**REQUEST FOR EXPRESSIONS OF INTEREST**

**CONSULTING SERVICES – FIRMS SELECTION**

**Republic of Serbia**

**The Serbia Railway Sector Modernization Project (SRSM)**

**Project ID No. P170868**

**Assignment Title:**

**Preparation of the Spatial Plan, Feasibility study with Preliminary Design and Environmental Impact Assessment study for reconstruction and modernization of the Ruma – Šabac – Donja Borina Junction – State Border railway line**

**Reference No. SER-SRSM-QCBS-CS-23-53**

The Republic of Serbia has received a Loan from the International Bank for Reconstruction and Development (IBRD) in the amount of EURO 51 million and from the Agence Francaise de Développement (AFD) in the amount of EURO 51 million, toward the cost of the Serbia Railway Sector Modernization Project, Phase 1 of the Multiphase Programmatic Approach (MPA) and intends to apply part of the proceeds to payments for consulting services for Preparation of the Spatial Plan, Feasibility study with Preliminary Design and Environmental Impact Assessment study for reconstruction and modernization of the Ruma – Šabac – Donja Borina Junction – State Border railway line.

The consulting services (“the Services”) include are divided into three activities:

* Activity 1: Inception report;
* Activity 2: Preparation of the Spatial Plan, Feasibility Study with Preliminary Design

and Environmental Impact Assessment Study

* Activity 3: Support in preparation of procurement documents

**Activity 1:** The Inception Report shall be the specific output of the Inception Period and present an overall approach and detailed program work plan and completion schedule for the services. It should discuss constraints and challenges identified by the Consultant and ways to address them in order to timely and effectively deliver the assignment.

**Activity 2**: Preparation of the Spatial Plan, Feasibility Study with Preliminary Design and Environmental Impact Assessment Study is divided into the following sub-activities:

Sub-activity 2.1: Preparation of the Spatial plan for the special-purpose area for Infrastructure Corridor

Sub-activity 2.2: Preparation of the Preliminary Solution

Sub-activity 2.3: Preparation of the Feasibility Study with Preliminary Design

Sub-activity 2.4: Preparation of the Environmental Impact Assessment Study

**Activity 3:** Support in preparation of procurement documents: Within this Activity, the Consultant will prepare technical scope of Employers requirements and schedule of prices based on a template to be provided by the Client that will be part of the tender document.

**Contract duration:** 23 months starting from the commencement date, but no later than 31 December 2026, as Project completion date.

The detailed Terms of Reference for the above referenced consulting services is posted on the website of the Ministry of Construction, Transport and Infrastructure (MoCTI):

<https://www.mgsi.gov.rs/lat/dokumenti/serbia-railway-sector-modernization-project-srsm-design-ruma-sabac-bosnian-border-railway>

The Central Fiduciary Unit (CFU) of the Ministry of Finance now invites eligible Consulting firms (“Consultants”) to indicate their interest in providing the Services. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services.

The Consultant firm will be selected in accordance with QCBS (Quality-and Cost-Based Selection) method set out in the World Bank’s Procurement Regulations for IPF Borrowers (July 2016, revised November 2017, August 2018 and November 2020). The Client intends to shortlist up to eight eligible firms to whom a subsequent Request for Proposals (RFP), both technical and financial, shall be sent. Consultants may associate with other firms to enhance their qualifications but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected.

The consulting firms/JV that will submit EoI shall possess the following experience and qualifications:

1. **Experience in railway infrastructure designs**
2. Minimum two (2) successfully completed railway infrastructure design contracts in the last nine (9) years for Construction/Reconstruction/Modernisation, of public railway infrastructure in minimum of 30km length each.

*Reference design contracts must be of a similar nature as the scope of this tender, covering minimum two (2) designs for construction or reconstruction of railway line and for all of the following components each:*

*- Track substructure and superstructure*

*- OCL (Overhead Contact Line) electrification*

*- electronic signalling, interlocking and telecommunications*

1. Minimum one (1) successfully completed design contract in the last nine (9) years for construction/reconstruction of minimum 1 (one) railway bridge with span greater than 50m.

