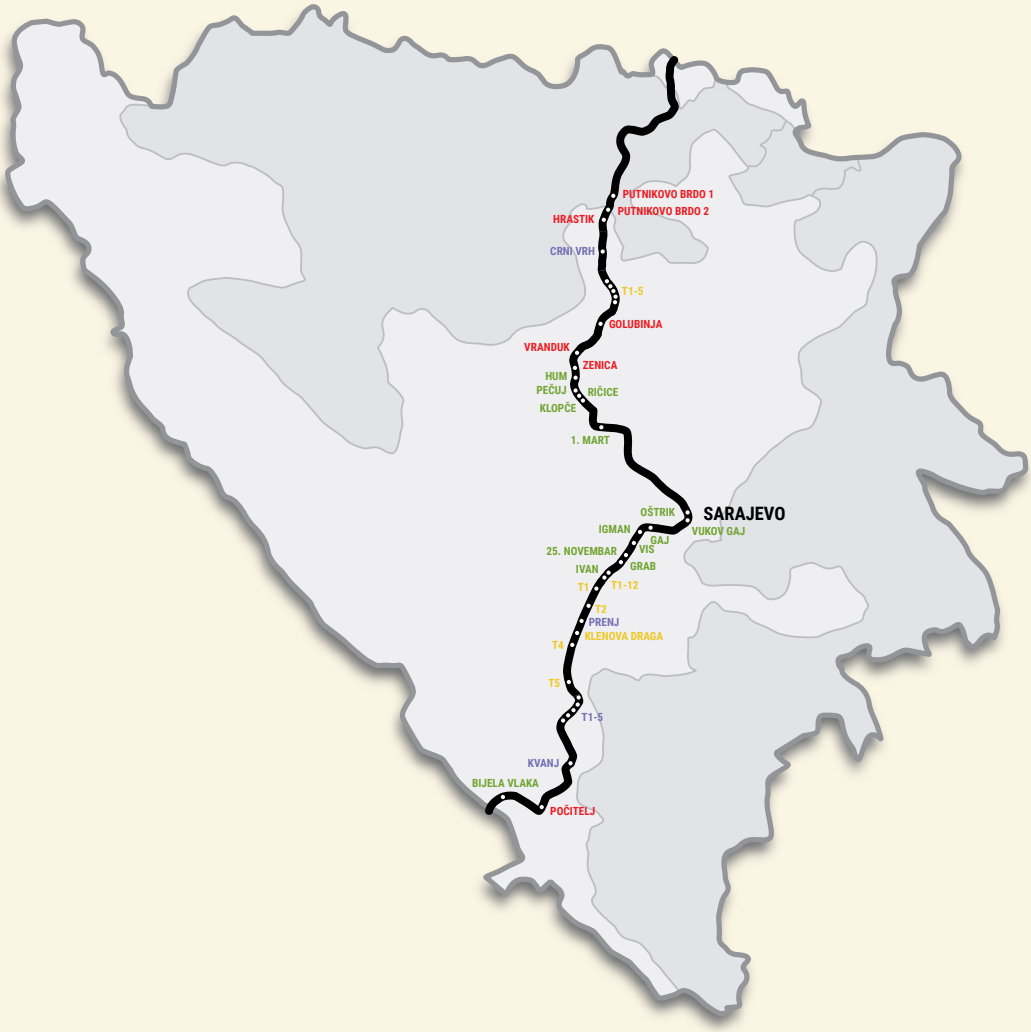
**Tarčin – Konjic**
- Tarčin – Ivan
- Ivan – Ovčari

**Ovčari – Mostar sjever**
- Ovčari – Tunel Prenj (ulaz)
- Tunel Prenj
- Tunel Prenj (izlaz) – Mostar sjever

**Mostar sjever – Mostar jug**
**Mostar jug – Počitelj**
- Mostar jug – Tunel Kvanj
- Tunel Kvanj – Buna
- Buna – Počitelj*

**Počitelj – Bijača**
- Počitelj – Zvirovići
- Zvirovići – Bijača

* izgrađeno, nije u prometu
built, not open for traffic




IZGRAĐENO/BUILT

U IZGRADNJI/UNDER CONSTRUCTION

TENDER U TOKU/TENDER IN PROGRESS

PROJEKTOVANJE U TOKU/DESIGN IN PROGRESS

# TUNELI NA KORIDORU Vc
## TUNNELS ON CORRIDOR Vc

**IZGRAĐENO**
BUILT

**UKUPNO**
TOTAL 14

HUM, PEČUJ, RIČICE, KLOPČE , 1. MART (VIJENAC), OŠTRIK, VUKOV GAJ (OŽEGA), GAJ, IGMAN (TULICA), VIS (GRABOSJEČ), 25. NOVEMBAR (SUHODOL), GRAB (TARČIN), IVAN, BIJELA VLAKA

**U IZGRADNJI**
UNDER CONSTRUCTION

**UKUPNO**
TOTAL 7

PUTNIKOVO BRDO 1, PUTNIKOVO BRDO 2, HRASTIK, GOLUBINJA, VRANDUK, ZENICA, POČITELJ

**TENDER U TOKU**
TENDER IN PROGRESS

**UKUPNO**
TOTAL 8

CRNI VRH, PRENJ*, T1-5*, KVANJ**

**PROJEKTOVANJE U TOKU**
DESIGN IN PROGRESS

**UKUPNO**
TOTAL 22

T1-5, T1-12, T1, T2 , KLENOVA DRAGA, T4, T5

* tender za izgradnju u toku, projektovanje u toku
tender for construction works in progress, design in progress

** tender za izgradnju i tender za izradu projekta u toku
tender for construction works and tender for preparation of design in progress

nazivi tunela u zagradi odnose se na prethodne nazive
names in parentheses refer to previous names

# TUNELI U BROJKAMA
# TUNNELS IN NUMBERS

## UKUPAN BROJ TUNELA/TOTAL NUMBER OF TUNNELS

PLANIRANO/PLANNED: 51
IZGRAĐENO/BUILT: 14
U IZGRADNJI/UNDER CONSTRUCTION: 7

## UKUPNA DUŽINA TUNELSKIH CIJEVI/TOTAL LENGTH OF TUNNEL TUBES

PLANIRANO/PLANNED:
Lijeva/Left: 60 027 m
Desna/Right: 60 061 m
Ukupno/Total: 120 088 m

IZGRAĐENO/BUILT:
Lijeva/Left: 13 325 m
Desna/Right: 13 155 m
Ukupno/Total: 26 480 m
Troškovi izgradnje/Construction costs: preko/over 330 mil. EUR

U IZGRADNJI/UNDER CONSTRUCTION:
Lijeva/Left: 10 905 m
Desna/Right: 10 854 m
Ukupno/Total: 21 759 m

## NAJDUŽI TUNEL/LONGEST TUNNEL

PLANIRANO/PLANNED: Prenj (10 902 m)
IZGRAĐENO/BUILT: 1. Mart (2 949 m)
U IZGRADNJI/UNDER CONSTRUCTION: Golubinja (3 617 m)

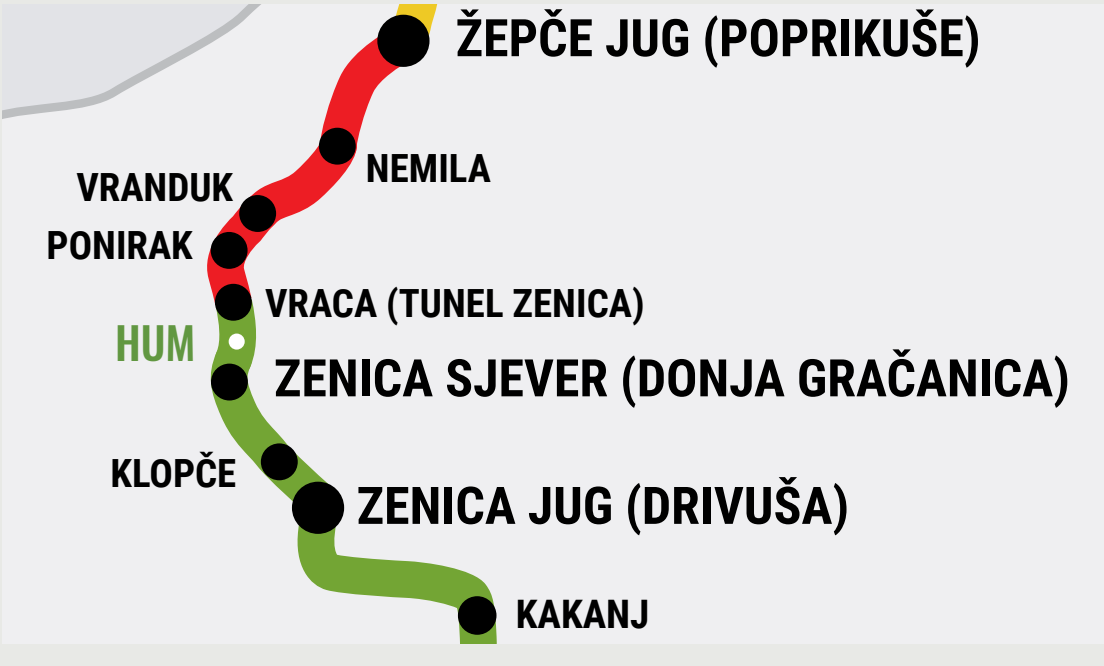
**KADA BUDE IZGRAĐEN, TUNEL PRENJ ĆE BITI DESETI NAJDUŽI CESTOVNI TUNEL U EVROPI**
**WHEN BUILT, TUNNEL PRENJ WILL BE THE TENTH LONGEST ROAD TUNNEL IN EUROPE**

## NAJDUBLJI TUNEL/DEEPEST TUNNEL

PLANIRANO/PLANNED: Prenj (1 175 m)
IZGRAĐENO/BUILT: 1. Mart (325 m)
U IZGRADNJI/UNDER CONSTRUCTION: Zenica (550 m)

# IZGRAĐENO
BUILT

**DIONICA/SECTION:** Poprikuše – Zenica sjever (Donja Gračanica)
**PODDIONICA/SUBSECTION:** Vraca (tunel Zenica) – Zenica sjever (Donja Gračanica)



# TUNEL / TUNNEL: **HUM**

**PROBIJEN/BREAKTHROUGH:** 2020.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2021.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 429 m
Desna/Right: 426 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 80 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** konglomerati, lapor/congolomerates, marl
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 90% | 10% |

