



Ministry of Construction,  
Transport and Infrastructure



# **The Serbia Railway Sector Modernization (SRSM) Project Phase 1 of the Multi-Phase Programmatic Approach**

## **TERMS OF REFERENCE**

**Preparation of technical documentation and Site Supervision for reconstruction of railway lines in tunnels Dedinje, Vezni, Stadion and Vračar and section Pančevački most - Pančevo Glavna**

## December 2022

Abbreviation	Meaning
ADF	Agence Francaise de Développement
CBA	Cost-benefit analysis
EIA	Environmental Impact Assessment Study
GIIP	Good International Industry Practice
FIDIC	International Federation of Consulting Engineers
IBRD	International Bank for Reconstruction and Development
IZS	Serbian Railways Infrastructure
MoCTI	Ministry of Construction, Transport, and Infrastructure
PIU	Project Implementation Unit
PIT	Project Implementation Teams
PD	Preliminary Design
Project	Serbia Railway Sector Modernization (SRSM) Project
RAP	Resettlement Action Plan
RAMS	Reliability, availability, maintainability and safety
TA	Technical Assistance
TEN-T	Trans-European Networks - Transport
ToR	Terms of Reference
WB	World Bank
WB ESIA	World Bank Environmental and Social Impact Assessment
WB EHSG	World Bank Environmental, Health, and Safety Guidelines
WB ESMF	World Bank Environmental and Social Management Framework
WB ESF	World Bank Environmental and Social Framework
WB LMP	World Bank Labour Management Procedure
WB OHS	World Bank Occupational Health and Safety

# 1. Background information

## 1.1 Beneficiary country: Republic of Serbia

**Client:** Ministry of Construction, Transport, and Infrastructure of Republic of Serbia (MoCTI).

**Final Beneficiary:** Infrastruktura železnica Srbije (Serbian Railway Infrastructure - IZS).

## 1.2 Project Information

The International Bank for Reconstruction and Development (IBRD) launched the Multiphase Programmatic Approach (MPA) to support the Government of Serbia in continuation of institutional, physical and operational modernization of the railway sector in an integrated manner through providing financial support to Serbia Railway Sector Modernization Project as part of the Multiphase Programmatic Approach to be implemented in three overlapping phases over the ten-year period.

For the purpose of financing the Serbia Railway Sector Modernization Project, Phase 1 of the MPA (the Project), the IBRD and the Agence Française de Développement (AFD), jointly, granted to the Republic of Serbia EUR 102 million loan to support enhancing the efficiency and safety of existing railway assets and improving governance and institutional capacity of the railway sector. The Project includes the following Components:

- Component 1: Infrastructure Investments and Asset Management. This component focuses on improving the quality and safety of railway infrastructure and enhancing rail asset management practices. **Sub-Component 1.1, Reliable and Safe Railway Infrastructure, finances the Services object of these TORs.**
- Component 2: Institutional Strengthening and Project Management. This component focuses on strengthening rail policies and institutions to deepen and sustain recent reforms.
- Component 3: Railway Modernization Enablers. This component will finance measures to protect the vulnerable and poor and strengthen sectoral enablers for sustainable business growth and job creation.

The Project is managed by the Ministry of Construction, Transport and Infrastructure (MoCTI) through the Project Implementation Unit (PIU) supplemented by the Project Implementation Teams (PITs) in Railway Directorate (RD) and in railway companies, respectively Serbian Railway Infrastructure (IZS), Serbia Voz (SV) and Serbia Cargo (SC). PITs will act as subordinate implementing agencies and provide technical support for specific Project subcomponents or activities of the MPA that pertain to their area of expertise. The Central Fiduciary Unit (CFU) in the Ministry of Finance provides procurement and financial services for the project. Primary responsibility for Project execution lies on PIU which will ensure that the Project development objectives are met.

### **1.3 General Railways Sector Information**

The position of Serbia in the European railway network is such that it forms part of the shortest traffic line between West and South-East Europe and as such is often referred to as a gateway of Europe. The length of the railway lines in the Republic of Serbia is 3,736 km, of which 3,441 km are single-track and 295 km of double-track railway lines, of which 1,546 km are electrified.

The Core Network extends for 1,414 km and it encompasses Corridor X (with branches Xb and Xc -770 km), Route 4 (421 km), Route 10 (84.5 km) and Route 11 (138 km). Except for one section on the Corridor Xc (Nis - Dimitrovgrad), Corridor X is electrified with 108 km of double track sections and 219 km of single-track sections. As for Route 4, connecting RoS with Montenegro and Romania, approximately 157 km is in very good and good condition, major part of route 4,212km is in medium condition, single track, electrified except for the section Pančevo - Vršac with diesel traction. Largest part of Route 10 traversing RoS is in good condition, and Route 11 section from Požega to Kraljevo is in very good condition.

Infrastructure modernization is essential to address various cross-cutting performance issues like safety, resilience, inclusion, and digitalization. Decades of low investments, outdated management structures and practices, and neglect of maintenance have led to serious deterioration of the network infrastructure, obsolescence of the rolling stock, and low service quality.

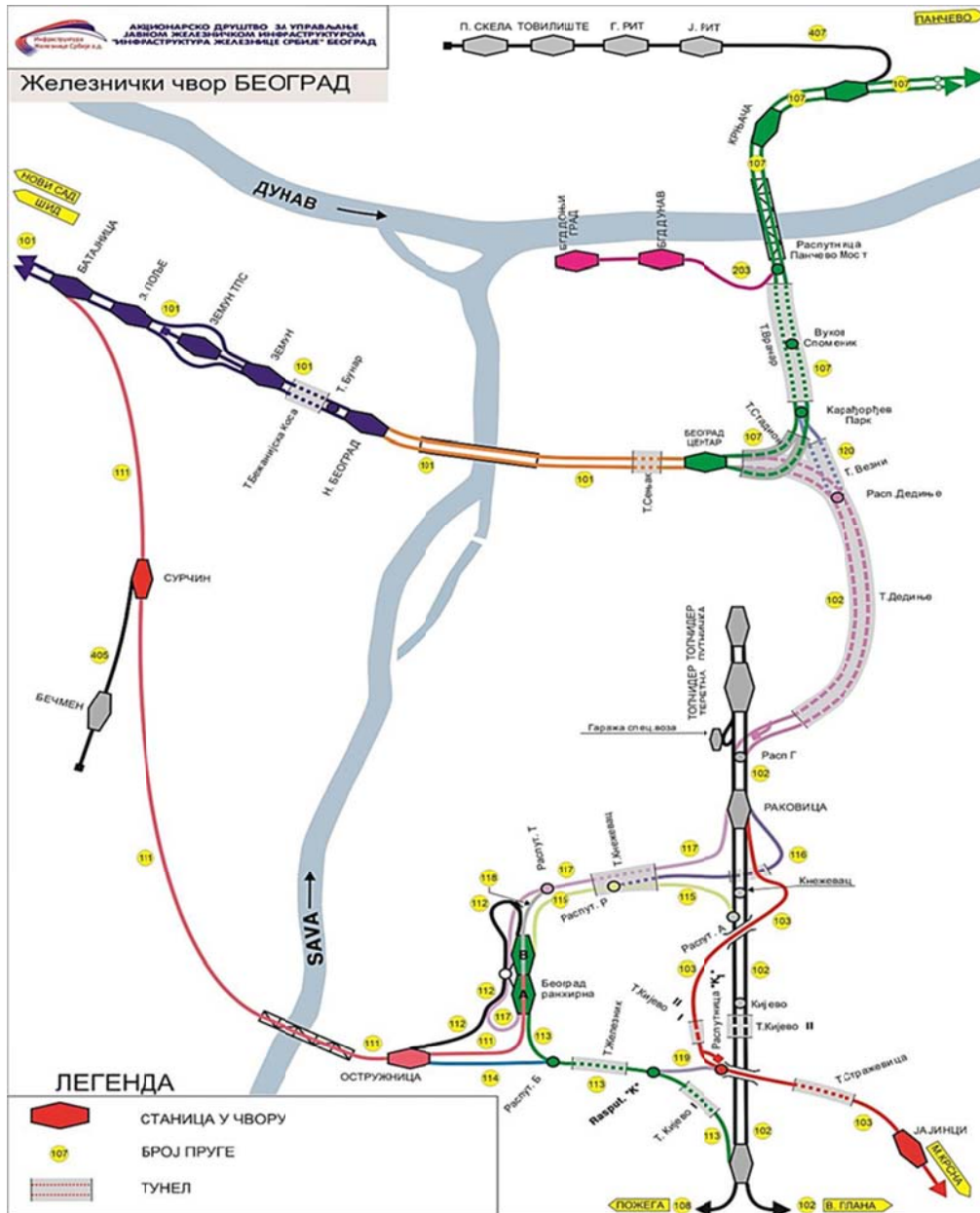
### **1.4 Belgrade rail tunnels**

The concept of the Belgrade railway junction (Figure 2) was defined back in 1972 and confirmed by the General Urbanization Plan of Belgrade, where the location in Prokop was chosen as the central location of the passenger railway station, where the Belgrade Centre railway station has been partially built. In Belgrade Centre station integrates rail lines from three directions, as follows:

- The route towards to New Belgrade, through the Senjak tunnel and rail bridge over Sava river and further north and west;
- The route that passes through the tunnels Stadion and Vračar, Pancevo bridge over Danube river and further to the north and east;
- The route that passes through the Dedinje tunnel leading to Rakovica and further to destinations in the south.

The urban concept of the development of the Belgrade railway junction envisaged, in addition to the main railway stations in Prokop and New Belgrade, several rail halts in different parts of the city, which enables the railway system to play a role in local urban and suburban traffic. Thus, the newly built and reconstructed facilities of the Belgrade junction enabled the formation of a network of city railway lines, which became the backbone of further development of urban and suburban traffic in Belgrade

Figure 1: Belgrade railway junction



As can be seen from the above, the main feature of the defined concept is the construction of rail lines in tunnels. All these tunnels were built in the period from 1976 to 1981, as follows:

- Tunnels "Stadium" and "Vracar" on line no. 107: Belgrade Center - Pancevo Glavna - Vrsac - state border - (Stamora Moravita);

The "Vračar" tunnel was built in the period from 1976 to 1981. This tunnel starts in the zone of Autokomanda, then continue in the zone of Nebojsa Street, Vuk's Monument, Roosevelt Street and end at the Pancevo Bridge. The building has a building permit from 17.05.1976. and usage permit from 21.09.1982.