*Reference design contract for railway bridges may be a separate individual design of a bridge, or part of a larger scope project.*

*The acceptable levels of technical documentation for design references are Preliminary and Design for a building permit (or equivalent), while concept/general designs or studies (or equivalent) design references shall not be considered as relevant experience. The design references shall be accepted if in the scope of a larger project (i.e. reconstruction of a railway section) as long as it includes all stated projects.*

1. Minimum one (1) successfully completed design contract in the last nine (9) years for construction/reconstruction of minimum 1 (one) railway tunnel in length greater than 100m.

*Reference design contract for railway tunnels may be a separate individual design of a bridge, or part of a larger scope project.*

*The acceptable levels of technical documentation for design references are Preliminary and Design for a building permit (or equivalent), while concept/general designs or studies (or equivalent) design references shall not be considered as relevant experience. The design references shall be accepted if in the scope of a larger project (i.e. reconstruction of a railway section) as long as it includes all stated projects.*

1. **Availability of qualified experts within the company/joint venture**

As proof of availability of qualified experts within their firm/JV listed in 5.1. Term of references, the bidder shall prepare an organization chart and a list of experts conforming to requested conditions within the company who are relevant to the assignment. The contents of the list should be short-form table information for the available experts and their fulfilment of stated conditions (i.e. name and surname of the expert, years of experience, names of reference projects, owned licenses issued by RoS chamber of engineers).

As proof of experience in railway infrastructure designs, the bidder shall prepare reference forms, naming **ten (10) references maximum** for each stated requirement, clearly stating the following:

- Reference #

- Start date and completion date (mm/yy)

- Brief description of the design (10 sentence each maximum)

- Country of assignment with client name and address, and client reference contact

- Contract value

- Role on project

Submitted expressions of interest should be no larger than 30 pages of text, including reference forms and excluding licenses and other official government documents (if any).

**Shortlisting of firms will be based on the following of points:**

1. Experience in railway infrastructure designs 70 points
2. Availability of qualified experts within the company/joint venture 30 points

**Key Experts' CV are not required and will not be evaluated at the shortlisting stage.**

\*Information on licensing requirements for firms/JVs

As outlined by laws and regulations in Republic of Serbia (Law on Planning and Construction - Article 126), for realization of services subject of this procurement, the firm or joint venture must possess specific company licenses for development of technical documentation. Possession of stated licenses is not a prerequisite for shortlisting and shall not be considered in evaluation of submitted EoIs at shortlisting stage or Bids at the following stage of procurement.

However, for the award of contract, the firm or JV must submit the following licenses as minimum, in the form of official Decision on fulfilment of conditions for stated licenses, issued for the Firm or JV members, by the Ministry in charge, namely license numbers:

* P141G2, P142G1, P141S1, P141E1, P141E4 and P131G2.

The conditions for obtaining the company licenses, with all other relevant information can be found on the website of Ministry of Construction, Transport, and Infrastructure of the Republic of Serbia's , on the following link:

<https://www.mgsi.gov.rs/lat/dokumenti/pravilnik-o-nacinu-postupku-i-sadrzini-podataka-za-utvrdivanje-ispunjenosti-uslova-za>

The attention of interested Consultants is drawn to paragraphs 3.14, 3.16 and 3.17 of the World Bank’s Procurement Regulations for IPF Borrowers – Procurement in Investment Project Financing Goods, Works, Non-Consulting and Consulting Services (July 2016, revised November 2017, August 2018 and November 2020) (“the Regulations”) setting forth the World Bank’s policy on conflict of interest.

Further information can be obtained at the address below during office hours 09:00 to 15:00 hours.