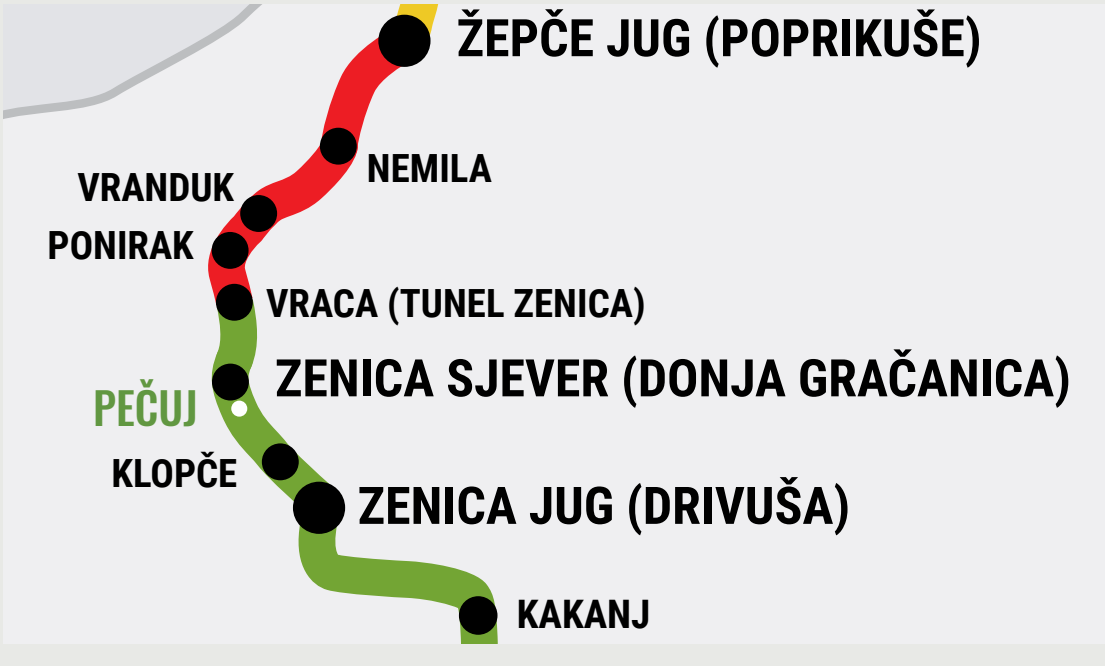
## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 72 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 19 000 $m^2$
**SIDRA/ANCHORS:** 12 3000 kom/pcs
**KOPLJA/FOREPOLING:** 9 500 kom/pcs
**REMENATE/LATTICE GIRDERS:** 275 t
**BETON/CONCRETE:** 12 700 $m^3$
**ARMATURA/REINFORCEMENT:** 310 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Žuta knjiga/FIDIC Yellow Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Yüksel Proje Uluslararasi A.Ş.
**IZVOĐAČ/CONTRACTOR:** Cengiz İnşaat Sanayi ve Ticaret A.Ş.
**NADZOR/SUPERVISION:** Technital S.p.A. & TZI-Inženjering d.o.o. Sarajevo
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 9,6 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD & EU-WBIF

**DIONICA/SECTION:** Zenica sjever (Donja Gračanica) – Zenica jug (Drivuša)
**PODDIONICA/SUBSECTION:** Zenica sjever (Donja Gračanica) – Klopče



# TUNEL / TUNNEL: **PEČUJ**

**PROBIJEN/BREAKTHROUGH:** 2018.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2021.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 1 000 m
Desna/Right: 1 022 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 65 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** gline, fliš/clays, flysch
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 49% | 51% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 185 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 22 200 $m^3$
**SIDRA/ANCHORS:** 30 200 kom/pcs
**REMENATE/LATTICE GIRDERS:** 600 t
**BETON/CONCRETE:** 35 000 $m^3$
**ARMATURA/REINFORCEMENT:** 810 t

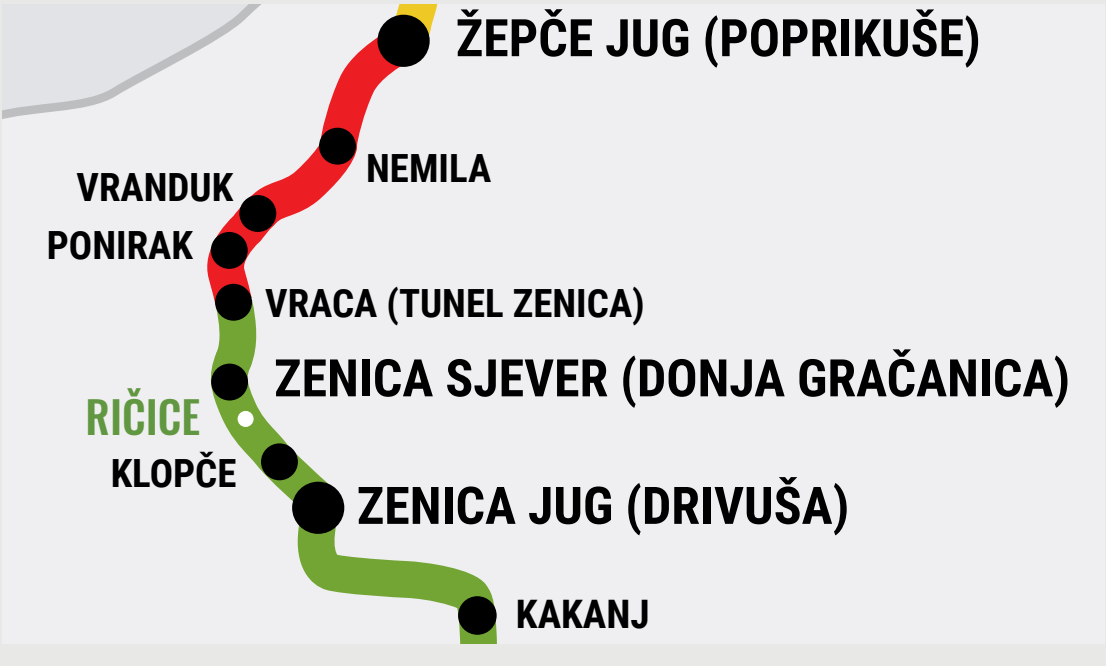
## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 1
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 14
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 14

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** TZI-Inženjering d.o.o. Sarajevo, Electra d.o.o. Sarajevo & Saraj Inženjering d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Euro-Asfalt d.o.o. Sarajevo & Strabag AG
**NADZOR/SUPERVISION:** EGIS International & IPSA Institut d.o.o. Sarajevo
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 26,2 mil. EUR
**FINANSIRANJE/FUNDING:** OFID & EBRD


**DIONICA/SECTION:** Zenica sjever (Donja Gračanica) – Zenica jug (Drivuša)
**PODDIONICA/SUBSECTION:** Zenica sjever (Donja Gračanica) – Klopče



# TUNEL / TUNNEL: **RIČICE**

**PROBIJEN/BREAKTHROUGH:** 2017.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2021.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 614 m
Desna/Right: 628 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 65 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** gline, fliš/clays, flysch
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 38% | 62% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 110 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 13 500 $m^3$
**SIDRA/ANCHORS:** 15 300 kom/pcs
**REMENATE/LATTICE GIRDERS:** 325 t
**BETON/CONCRETE:** 20 000 $m^3$
**ARMATURA/REINFORCEMENT:** 735 t

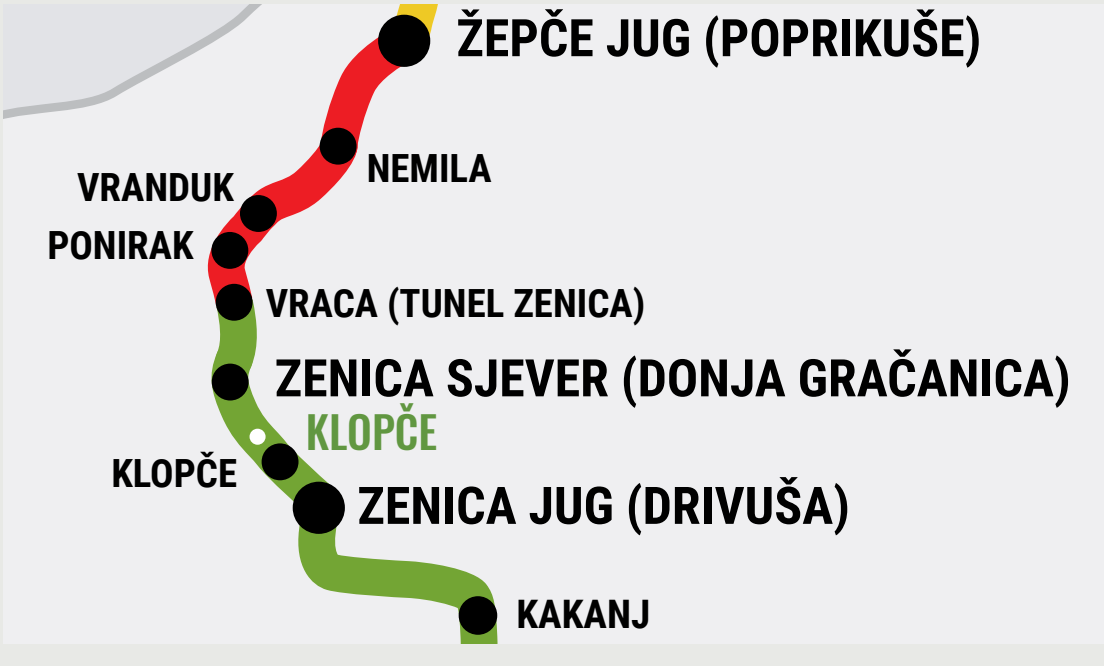
## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 1
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** TZI-Inženjering d.o.o. Sarajevo, Electra d.o.o. Sarajevo & Saraj Inženjering d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Euro-Asfalt d.o.o. Sarajevo & Strabag AG
**NADZOR/SUPERVISION:** EGIS International & IPSA Institut d.o.o. Sarajevo
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 18,4 mil. EUR
**FINANSIRANJE/FUNDING:** OFID & EBRD

**DIONICA/SECTION:** Zenica sjever (Donja Gračanica) – Zenica jug (Drivuša)
**PODDIONICA/SUBSECTION:** Zenica sjever (Donja Gračanica) – Klopče



# UMJETNI TUNEL / CUT & COVER TUNNEL: **KLOPČE**

**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2021.
**METODA IZVOĐENJA/EXCAVATION METHOD:** Cut&Cover
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 182,5 m
Desna/Right: 182,5 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** gline, drobina, krečnjak/clays, debris, limestone
**MAKSIMALNA VISINA NASIPA/MAXIMUM FILL HEIGHT:** 9 m

## KONSTRUKCIJA TUNELA/TUNNEL STRUCTURE:

zasvedena konstrukcija na šipovima/arch shaped structure on piles
prečnik šipova/piles diameter: 150 cm
bočni šipovi/side piles:
- dužina/length: 13 m
- osovinski razmak/center distance: 2 m
- ukupno šipova/total piles: 190 kom/pcs