	Chainage	Length
Right tube	1+165 - 4+675 km	3,510 km
Left tube	1+066 - 4+570 km	3,504 km
Distance between tubes	16-22,5 m	

The "Stadium" tunnel passes under the field of the Partizan football club. It was made together with the "Link" tunnel and the bridges over the highway with which they form a triangle, ie the main hub of the Belgrade railway junction, which consists of three branches (north, west and south). The building has a building permit from 17.05.1976. and usage permit from 12.07.1982.

	Chainage	Length
Right tube	0+300 - 0+849 km	549 m
Left tube	0+300 - 0+710 km	410m
Distance between tubes	min 25,5 m	

- Tunnel "Dedinje" on line no. 102: Belgrade Center - Junction "G" - Rakovica - Mladenovac - Lapovo - Nis - Presevo - state border - (Tabanovce);

The "Dedinje" tunnel was built in the period from 1976 to 1981. The entrance and exit of this tunnel is in the Belgrade Centre railway station, so they continue in the area of Humska Street, Beli Dvor and end in the immediate vicinity of the "Blue Train" garage in Topčider. The building has a building permit from 05.12.1975. and usage permit from 05.05.1983.

	Chainage	Length
Right tube	0+364 - 3+334 km	2,97 km
Left tube	0+364 - 3+373 km	3,009 km
Distance between tubes	13,5 - 16 m	

- Tunnel "Link" on line no. 120: 120 (Junction Pancevo Bridge) - Junction Karadjordjev Park - Junction Dedinje - (Junction G)

The "Link" tunnel connects the Vracar and Dedinje tunnels. They were made in the period from 1976 to 1981. They are located in the Autokomanda zone and enable the movement of city trains from the Vukov spomenik station to Rakovica. The building has a building permit from March 16, 1977. and usage permit from 30.05.1995. years.

	Chainage	Length
Right tube	0+482 - 1+156 km	674 m
Left tube	0+482 - 1+297 km	815 m
Distance between tubes	11,4 – 15 m	

The railway was put into operation through the "Vračar" tunnel in 1988, while for other tunnels it was put into operation in phases in 1993 and 1995 with the following characteristics:

Rail line Category	Category D4 (load: 22,5 tonnes per axle; 8,0 tonnes per meter)
Rail type	Type 49E1 welded into a long rail strip
Sleepers type	Type JZ70 - concrete and partly wooden sleepers
Fastening type	Rigid track fasteners type "K"
Ballast	Gravel of the first category

Although underground rail is the most efficient solution in urban transport, the noise and vibration produced by rail is often a significant drawback if specific solutions are not installed to mitigate the effects of these two phenomena. No vibration mitigation measures were applied during the construction of the existing track in the tunnels (for example: under sleeper pads and/or under ballast mats).

Noise and vibration measurements were performed in 1996 and 2003 by the institutes IMS and the Kirilo Savić , respectively, and both times the client was the Company for the construction of the Belgrade railway junction.

The problem of noise and vibration became even more pronounced when the rail line from Belgrade to Novi Sad was closed to traffic in February 2019 in order to carry out works on the modernization of the railway in the regime of complete suspension of traffic. Then, all freight traffic was redirected to an alternative route through Pancevo, which requires the passage of freight trains through the Vracar tunnel.

Accordingly, IZS and MGSI within this project proposed the development of technical documentation for the replacement of the superstructure and rehabilitation of the substructure of the rail line in tunnels and the installation of a technical solution aimed at reducing noise and vibration generated train operation.

The Instituto da Construção from Portugal (hereinafter: the IC FEUP) conducted a preliminary assessment on potential excessive vibrations caused by railway traffic in tunnels passing through Belgrade in order to envisage recommendations for design stage. This assessment is available in the Project data room, accessible via following URL:

[https://drive.google.com/drive/folders/1xn8o6mv\\_VI7eL7mhyLI6vLxbP28DxCqo?usp=sharing](https://drive.google.com/drive/folders/1xn8o6mv_VI7eL7mhyLI6vLxbP28DxCqo?usp=sharing)

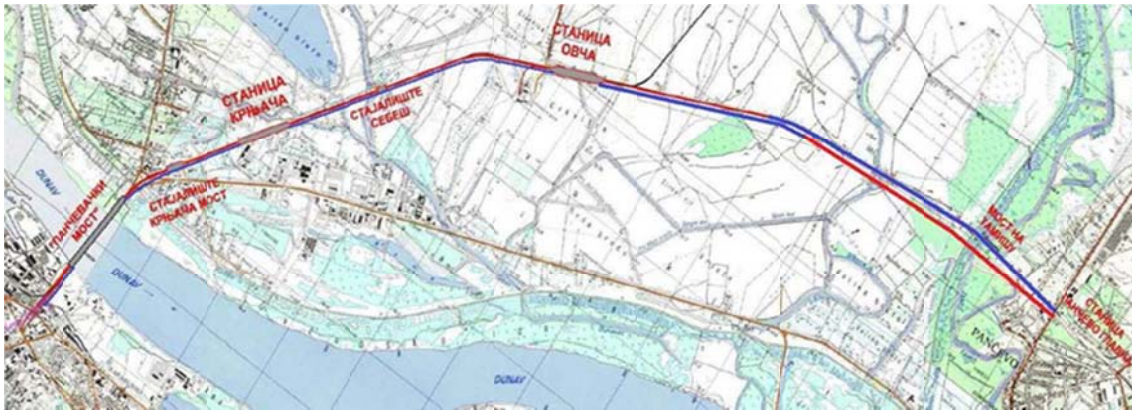
One of the objectives this investment is to mitigate excess vibration and noise by installing antivibration measures by reconstructing the railway tracks in subject tunnels, as well as strengthen and improve parameters of the existing substructure and drainage elements where possible and executing complete reconstruction works on track superstructure by replacing all superstructure elements (rails, sleepers, ballast)

Accordingly, the Consultant when compiling the technical documentation for the reconstruction of the superstructure and rehabilitation of the substructure should adhere to the recommendations given in the study and conduct additional analyses in accordance with the agreement IZS, MGSI/PIU proposed to the study.

## 1.5 Pancevo Bridge - Pancevo Main railway section

The project for the construction of the second track of the Belgrade-Pancevo-Vrsac-state border railway, on the section Pancevo Bridge - Pancevo Main station in length of 14.86 km long, was completed in 2017 through a loan provided by the Russian Federation. Works were executed in amount of \$89.9 million. The works included the construction of the second track, the right one from km 5 + 082.57 to km 15 + 882.72 and the left one from km 15 + 309.59 to km 19 + 562.73, as it is marked in blue in Figure 4. below.

*Figure 4: Route of the Pancevo Bridge - Pancevo Main section*



As part of these works, track and turnout capacities in the stations Krnjača (3rd and 4th track) and Ovča (5th, 6th and 7th track) were constructed, the existing Sebeš stop was renewed and a new stop Krnjača Most was built, a new single-track railway bridge over the river Tamiš was built (upstream of the existing single-track railway bridge, 242 m long), 4 new bridges (span up to 8 m) and 5 culverts (span up to 2.2 m) were built and it was constructed new and reconstructed part of existing catenary network, telecommunication and signalling systems and devices. Accordingly, the Consultant should determine the current state of the infrastructure capacities of the section on which work will need to be carried, and prepare the necessary technical documentation for the replacement of the superstructure and rehabilitation of the substructure part of the railway, for the parts in bad conditions. Existing documentation is available on the Project data room, accessible via URL



## 1.6 Objectives and scope of the Works

### A. Belgrade rail tunnels

Works in Belgrade railway tunnel include all necessary works for installation of noise suppression and noise mitigation measures for tunnels Vračar, Dedinje, Stadium and “link”. Works within tunnels and tunnel portal zones are expected to include:

- Survey works for transferring geodetic data and placement of geodetic markers,
- Eventual additional geology works,
- Works on rehabilitation/reconstruction of track superstructure,
- Works on installation of anti-vibration and noise suppression systems in ballast and/or substructure,
- Works on reconstruction/repair of drainage systems,
- Works on installation of cable troughs for optical and other cable infrastructure protection;
- Eventual replacement and/or relocation of installations,

Tunnel lengths and other basic information is presented in section 1.4 of this ToR.

The detailed scope of works shall be defined by the preliminary design(s) in full compliance with conditions presented in section 3.2 of this ToR, the location conditions issued by relevant authority and the technical conditions issued by IZS per submitted Preliminary solution.

### B. Reconstruction of railway section Pančevo bridge (including) – Pančevo main (excluding)

Works on reconstruction of railway section Pancevo bridge (incl.) – Pancevo main (excl.) on railway no. 107 Belgrade (Center) – Pancevo main – Vrsac – State border – (Stamora Moravita) are planned from start of entrance switch no. 5 in Pancevo bridge station in km 4+742,03 to start of switch no. 1 in km 15+478,14 towards Vrsac in Pančevo main station.

The objective of works is reconstruction of all parts of this section that haven't been included in recent reconstruction works, and are expected to include:

- Survey works for transferring geodetic data and placement of geodetic markers,
- Eventual additional geology works,
- Works on substructure and superstructure reconstruction in parts of all service points and parts of open track as follows:
  - All tracks in station Pancevo bridge;
  - Non-reconstructed track on section Pancevo bridge (incl.) – Pancevo Main (excl.)
- Works on reconstruction and upgrade of Electrical traction system parts that haven't been upgraded and/or reconstructed,
- Works on reconstruction and installation of new signalization and safety systems / interlocking systems and devices on the subject section,
- Works on installation of new and reconstruction of existing drainage systems,
- Eventual works on reconstruction/strengthening of existing engineering structures on track (culverts, bridges, embankments etc...),
- Installation of new technical protection systems (video surveillance, alarms etc...)

Detailed scope of works shall be defined by the preliminary design(s) in full compliance with conditions presented in section 3.2 of this ToR, location conditions issued by the relevant authority and the technical conditions issued by IZS per the submitted Preliminary solution.

## **2. Objective, purpose and expected results of the Services**

### **2.1 Definitions**

The “**Belgrade Tunnels**” is the rail tunnels in which rail line to be reconstructed, described in Section 1.4.

The “**Pancevo Bridge - Pancevo Main**” is the rail section to reconstructed, described in Section 1.5.

The “**Contract**” refers to the contract for design services for works on reconstruction.