Expressions of interest in English language must be delivered in a written form to the email below, by **March 25, 2024, 12:00 hours, noon, local time**.

|  |  |  |
| --- | --- | --- |
| Contact: | E–mail: | Address: |
| To: | [zorica.petrovic@mfin.gov.rs](mailto:zorica.petrovic@mfin.gov.rs)  Ms. Zorica Petrovic  Procurement Specialist | Ministry of Finance  Central Fiduciary Unit  3-5 Sremska St  11000 Belgrade, Serbia  Tel/Fax: (+381 11) 765 2587 |
| Cc: | [ljiljana.dzuver@mfin.gov.rs](mailto:ljiljana.dzuver@mfin.gov.rs)  [larisa.puzovic@mgsi.gov.rs](mailto:larisa.puzovic@mgsi.gov.rs) |

**The Serbia Railway Sector Modernization (SRSM) Project**

**Phase 1 of the Multi-Phase Programmatic Approach**

**TERMS** **OF** **REFERENCE**

**for preparation of the**

**Spatial Plan, Feasibility Study with Preliminary Design and Environmental Impact Assessment Study for reconstruction and modernization** **of the Ruma – Sabac – Donja Borina Junction – State Border railway line**

# Background information

## Beneficiary country: Republic of Serbia

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

## 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 Serbia Railway Sector Modernization Project, Phase 1 of the MPA (the Project), IBRD and the Agence Francaise 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. **This assignment belongs to Sub-Component 1.2 Technical Documentation.**
* 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. Primary responsibility for Project execution lies on PIU which will ensure that the Project development objectives are met.

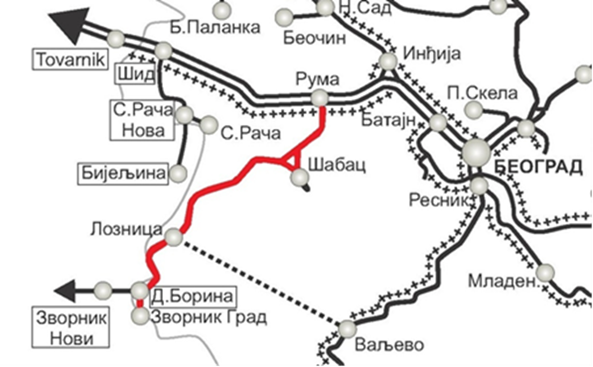
## General Railways Sector Information

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 3.348,1 km, of which 3.059,4 km are single-track and 288.7 km of double-track railway lines, of which 1.273,7 km are electrified. Railways within the Serbian railway network are categorized as main, regional, local and shunting lines.

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 Serbian rail network infrastructure, obsolescence of the rolling stock, and low rail service quality.

Within the Project, the preparation of spatial and technical documentation is planned for the reconstruction and modernization of the **railway line** **Ruma – Šabac - Donja Borina Junction – State border with Bosnia and Herzegovina, with a total length of approximately 107 km.** A schematic representation of the position of the Ruma-Šabac-Zvornik-state border with Bosnia and Herzegovina is given in Figure 1.



*Figure 1. Schematic layout of railway line Ruma – Šabac - Donja Borina Junction– State border marked with red*

## Existing condition of Ruma – Sabac - Donja Borina Junction – State border

The Ruma – Sabac - Donja Borina Junction - border with Bosnia and Herzegovina railway is a single-track, non-electrified railway line with a length of about 107 km, which in current condition of railway substructure and superstructure does not meet modern transport requirements.

The railway was constructed between 1901 and 1978. According to the Network Statement for the year 2023, the maximum allowable speed for diesel railcars ranges from 50 to 70 (80) km/h.

There are 26 service points along the line, including 13 stations (one freight station), 11 halts, and two junctions. The stations on the railway are: Ruma, Buđanovci, Nikinci, Platičevo, Šabac, Štitar, Petlovača, Prnjavor Mačvanski, Lešnica, Loznica, Koviljača, Brasina, and Zvornik.

The civil structures on the route include 4 tunnels (total length of 320m), 7 concrete bridges (total length of 754m), and 10 steel bridges (total length of 155m). Additionally, there are 71 culverts, 45 slab culverts, and 3 arched culverts, 113 level crossings, and 8 retaining walls.