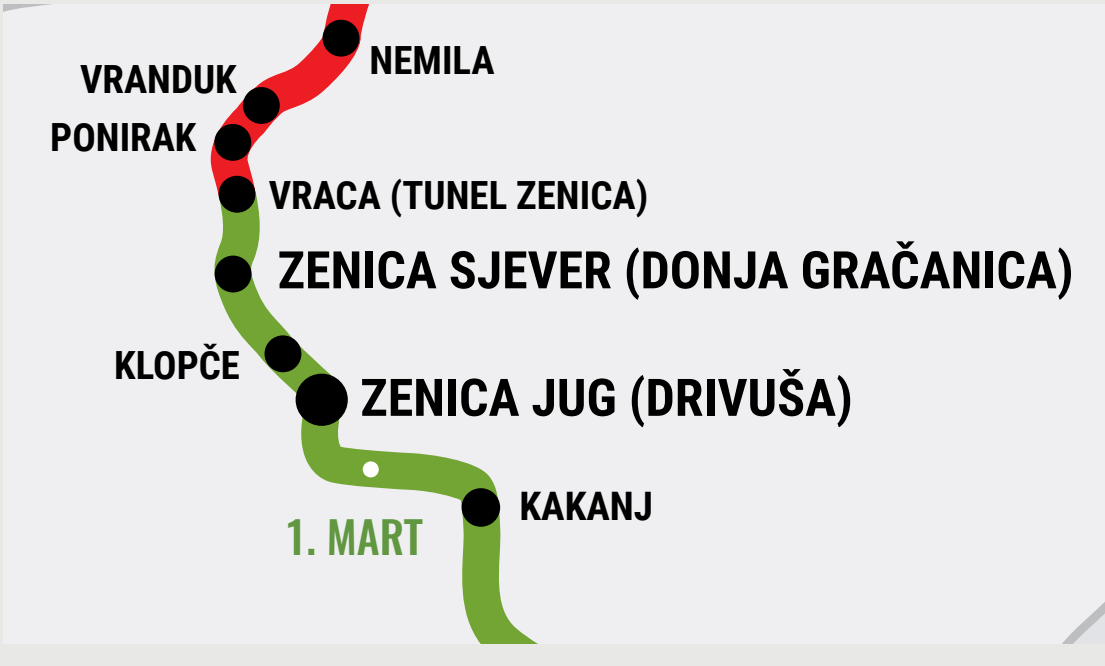
srednji šipovi/middle piles:
- dužina/length: 22 m
- osovinski razmak/center distance: 2,7 m
- ukupno šipova/total piles: 68 kom/pcs

ukupna dužina šipova/total length of piles: 3 966 m'

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** TZI-Inženjering d.o.o. Sarajevo, Electra d.o.o. Sarajevo & Saraj Inženjering d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Euro-Asfalt d.o.o. Sarajevo & Strabag AG
**NADZOR/SUPERVISION:** EGIS International & IPSA Institut d.o.o. Sarajevo
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 7,7 mil. EUR
**FINANSIRANJE/FUNDING:** OFID & EBRD

**DIONICA/SECTION:** Zenica jug (Drivuša) – Sarajevo sjever (Jošanica)
**PODDIONICA/SUBSECTION:** Zenica jug (Drivuša) – Kakanj: Gorica - Lašva



# TUNEL / TUNNEL: **1. MART**

**PROBIJEN/BREAKTHROUGH:** 2013.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 2 949 m
Desna/Right: 2 914 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 325 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** lapor, pješčari, konglomerati/marl, sandstones, conglomerates
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 92% | 4% | 4% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 575 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 135 000 $m^2$
**SIDRA/ANCHORS:** 22 000 kom/pcs
**REMENATE/LATTICE GIRDERS:** 570 t
**BETON/CONCRETE:** 131 000 $m^3$
**ARMATURA/REINFORCEMENT:** 2 650 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 9
Vozila/Vehicles: 2
**PARKIRNE NIŠE/LAY-BYS:** 4
**SOS NIŠE/EMERGENCY CALL NICHES:** 40
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 44

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** IPSA Institut d.o.o. Sarajevo & Divel d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** SCT d.d. Ljubljana / Primorje d.d. Ajdovščina / Euro-Asfalt d.o.o. Sarajevo, Hidrogradnja d.d. Sarajevo, ŽGP d.d. Sarajevo, Entea d.o.o. Sarajevo & Butmir d.o.o. Sarajevo / Euro-Asfalt d.o.o. Sarajevo & ŽGP d.d. Sarajevo
**NADZOR/SUPERVISION:** Institut IGH d.d. Zagreb
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 65,8 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD

**DIONICA/SECTION:** Sarajevo sjever (Jošanica) – Sarajevo zapad (Vlakovo)
**PODDIONICA/SUBSECTION:** Sarajevo sjever (Jošanica) – Butila

# TUNEL / TUNNEL: **OŠTRIK**

**PROBIJEN/BREAKTHROUGH:** 2008.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 273 m
Desna/Right: 303 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 54 m

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION*:** 20 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 1 850 $m^3$
**ČELIČNI LUKOVI/STEEL RIBS:** 145 t
**BETON/CONCRETE:** 8 800 $m^3$
**ARMATURA/REINFORCEMENT:** 335 t

* Iskop lijeve tunelske cijevi i dokopovanje na mjestima u postojećoj desnoj tunelskoj cijevi kako bi se postigla projektovana širina profila/Excavation of the left tunnel tube and excavation in places in the existing right tunnel tube to achieve the designed profile width.

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Incosa Ingeniería & TZI-Inženjering d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** SCT d.d. Ljubljana / Strabag AG & HP Investing d.o.o. Mostar
**NADZOR/SUPERVISION:** DDC svetovanje inženiring d.o.o. Ljubljana, Divel d.o.o Sarajevo & Zavod za saobraćaj Sarajevo
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 5,4 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD, EIB & OFID

**DIONICA/SECTION:** Sarajevo sjever (Jošanica) – Sarajevo zapad (Vlakovo)
**PODDIONICA/SUBSECTION:** Sarajevo sjever (Jošanica) – Butila

# TUNEL / TUNNEL: **VUKOV GAJ**

**PROBIJEN/BREAKTHROUGH:** 2009.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 393 m
Desna/Right: 382 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 48 m

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 53 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 3 200 $m^3$
**ČELIČNI LUKOVI/STEEL RIBS:** 230 t
**BETON/CONCRETE:** 14 000 $m^3$
**ARMATURA/REINFORCEMENT:** 255 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Incosa Ingeniería & TZI-Inženjering d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** SCT d.d. Ljubljana / Strabag AG & HP Investing d.o.o Mostar
**NADZOR/SUPERVISION:** DDC svetovanje inženiring d.o.o. Ljubljana, Divel d.o.o Sarajevo & Zavod za saobraćaj Sarajevo
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 9 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD, EIB & OFID

**DIONICA/SECTION:** Sarajevo zapad (Vlakovo) – Tarčin
**PODDIONICA/SUBSECTION:** Sarajevo zapad (Vlakovo) – Lepenica

# TUNEL / TUNNEL: **GAJ**

**PROBIJEN/BREAKTHROUGH:** 2014.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 850 m
Desna/Right: 865 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 54 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** glinci, lapor, krečnjak, dolomitni grus/claystones, marl, limestone, dolomite gruss
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 10% | 60% | 30% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 150 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 47 500 $m^2$
**SIDRA/ANCHORS:** 26 900 kom/pcs
**KOPLJA/FOREPOLING:** 12 800 kom/pcs
**REMENATE/LATTICE GIRDERS:** 515 t
**BETON/CONCRETE:** 28 100 $m^3$
**ARMATURA/REINFORCEMENT:** 860 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 10
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 10

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** TZI-Inženjering d.o.o. Sarajevo & IPSA Institut d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Cengiz İnşaat Sanayi ve Ticaret A.Ş.
**NADZOR/SUPERVISION:** EGIS International
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 19,3 mil. EUR
**FINANSIRANJE/FUNDING:** EIB

**DIONICA/SECTION:** Sarajevo zapad (Vlakovo) – Tarčin
**PODDIONICA/SUBSECTION:** Sarajevo zapad (Vlakovo) – Lepenica

# TUNEL / TUNNEL: **IGMAN**

**PROBIJEN/BREAKTHROUGH:** 2014.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 333 m
Desna/Right: 343 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 38 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** pješčari, glinci, lapor, škriljci/ sandstones, claystones, marl, shales
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 30% | 70% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 60 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 23 000 $m^2$
**SIDRA/ANCHORS:** 11 500 kom/pcs
**KOPLJA/FOREPOLING:** 3 000 kom/pcs
**REMENATE/LATTICE GIRDERS:** 240 t
**BETON/CONCRETE:** 11 000 $m^3$
**ARMATURA/REINFORCEMENT:** 605 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** TZI-Inženjering d.o.o. Sarajevo & IPSA Institut d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Cengiz İnşaat Sanayi ve Ticaret A.Ş.
**NADZOR/SUPERVISION:** EGIS International
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 9,6 mil. EUR
**FINANSIRANJE/FUNDING:** EIB

**DIONICA/SECTION:** Sarajevo zapad (Vlakovo) – Tarčin
**PODDIONICA/SUBSECTION:** Lepenica – Suhodol

# TUNEL / TUNNEL: **VIS**

**PROBIJEN/BREAKTHROUGH:** 2013.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 888 m
Desna/Right: 833 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 118 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjački dolomiti/limestone dolomites
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 30% | 50% | 10% | 10% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 140 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 41 300 $m^2$
**SIDRA/ANCHORS:** 5 800 kom/pcs
**KOPLJA/FOREPOLING:** 420 kom/pcs
**REMENATE/LATTICE GIRDERS:** 51 t
**BETON/CONCRETE:** 21 200 $m^3$
**ARMATURA/REINFORCEMENT:** 305 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 3
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 12
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 12

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Divel d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Cengiz İnşaat Sanayi ve Ticaret A.Ş.
**NADZOR/SUPERVISION:** EGIS International & IPSA Institut d.o.o. Sarajevo
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 15,1 mil. EUR
**FINANSIRANJE/FUNDING:** EIB