The “**Contractor**” refers to the firm or Joint-Venture of firms that will execute the Contract.

The “**Consultant**” refers to the consulting firm/joint-venture to be selected through the present procurement process to undertake the Services.

The “**Services**” are described in Section 3;

The “**Works**” refer to the construction activities to be undertaken by a Contractor.

### **2.2 Objective of the Services**

The objectives of the Services are:

- 1) Preparation of the necessary technical documentation according to the article 145 of Law on planning and construction, i.e. **Preliminary Design** for reconstruction of the superstructure and rehabilitation of the substructure of the rail line in Belgrade Tunnels with the installation of the technical solution for mitigation of noise and vibration caused by railway traffic and Preliminary design for the reconstruction Pancevo Bridge – Pancevo Main section. Noise reduction alternative analyses is part of the scope of the Services. The technical documentation should be prepared at the required level to provide sufficient details necessary for obtaining the Decision for approval of works (per article 145 of law on planning and construction) and the preparation of the tender documentation for the selection of the Contractor;
- 2) Independent **external technical control of preliminary design** per Law on planning and construction, in regard to preliminary designs for reconstruction of linear traffic infrastructure.
- 3) Development of a Request for determining the **scope and content of the Environmental Impact Assessment Study** and preparation of the Environmental Impact Assessment Study according to the Serbian regulation;
- 4) Preparation of **Technical Specifications** and other technical elements as inputs to Tender Documents for procurement of Works;
- 5) Support of the Client in **evaluation of bids for procurement** of Works;
- 6) Supervision Services of execution of Works.

## **3. Scope of the Services**

### **3.1 General**

The Consultant shall carry out the specific tasks and activities as listed below and develop a well-functioning co-operation mechanism with MoCTI, the PIU and IZS/PIT on the basis of the following principles:

- a) Consultation and consent - the responsibilities for the general implementation of the Project are delegated to the PIU. MoCTI is the Client for this Contract. The PIU/MoCTI and the IZS through its nominated Project Implementation team (PIT) shall be involved in the decision-making processes regarding the Contract implementation and shall be kept informed in all stages related to contract(s) monitoring and implementation. IZS is the final beneficiary of the contract and they should be satisfied with all results and outputs. The cooperation with the final beneficiary will be sustained and managed by the PIU;
- b) The involvement of the IZS's PIT in the head office on the day-to-day activities together with the Consultant's staff is crucial;
- c) Efficiency - the cooperation with the IZS's PIT and PIU/MoCTI shall be designed to avoid any delay or discontinuity in the decision-making process or any dilution of the Consultant's responsibility.

The Consultant is required to prepare professional inputs, advice and support during execution of his tasks.

The Consultant is expected to perform the following activities within its contract, which are grouped into two phases: (i) Design Phase; and (ii) Works supervision.

### **3.2 Phase 1 – Design Phase (Lump-sum portion of the contract)**

It includes activities relevant to the development of Preliminary Designs and Environmental Impact Assessment Studies.

#### **Activity 1: Inception phase**

After the initial meeting with the representatives of PIU/MGSI and IZS, the first task of the Consultant will be to visit all sites, to get acquainted with specific areas, to meet with relevant stakeholders and to collect the necessary data.

IZS will provide the Consultant with all existing technical and other documentation. The information, data and documents collected will be included in the Inception Report, with a detailed description and assessment of the current situation.

The Inception Report will be proposed by the Consultant. The Inception Report will be a specific result of the Inception Phase and will present a general approach with an analysis of the project scope, based on available documentation and information gathered on site, a detailed program work plan and schedule for the completion of services, including the planned mobilization of experts, as well as planned site works, that may require IZS intervention/authorization. The Inception report should cover all the constraints and challenges identified by the Consultant and the ways to address them in order to complete the task on time.

## **Activity 2: Development of Preliminary Designs**

Preliminary designs will determine: purpose, position, shape, capacity, technical-technological and functional characteristics and appearance of works to be carried out; preliminary designs should include:

- General documentation,
- Textual documentation,
- Numerical documentation,
- Graphic documentation.

Rehabilitation works may entail different technical solutions for the Works. As needed and as part of this Preliminary Designs phase, in the form of reports or technical notes documents different from the design, the Consultant will prepare technical, implementation and cost analysis comparison among several possible technical solutions to be adopted. On this basis, the Client and Final Beneficiary will decide the solution to be adopted for the preliminary design.

All designs shall reflect conclusions and recommendations, and address all issues presented by the respective national Environmental Impact Assessments (EIAs), if applicable, as well as World Bank required Environmental and Social Assessments (ESAs) whether ESIA, ESMPs or ESMP Checklists.

For the development of the Preliminary Designs, the Consultant shall carry out the following activities;

### **I. Survey works**

**Geodetic survey works** shall include, but should not be limited to:

- establishing the geodetic base for surveying as an operational polygon, which will serve for initial and updated surveying, marking of temporary and permanent (fixed) points, while existing fixed points in tunnels can be used with adequate checks of its positional data,
- surveying and digitally recording existing terrain data, positions of all existing railway and nearby infrastructure, buildings, structures, visible installations and all other relevant objects,
- transfer of surveyed data into detailed geodetic survey maps with all surveyed points represented on a digital cadaster-topographic base,
- survey point coordinates aligned with the national coordinate grid,
- preparation of geodesy marking project and operational polygon as an integral part of the preliminary design,
- Cadaster-topographic bases with established an up-to-date borders of land owned by RoS managed by IZS (railway land area) in service points where the reconstruction is planned,
- performing of all other geodetic surveys for the purposes of preparing technical documentation,

**Geotechnical survey works** have been executed and detailed in the geotechnical elaborate within the preliminary project for construction of 2<sup>nd</sup> track completed in 2012, including

geotechnical results and geomechanical properties on existing track substructure, engineering structures and surrounding terrain. The geotechnical elaborate from preliminary design for construction of 2<sup>nd</sup> track is included in the project data room.

In relation to tunnel works design, geotechnical survey works shall be done, which shall include but not be limited to excavation of exploration pits (local term: istražni raskopi) on locations of all tunnel portals, in depths of 0.60 to 1.50m. The goal of this survey is to assess the condition of the existing substructure on portal entrances and determine the possibility of improvement of top substructure layers in relation to mitigating noise and vibrations from railway traffic. Results and conclusions shall be addressed within the geotechnical assessment.

Geotechnical survey works shall be completed for obtaining detailed and reliable geotechnical data on conditions and parameters required for design of the reconstruction of Pančevo bridge – Pančevo main section. Surveys shall include but not be limited to:

- exploratory drilling and sample collection
- excavation of exploration pits,
- eventual geophysics geoelectric surveys where needed
- static penetration
- detailed geotechnical core mapping
- laboratory geomechanical research,
- preparation of geotechnical bases and documentation

Indicative geotechnical survey works shall include, but not be limited to:

- minimum 2 explorations drills of min. 10m depth for embankment reconstruction from km 17 + 800 to km 17 + 950;
- minimum 1 explorations drills of min. 10m depth per 1km of track, for control of existing geotechnical elaborate results;
- exploration pits in depth 0,6m to 1.5m for every circa 300m of track, for control of existing substructure;

Stated quantities are indicative, and the quality of results in the geotechnical elaborate is the sole responsibility of the Consultant. Definite number and depth of exploration pits, drills, collected samples and other geotechnical works shall be defined in The Program of geotechnical works per all laws, by-laws, standards and good engineering practices. The program of geotechnical works shall be subject to approval by IZS.

Additional geotechnical survey works may be done by the Consultant, if deemed required by the Consultant or upon request by IZS or MoCTI/PIU. Additional surveys may include new exploratory drilling, exploration pits or other type of geotechnical surveys that would determine the required design solution(s).

Geotechnical elaborates shall include, but not be limited to:

- Detailed collected sample profiles;
- Relevant underground water levels presented in profiles and sections;
- Laboratory results;
- Conditions for structure foundations (for eventual new/reconstructed structures);

- Hydro-geological conditions;
- Conclusion with suggestions existing substructure reinforcement / rehabilitation.

Additional geotechnical surveys and/or laboratory research shall be done by the Consultant on request by IZS or MoCTI/PIU.

For these services, the consultant shall prepare OHS plan compliant to ESF, WB EHSR and national legislation before exploration activity commences, subject to PIU and WB approval.

## **II. Preliminary Solution**

The Preliminary Solution contains an overview of the planned concept of the infrastructure capacity of the rail line, with the presentation and list of all the data necessary to determine the Location Conditions. The purpose of the Preliminary Solution is to obtain Location Conditions.

The Location Conditions are a legal document obtained for the purpose of determining all urban planning, technical, and other conditions for preparation of the technical documentation, which define the possibilities and limitations of the subject location for construction, i.e. upgrading of the facility, or execution of work envisaged in the Preliminary Design. The competent authority issues, or acquires from the holder of public authority, only those conditions which, according to the class and intended use of the facility, are relevant for the construction, i.e. execution of works.

The Consultant is obliged to prepare:

- Preliminary Solution for the works planned in the Belgrade Tunnels,
- Preliminary Solution for the works planned on the section Pancevo Bridge - Pancevo Main.

Location conditions will be obtained by IZS on the basis of Preliminary Solution prepared by the Consultant and the existing planning documentation.

## **III. Preliminary Designs**

### **A. Belgrade Tunnels**

The Consultant will adhere to the following general and special design conditions when preparing this Preliminary Design:

#### **1) General conditions**

- The Preliminary design shall define technical solutions for the reconstruction of the railway tracks in Belgrade Tunnels for the load category D4 (225 kN, 80 kN/m);
- The preliminary design shall define all anti vibration and noise suppression measures per applicable regulations, standards and;
- All contents defined by the Preliminary Design should be planned on “railway land”;
- All intersection of the rail line with the existing and planned installations of water supply, sewerage, power lines, telecommunication installations and mechanical installations should be designed in accordance with the legal regulations and technical conditions of the holder of public authorizations;

- All technical solutions must be designed so that it can be executed in regime of works execution under traffic, i.e. without complete closure of traffic on the rail line;
- Bill of quantities and other estimates must be expressed in dinars and euros;
- The Consultant is obliged to obtain all necessary conditions and consents of the competent authorities and companies;
- Designs must be developed and consider the relevant national environmental, occupational and community health and safety regulations, World Bank labor management procedures and World Bank EHSR where the stricter ones prevailing. Also, World Bank recommendations on Climate Change impact minimization need to be accounted for in designs as well as construction's resistance to natural disasters and impacts attributable to Climate Change. Resulting design must be in line and take into account, measures and recommendations documented in the national EIA and World Bank ESIA, which will be prepared in parallel with Preliminary Design.