In 2018, the section from Sabac to Brasina was overhauled in total length of 53 km, which, after thirteen years, created the conditions for the establishment of regular passenger rail traffic between Sabac and Loznica. About two and a half billion dinars were invested in this reconstruction.

The reconstruction and modernization of this railway line shall cover the following:

* reconstruction and modernization of the entire railway line, starting from the entrance switch of Ruma station, passing through the Šabac junction (one branch to Šabac station), the Donja Borina junction, and reaching Zvornik and the State Border, including the improvement of alignment elements for speeds of up to 120 km/h and permissible axle load on the railway line of 225 kN and permissible load per linear meter of 80 kN/m (category D4);
* reconstruction of tracks and switches in stations and halts;
* reconstruction, rehabilitation and replacement of tunnels, bridges and culverts, as needed;
* construction of fixed electric traction installations (electrification with the 25 kV/50 Hz system);
* fitting the open track and station tracks capacities with modern signaling and interlocking facilities in stations;
* increasing the level of protection at level crossings, reconstruction and eventual redesign of existing level crossings and/or potential deleveling of the most critical level crossings on the railway line;
* provision of clearance that corresponds to the loading gauge GC for electrified lines and enabling of the use of all intermodal transport technologies without restrictions;
* digitalisation of telecommunications on the entire railway line;
* renovation of architectural buildings along the railway line, primarily the station buildings and auxiliary buildings including the station auxiliary areas (e.g. the access, parking areas, bus stops, etc., as applicable);
* improvement of accessibility of the rail system for persons with disabilities and persons with reduced mobility in the all-railway stations.

The Spatial plan for the special-purpose area of the railway Infrastructure Corridor Ruma – Sabac - Donja Borina Junction– State border does not exist and needs to be developed in order to obtain location conditions for design from authorities along the line

# Objective, purpose and expected results

## Definitions

The “**Ruma – Sabac - Donja Borina Junction – State border**” is the railway line to be reconstructed and modernized, described in Section 1.4.

The “**Contract**” refers to the contract for the preparation of the Spatial Plan, Feasibility Study, Environmental Impact Assessment, Preliminary Design, technical scope of Client’s requirements and schedule of prices for Design&Build contract type tender Documents.

The “**Client**” refers to the MoCTI.

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

The **“Contractor”** refers to the company/consortium to be selected for works execution.

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

## Objective of the Services

For the reconstruction and modernization of the railway line Ruma – Šabac - Donja Borina Junction– State border, the Consultant shall prepare the following main documents:

1. Inception Report
2. Spatial Plan of special purpose area for Infrastructure Corridor;,
3. Strategic Environmental and Social Assessment (SESA), optional, if required by WB
4. Preliminary Solution;
5. Feasibility Study with Preliminary Design;
6. Environmental Impact Assessment (EIA);
7. Draft technical scope of Client’s requirements for Contractor tendering

The designs will be developed in a format that allows local authorities to follow up on matters provided for by the local regulations, such as design validation by the State Review Committee, approval of the procurement type, etc. Design documents shall be bi-lingual (Serbian and English).

# Scope of the Services

## General activities

The Consultant shall carry out the specific tasks and activities as listed below and develop a well-functioning co-operation mechanism with the Client. The Client retains the discretion to engage and request reviews of deliverables (such as reports, drawings, and solutions) produced by the Consultant from any relevant agency or entity, including but not limited to IZS, PIU, and PIT. All feedback and recommendations must be channeled through the Client and subsequently communicated to the Consultant. The Consultant is required to provide professional inputs, advices and support during execution of his tasks.Top of Form

## Specific activities

All the activities to be executed by the Consultant will be as follows.

### Activity 1: Inception report

Following the Kick-off Meeting to be held with the Clients representative(s) and IZS/PIT, the Consultant’s first task shall be to meet with the relevant stakeholders and to gather the necessary data. Client will provide all necessary support during collection data and information. Gathered information, data and collected documents shall be included in the **Inception Report**, with a detailed description and assessment of the current situation.