**DIONICA/SECTION:** Sarajevo zapad (Vlakovo) – Tarčin
**PODDIONICA/SUBSECTION:** Suhodol – Tarčin

# TUNEL / TUNNEL: **25. NOVEMBAR**

**PROBIJEN/BREAKTHROUGH:** 2014.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 2 802 m
Desna/Right: 2 743 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 200 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjački dolomiti, škriljci/limestone dolomites, shales
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 85% | 10% | 5% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 450 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 128 500 $m^2$
**SIDRA/ANCHORS:** 29 100 kom/pcs
**KOPLJA/FOREPOLING:** 15 300 kom/pcs
**BETON/CONCRETE:** 72 000 $m^3$
**ARMATURA/REINFORCEMENT:** 1 070 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 9
Vozila/Vehicles: 2
**PARKIRNE NIŠE/LAY-BYS:** 5
**SOS NIŠE/EMERGENCY CALL NICHES:** 47
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 47

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Divel d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Cengiz İnşaat Sanayi ve Ticaret A.Ş.
**NADZOR/SUPERVISION:** EGIS International
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 55,9 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD

**DIONICA/SECTION:** Sarajevo zapad (Vlakovo) – Tarčin
**PODDIONICA/SUBSECTION:** Suhodol – Tarčin

# TUNEL / TUNNEL: **GRAB**

**PROBIJEN/BREAKTHROUGH:** 2014.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 437 m
Desna/Right: 381 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 95 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** škriljci, filiti/shales, phyllites
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 20% | 20% | 60% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 74 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 19 800 $m^2$
**SIDRA/ANCHORS:** 11 200 kom/pcs
**KOPLJA/FOREPOLING:** 12 700 kom/pcs
**REMENATE/LATTICE GIRDERS:** 290 t
**BETON/CONCRETE:** 14 400 $m^3$
**ARMATURA/REINFORCEMENT:** 420 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Divel d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Cengiz İnşaat Sanayi ve Ticaret A.Ş.
**NADZOR/SUPERVISION:** EGIS International
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 14,4 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD

**DIONICA/SECTION:** Tarčin – Konjic
**PODDIONICA/SUBSECTION:** Tarčin - Ivan (LOT 2 - tunel/tunnel Ivan)

# TUNEL / TUNNEL: **IVAN**

**PROBIJEN/BREAKTHROUGH:** 2021.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2022.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 1 761,5 m
Desna/Right: 1 721,5 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 205 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** pješčari, krečnjak, glinci, laporovite gline, lapor/sandstones, limestone, claystones, marly clays, marl
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 13% | 62% | 25% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 330 000 $m^3$
**MLAZNI BETON/SHOTCRETE:** 115 000 $m^2$
**SIDRA/ANCHORS:** 57 500 kom/pcs
**KOPLJA/FOREPOLING:** 4 850 kom/pcs
**REMENATE/LATTICE GIRDERS:** 1 360 t
**BETON/CONCRETE:** 71 500 $m^3$
**ARMATURA/REINFORCEMENT:** 2 770 t

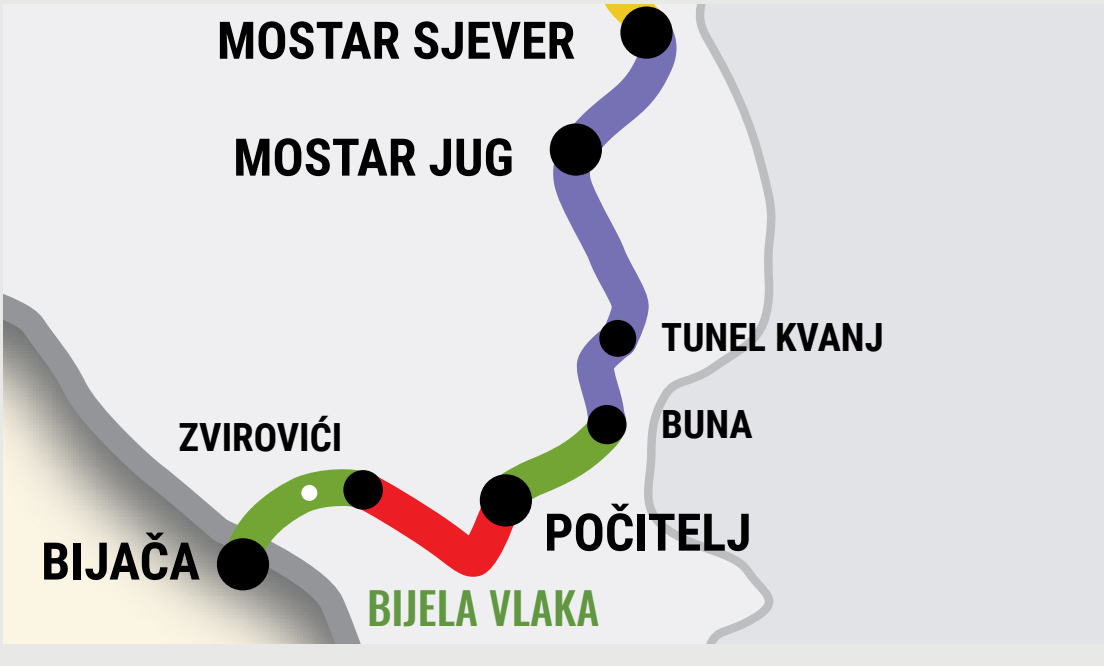
## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 5
Vozila/Vehicles: 1
**PARKIRNE NIŠE/LAY-BYS:** 2
**SOS NIŠE/EMERGENCY CALL NICHES:** 22
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 25

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Divel d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Euro-Asfalt d.o.o. Sarajevo
**NADZOR/SUPERVISION:** IRD Engineering S.r.l.
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 68,8 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD & EU-WBIF

**DIONICA/SECTION:** Počitelj – Bijača
**PODDIONICA/SUBSECTION:** Zvirovići – Bijača



# TUNEL / TUNNEL: **BIJELA VLAKA**

**PROBIJEN/BREAKTHROUGH:** 2013.
**PUŠTEN U PROMET/OPEN FOR TRAFFIC:** 2014.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 413 m
Desna/Right: 411 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 27 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** rudistni krečnjak/rudist limestone
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 47% | 53% | - |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 68 000 m³
**MLAZNI BETON/SHOTCRETE:** 21 300 m²
**SIDRA/ANCHORS:** 4 200 kom/pcs
**KOPLJA/FOREPOLING:** 2 000 kom/pcs
**REMENATE/LATTICE GIRDERS:** 85 t
**BETON/CONCRETE:** 8 300 m³
**ARMATURA/REINFORCEMENT:** 165 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** IGH d.o.o. Mostar
**IZVOĐAČ/CONTRACTOR:** OHL ŽS a.s. Brno & Niskogradnja d.o.o. Laktaši
**NADZOR/SUPERVISION:** TZI-Inženjering d.o.o. Sarajevo & Roughton International Ltd.
**TROŠKOVI IZGRADNJE/CONSTRUCTION COSTS:** 5,7 mil. EUR
**FINANSIRANJE/FUNDING:** EBRD

# U IZGRADNJI
# UNDER CONSTRUCTION


JOHOVAC
PUTNIKOVO BRDO 1
RUDANKA
PUTNIKOVO BRDO
MEDAKOVO
ŽEPČE SJEVER (OZIMICA)
ŽEPČE JUG (POPRIKUŠE)
NEMILA
VRANDUK
PONIRAK
VRACA (TUNEL ZENICA)
ZENICA SJEVER (DONJA GRAČANICA)
KLOPČE
ZENICA JUG (DRIVUŠA)
KAKANJ

# TUNEL / TUNNEL: **PUTNIKOVO BRDO 1**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**

Lijeva/Left: 1 592 m

Desna/Right: 1 603 m

**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 100 m

**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** glinci, pješčari, alevroliti, lapor/ claystones, sandstones, siltstones, marl

**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | - | 100% |

Svi podaci prema Glavnom projektu iz 2010. godine/All data according to the Main design from 2010.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 320 000 m³
**MLAZNI BETON/SHOTCRETE:** 115 000 m²
**SIDRA/ANCHORS:** 29 000 kom/pcs
**REMENATE/LATTICE GIRDERS:** 925 t
**BETON/CONCRETE:** 60 000 m³
**ARMATURA/REINFORCEMENT:** 2 300 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Interventna vozila/Emergency vehicles: 2
Vozila/Vehicles: 1
**PARKIRNE NIŠE/LAY-BYS:** 2
**SOS NIŠE/EMERGENCY CALL NICHES:** 22
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 24

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Žuta knjiga/FIDIC Yellow Book
**GLAVNI PROJEKAT/MAIN DESIGN:** IPSA Institut d.o.o. Sarajevo, IGH d.d. Zagreb & Dalekovod d.d. Zagreb
**IZVOĐAČ/CONTRACTOR:** Integral inženjering a.d. Laktaši
**NADZOR/SUPERVISION:** IRD Engineering S.r.l.
**FINANSIRANJE/FUNDING:** EBRD


JOHOVAC
PUTNIKOVO BRDO 2
RUDANKA
PUTNIKOVO BRDO
MEDAKOVO
ŽEPČE SJEVER (OZIMICA)
ŽEPČE JUG (POPRIKUŠE)
NEMILA
VRANDUK
PONIRAK
VRACA (TUNEL ZENICA)
ZENICA SJEVER (DONJA GRAČANICA)
KLOPČE
ZENICA JUG (DRIVUŠA)
KAKANJ

# TUNEL / TUNNEL: **PUTNIKOVO BRDO 2**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
**Lijeva/Left:** 680 m
**Desna/Right:** 694 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 55 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** pjeskovite gline, degradirani lapor, lapor/sandy clays, degraded marl, marl

Svi podaci prema Glavnom projektu iz 2015. godine/All data according to the Main design from 2015.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 230 000 m³
**MLAZNI BETON/SHOTCRETE:** 10 400 m²
**SIDRA/ANCHORS:** 16 000 kom/pcs
**KOPLJA/FOREPOLING:** 9 300 kom/pcs
**REMENATE/LATTICE GIRDERS**: 335 t
**BETON/CONCRETE:** 28 000 m³
**ARMATURA/REINFORCEMENT:** 1 230 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 1
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 10
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 10

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Žuta knjiga/FIDIC Yellow Book
**GLAVNI PROJEKAT/MAIN DESIGN:** TZI-Inženjering d.o.o. Sarajevo & Institut za građevinarstvo "IG" d.o.o. Banja Luka
**IZVOĐAČ/CONTRACTOR:** Integral inženjering a.d. Laktaši
**NADZOR/SUPERVISION:** IRD Engineering S.r.l.
**FINANSIRANJE/FUNDING:** EBRD


JOHOVAC
RUDANKA
PUTNIKOVO BRDO
HRASTIK
MEDAKOVO
ŽEPČE SJEVER (OZIMICA)
ŽEPČE JUG (POPRIKUŠE)
NEMILA
VRANDUK
PONIRAK
VRACA (TUNEL ZENICA)
ZENICA SJEVER (DONJA GRAČANICA)
KLOPČE
ZENICA JUG (DRIVUŠA)
KAKANJ