## **2) Specific Conditions**

### ***Traffic organization and technology***

- Analysis and technical description of the current state of infrastructure and service points,
- Overview of the existing volume of passenger and freight trains and the volume of passenger and goods transport for the previous period;
- Analysis of existing traffic and train circulation (operations);
- Planned organization of traffic and train circulation;
- Technical-technological requirements from the aspect of traffic organization during the execution of works, which will be harmonized with the proposed dynamics of works. The anticipated dynamics of works should envisage alternating intervals of works and train traffic. The Consultant will propose relevant scenarios, depending on sections or subsections considered, in terms of dynamics of execution of works and evaluate it in accordance with the impact on the traffic, cost of site organization and execution of works. The proposed dynamics should be approved by the PIU and IZS;
- Graphic presentation of the traffic and train operations impact and restrictions.

### ***Substructure and superstructure***

- Define the centreline, vertical alignment and all other track geometry parameters for originally designed train speeds fully conforming with existing tunnel geometry and eventual constraints of each specific tunnel ;
- substructure shall be planned for rehabilitation per parameters stated in the geotechnical survey elaborates, for loads of a D4 category railway track (225 kN, 80 kN/m), with special consideration of geotechnical parameters of existing substructure layers;
- substructure formation shape shall be kept in original or strengthened per typical cross section dimensions for D4 category main railway in tunnels and open track,
- substructure formation materials shall be planned economically justifiable and from nearby borrow pits, quarries and other sources as to avoid unnecessary transportation costs;
- Substructure design shall include installation of antivibration measures to abate the level of noise and vibrations from trains circulation in tunnels. The Consultant will propose different technical solutions and compare them in a cost-benefit analysis,

including on noise/vibration abatement levels resulting from these different technologies. The . Antivibrations measures to be planned conformant with each tunnels geometric and structural constraints,

- Antivibration measures shall be planned for either ballasted track or concrete slab track, separately for each individual case,
- Fastening stiffness shall conform to designed antivibration measures, and shall be designed for each individual case,
- detailed static calculations and checks shall be done in accordance with the applicable regulations and standards for all engineering and substructure objects such as culverts, and other similar structures concluding if existing structure conforms with reconstructed track parameters;
- Superstructure shall be designed and planned for complete reconstruction with appropriate type of rails pre-stressed concrete sleepers, elastic fastenings in category 1 crushed stone ballast, or as a concrete slab track with appropriate fastening systems, especially relating to designed antivibration measures. The design shall include complete replacement of superstructure elements of the track (rails, sleepers, fastening, ballast);
- Tracks will be designed as CWR track on the full length of the subject railway sections; CWR track design shall be an integral part of each tunnel design with special consideration for measures regarding track installation on all critical places regarding differing/fluctuating temperature parameters;
- Switches in the triangle Junction Karadjordjev Park - Junction Dedinje shall be planned for replacement in accordance with relevant standards and rulebooks to enable the most suitable functioning, specifically using simple switches and simple switch track connections;
- Switches shall be designed as welded in CWR track;
- Installation of new cable troughs for placement and protection of optical and other cable infrastructure for future installation of ETCS shall be included in the design, preferably around ballast level (if tunnel profile dimensions allow);
- Investigate the possibility and propose a technical solution for the reconstruction of passenger platforms in the stations/stops “Karadjordjev Park”, “Vukov Spomenik” and “Pancevacki most” and adaptation to the height of 55 cm.

### ***Hydrotechnical investigation works***

Substructure and track bed drainage shall be designed to fully conform with applicable standards and good engineering practices, especially for tracks in tunnels, using parameters of existing substructure and drainage parameters stated in geotechnical survey elaborate.

As part of Preliminary Design, the reconstruction of facilities that are in the function of track bed drainage should be planned for existing geometry conditions of the rail line, as to avoid any change to their individual geometry and especially avoiding any works beyond boundaries of “railway land”. If this proves not feasible, the existing conditions may be maintained, with direct consent by the PIU/MGSI and the IZS for each individual case.

### ***Cost estimates***

Cost estimates prepared based on Preliminary design and BoQ (to be a deliverable separated from the Preliminary design). Cost estimates shall be separated relevant subsections (units of works) and per types of interventions (civil works, track, electrical, etc.)



## **B. Pancevo Bridge – Pancevo Main**

The Consultant will adhere to the following general and special design conditions when preparing the Preliminary Design:

### **1) General conditions**

- The preliminary design shall define technical solutions for the reconstruction of the rail line and its return to the design condition for the load category D4 (225 kN, 80 kN / m);
- All works defined by the Preliminary Design should be planned exclusively on “railway land”;
- All intersection of the rail line with the existing and planned installations of water supply, sewerage, power lines, telecommunication installations and mechanical installations should be designed in accordance with the legal regulations and technical conditions of the holder of public authorizations;
- All technical solutions must be designed so that it can be executed in regime of works execution under traffic, i.e. without complete closure of traffic on the rail line;
- Bill of quantities and other estimates must be expressed in dinars and euros;
- The Consultant is obliged to obtain all necessary conditions and consents of the competent authorities and companies;
- Designs must be developed and consider the relevant national environmental, occupational and community health and safety regulations, labor management procedures and, WB EHSR where the stricter ones prevailing. Also, WB recommendations on Climate Change impact minimization need to be accounted for in designs as well as construction’s resistance to natural disasters and impacts attributable to Climate Change. Resulting design must be in line and take into account, measures and recommendations documented in the national EIA and WB ESIA, which will be prepared in parallel with Preliminary Design.

### **2) Specific Conditions**

#### ***Traffic organization and technology***

- Analysis and technical description of the current state of infrastructure and service points;
- Overview of the existing volume of passenger and freight trains and the volume of passenger and goods transport for the previous period;
- Analysis of existing traffic and train circulation (operations);
- Planned organization of traffic and train circulation;
- Technical-technological requirements from the aspect of traffic organization during the execution of works, which will be harmonized with the proposed dynamics of works. The anticipated dynamics of works should envisage alternating intervals of works and train traffic. The Consultant will propose relevant scenarios, depending on sections or subsections considered, in terms of dynamics of execution of works and evaluate it in accordance with the impact on the traffic, cost of site organization and execution of works. The proposed dynamics should be approved by the PIU and IZS;
- Graphic presentation of the traffic and train operations impact and restrictions.

#### ***Substructure and superstructure***

- Define the centreline, vertical alignment and all other track geometry parameters conforming with parameters on the constructed 2<sup>nd</sup> track;
- The design shall include reconstruction of all parts of non reconstructed track on section Pančevo bridge – Pančevo main; Works on recently reconstructed track are not to be included in scope of this project
- The design shall cover the replacement of superstructure and substructure reinforcement and/or replacement in the following service points:
  - Krnjača Station - the first station track and the second left transit track
  - Ovča Station - first station track, second left transit track, right transit track and fourth station track
- substructure shall be designed for rehabilitation per parameters stated in the geotechnical survey elaborates, for loads of a D4 category railway track (225 kN, 80 kN/m), with special consideration of geotechnical parameters of existing substructure layers;
- substructure formation shape shall be strengthened per typical cross section dimensions for D4 category main railway lines;
- substructure formation materials shall be planned economically justifiable and from nearby borrow pits, quarries and other sources as to avoid unnecessary transportation costs;
- Design must include the reconstruction of the railway embankment, on the right track, from km 17 + 800 to km 17 + 950 and eventual other parts, depending on the measures defined in geotechnical survey results;
- detailed static calculations and checks shall be done in accordance with the applicable regulations and standards for all existing engineering and substructure objects that haven't been covered by designs for the 2<sup>nd</sup> track, concluding if existing structure conforms with reconstructed track parameters;
- Superstructure shall be designed and planned for complete reconstruction with appropriate type of rails pre-stressed concrete sleepers, elastic fastenings in category 1 crushed stone ballast. The design will include complete replacement of superstructure elements of the track (rails, sleepers, fastening, ballast)
- The design shall include installation of rail rubricants where deemed necessary per applicable standards;
- The design shall include replacement of switches no. 8 and 9 at Pancevo bridge;
- Superstructure on level crossings will be designed for reconstruction and replacement, with keeping existing equipment and safety systems; Road structure on RLC (panels or other types) shall be designed as kept or planned for replacement depending on condition of each RLC;
- Existing passenger platforms in Pancevo bridge service point shall be planned for reconstruction and replacement from existing 96cm height to 55cm height platforms;
- Tracks will be designed as CWR track on the full length of the subject railway sections;
- Switches shall be designed as welded in CWR track;

### ***Bridges and culverts***

- The preliminary design shall include replacement of steel culverts with concrete culverts with open track in gravel, with same parameters as constructed culverts on works on construction of the 2<sup>nd</sup> track on this railway section;

- on Pančevački most – Krnjača section, on the left track, the design will include replacement of the existing underpasses (underpasses in km 6 + 644 and km 6 + 852), applying the same technical solution as on the newly added 2<sup>nd</sup> track;
- works on "Tamis Bridge" on the right track shall include new anticorrosive protection of the steel lattice structure.

### ***Hydrotechnical works***

Substructure and track bed drainage shall be designed to fully conform with applicable standards and good engineering practices, especially regarding existing track drainage for newly built 2<sup>nd</sup> track on this railway section, and using parameters of existing substructure and drainage parameters stated in geotechnical survey elaborate.

As part of Preliminary Design, the reconstruction of facilities that are in the function of draining the rail line should be envisaged under the conditions that the geometry of the rail lines does not change and does not go beyond the boundaries of the railway land. If this proves not feasible, the existing conditions may be maintained, with the consent of the PIU/MGSI and the IZS for each individual case.

### ***Electro technical works***

The design shall include the reconstruction of the 25kV, 50Hz catenary network on the railway section Pancevo Bridge (inclusive) - Pancevo Main (exclusively). For design speed of up to 120 km/h, it is necessary to develop design of reconstruction of the existing catenary network only on parts with old hanging equipment with porcelain insulators, which were not reconstructed during the construction of the second track Pancevo Bridge - Pancevo Main.