The outline of the Inception Report shall be proposed by the Consultant. The Inception Report shall be the specific output of the Inception Period and present an overall approach and detailed program work plan and completion schedule for the services. It should discuss constraints and challenges identified by the Consultant and ways to address them in order to timely and effectively deliver the assignment.

**3.2.2 Activity 2: Preparation of the Spatial Plan, Feasibility Study with Preliminary Design and Environmental Impact Assessment Study**

Includes activities relevant to preparing the Spatial plan for the special-purpose area of the Railway Infrastructure Corridor Ruma - Šabac - Zvornik - State border, Preliminary Solution, Feasibility Study with Preliminary Design, and Environmental Impact Assessment Study.

The **documentation basis** for the preparation of technical documentation for the modernisation of the railway line is:

* Law on Planning and Construction ("Official Gazette of RS", No. 72/2009, 81/2009 - corrected, 64/2010 – decision US, 24/2011, 121/2012, 42/2013 - decision US, 50/2013 - decision US, 98/2013 - decision US, 132/2014, 145/2014, 83/2018, 31/2019, 37/2019 – another law, 9/2020, 52/21 and 62/23).
* Law on Railways ("Official Gazette of RS", No. 41/2018 and 62/2023).
* Law on Railway Traffic Safety ("Official Gazette of RS", No. 41/2018).
* 1.5 Law on Railway System Interoperability ("Official Gazette of RS", No. 41/2018).
* Commission Regulation (EU) No. 1299/2014 of November 18, 2014, on the technical specifications for interoperability relating to the "infrastructure" subsystem of the European Union's railway system.
* Commission Regulation (EU) No. 1300/2014 of November 18, 2014, on the technical specifications for interoperability relating to the accessibility of the Union's railway system for persons with disabilities and reduced mobility.
* Commission Regulation (EU) No. 1301/2014 of November 18, 2014, on the technical specifications for interoperability relating to the "energy" subsystem of the Union's railway system.
* Commission Regulation (EU) 2016/919 of May 27, 2016, on the technical specification for interoperability relating to the "control-command and signaling" subsystems of the European Union's railway system.
* Commission Regulation (EU) No. 776/2019 of June 16, 2019, amending the technical specifications for interoperability relating to the subsystems INF, CCS, and ENE of the European Union's railway system.
* Rulebook on Maintenance of the Superstructure and Substructure of Railway Lines ("Official Gazette of RS", No. 39/23 of May 12, 2023).
* Rulebook on Technical Requirements for the Infrastructure Subsystem ("Official Gazette of RS", No. 39/23 of May 12, 2023).
* Rulebook on Technical Requirements for the Energy Subsystem ("Official Gazette of RS", No. 6/2020 of January 24, 2020).
* Law on Occupational Safety and Health ("Official Gazette of RS", No. 101/2005, 91/2015, and 113/2017 – another 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 – another law 72/2009 – another law, 43/2011 – decision US, 14/2016, 76/2018, 95/2018 – another law, and 95/2018 – another law).
* Law on Fire Protection ("Official Gazette of RS", No. 111/09, 20/2015, and 78/2018), and related subregulations in the field of fire protection.
* Rulebook on the Content, Method, and Procedure for the Preparation and Control of Technical Documentation According to the Class and Purpose of the Structures ("Official Gazette of RS", No. 73/2019).
* Rulebook for Civil Structures ("Official Gazette of RS", No. 89/2019, 52/2020, and 122/2020).
* Regulation on Safety and Health at Work on Temporary and Mobile Construction Sites ("Official Gazette of RS", No. 14/2009, 95/2010, and 98/2018).
* Regulation on Location Conditions ("Official Gazette of RS", No. 115/2020).
* General Regulation Plans and Detailed Regulation Plans for the respective area.
* Technical documentation of the existing state of infrastructure capacities (buildings, facilities, and installations) of the open railway line and official locations of the railway line Ruma – Šabac – Zvornik – State Border.
* Decision of the Board of Directors of "Infrastructure of Railways of Serbia" JSC on the adoption of the Catalog of symbols for electronic installations to be installed within the area of "Infrastructure of Railways of Serbia" JSC, No. 4/2020-2344-520 of November 17, 2020.
* Main Design for the reconstruction of telecommunication infrastructure on railway land alongside the railway lines of Serbian Railways through the reconstruction of the existing cable and telecommunication infrastructure along the corridors of Serbian Railways.
* General Design of an integrated telecommunication system from 2007.
* Temporary Technical Guidelines for Designing and Constructing Single-Phase Contact Network 25kV, 50Hz on Yugoslav Railways (ZJŽ No.189-30/63, ZJŽ No.287-1/70).
* Technical Requirements for the Preparation of Investment-Technical Documentation for Single-Phase Contact Network 25kV, 50Hz on Yugoslav Railways (ZJŽ No.284-2/64).
* Catalog of Elements for Single-Phase Contact Network 25kV, 50Hz on JŽ (ZJŽ No. 77/96 of January 25, 1996).
* Rulebook on Types of Signals, Signal Indicators, and Signs on the Track ("Official Gazette of RS", No. 51 of April 6, 2020).