# UMJETNI TUNEL / CUT&COVER TUNNEL: **HRASTIK**

**METODA IZVOĐENJA/EXCAVATION METHOD:** Cut&Cover
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 162 m
Desna/Right: 162 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 65 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** gline, krečnjak, lapor/clays, limestone, marl
**MAKSIMALNA VISINA NASIPA/MAXIMUM FILL HEIGHT:** 10 m

## KONSTRUKCIJA TUNELA/TUNNEL STRUCTURE:

zasvedena konstrukcija na šipovima/arch shaped structure on piles
prečnik šipova/piles diameter: 150 cm
bočni šipovi/side piles:
dužina/length: 14 m
osovinski razmak/center distance: 2 m
ukupno šipova/total piles: 166 kom/pcs
srednji šipovi/middle piles:
dužina/length: 18 m
osovinski razmak/center distance: 2 m
ukupno šipova/total piles: 81 kom/pcs
ukupna dužina šipova/total length of piles: 3 782 m'

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** IPSA Institut d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** Euro-Asfalt d.o.o. Sarajevo
**NADZOR/SUPERVISION:** IRD Engineering S.r.l.
**FINANSIRANJE/FUNDING:** EBRD & EU-WBIF

**DIONICA/SECTION:** Poprikuše – Zenica sjever (Donja Gračanica)
**PODDDIONICA/SUBSECTION:** Poprikuše – Nemila

# TUNEL / TUNNEL: **GOLUBINJA**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**

Lijeva/Left: 3 617 m

Desna/Right: 3 590 m

**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 480 m

**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** dijabaz, grauvake, glinci, škriljevac, rožnaci/diabase, greywacke, claystones, shale, hornblende

**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 5% | 80% | 15% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 640 000 m³
**MLAZNI BETON/SHOTCRETE:** 175 000 m²
**SIDRA/ANCHORS:** 74 200 kom/pcs
**REMENATE/LATTICE GIRDERS:** 1 000 t
**BETON/CONCRETE:** 120 500 m³
**ARMATURA/REINFORCEMENT:** 7 700 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 11
Vozila/Vehicles: 3
**PARKIRNE NIŠE/LAY-BYS:** 6
**SOS NIŠE/EMERGENCY CALL NICHES:** 50
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 58

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Žuta knjiga/FIDIC Yellow Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Yüksel Proje Uluslararasi A.Ş.
**IZVOĐAČ/CONTRACTOR:** Cengiz İnşaat Sanayi ve Ticaret A.Ş.
**NADZOR/SUPERVISION:** IRD Engineering S.r.l.
**FINANSIRANJE/FUNDING:** EIB, EBRD & EU-WBIF

**DIONICA/SECTION:** Poprikuše – Zenica sjever (Donja Gračanica)
**PODDDIONICA/SUBSECTION:** Vranduk – Ponirak

# TUNEL / TUNNEL: **VRANDUK**

**PROBIJEN/BREAKTHROUGH:** 2021.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 380 m
Desna/Right: 312 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 59 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** pjeskoviti i silificirani glinci, krečnjak/ sandy and silicified claystones, limestone
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 62% | 24% | 14% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 53 000 m³
**MLAZNI BETON/SHOTCRETE:** 15 300 m²
**SIDRA/ANCHORS:** 3 900 kom/pcs
**REMENATE/LATTICE GIRDERS:** 80 t
**BETON/CONCRETE:** 13 700 m³
**ARMATURA/REINFORCEMENT:** 355 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Integra d.o.o. Mostar
**IZVOĐAČ/CONTRACTOR:** AzVirt LLC & Hering d.d. Široki Brijeg
**NADZOR/SUPERVISION:** DRI upravljanje investicij d.o.o. & Divel d.o.o. Sarajevo
**FINANSIRANJE/FUNDING:** OFID

**DIONICA/SECTION:** Poprikuše – Zenica sjever (Donja Gračanica)
**PODDDIONICA/SUBSECTION:** Ponirak – Vraca (tunel Zenica)

# TUNEL / TUNNEL: **ZENICA**

**PROBIJEN/BREAKTHROUGH:** 2022.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 3 282 m
Desna/Right: 3 330 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 550 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** fliš/flysch
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 32% | 56% | 12% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 555 700 m³
**MLAZNI BETON/SHOTCRETE:** 150 000 m²
**SIDRA/ANCHORS:** 52 000 kom/pcs
**REMENATE/LATTICE GIRDERS:** 1 250 t
**BETON/CONCRETE:** 83 000 m³
**ARMATURA/REINFORCEMENT:** 1 970 t

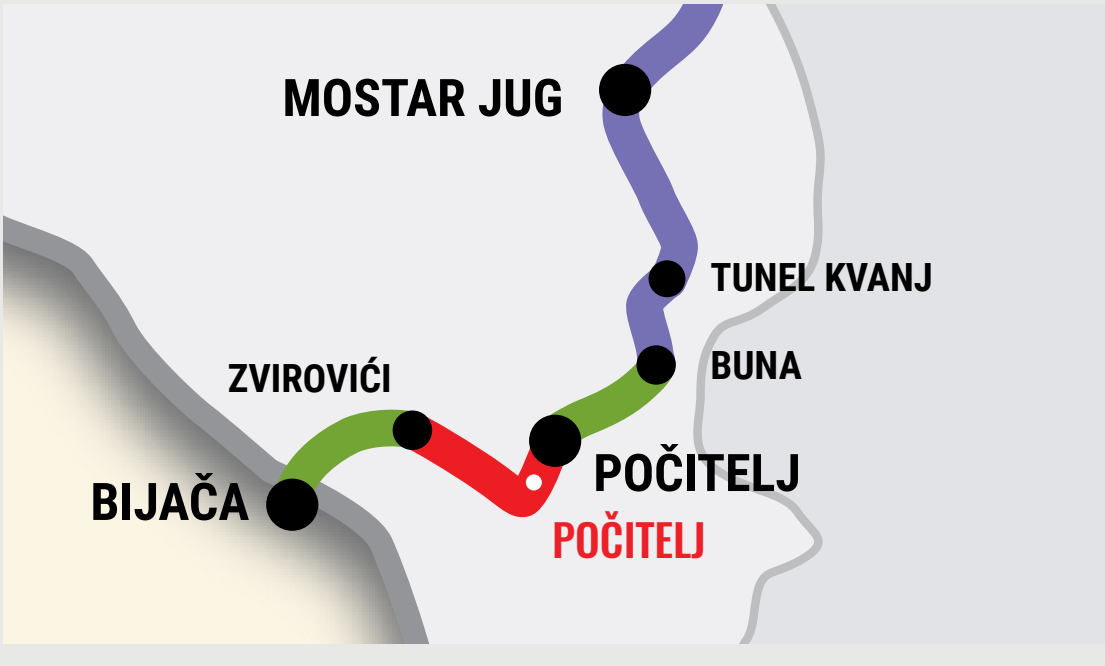
## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 10
Vozila/Vehicles: 3
**PARKIRNE NIŠE/LAY-BYS:** 3
**SOS NIŠE/EMERGENCY CALL NICHES:** 49
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 54

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga za cca 2,4 km/FIDIC Red Book for approx. 2,4 km & FIDIC Žuta knjiga za cca 0,9 km/FIDIC Yellow Book for approx. 0,9 km
**GLAVNI PROJEKAT/MAIN DESIGN:** Integra d.o.o. Mostar / Yüksel Proje Uluslararasi A.Ş.
**IZVOĐAČ/CONTRACTOR:** Euro-Asafalt d.o.o. Sarajevo (Cengiz İnşaat Sanayi ve Ticaret A.Ş: iskop, primarna i sekundarna podgrada za 870 m/excavation, primary and secondary tunnel support for 870 m)
**NADZOR/SUPERVISION:** Proyapi Engineering & Consultancy
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

**DIONICA/SECTION:** Počitelj – Bijača
**PODDIONICA/SUBSECTION:** Počitelj – Zvirovići



# TUNEL / TUNNEL: **POČITELJ**

**PROBIJEN/BREAKTHROUGH:** 2020.
**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 1 192 m
Desna/Right: 1 163 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 100 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** glina, degradirani krečnjak, krečnjak/ clay, degraded limestone, limestone
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 37% | 58% | 1% | 4% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 182 000 m³
**MLAZNI BETON/SHOTCRETE:** 44 000 m²
**SIDRA/ANCHORS:** 7 000 kom/pcs
**KOPLJA/FOREPOLING:** 140 kom/pcs
**REMENATE/LATTICE GIRDERS:** 25 t
**BETON/CONCRETE:** 25 700 m³
**ARMATURA/REINFORCEMENT:** 395 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 3
Vozila/Vehicles: 1
**PARKIRNE NIŠE/LAY-BYS:** 2
**SOS NIŠE/EMERGENCY CALL NICHES:** 18
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 18

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** IPSA Institut d.o.o. Sarajevo & Divel d.o.o. Sarajevo
**IZVOĐAČ/CONTRACTOR:** China State Construction Engineering Corporation Ltd. (podugovarač za izgradnju tunela/subcontractor for tunnel construction Euro-Asfalt d.o.o Sarajevo)
**NADZOR/SUPERVISION:** IRD Engineering S.r.l.
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

# TENDER U TOKU

TENDER IN PROGRESS


JOHOVAC
RUDANKA
PUTNIKOVO BRDO
MEDAKOVO
CRNI VRH
ŽEPČE SJEVER (OZIMICA)
ŽEPČE JUG (POPRIKUŠE)
NEMILA
VRANDUK
PONIRAK
VRACA (TUNEL ZENICA)
ZENICA SJEVER (DONJA GRAČANICA)
KLOPČE
ZENICA JUG (DRIVUŠA)
KAKANJ

# TUNEL / TUNNEL: **CRNI VRH**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 2 217,5 m
Desna/Right: 2 200 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 200 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** spiliti i dijabazi, flišovi, pješčari, alveroliti i glinci/spilite and diabase, flysch, sandstones, siltstones and claystones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 14% | 54% | 21% | 11% |

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 390 000 m³
**MLAZNI BETON/SHOTCRETE:** 122 700 m²
**SIDRA/ANCHORS:** 43 600 kom/pcs
**KOPLJA/FOREPOLING:** 57 700 kom/pcs
**REMENATE/LATTICE GIRDERS:** 1 260 t
**BETON/CONCRETE:** 69 500 m³
**ARMATURA/REINFORCEMENT:** 1 770 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 7
Vozila/Vehicles: 2
**PARKIRNE NIŠE/LAY-BYS:** 2
**SOS NIŠE/EMERGENCY CALL NICHES:** 30
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 30

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Divel d.o.o. Sarajevo, IPSA Institut d.o.o. Sarajevo, Integra d.o.o. Mostar, Design & QC d.o.o. Sarajevo, INK Constructor d.o.o. Banja Luka & PPG d.o.o. Sarajevo
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

Izabran Izvođač Cengiz İnşaat Sanayi ve Ticaret A.Ş; potpisivanje ugovora u proceduri/Contractor Cengiz İnşaat Sanayi ve Ticaret A.Ş. selected; contract signing in procedure.