### ***Works on signalisation-safety systems***

Envisage reconstruction of the signal-safety by replacement of the existing electro relay devices for securing stations and the automatic block signalling (ABS) with new electronic devices with the corresponding HMI (Human-Machine Interface) with punctual control of the rail block occupancy. Design for the reconstruction of the signal-safety system should include:

- Service points Pancevo Bridge, Krnjaca and Ovca as well as ABS sections Pancevo Bridge - Krnjaca, Krnjaca - Ovca and Ovca – Pancevo Main should be equipped with conventional electronic signal safety devices with visual signals and track devices for punctual control of train speed, which enable the speed of trains equipped with the locomotive part of auto stop devices (auto stop system I-60) at speeds up to 120 km/h;
- Provide for the replacement of existing axle counters with an axle counter system and electronic wheel detectors;
- Provide for the replacement of existing electrical relay devices at rail level crossings with a device made in electronic technology or a combination of electronic and relay technology;
- Envisage the abolition of the rail level crossing at the inter-station distance Ovca - Pancevo Main.
- Provide interfaces and station equipment (hardware and software) in electronic settings that will enable the connection of electronic settings to the transmission system that should connect electronic settings with the Traffic Control Centre (CTC) and the Center for monitoring the operation of signalling devices;

- In all official places replace all existing signal and power cables with new cables with appropriate cross-sections, number of cores and other parameters necessary for the smooth operation of signal safety devices;
- Envisage new LED modules instead of the existing ones on all light signals;
- Replace existing signal cabinets with new signal cabinets and new equipment on all signals;
- On all main signals it is necessary to envisage new induction magnets 1000/2000 Hz with the associated equipment;
- On all installed switches planned through this ToR it is necessary to install a new switch device with accompanying accessories;
- In all official places, envisage the installation of devices for electric heating of switches with power supply from the overhead catenary line. For all switches, the installation of longitudinal heaters should be envisaged, and for switches on running tracks, the installation of transverse heaters. The switch heating system is envisaged as a SCADA system with a central dispatch terminal, station terminals and control cabinets per station;
- Replace the existing 80 m wheel detectors, which are used to block the resolution of the driving route and train announcement, with new electronic wheel detectors;
- Provide uninterruptible power supply systems in official places where the existing power supply device is replaced with a new power supply device. Provide the necessary voltages from static converters and rectifiers with redundant design according to the "1 of 2" principle with a static switch.
- Provide interfaces in stations from which other lines are separated, in order to achieve inter-station dependencies with neighbouring stations on those lines that are separated from the main line, and with stations on the existing line, which are provided by other technology;
- As part of the works in all official places on existing buildings where signal safety devices are located, envisage adaptation of premises intended for installation of new signal safety devices in accordance with existing standards and regulations applicable to installation of this type of equipment;
- With this project, it is necessary to pay attention not to create unnecessary restrictions for the subsequent, independent project of introducing ETCS on the line Belgrade Center - Pancevo Main - Vrsac - state border - (Stamora Moravita), when the conditions are met.

### ***Telecommunication works and IT system***

Works within the reconstruction of the telecommunications system should include:

- General conditions for storage of telecommunication equipment and information-communication equipment and cable infrastructure;
- Provide dispatch and rail systems in all official places with new integrated digital cellular and central dispatch telephone devices (central devices, anti-vandal telephones, TC desks), in accordance with the requirements of traffic technology as well as signal-safety and electricity requirements. Provide registers of appropriate capacity in official places in accordance with the Traffic Technology.
- The design shall include the replacement of all railway radio stations and power supplies (rectifiers and accumulators) while maintaining the existing antenna systems on the railway section from Pancevo Bridge to Pancevo Glavna, as well as the replacement of the railway radio station at the Belgrade Center station.

- Provide an SDH (Synchronous Digital Hierarchy) system (if the project proves to be necessary for electrical power plants as well) and an IP data transmission system as two special options for the transmission network.
- Provide the necessary equipment, materials and works for the realization of temporary telephone connections for traffic regulation after the disconnection of SS devices and dismantling of station railway telephone devices for proven agreement of traffic staff. In accordance with the requirements of traffic technology.
- Provide for the replacement of the existing system with a modern digital system for sound information of passengers based on IP technology, which will serve to provide information on the timetable (arrivals and departures of trains, their delays, arrival / departure track, train composition).
- Provide a system for visual information of passengers based on IP technology and equipment, which will serve to provide information on the timetable (arrivals and departures of trains, their delays, arrival / departure track, train composition...). Provide a monitoring system for monitoring / supervising the correct operation of the information board system with all its elements.
- Provide a clock system based on IP technology and equipment in stations.

### ***Technical protection systems***

- The design shall include works and materials for installation of technical protection systems (video surveillance, alarm system, access control, fire alarm system, landslides, etc.) in accordance with applicable laws, regulations and standards. Apply technical protection systems to critical locations:
  - Bridges,
  - Stable electric traction plants,
  - Railway station facilities/stops,
  - Station area (Switches, signals, track chokes, balises, rail power and relay heads, axle counters, telephones, power stations, etc.)
  - Road level crossings,
  - Radio dispatch base stations and houses,
  - As well as other facilities that may affect traffic safety.
  - Equip official places with a fire alarm system.
- Provide a video surveillance system based on IP technologies and equipment.
- Provides a server information system for business applications, backups, computer network server systems and network control systems.

### ***Cost estimates***

Cost estimates prepared based on Preliminary design and BoQ (to be a deliverable separated from the Preliminary design). Cost estimates shall be separated relevant subsections (units of works) and per types of interventions (civil works, track, electrical, etc.)

### **C. Documentation basis**

The documentation basis for preparation of Preliminary Designs shall be:

- General regulation plan for the construction area of the local self-government unit - City of Belgrade (units I – XIX) (“Official Gazette of the City of Belgrade” No. 20/16)
- Law on Railways ("Official Gazette of RS" No. 41/2018).

- Law on Safety in Railway Traffic ("Official Gazette of RS" No. 41/2018).
- Law on Interoperability of the Railway System ("Official Gazette of RS" No. 41/2018).
- Law on Planning and Construction, "Official Gazette of RS", No. 72/2009, 81/2009 - corrigendum, 64/2010 - decision of the US, 24/2011, 121/2012, 42/2013 - decision of the US, 50/2013 - US decision, 98/2013 - US decision, 132/2014, 145/2014, 83/2018, 31/2019, 37/2019 - other law, 9/2020 and 52/2021).
- Law on Safety and Health at Work ("Official Gazette of RS", No. 101/2005, 91/2015 and 113/2017 - other law).
- Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/2004 and 36/2009).
- Law on Environmental Protection "Official Gazette of RS", No. 135/2004 and 36/2009 36/2009 - other law 72/2009 - other law, 43/2011 - decision US, 14/2016, 76 / 2018, 95/2018 - other law and 95/2018 - other law).
- Rulebook on the content, manner and procedure of preparation and manner of control of technical documentation according to the class and purpose of the facility ("Official Gazette of RS", No. 73/2019)
- („Official Gazette of the Republic of Serbia“, no 69/2005);
- Rulebook on the content and scope of Preliminary works, Prefeasibility and Feasibility Study („Official Gazette of the Republic of Serbia“, no 1/2012).
- Rulebook on technical conditions and maintenance of the railway substructure ("Official Gazette of RS", No. 39/2016 and 74/2016)
- Rulebook on technical conditions and maintenance of the railway superstructure ("Official Gazette of RS", No. 39/2016 and 74/2016)
- General regulation plans and detailed regulation plans for the subject area.
- Main Design of construction of the second track of the railway Belgrade - Pancevo - Vrsac - state border, section Pancevo Bridge - Pancevo Main.
- All available technical documentation of the rail lines on the territory of the Belgrade railway junction and projects of constructed conditions.
- Data on underground installations of "Infrastructure of the Serbian Railways" JSC;
- Existing documentation for capital repair and rehabilitation works;
- WB Environmental and Social Framework, including relevant E&S Standards, WB EHSG and GIIP;
- Project Environmental and Social Management Framework and Labor Management Procedures;
- All other applicable laws, by-laws, standards and regulations related to the subject of the project, fire protection, regulations related to safety and protection at work.

#### **D. Review and approval**

Preliminary designs shall be made for the purpose of obtaining the Decision on approval of works per article 145 of Law on Planning and Construction, "Official Gazette of RS", No. 72/2009, 81/2009 - corrigendum, 64/2010 - decision of the US, 24/2011, 121/2012, 42/2013 - decision of the US, 50/2013 - US decision, 98/2013 - US decision, 132/2014, 145/2014, 83/2018, 31/2019, 37/2019 - other law, 9/2020 and 52/2021). The Consultant shall engage an independent company with adequate licences to complete the independent technical design review of the Preliminary design per Law on planning and construction, specifically in regard to articles for designs of reconstruction of linear infrastructure.

The Consultant shall provide the independent technical control report in a timely manner, per all regulations, standards and good engineering practices. The Consultant is obliged to timely and without additional costs eliminate all deficiencies in the Preliminary Design, according to the findings of the technical control.

Form of the technical review report shall be completed per all applicable regulations for obtaining the Decision for approval of works per article 145. of Law on planning and construction.

Preliminary designs with the technical review reports shall be made in four (4) printed copies in Serbian and four (4) copies on CD, in Serbian and English, and submitted to the IZS and PIU/MGSI. The documentation on the CD must be identical to the printed copies in terms of pre-presentation, content and order of data. All drawings, textual and graphic attachments submitted on the CD must be submitted in \* .pdf format and open files (\* .doc, \* xls, \* .dvg, \* .mpp, ...) with all models of the situation in The DVG format must be in the national (spatial) reference system.

#### **Activity 4: Preparation of Environmental Impact Assessment studies for works in tunnels and for works on the section Pancevo Bridge - Pancevo Main**

The Consultant is obliged to prepare two separate Environmental Impact Assessment studies according to the Serbian regulation for works in Belgrade tunnels and Pancevo Bridge – Pancevo Main station which will outline the main procedures and responsibilities to manage environmental and social risks associated with the implementation of the Project activities.

This shall include:

- Development of the **Request for determination of the scope and content**, in accordance with the Rulebook on the content of the request on the need for impact assessment and the content of the request for determination of the scope and content of the Environmental Impact Assessment Study ("Official Gazette of RS", No. 69/05) and Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09);
- Preparation of **Environmental Impact Assessment Study**;
- Development and participation in the procedure of adoption of the **Environmental Impact Assessment Study**, in accordance with the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09), Rulebook on the content of the Environmental Impact Assessment Study ("Official Gazette of RS", No. 69/05) and the Decision on determining the scope and content of the Environmental Impact Assessment Study issued by the competent body for Environmental protection.