* Temporary Provisions for the Marking of Disconnectors in the Contact Network and Sections of the Contact Network in the Single-Phase System 25kV, 50Hz (ZJŽ 14 No. 28/85-82).
* Temporary Provisions on Technical Requirements for the Connection of Other Electricity Consumers to Stable Electric Traction Facilities (ZJŽ 14 No. 28/85-123).
* Material Specification and Testing Specification for Elements of the Single-Phase Contact Network 25kV, 50Hz (November 1967).
* TPE-KM 1. Temporary Technical Instruction for Designing and Constructing Single-Phase Contact Network 25kV, 50Hz on JŽ (ZJŽ No.189-30).
* TPE-KM 1. Part IV - Return Line and Grounding (ZJŽ No.287-1).
* TPE-KM 1.1. Technical Requirements for the Preparation of Investment-Technical Documentation for Single-Phase Contact Network 25kV, 50Hz on JŽ (ZJŽ No.284-1).
* TPM-KM 2. Instructions for Inspection, Testing, and Commissioning of Single-Phase Contact Network 25kV, 50Hz (ZJŽ No.284-6).
* TPE-EVP 1. Temporary Technical Instruction for Designing and Constructing EVP and PS Single-Phase System 25kV, 50Hz on JŽ (ZJŽ No.189-31).
* Rulebook on Technical Norms for Electro-Energetic Facilities with Rated Voltage above 1000V ("Official Gazette of SFRJ", No. 4/74).
* Rulebook on Technical Norms for Low-Voltage Electrical Installations ("Official Gazette of SRJ", No. 28/95).
* Rulebook on Technical Norms for Grounding of Electro-Energetic Facilities with Rated Voltage above 1000V ("Official Gazette of SRJ", No. 61/95).
* Rulebook on Technical Norms for the Protection of Electro-Energetic Facilities and Devices from Fire ("Official Gazette of SFRJ", No. 74/90).
* TPE-EVP 1.1. Technical Requirements for the Preparation of Investment-Technical Documentation for EVP and PS Single-Phase System 25kV, 50Hz on JŽ (ZJŽ No. 284-2).
* TPE-EVP 1.4. Technical Requirements for the Production, Testing, Acceptance, and Supply of Single-Phase Transformers 110/27.5 kV for Installation in Electric Traction Substations of the Single-Phase System (ZJŽ 14 No.28/85-1).
* TPE-EVP 1.5. Technical Requirements for the Production, Testing, Acceptance, and Supply of Single-Pole Switches 25kV (ZJŽ No. 284-23).
* General Design of the single-phase contact network 25kV, 50Hz.
* Temporary Technical Requirements for the Production, Standard, Command, and Periodic Testing of Grounding Rods for Stable Electric Traction Facilities JŽ.
* Technical Requirements for Carrying Out Works on the Single-Phase Contact Network 25kV, 50Hz.
* Rulebook on Safety Measures against Electrical Current on Electrified Railways JŽ (ZJŽ No. 287-8/78).
* Rulebook 227a for the Application of Safety Measures against Electrical Current on the Contact Network of the Single-Phase System 25kV, 50Hz JŽ (ZJŽ No. 287-19/79).
* Rulebook 237 for the Application of Signals for Electric Traction (ZJŽ No. 287-67/73).
* Rulebook 212 on the Use of Stable Electric Traction Facilities on JŽ Railways (ZJŽ14, 28-84/50).
* Rulebook on Technical Requirements for Signal-Safety Devices ("Official Gazette of RS", No. 118/21).
* Rulebook on Technical Requirements and Maintenance of Railway Telecommunication Network ("Official Gazette of RS", No. 68/21 of July 7, 2021).
* Rulebook on Elements of Public Railway Infrastructure ("Official Gazette of RS", No. 30/19 of April 25, 2019).
* Existing documentation of "Infrastructure of Serbian Railways" JSC on the construction of the railway line, measures and works on maintenance and rehabilitation, the existing condition of the railway line, recorded problems, etc.;
* Data on underground installations of "Infrastructure of the Serbian Railways" JSC and other relevant infrastructure owners in scope of project;
* Existing documentation for capital repair and rehabilitation works;
* Law on Environmental Protection (OG of RS", No. 135/2004, 36/2009, 36/2009, 72/2009, 43/2011 – decision),
* Law on Waste Management Plan (No. 36/2009-95/2018);
* Law on Water (OG of RS 30/2010, 93/2012, 101/2016, 95/2018 and 95/2018);
* Regulation on the operational plan for flood control (2013);
* Regulation on the general plan for flood protection (2011);
* Law on Chemicals (OG of RS 36/2009, 88/2010, 92/2011, 93/2012 i 25/2015);
* Law on Nature Protection (OG of RS 36/2009, 88/2010, 91/2010, 14/2016, 95/2018, 71/2021); Law on EIA (OG of RS 135/2004, 36/2009);
* Law on Protection of Cultural Heritage (OG of RS 71/94, 52/2011, 99/2011, 6/2020, 35/2021, 129/2021);
* Law on Occupational Health and Safety (OG of RS 35/2023)
* and other applicable laws, bylaws and regulations regulating environmental and nature protection, protection of cultural heritage, climate change abatement and resistance, and occupational and community health and safety.
* WB Environmental and Social Framework, including relevant E&S Standards, WB EHSG and GIIP (including but not limited to EU Directives such as Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)). World Bank Directive on Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups. If any of ESF (including EHSG and GIIP) requirements, are different from the national requirements, the stricter will prevail.
* Project Environmental and Social Management Framework;
* 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.