**DIONICA/SECTION:** Ovčari – Mostar sjever
**PODDIONICA/SUBSECTION:** Tunel Prenj

# TUNEL / TUNNEL: **PRENJ**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 10 864 m
Desna/Right: 10 902 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 1 175 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** drobine, lapori, alevroliti, glinci, krečnjaci, pješčari/debris, marls, siltstones, claystones, limestones, sandstones

Svi podaci predstavljaju grube preliminarne procjene; Idejni projekat s elementima Glavnog projekta u toku/
All data represent rough preliminary estimates; Preliminary design with elements of Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 3 260 000 m³
**MLAZNI BETON/SHOTCRETE:** 213 000 m³
**SIDRA/ANCHORS:** 280 000 kom/pcs
**KOPLJA/FOREPOLING:** 630 000 kom/pcs
**REMENATE/LATTICE GIRDERS:** 5 220 t
**BETON/CONCRETE:** 635 000 m³
**ARMATURA/REINFORCEMENT:** 11 100 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 35
Vozila/Vehicles: 11
**PARKIRNE NIŠE/LAY-BYS:** 22
**SOS NIŠE/EMERGENCY CALL NICHES:** 190
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 190

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Žuta knjiga/FIDIC Yellow Book
**IDEJNI PROJEKAT/PRELIMINARY DESIGN:** Divel d.o.o. Sarajevo
**IDEJNI PROJEKAT S ELEMENTIMA GLAVNOG PROJEKTA/PRELIMINARY DESIGN WITH ELEMENTS OF MAIN DESIGN:** Elea Ic, iC Consulenten ZT GmbH, SEED Consulting Shpk & IBE d.d. Ljubljana
**FINANSIRANJE/FUNDING:** EBRD, EIB & EU-WBIF


KONJIC
TUNEL PRENJ
MOSTAR SJEVER
MOSTAR JUG
T1-5
TUNEL KVANJ
BUNA
ZVIROVIĆI
POČITELJ
BIJAČA

# TUNEL / TUNNEL (T1-5): **T1**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 616 m
Desna/Right: 640 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 68 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci/limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 60% | 30% | 5% | 5% |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 100 000 m³
**MLAZNI BETON/SHOTCRETE:** 25 000 m²
**SIDRA/ANCHORS:** 3 800 kom/pcs
**REMENATE/LATTICE GIRDERS:** 15 t
**BETON/CONCRETE:** 14 500 m³
**ARMATURA/REINFORCEMENT:** 280 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Yüksel Proje Uluslararasi A.Ş, PPG d.o.o. Sarajevo, Design & QC d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**FINANSIRANJE/FUNDING:** EBRD & commercial banks

# TUNEL / TUNNEL (T1-5): **T2**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 1 490 m
Desna/Right: 1 485 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 128 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci/limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 55% | 35% | 5% | 5% |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 221 000 m³
**MLAZNI BETON/SHOTCRETE:** 65 000 m²
**SIDRA/ANCHORS:** 8 400 kom/pcs
**REMENATE/LATTICE GIRDERS:** 30 t
**BETON/CONCRETE:** 35 000 m³
**ARMATURA/REINFORCEMENT:** 725 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 4
Vozila/Vehicles: 1
**PARKIRNE NIŠE/LAY-BYS:** 2
**SOS NIŠE/EMERGENCY CALL NICHES:** 22
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 24

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Yüksel Proje Uluslararasi A.Ş, PPG d.o.o. Sarajevo, Design & QC d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**FINANSIRANJE/FUNDING:** EBRD & commercial banks

# TUNEL / TUNNEL (T1-5): **T3**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 643 m
Desna/Right: 655 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 102 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci/limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 45% | 35% | 10% | 10% |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 97 000 m³
**MLAZNI BETON/SHOTCRETE:** 23 000 m²
**SIDRA/ANCHORS:** 8 000 kom/pcs
**REMENATE/LATTICE GIRDERS:** 15 t
**BETON/CONCRETE:** 14 000 m³
**ARMATURA/REINFORCEMENT:** 510 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Yüksel Proje Uluslararasi A.Ş, PPG d.o.o. Sarajevo, Design & QC d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**FINANSIRANJE/FUNDING:** EBRD & commercial banks

# TUNEL / TUNNEL (T1-5): **T4**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 727 m
Desna/Right: 706 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 103 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci/limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 45% | 45% | 10% | - |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 106 000 m³
**MLAZNI BETON/SHOTCRETE:** 23 000 m²
**SIDRA/ANCHORS:** 4 100 kom/pcs
**REMENATE/LATTICE GIRDERS:** 15 t
**BETON/CONCRETE:** 15 600 m³
**ARMATURA/REINFORCEMENT:** 505 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: 0
**PARKIRNE NIŠE/LAY-BYS:** 0
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Yüksel Proje Uluslararasi A.Ş, PPG d.o.o. Sarajevo, Design & QC d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**FINANSIRANJE/FUNDING:** EBRD & commercial banks

# TUNEL / TUNNEL (T1-5): **T5**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 2 326 m
Desna/Right: 2 203 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 95 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci/limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 70% | 10% | 15% | 5% |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 350 000 m³
**MLAZNI BETON/SHOTCRETE:** 110 000 m²
**SIDRA/ANCHORS:** 19 800 kom/pcs
**REMENATE/LATTICE GIRDERS:** 30 t
**BETON/CONCRETE:** 53 000 m³
**ARMATURA/REINFORCEMENT:** 1 600 t

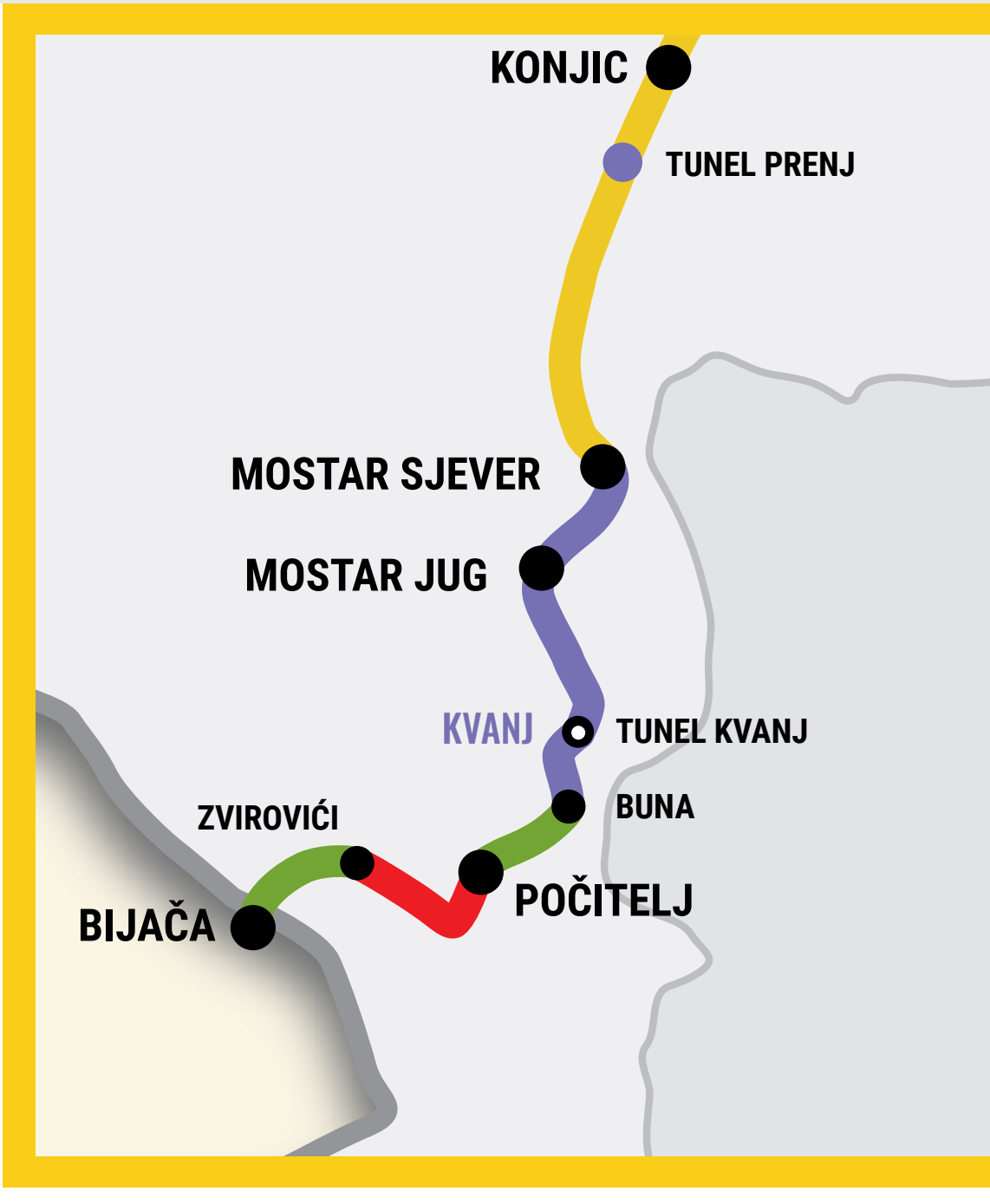
## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 6
Vozila/Vehicles: 2
**PARKIRNE NIŠE/LAY-BYS:** 4
**SOS NIŠE/EMERGENCY CALL NICHES:** 34
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 38

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Yüksel Proje Uluslararasi A.Ş, PPG d.o.o. Sarajevo, Design & QC d.o.o. Sarajevo, Integra d.o.o. Mostar & Trasa d.o.o. Sarajevo
**FINANSIRANJE/FUNDING:** EBRD & commercial banks

**DIONICA/SECTION:** Mostar jug – Počtelj
**PODDIONICA/SUBSECTION:** Tunel Kvanj – Buna



# TUNEL / TUNNEL: **KVANJ**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 2 720 m
Desna/Right: 2 645 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 245 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjak, laporoviti krečnjak, lapor/ limestone, marly limestone, marl
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 35% | 35% | 13% | 17% |

## UGOVOR/CONTRACT

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Žuta knjiga/FIDIC Yellow Book
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

Prema prethodnom Idejnom projektu i studiji za dobivanje urbanističke saglasnosti od IPSA Institut d.o.o. Sarajevo iz 2017. godine; tender za izradu Idejnog i Glavnog projekta u toku/According to the previous Preliminary design and study for obtaining an urban permit by IPSA Institut d.o.o. Sarajevo from 2017; tender for the preparation of Preliminary and Main design in progress.