The Consultant is obliged to, timely and at its own expense, to eliminate all deficiencies in the Study on Environmental Impact Assessment, according to the findings of the competent authority that issues the consent to the subject study.

#### **Activity 7: Technical support to procurement of Works**

In this phase, the Client will undertake a procurement process to hire a Contractor able to carry out the execution of the Works. Supporting the Client in this effort, the Consultant will:

- Draft the Employers Requirements and Technical Specifications for the bidding documents, based on a template to be provided by the Client, to contract the Contractor for the execution of the Works;
- Propose qualification criteria for the Works bidding documents;
- Support the Client to respond to questions received from prospective bidders during the procurement process;
- Support Client during evaluation the technical and financial proposals received from bidders. The support will include analysis of: conformity to the technical specifications, analysis of method statements, analysis of implementation schedule, team proposed, assessment of proposed unit prices, comparison to benchmarks.

### **3.3 Phase 2 - Supervision and Works Contract administration (Time-based portion of the Contract)**

The Consultant shall carry out full supervisory services during construction of works.

For this purpose, the Consultant shall set up an adequate organization, including monitoring systems, to meet requirements for an efficient construction supervision and administration. In the performance of duties, the Consultant shall ensure that the Works Contract brings the construction works to completion within the approved time, quality and budget in accordance with the requirements of the wWorks contract.

The Consultant shall be required to establish and follow detailed supervision procedures based on sound international practice to monitor the completion of the Works Contract within the agreed program and budget and to the quality standards and environmental provisions stipulated in that contract.

The Consultant shall perform his duties or act:

- proactively, where the initiative lies with the Consultant in administering the Works Contract;
- reactively, in response to the Contractor's or the IZS and MoCTI/PIU requests and
- passively, in observing the requirements of the Works Contract.

Wherever appropriate and not in conflict with the Works Contract, the Consultant shall exercise every reasonable care to protect the interests of the IZS and MoCTI/PIU.

The Consultant will comply his activities with the provisions of both the Law on Planning and Construction (Official Gazette of RS No. 72/221A9, 81/221A9 - corrigendum, 64/2010 - decision US, 24/2011, 121/2012, 42/2013 - decision US 50/2013 - decision US, 98/2013-US, 132/2014, 145 / 2014, 83/2018, 31/2019, 37/2019, 9/2020 and 52/2021) and the Rulebook on the content and method of conducting the site supervision ("Official Gazette of RS", No. 22/2015 and 24/2017).

Generally, scope of services shall include, but should not limited to, the following:

- Supervision of all activities of the Contractor in all aspects of fulfilment of its obligations, responsibilities and actions taken in relation to the performance of Works Contract obligations and timely completion of the same. Also, supervision has to be carried out in line with WB ESIA and the Provisions of the ESF, including already



prepared instruments (ESMF, project level SEP, project level LMP) and site-specific instruments that will be prepared for this subproject: ESIA, subproject level LMP, subproject level SEP and RAP;

- Issuing of Commencement Order for works;
- Daily supervision of works, checking whether works are performed according to technical documentation, specifications and standards. The control includes monitoring the Contractor's activities on and off the construction site, as well as inspecting the environment, which may, directly or indirectly, be endangered by the contractor's activities. Also, the inspection includes the Contractor's equipment for performance of works, safety of works, property, personnel and third parties;
- Control of the Contractor regarding the implementation of environmental protection measures, occupational, health and safety measures, as well as ensuring compliance with recommendations and requirements of traffic safety during the contract;
- Monitoring implementation of World Bank Environmental and Social Management Plans and (based on observations and results) preparing environmental and social compliance monthly report for PIU;
- Preparation of all documents, especially technical and financial documents, relevant for the execution of the contract or decision-making, for the needs of the PIU/MoCTI and IZS;
- If any disputes arise during the term of the Works Contract, providing the necessary evidence, analysis and testimony to represent the interests of the PIU/MoCTI and IZS;
- Check the status of implementation of environmental protection measures in accordance with the requirements defined by the Construction Permit Design and the Construction Design;
- Pre-approval of the interim payment application and sending it to the IZS and PIU for the final approval;
- Attend the taking over and final taking over committee;
- And other activities necessary for successfully execution of the works.

The supervision of the Works shall be implemented in compliance with the requirements of the relevant legislation and World Bank environmental and social requirements. Taking that into account, the Consultant should have a license indicating the eligibility to act as a Supervisor in RoS for civil and electro-technical works.

Within this Phase, the Consultant shall be responsible for:

### **Activity 1: Pre-construction activities**

These activities will initiate with the award of Works Contract and ceases with the commencement of the implementation. Most of the pre-construction activities (reviews, time and activity planning etc.) will be performed in the main office in Belgrade.

#### **Sub-activity 1: Supervision of Construction designs preparation**

The Contractor may sub-divide the Construction design of the structure into design packages in accordance with the type and schedule of works. Every design package or whole Construction design will be submitted in advance to Consultant for acceptance. The design packages must relate to the significant and clearly identifiable parts of the Construction Permit Design and shall address the design requirements as described herein. The design packages shall facilitate the review and understanding of the Construction Permit Design as a whole and shall be produced and submitted in an orderly, sequential and progressive manner.

During the Supervision of preparation of Construction Designs, the Consultant shall carry out the following activities but not limited to:

- Monitoring the preparation and control of compliance of the Construction Design with the construction permit, the Construction Permit Design and with all relevant laws, standards, regulations and other documents that define the content and scope of the project;
- Ensure all designs are compliant to finalized WB Environmental and Social Assessments and applicable environmental legislation;
- Control that all parts of the designs are mutually harmonized and whether designs solutions can be implemented on the site;
- Control whether the project specifies technical measures for environmental protection and prevention of harmful effects on land and facilities in the environment during the implementation of the projected works and later during the exploitation phase;
- Control of whether the requirements regarding traffic safety are met;
- Control of the characteristics of the materials proposed within the projects from the aspect of justification and adequacy;
- Check whether the technical conditions for the executions of works for each item contain a description of the quality control methods of applied materials and work performed, which clearly and precisely states the tests to be performed and the criteria to be met;
- Approve Construction Designs in written and inform the Contractor

The Consultant shall complete this activity in duration of one month from receiving the final and finished version of the Construction Design from the Contractor.

## **Sub-activity 2: Other Pre-construction activities**

Within this, the Consultant shall:

- Ensure that all Consultant's Representatives in the sites are prepared to act with a common approach and performing the activities in the same manner and in accordance with the rules and procedures of the Project;
- Prepare detailed time and activity schedule (supervision plan), for easy monthly (minimum) updating throughout the duration of the contract and with reference to reporting requirements;
- Assess the site conditions, related legislation, related technical standards and institutional state of the key stakeholders;
- Evaluate and scrutinize the relevant documentation;
- Mobilize and set-up the site offices at the premises to be Envisaged by the Contractor as indicated in the works contract;
- Ensure proper introduction and training of all relevant staff;
- Confirm the responsibilities and duties of the supervisory staff with the MoCTI, IZS and the contractor;
- For works contract signed or taken-over mobilize the supervision staff to the site;
- Ensure/check that all activities/formalities and in particular all Supervisor's responsibilities are fulfilled prior to the works are carried out or started up for works contract signed or taken-over, such as insurance of works, detailed Implementation Program, Notice of Commencement Order, approval of contractors representative and other staff, approval of sub-contractors, suppliers (of works contract), supply of

documents of contractors, data for setting-out, safety on site, machinery and equipment used in the construction works, approval of means and format of the communication and reporting;

- Hold kick-off meeting with the IZS, PIU and the contractor and keep the minutes of the meeting;
- Agree to regular site meetings, weekly, monthly meeting formats and attendance,
- Agree on timing and commencement of the works;
- Supervise implementation of environmental, occupational, health and safety (OHS) and community safety related activities as outlined in the ESMF of the Project and further defined in the Environmental and Social Management Plan (ESMP), required by the WB E&S Policies and the relevant national regulation;
- Report regularly on E&S compliance and implementation of ESAs.

### **Activity 2: Construction activities**

The Consultant shall carry out full supervision services during construction of the works, supporting IZS and MoCTI/PIU.

This phase will commence at the Commencement Date of the work contract and will continue until the temporary acceptance.

The Consultant's services will include but not be limited to:

- Overall day-to-day supervision, including, but not limited to, management and planning, cost and quality control, reporting and monitoring physical and financial progress of the works contract and related activities;
- Organization of monthly site meetings, and ad hoc site meetings, whenever necessary, with the contractor and other related parties (IZS, PIU/MoCTI, Municipality, etc.), if any, to monitor the progress of works to ensure sound and timely completion of the works in the desired quality;
- Carry out quantity surveys to verify the progress of the works;
- Checking of the quality of executed works, quality of built-in materials and installed equipment, all test runs of completed works along with the tests proving the achievement of guaranteed parameters set out in the works contract(s) and all related activities taken by the contractor(s), checking quality certificates, approvals, statement of compliance, certificates, guarantees etc.;
- Prepare post-contract documentation, checking the contractor's invoice(es), that amounts claimed have actually incurred in accordance with the requirements of the works contract, issuing the certificates of payment, variation orders, taking-over certificates, payment certificates, performance certificates etc.;
- Follow-up on cash flows and monthly progress time schedules;
- Control the Contractor's setting out of the works, review and approve the as-built drawings by the contractor post construction activities;
- Review and approve the testing plans, performance test and commissioning plans in accordance with the conditions of the works contract;
- Settlement of disputes amicably;
- Cooperation in work with representatives of government bodies and other authorized persons, who are responsible for affairs related to the construction in question;
- Cooperation with representatives of the owners of installations that need to be protected, relocated or cancelled during the execution of works;

- Prepare and submit Progress Reports (weekly, monthly) which includes progress reporting, photos, physical and financial progress schedules, minutes of meetings related to the reporting period;
- Supervise compliance by the Contractor of the rail traffic safety procedures;
- Supervise implementation of and monitor Contractor's compliance with environmental, OHS and community safety related activities as outlined in the ESMF and LMP of the Project and further defined in the ESMP, required by the WB ESF standards and the relevant national regulation;
- Report regularly on E&S compliance and implementation of ESA;
- Report in a timely manner to the Client of possible non-compliance;

### **Activity 3: Installation activities**

The Consultant's Services will include but not be limited to:

- Monitoring and ensuring timely purchase and delivery of the equipment at the specific installation site,
- Acceptance of equipment delivered from the plant to the specific installation site,
- Quality control of installation performed,
- Check-up of documents availability,
- Check-up of completeness of equipment in accordance with packing lists,
- Check-up of completeness of spare parts and accessories in accordance with documents,
- Check-up of components, assembly parts and materials,
- Check-up of delivered equipment integrity,
- Compliance of foundation (bottom) for mounting of equipment,
- Control of the quality of installation,
- Visual inspection of assembly and check-up of the whole equipment,
- Testing of the equipment,
- Set out basic principles for the safe and reliable operation of equipment as a reference for the Contractor(s) to prepare his O&M manual,
- Check-up integration of new, installed equipment into existing system,
- Supervise implementation of environmental, OHS and community safety related activities as outlined in the ESMF of the Project, Labor Management Plan and further defined in ESMP of the sub-project, required by the WB ESF standards and the relevant national regulation.
- Report regularly on E&S compliance and implementation of ESAs.