**Sub-activity 2.1: Preparation of the Spatial plan for the special-purpose area for the Infrastructure Corridor**

Preparation of a Spatial plan for the special purpose area for the railway infrastructure corridor Ruma – Sabac - Donja Borina Junction– State border can be carried out by a Consultant with relevant licenses or through a sub-consultant who will carry out this activity.

Planning, use, arrangement and protection of the railway corridor should be based on the principles of arrangement and use of space established by the Law on Planning and Construction ("Official Gazette of RS", No. 72/09, 81/09 - correction, 64/10 - US, 24 / 11, 121/12, 42/13 - US, 50/13 - US, 98/13 - US, 132/14, 145/14, 83/18 and 31/19 – another law, 9/2020, 52/21 and 62/23), as and the Law on Railways ("Official Gazette of RS", No. 41/18), including Article 87, the Law on Spatial Plan of the Republic of Serbia from 2020 to 2035[[1]](#footnote-1), the Law on Environmental Protection ("Official Gazette of RS", No. 135/04, 36/09, 36/09-other law, 72/09-other law, 43/11-decision US, 14/16, 78/18 and 95 / 18-other law), the Law on Strategic Environmental Assessment (“Official Gazette of RS”, No. 135/04 and 88/10), the Rulebook on Elements of Railway Infrastructure (“Official Gazette of RS”, No. 10/14 ), The Rulebook on the content, manner and procedure of drafting spatial and urban planning documents ("Official Gazette of RS", No. 32/19) and other laws and bylaws acts of the Republic of Serbia which define and determine the conditions, manner and content of preparation of planning and technical documentation.