# PROJEKTOVANJE U TOKU

DESIGN IN PROGRESS


RUDANKA
PUTNIKOVO BRDO
MEDAKOVO
ŽEPČE SJEVER (OZIMICA)
T1-5
ŽEPČE JUG (POPRIKUŠE)
NEMILA
VRANDUK
PONIRAK
VRACA (TUNEL ZENICA)
ZENICA SJEVER (DONJA GRAČANICA)
KLOPČE
ZENICA JUG (DRIVUŠA)
KAKANJ

# TUNELI / TUNNELS (T1-5): **T1**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 737 m
Desna/Right: 735 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 52 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** prašinaste gline, drobina, lapor/ silty clays, debris, marl
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 70% | 30% |

Svi podaci prema Glavnom projektu; Glavni projekat završen/All data according to the Main design; Main design completed.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 134 000 m³
**MLAZNI BETON/SHOTCRETE:** 60 000 m²
**SIDRA/ANCHORS:** 23 500 kom/pcs
**KOPLJA/FOREPOLING:** 4 450 kom/pcs
**REMENATE/LATTICE GIRDERS:** 275 t
**BETON/CONCRETE:** 20 000 m³
**ARMATURA/REINFORCEMENT:** 725 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURE

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Trasa d.o.o. Sarajevo, Saraj inženjering d.o.o. Sarajevo, Institut za građevinarstvo "IG" d.o.o. Banja Luka & Routing d.o.o. Banja Luka
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

# TUNELI / TUNNELS (T1-5): **T2**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 260 m
Desna/Right: 263 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 46 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** pjeskoviti lapor/sandy marl
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 75% | 25% |

Svi podaci prema Glavnom projektu; Glavni projekat završen/All data according to the Main design; Main design completed.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 41 500 m³
**MLAZNI BETON/SHOTCRETE:** 26 400 m²
**SIDRA/ANCHORS:** 5 500 kom/pcs
**KOPLJA/FOREPOLING:** 4 100 kom/pcs
**REMENATE/LATTICE GIRDERS:** 90 t
**BETON/CONCRETE:** 6 000 m³
**ARMATURA/REINFORCEMENT:** 480 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Trasa d.o.o. Sarajevo, Saraj inženjering d.o.o. Sarajevo, Institut za građevinarstvo "IG" d.o.o. Banja Luka & Routing d.o.o. Banja Luka
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

# TUNELI / TUNNELS (T1-5): **T3**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 405 m
Desna/Right: 395 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 51 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** prašinasto-pjeskovite gline, drobina, alevrolit, dolerit/silty-sandy clays, debris, siltstone, dolerite
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 25% | 45% | 30% |

Svi podaci prema Glavnom projektu; Glavni projekat završen/All data according to the Main design; Main design completed.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 67 100 m³
**MLAZNI BETON/SHOTCRETE:** 46 100 m²
**SIDRA/ANCHORS:** 8 000 kom/pcs
**KOPLJA/FOREPOLING:** 3 180 kom/pcs
**REMENATE/LATTICE GIRDERS:** 300 t
**BETON/CONCRETE:** 11 800 m³
**ARMATURA/REINFORCEMENT:** 940 t

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Trasa d.o.o. Sarajevo, Saraj inženjering d.o.o. Sarajevo, Institut za građevinarstvo "IG" d.o.o. Banja Luka & Routing d.o.o. Banja Luka
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

# TUNELI / TUNNELS (T1-5): **T4**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 740 m
Desna/Right: 749 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 62 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** gline, drobina, alevrolit, glinci, peridotit/clays, debris, siltstone, claystones, peridotite
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 51% | 49% |

Svi podaci prema Glavnom projektu; Glavni projekat završen/All data according to the Main design; Main design completed.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 133 000 m³
**MLAZNI BETON/SHOTCRETE:** 97 000 m²
**SIDRA/ANCHORS:** 25 000 kom/pcs
**KOPLJA/FOREPOLING:** 12 800 kom/pcs
**REMENATE/LATTICE GIRDERS:** 450 t
**BETON/CONCRETE:** 25 300 m³
**ARMATURA/REINFORCEMENT:** 2 680 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Trasa d.o.o. Sarajevo, Saraj inženjering d.o.o. Sarajevo, Institut za građevinarstvo "IG" d.o.o. Banja Luka & Routing d.o.o. Banja Luka
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

# TUNELI / TUNNELS (T1-5): **T5**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 630 m
Desna/Right: 765 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 47 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** pjeskovite gline, drobina, alevrolit, glinci, /silty clays, debris, siltstone, claystones,
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 32% | 68% |

Svi podaci prema Glavnom projektu; Glavni projekat završen/All data according to the Main design; Main design completed.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 129 000 m³
**MLAZNI BETON/SHOTCRETE:** 130 300 m²
**SIDRA/ANCHORS:** 24 300 kom/pcs
**KOPLJA/FOREPOLING:** 15 500 kom/pcs
**REMENATE/LATTICE GIRDERS:** 720 t
**BETON/CONCRETE:** 22 300 m³
**ARMATURA/REINFORCEMENT:** 1 925 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 10
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 10

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**GLAVNI PROJEKAT/MAIN DESIGN:** Trasa d.o.o. Sarajevo, Saraj inženjering d.o.o. Sarajevo, Institut za građevinarstvo "IG" d.o.o. Banja Luka & Routing d.o.o. Banja Luka
**FINANSIRANJE/FUNDING:** EIB & EU-WBIF

**DIONICA/SECTION:** Ovčari – Mostar sjever
**PODDIONICA/SUBSECTION:** Ovčari – Tunel Prenj (ulaz)

# TUNELI / TUNNELS: **T1 & T2**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**UKUPNA DUŽINA TUNELSKIH CIJEVI/TOTAL LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 1 853 m
Desna/Right: 1 763 m
Ukupno/Total: 3 616 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** dolomiti/dolomites

**UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS**
**IDEJNI PROJEKAT/PRELIMINARY DESIGN:** AIK Inženjering d.o.o. Banovići
**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA ZA SVE TUNELE/MATERIAL QUANTITIES FOR ALL TUNNELS

**ISKOP/EXCAVATION:** 300 000 m³
**MLAZNI BETON/SHOTCRETE:** 104 000 m²
**SIDRA/ANCHORS:** 33 500 kom/pcs
**KOPLJA/FOREPOLING:** 21 700 kom/pcs
**REMENATE/LATTICE GIRDERS:** 360 t
**BETON/CONCRETE:** 58 700 m³
**ARMATURA/REINFORCEMENT:** 4 245 t

**T1**

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 682 m Desna/Right: 603 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 112 m

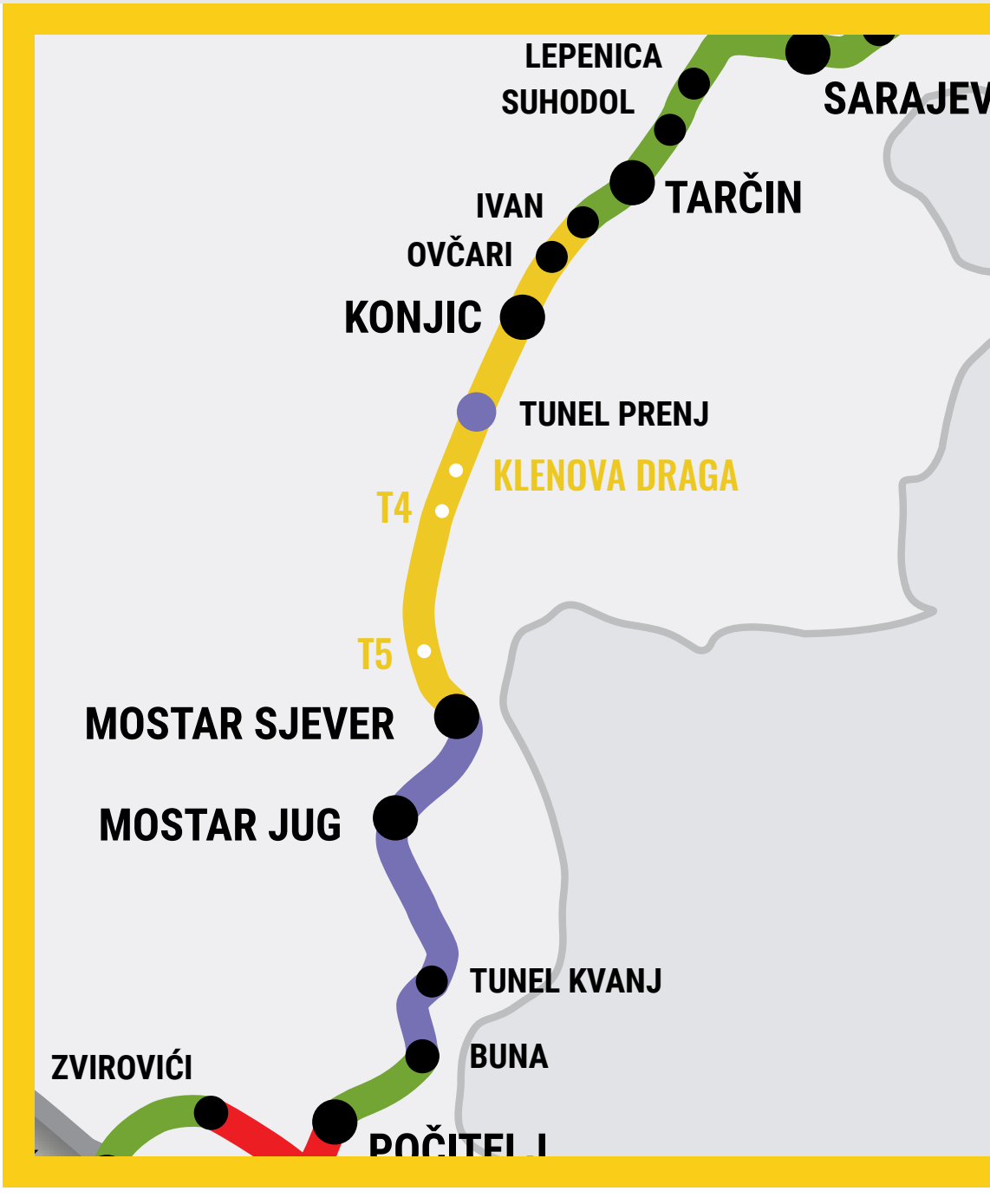
**T2**

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 1 171 m Desna/Right: 1 160 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 250 m