### **Activity 4: Completion and hand-over activities**

The Consultant's Services will include but not be limited to:

- Carry-out the technical inspections, tests and verifications prior to Works Contract milestones and Client acceptance;
- Carry out the taking-over inspections;
- Control, approve and compile the As-Built documents prepared by the Contractor;
- Providing assistance in the work of the Commission for handover of works; preparation of documentation and participation in the work of the Commission for final settlement;

- Supervision over the works on elimination of deficiencies according to the remarks of the Commission for technical inspection of works.

## **5. Location and timing**

### **5.1 Location**

During Phase 1, the Consultant is obliged to establish an operational base in Belgrade.

During Phase 2, following the establishment of an on-site office, the Contractor will provide additional facilities for the Consultant's staff.

### **5.2 Commencement date and period of implementation**

The intended commencement date is April 2023, but the actual commencement date will be defined with the signature of the Contract. The period of implementation of the Contract will be 34 months starting from the start date, but no later than December 31, 2026, as the end date of the Project. That is, the duration of Phase 1 - Design is planned to be **14 months** starting from the commencement date. The duration of Phase 2 – Supervision and Works Contract administration is estimated at **20 months**.

The Consultant will carry out the Services in line with a detailed time schedule to be submitted as part of his proposal.

## **6. Consultant requirements**

### **6.1 Personnel**

The firm shall establish its Team in accordance with the needs and requirements of this ToR. The Team shall consist of a core team of key experts with the qualifications and skills defined in the Table 3 below and non-key experts, as needed.

The firm is obliged to ensure adequate staff in terms of expertise and time allocation, as well as needed equipment in order to complete the activities required under the scope of work and to achieve the objectives of this Contract in terms of time, costs, and quality. The Consultant is expected to be flexible in terms of travelling.

All experts shall be independent and free from any conflicts of interest in the responsibilities have appropriate licenses issued by the MoCTI.

Note that staff of the public administration of the beneficiary country (Republic of Serbia) cannot be proposed as experts.

The Project language is English. All the team members assigned by the Consultant must be able to communicate effectively in English. A sufficient number of the Consultant's team should be fluent in Serbian language.

The Consultant shall provide adequate administrative staff (secretary, translators, drivers accountant) needed to support the expert team.

### 6.1.1 Key experts

The team should include key experts with the qualifications and experience listed below, as well as non-key experts, if necessary, and as a minimum, the Consultant shall provide the following experts:

*Table 3 Key experts for the assignment*

Title	Qualifications/Experience	Skills
<b>Phase 1 – Design Phase</b>		
<b>Team Leader – Design phase</b>	<p><b>Education:</b> Have as a minimum MSc Degree in civil engineering or another relevant field;</p> <p><b>Relevant professional experience:</b> At least 15 years of general experience; at least 7 years of relevant experience in preparation technical documentation for the railway sector; Experience as a team leader/main designer in successful design of at least 2 railway projects related to designs of (re)construction/rehabilitation of railway track, investment value of minimum 10 million euros each.</p>	<p>Excellent command of the English language. Computer literacy. Knowledge of Serbian language will be an advantage</p>
Railway Civil Engineer	<p><u>Education:</u> Have as a minimum MSc Degree in civil engineering or another relevant field;</p> <p><u>Relevant Professional Experience:</u> Experience: at least 10 years of general experience; at least 7 years of relevant experience in preparation of technical documentation; experience in preparation of technical documentation for the railway sector. Participation in at least 2 projects in the last 7 years for railway infrastructure design for (re) construction/rehabilitation of at least 30 km track designed. Valid license: 315 (New code: 343I)</p>	<p>Communication skills, fluency in English. Knowledge of Serbian language will be an advantage</p>
Railway Electrification Engineer	<p><u>Education:</u> Have as a minimum MSc Degree in electrotechnical engineering or another relevant field;</p> <p><u>Relevant Professional Experience:</u> Experience: at least 10 years of general experience; at least 7 years of relevant experience in preparation of technical documentation; experience in preparation of technical documentation for the railway sector. Participation in at least 2 projects in the last 7 years for railway infrastructure design for (re)construction/rehabilitation of power supply and OCL at least 30 km of track designed. Valid license 350, 352 (New codes: 351I)</p>	<p>Communication skills, fluency in English. Knowledge of Serbian language will be an advantage</p>

<p>Railway Signalling Engineer</p>	<p><u>Education:</u> Have as a minimum MSc Degree in electrotechnical engineering or another relevant field;</p> <p><u>Relevant Professional Experience:</u> Experience: at least 10 years of general experience; at least 7 years of relevant experience in preparation of technical documentation; experience in preparation of technical documentation for the railway sector. Participation in at least 2 projects in the Participation in at least 2 projects in the last ten years for railway infrastructure design for (re)construction/rehabilitation of railway signaling with electronic interlocking at least 30 km of track designed.</p> <p>Valid license 352, 353 (New codes: 351I; 353I)</p>	<p>Communication skills, fluency in English. Knowledge of Serbian language will be an advantage</p>
<p><b>Phase 2 - Supervision and works contract administration</b></p>		
<p><b>Team Leader - Supervision</b></p>	<p><u>Education:</u> Have as a minimum MSc Degree in civil engineering or other relevant field;</p> <p><u>Relevant professional experience:</u> At least 15 years of general experience; at least 7 years of relevant experience in project management/supervision in the railway sector; Experience as a team leader/project manager in successful implementation of at least 2 contracts for railway construction/supervision which were realized according to the FIDIC or similar model contract (i.e. WB model) in the investment value amount of at least 10 million euros each.</p>	<p>Excellent command of the English language. Computer literacy. Knowledge of Serbian language will be an advantage</p>
<p>Supervision Engineer for rail substructure and superstructure</p>	<p><u>Education:</u> Have as a minimum MSc Degree in civil engineering.</p> <p><u>Relevant Professional Experience:</u> Minimum 10 years of experience in the profession, of which 7 years in the railway sector</p> <p>Work experience as a supervisor on at least 1 project of modernization, construction / reconstruction of railway infrastructure completed in the last 10 years, which was realized according to the FIDIC model contract in the amount of at least 20 million euros.</p> <p>Valid license: 310 or 410 (New codes: 341I or 441M)</p>	<p>Communication skills, fluency in English. Knowledge of Serbian language will be an advantage</p>

Supervision Engineer for rail electrotechnical works	<u>Education:</u> Have as a minimum MSc Degree in civil engineering. <u>Relevant Professional Experience:</u> Minimum 10 years of experience in the profession, of which 7 years in the railway sector Work experience as a supervisor on at least 1 project of modernization, construction / reconstruction of railway infrastructure completed in the last 10 years, which was realized according to the FIDIC model contract in the amount of at least 20 million euros.	Communication skills, fluency in English. Knowledge of Serbian language will be an advantage
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Key experts proposed for Phase 1 – design phase may as well be proposed for services of Phase 2 – Supervision. Note that in case of same engineer being named for both Phase 1 and Phase 2 services, the person must meet the stated criteria for both Phase 1 and Phase 2 positions.

### 6.1.2 Non - Key experts

Non-key experts for Phase 1 – Design phase from the following areas of expertise are foreseen (but not limited to): Transport planner/Transport economist, Railways Traffic Operations engineer, Civil Engineer for rail engineering structures, Architectural engineer, OHS expert Geological engineer; Geodetic engineer; Electrical engineers, Reliability, Availability, Maintainability and Safety (RAMS) expert, Environmental and social engagement specialists.

Non-key experts for Phase 2 - Supervision of works from the following areas of expertise are foreseen (but not limited to): FIDIC Claim expert, Contract Claim, Railway Telecommunication Expert, Railways Traffic Operations Engineers, Materials Engineers - Geotechnics, Geodetic Engineers - Geodetic Works, Environmental Specialist, Social specialist and Coordinator for OHS during the execution of works.

Non-key experts are expected to complement all the activities of the key experts. CVs of non-key experts should be submitted in the proposal, however they would not be subject of evaluation. Yet, their level of effort should appear clearly in the proposal, workplan in particular, as the adequateness of the proposed workplan to these Terms of Reference will be evaluated as part of the Technical proposal.

Possession of relevant Serbian license for design/construction would be required, as applicable. All experts must be independent and free from conflicts of interest in the responsibilities they take on.

### 6.2 Office accommodation

Office accommodation for Phase 1 – Design phase, is to be provided by the Consultant. Office accommodation for Phase 2 – Supervision and works contract administration will be provided by the Contractor.



The Consultant shall ensure that experts are adequately supported and equipped. In particular, it shall ensure that there is sufficient administrative, secretarial and interpreting provision to enable experts to concentrate on their primary responsibilities.

No equipment is to be purchased on behalf of the neither Client (MoCTI), PIU nor Beneficiary (IZS) as part of this service contract or transferred to the Client or beneficiaries at the end of this Contract.

## 7. Outputs

### 7.1 Outputs requirements

The Consultant shall prepare, as a minimum, the below listed documents during the period of execution of the Contract.