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: 1
**PARKIRNE NIŠE/LAY-BYS:** 2
**SOS NIŠE/EMERGENCY CALL NICHES:** 14
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 15

**DIONICA/SECTION:** Ovčari – Mostar sjever
**PODDIONICA/SUBSECTION:** Tunel Prenj (izlaz) – Mostar sjever



# TUNELI / TUNNELS (KLENOVA DRAGA, T4, T5): **KLENOVA DRAGA**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 817 m
Desna/Right: 867 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 338 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci/limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 70% | 20% | 7% | 3% |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 155 000 m³
**MLAZNI BETON/SHOTCRETE:** 38 000 m²
**SIDRA/ANCHORS:** 5 200 kom/pcs
**REMENATE/LATTICE GIRDERS:** 25 t
**BETON/CONCRETE:** 18 000 m³
**ARMATURA/REINFORCEMENT:** 350 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 3
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 12
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 12

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**IDEJNI PROJEKAT/PRELIMINARY DESIGN:** COWI A/S & IPSA Institut d.o.o. Sarajevo

# TUNELI / TUNNELS (KLENOVA DRAGA, T4, T5): **T4**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 700 m
Desna/Right: 703,5 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 160 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci i dolomitni krečnjaci/ limestones and dolomitic limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 60% | 20% | 15% | 5% |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 140 000 m³
**MLAZNI BETON/SHOTCRETE:** 32 000 m²
**SIDRA/ANCHORS:** 5 500 kom/pcs
**REMENATE/LATTICE GIRDERS:** 25 t
**BETON/CONCRETE:** 16 000 m³
**ARMATURA/REINFORCEMENT:** 325 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 10
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 10

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**IDEJNI PROJEKAT/PRELIMINARY DESIGN:** COWI A/S & IPSA Institut d.o.o. Sarajevo

# TUNELI / TUNNELS (KLENOVA DRAGA, T4, T5): **T5**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 2 197 m
Desna/Right: 2 166 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 280 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** krečnjaci i dolomitni krečnjaci/ limestones and dolomitic limestones
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | 70% | 10% | 15% | 5% |

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog i Glavnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary and Main design in progress.

## KOLIČINE MATERIJALA/MATERIAL QUANTITIES

**ISKOP/EXCAVATION:** 340 000 m³
**MLAZNI BETON/SHOTCRETE:** 105 000 m²
**SIDRA/ANCHORS:** 18 600 kom/pcs
**REMENATE/LATTICE GIRDERS:** 45 t
**BETON/CONCRETE:** 51 000 m³
**ARMATURA/REINFORCEMENT:** 1 520 t

## SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 6
Vozila/Vehicles: 2
**PARKIRNE NIŠE/LAY-BYS:** 4
**SOS NIŠE/EMERGENCY CALL NICHES:** 34
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 34

## UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS

**MODEL UGOVORA/CONTRACT MODEL:** FIDIC Crvena knjiga/FIDIC Red Book
**IDEJNI PROJEKAT/PRELIMINARY DESIGN:** COWI A/S & IPSA Institut d.o.o. Sarajevo

**DIONICA/SECTION:** Tarčin – Konjic
**PODDIONICA/SUBSECTION:** Ivan – Ovčari

# TUNELI / TUNNELS: **T1-12**

**METODA IZVOĐENJA/EXCAVATION METHOD:** NATM
**UKUPNA DUŽINA TUNELSKIH CIJEVI/TOTAL LENGTH OF TUNNEL TUBES**
Lijeva/Left: 5 854,5 m
Desna/Right: 6 209,5 m
Ukupno/Total: 12 064 m
**GEOLOŠKI OPIS/GEOLOGICAL DESCRIPTION:** škriljici, dolomiti/shales, dolomites

**UGOVOR, PROJEKAT I UČESNICI/CONTRACT, DESIGN AND PARTICIPANTS**
**MODEL UGOVORA/CONTRACT MODEL: FIDIC** Crvena knjiga/FIDIC Red Book
**IDEJNI PROJEKAT/PRELIMINARY DESIGN:** IPSA Institut d.o.o. Sarajevo

Svi podaci predstavljaju preliminarne procjene; izrada Idejnog projekta u toku/All data represent preliminary estimates; preparation of the Preliminary design in progress.

## KOLIČINE MATERIJALA ZA SVE TUNELE/MATERIAL QUANTITIES FOR ALL TUNNELS

**ISKOP/EXCAVATION:** 1 542 000 m³
**MLAZNI BETON/SHOTCRETE:** 321 000 m²
**SIDRA/ANCHORS:** 96 400 kom/pcs
**KOPLJA/FOREPOLING:** 45 100 kom/pcs
**REMENATE/LATTICE GIRDERS:** 890 t
**BETON/CONCRETE:** 172 600 m³
**ARMATURA/REINFORCEMENT:** 16 300 t

## T1

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 1 100 m  Desna/Right: 1 093 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 210 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 49% | 42% | 9% |

### SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 4
Vozila/Vehicles: 1
**PARKIRNE NIŠE/LAY-BYS:** 2
**SOS NIŠE/EMERGENCY CALL NICHES:** 18
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 18

## T2

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 580 m  Desna/Right: 590 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 117 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 94% | 6% | - |

### SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS:** -
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## T3

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 260 m  Desna/Right: 310 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 30 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 100% | - |

## T4

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 280 m  Desna/Right: 260 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 30 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 77% | 23% | - |

## T5

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 725 m  Desna/Right: 725 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 115 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 56% | 39% | 5% |

### SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS: -**
**SOS NIŠE/EMERGENCY CALL NICHES:** 10
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 10

## T6

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 731 m  Desna/Right: 735 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 80 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 92% | 8% |

### SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS: -**
**SOS NIŠE/EMERGENCY CALL NICHES:** 10
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 10

## T7

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 221 m  Desna/Right: 400 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 45 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | - | 100% | - |

## T8

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 619,5 m  Desna/Right: 650 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 125 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 19 | 77% | 4% |

### SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS: -**
**SOS NIŠE/EMERGENCY CALL NICHES:** 8
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 8

## T9

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 442 m  Desna/Right: 447,5 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 90 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 95% | 5% | - |

## T10

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 66 m Desna/Right: 195 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 35 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 92% | 8% | - |

## T11

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 169 m Desna/Right: 169 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 50 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 88% | 12% | - |

## T12

**DUŽINA TUNELSKIH CIJEVI/LENGTH OF TUNNEL TUBES:**
Lijeva/Left: 661 m Desna/Right: 635 m
**MAKSIMALNI NADSLOJ/MAXIMUM OVERBURDEN:** 145 m
**GEOMEHANIČKA KLASIFIKACIJA/GEOMECHANICAL CLASSIFICATION:**

| I | II | III | IV | V |
|---|---|---|---|---|
| - | - | 95% | 5% | - |

### SIGURNOSNE KARAKTERISTIKE TUNELA/TUNNEL SAFETY FEATURES

**POPREČNI PROLAZI/CROSS PASSAGES:**
Pješaci/Pedestrians: 2
Vozila/Vehicles: -
**PARKIRNE NIŠE/LAY-BYS: -**
**SOS NIŠE/EMERGENCY CALL NICHES:** 9
**HIDRANTSKE NIŠE/FIRE EXTINGUISHER BAYS WITH HYDRANTS:** 9

# UDRUŽENJE INŽENJERA GEOTEHNIČARA U BiH
## ASSOCIATION OF GEOTECHNICAL ENGINEERS IN B&H

Samir DOLAREVIĆ
Predsjednik/President

Udruženje inženjera geotehničara u Bosni i Hercegovini osnovano je 19. novembra 2012. godine sa zadatkom daljnjeg jačanja, promocije i afirmacije profesije inženjera geotehničara u Bosni i Hercegovini. Zbog ekspanzije u gradnji objekata visokogradnje i niskogradnje, sve je veća potreba za specifičnim znanjima iz oblasti geotehničkog inženjerstva. Gradnja objekata visokogradnje, pored standardnih zahtjeva temeljenja, često zahtijeva i izvođenje različitih tipova zaštitnih jama. Gradnja objekata niskogradnje, zbog složene geološke građe i konfiguracije terena, nerijetko je praćena izgradnjom kompleksnih potpornih konstrukcija i tunela, pri čemu je trenutno najznačajniji projekat izgradnje Koridora Vc. Također, neizostavan i vrlo izražen je i problem klizišta i njihove sanacije.

Optimalna projektna rješenja za prethodno navedene probleme, koji se gotovo svakodnevno susreću u građevinskoj praksi, zahtijevaju kombinaciju znanja i iskustva inženjera geotehničara. S tim u vezi, osnovano je Udruženje inženjera geotehničara u Bosni i Hercegovini s ciljem daljnjeg razvoja i unapređenja struke kroz međusobnu saradnju članova Udruženja, saradnju s privrednim subjektima, akademskom zajednicom, nadležnim tijelima i institucijama, održavanje stručnih skupova, predavanja i konferencija, itd.

Udruženje inženjera geotehničara u Bosni i Hercegovini, uz podršku svih članova Udruže-

The Association of Geotechnical Engineers in Bosnia and Herzegovina was founded on November 19, 2012, with the task of further strengthening, promoting, and affirming the profession of geotechnical engineers in Bosnia and Herzegovina. Due to the expansion in the construction of buildings and road infrastructure, there is an increasing need for specific knowledge in the field of geotechnical engineering. The construction of buildings, in addition to foundation requirements, often requires a certain form of construction pit protection. The road construction, due to the complex geological structure and configuration of the terrain, is often accompanied by the construction of complex retaining structures and tunnels, with the most significant project currently being the construction of Corridor Vc. Also, the problem of landslides and their rehabilitation is essential and very pronounced.

Optimal design solutions for the previously mentioned problems, which are encountered almost daily in civil engineering practice, require a combination of knowledge and experience of geotechnical engineers. In this regard, the Association of Geotechnical Engineers in Bosnia and Herzegovina was founded with the aim of further development and improvement of the profession through the cooperation of Association members, cooperation with business entities, the academic community,

nja i firmi koje finansijski potpomažu rad Udruženja, nastoji kontinuirano unapređivati svoj rad kako bi postavljeni ciljevi Udruženja bili realizovani.

relevant bodies and institutions, organization of meetings, lectures, and conferences, etc. The Association of Geotechnical Engineers in Bosnia and Herzegovina, with the support of all members of the Association and companies that financially support the work of the Association, strives to continuously improve its work so that the goals of the Association are achieved.

**UDRUŽENJE INŽENJERA GEOTEHNIČARA U BOSNI I HERCEGOVINI**
ASSOCIATION OF GEOTECHNICAL ENGINEERS IN BOSNIA AND HERZEGOVINA

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