Deliverables	Description	Due date	Format	Payments
<b>Phase 1 – Design Phase (Lump sum portion)</b>				
Inception Report	Describe the initial findings, progress in collecting data, any difficulties encountered or expected, the proposed approach, taking into consideration the situation at the starting date of the assignment. It will also set out a detailed work plan for completion of the activities. If there are any proposed modifications to the Terms of Reference due to changed circumstances after arrival on the site, these are to be discussed and agreed in principle with the Client and IZS before the submission of the Report (up to 20 pages). Subject to approval of the MoCTI	No later than 1 month after the commencement date	Digital and 2 hard copies in English and Serbian language	20% of the lump-sum amount of the contract
Preliminary Solution	Preliminary Solution in terms of scope and content should be done in accordance with applicable laws, regulations, codes, instructions and standards that are the subject of designing. Subject to pre-approval of IZS and approval of the MoCTI	Belgrade Tunnels: no later than 3 months from commencement For works in Pancevo Bridge – Pancevo Main: no later than 5 months from commencement	4 printed copies in Serbian and 4 digital copies on CD in Serbian and English	20% of the lump-sum amount of the contract
Preliminary Design	Preliminary Design with independent technical review report in terms of scope and content should be done in accordance with applicable laws, regulations, codes, instructions and standards that are the subject of designing. Subject to pre-approval IZS and	Belgrade Tunnels: No later than 5 months from the date of receipt of location conditions.	4 printed copies in Serbian and 4 digital copies on CD in Serbian and English	20% of the lump-sum amount of the contract

<b>Deliverables</b>	<b>Description</b>	<b>Due date</b>	<b>Format</b>	<b>Payments</b>
	MoCTI and approval of independent Technical Control.	Pancevo Bridge – Pancevo Main: No later than 7 months from the date of receipt of location conditions		
Environmental Impact Assessment Study	Environmental Impact Assessment Study should be done in accordance with Decision on determining the scope and content of the Environmental Impact Assessment Study issued by the competent body for Environmental protection and in accordance with applicable laws and regulations.  Subject to pre-approval of the Ministry for Environment Protection and approval of the MoCTI.	Belgrade Tunnels: No later than 5 months from the date of receipt of location conditions.	3 printed copies in Serbian and 3 digital copies on CD in Serbian and English	20% of the lump-sum amount of the contract
		Pancevo Bridge – Pancevo Main: No later than 7 months from the date of receipt of location conditions		
Employers Requirements and Technical Specifications for bidding documents	Preparation of Employers Requirements and Technical Specifications that will be part of the design and build bidding documents	No later than 1 months from the date of the approval of the Preliminary Designs by Technical Control	Digital, Serbian and English	20% within 10 business days from submission.
<b>Phase 2 - Supervision and works contract administration (Time-based portion)</b>				
Supervision Basis Report	The Supervise basis report shall summarize all data accessed and to be used as an input to the construction. It shall include a section on the validation of data and lack of data, if any.(up to 10 pages)  Subject to pre-approval of IZS and approval of the MoCTI.	No later than 1 month after the commencement of supervision	Digital	
Monthly Reports	Description of the level of implementation of the contractor's dynamic plan, possible problems and proposals for their solution, review of adopted works by variations and explained proposal for change / variation, plan for engagement of supervision for the next period, data on inspections,	Not later than 1 week after the end of month	Digital	

Deliverables	Description	Due date	Format	Payments
	data on incidents during works, and others important events. Monthly reports must also contain an overview of all receivables submitted by the Contractor since the beginning of the implementation of the construction contract. This review should be made in a convenient form that allows consideration of requests, previous activities and key deadlines for resolving requests. The monthly report should also contain photo documentation (up to 20 pages).			According to the proposed working days and fixed daily fee rate for the experts
Quarterly Progress Reports	Description of progress (technical and financial) including problems encountered; planned activities for the next 3 months (up to 30 pages) The report must include a summary of the progress of the services defined this ToR, with particular reference to major activities and those on the critical path for completion of the works. The report must detail delays and difficulties encountered and proposed mitigation measures to alleviate them and envisage future projections for implementation of the activities (up to 20 pages)	No later than 2 weeks after the end of each 3-month implementation period	Digital	
E&S Compliance Reporting	Supervising engineer and OHS Expert at the work site will prepare and submit to PIU ESIA Implementation Report on monthly basis. Supervision engineer is also responsible for immediate reporting of accidents and incidents in accordance with procedures in the case of accidents which will be by the PIU.	Regular E&S reports will be submitted monthly  Accidents will be reported immediately (within 48 hours) and more detailed report will follow this one according to	Regular reports – Digital in Serbian or English  Accidents report - Digital in English language	
Works Contract Completion Report	On completion of works contract, upon issue of the Taking-Over Certificate, within 15 days the Consultant shall submit a Completion Report to the IZS and PIU/MoCTI. The main report must contain: <ul style="list-style-type: none"> <li>– Copies of the Taking-Over Certificate(s)</li> <li>– Verified "as-built" drawings showing all</li> </ul>	No later than 15 days after issue of Taking-Over Certificate of works contract.	Digital in Serbian and English and 4 hard copies in Serbian and 2 hard copies in English language	

Deliverables	Description	Due date	Format	Payments
	<ul style="list-style-type: none"> <li>– revision to the design of the works.</li> <li>– A complete analysis of the completion cost of the works.</li> <li>– An overview of the actual progress of the works detailing reasons for delays and/or extensions of time</li> <li>– Commissioning report for the various mechanical and electrical components of the works</li> <li>– Details of all permits required for the operation of the works</li> <li>– An overview of site safety procedures, any problems in this regard and recommendations for improvement.</li> <li>– An overview of the Consultant's working practices and resources.</li> <li>– An assessment of the quality of materials and workmanship any problems in this regard and recommendations for improvement.</li> <li>– Details of technical difficulties encountered and how these were overcome.</li> <li>– Details of administrative difficulties encountered and how these were overcome</li> </ul> <p>An appraisal of the strengths and weaknesses in the contract documents and in the design of the works (including but not limited to the Special Conditions of works contract, technical specifications, price schedules, design details and drawings) with recommendations on how improvements could be made for future contracts.</p>			
Quality Assurance (QA) Dossiers	In addition to the Completion Report the Consultant shall submit a comprehensive QA Dossier containing all original requests for inspection, approval, test forms and certificates relating to the construction of the works, materials and equipment incorporated into the works. Documentation in the	The QA Dossier will be compiled during the course of the works contract and it must be available for inspection by	Digital in Serbian and English and 4 hard copies in Serbian and 2 hard copies in English language	

Deliverables	Description	Due date	Format	Payments
	QA Dossier must include but not necessarily be restricted to: <ul style="list-style-type: none"> <li>– All manufacturer's test certificates for materials, if any</li> <li>– Performance test certificates and warranty agreements where applicable for mechanical and electrical equipment.</li> <li>– Requests for inspection (if any), approvals and test results</li> </ul>	the MoCTI at any reasonable time.		

## 7.2 Submission and approval of outputs

All reports and other outputs, if any must be written in English and translated into Serbian language. The draft version of the reports (electronic copy) shall be submitted to PIU for distribution to the MoCTI and IZS. The commenting period for the outputs is 2 weeks. In case of no-reaction to the submitted outputs such status will be interpreted as “no objection” and shall be deemed as approved.

During implementation of Phase 1 – Design phase, the Review period of the relevant authorities, such as Republic Commission for Expert Control of technical documentation and other competent and state bodies, shall not be part of the consultant time. Such approvals are estimated to be as follow:

- for issuing location conditions: 45 calendar days,
- to receive a positive Technical Control report: 30 calendar days,
- to obtain approval for the Environmental Impact Assessment Study: 60 calendar days.

During Phase 2 - Supervision and works contract administration the Consultant shall prepare the Minutes of Meetings (MoM) for the site meetings and monthly progress meetings. All Meetings must be ensured to lead to clear decisions, persons in charge and deadlines. Minutes of Meetings will be distributed by the Consultant. MoM of the site meetings must be commented within 7 calendar days by participants. MoM for the monthly progress meetings will be always in the agenda of the next monthly meeting to be approved and followed up.

All deliverables will be sent as electronic copies to PIU.

Hard copies will be sent to the following addresses:

- “Serbian Railways Infrastructure“ JSC, 6, Nemanjina Street, 11000 Belgrade, Republic of Serbia
- PIU, 22-26, Nemanjina street, office 35, 11000 Savski Venac, Republic of Serbia.

## 8. Terms of Payment

The Consultant should note that the proposed contract for this assignment will be as follows:

- For Phase 1 - Design phase – Lump Sum payments with milestones against submission of deliverables and,

- For Phase 2 - Supervision and Works Contract administration – Time Based with periodic payments against time actually spent on the services.

## **9. Conflict of Interest**

The engaged Consultant firm must not be involved in any other related activity to this Project.

## Appendix 1. Available documentation

Existing documentation is available on the following URL:

[https://drive.google.com/drive/folders/1xn8o6mv\\_VI7eL7mhyLI6vLxbP28DxCqo?usp=sharing](https://drive.google.com/drive/folders/1xn8o6mv_VI7eL7mhyLI6vLxbP28DxCqo?usp=sharing)

#	Folder/File	Description
1	Tunnels/Report N&V Connected Tunnels-IKS_2003.pdf	The excerpt from the study on the performed measurements of COMMUNAL NOISE AND VIBRATIONS registered in the building Humska 12 caused by train passages through the railway tunnels in the area of the building.  - Institute Kirilo Savić, 2003. – In Serbian language
2	Tunnels/Report N&V Tunnels Vracar-IMS_1996	Report on measurements of noise and vibrations from underground railway traffic.  - IMS, 1996. In Serbian language
3	Tunnels/World_Bank_Belgrade_FINAL REPORT_2.pdf	Assessment of ground-borne noise and vibrations induced by railway traffic in the tunnels of Belgrade  - IC – FEUP, 2021.- In English language
4	PA Most – Pa Glavna/Main project 2012.zip	Main project for construction of 2 <sup>nd</sup> track on section Pančevo bridge – Pančevo main, km 4+742 to km 19+600  - SI CIP, 2012 – In Serbian language
5	PA Most – Pa Glavna/ Geotehnicki Elaborat IDP.zip	Book 26 - Geotechnical elaborate from preliminary design for construction of 2 <sup>nd</sup> track on section Pančevo bridge – Pančevo main, km 4+742 to km 19+600  - SI CIP, 2012 – In Serbian language
6	PA Most – Pa Glavna/ Description ET.pdf	Description of existing and needed ET Infrastructure on section Pančevo bridge – Pančevo main  - In English language