An integral part of the Spatial Plan is the Report on the Strategic Environmental Assessment of the Spatial Plan.

The immediate subject of the Spatial Plan is the creation of conditions for raising the quality of the railway infrastructure on the railway section Ruma – Šabac - Donja Borina Junction– State border, which will increase the quality of accessibility of the Republic of Serbia.

The process of drafting the spatial plan is a combination of several activities in which the Department of Urbanism and Spatial Planning within the Ministry of Construction, Transport and Infrastructure also participates. In the following table, the most important activities in the process of drafting the spatial plan and the relevant institutions that implement these activities are identified.

*Table 1. Process of preparation of Spatial plan for the special-purpose area*

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Activity** | **Relevant Institutions** | **Expected Duration** |
| 1. | Adoption of the Decision on the development of the Spatial Plan by the Government of the Republic of Serbia and Decisions on the development of the Strategic Environmental Assessment of the Spatial Plan | Department of Urbanism and Spatial Planning | 2 months |
| 2. | Engagement of qualified sub consultant (if needed) | Consultant | 3 months |
| 3. | Preparation of documents for early public insight | Consultant/ sub consultant | 1 month |
| 4. | Early public insight | Department of Urbanism and Spatial Planning/ | 15 days |
| 5. | Obtaining conditions from the holder of public authorizations for the development of a spatial plan | Department of Urbanism and Spatial Planning | 1 months |
| 6. | Preparation of the Draft Spatial Plan | Consultant/ sub consultant | 3 months |
| 7. | Expert control of the Draft Spatial Plan | Department of Urbanism and Spatial Planning | 5 days |
| 8. | Amendments to the Draft Spatial Plan in accordance with the Expert Control Report | Consultant/ sub consultant | 1 month |
| 9. | Public insight | Department of Urbanism and Spatial Planning/ sub consultant | 1 month |
| 10. | Public session and preparation of Report on the performed public insight into the Draft Spatial Plan | Department of Urbanism and Spatial Planning | 5 days |
| 11. | Amendments to the Draft Spatial Plan in accordance with the Report on the performed public insight | Consultant/ sub consultant | 1 month |
| 12. | Procedure of adoption and publication of Spatial Plan | Department of Urbanism and Spatial Planning | 2 months |

**Sub-activity 2.2: Preparation of the Preliminary Solution**

The Preliminary Solution shall be prepared with all technical and functional specifications in accordance with all regulatory and requirements for The technical and functional specifications include but are not limited to: track centerline(s), general vertical alignment, normal profiles for the open track and stations, general bridge and tunnel disposition(s) and planned work(s), power supply and overhead contact line details, signalisation and safety details and cable infrastructure general position, general drainage solution(s) with planned recipients, level crossings layouts and details on raising the safety levels, general positions of eventual engineering structures (walls, substructure protections, etc), stations and station building reconstruction layouts and all other details necessary for definition and issuing of location conditions and for further development of the design through the preliminary design.

The preliminary solution shall be designed per general and technical parameters defined in this ToR and should be approved by the Client.

Preliminary Solution should be prepared according to the Rulebook on the content, manner and procedure of preparation and manner of control of technical documentation according to the classes and purposes of the objects ("Official Gazette of RS", No. 73/2019).

IZS shall be responsible for obtaining location conditions based on the Spatial plan for the special-purpose area of the Railway Infrastructure Corridor Ruma – Sabac - Donja Borina Junction– State border adopted by the Government of RoS and the approved Preliminary Solution.

**Sub-activity 2.3: Preparation of the Feasibility Study with Preliminary Design**

The Consultant shall prepare the Feasibility Study with the Preliminary Design, following all parameters and conditions defined by the location conditions issued by the relevant authority per the submitted preliminary solution.

1. **Preliminary Design** to be prepared shall be designed as a detailed follow-up to the preliminary solution, considering all specific conditions and restrictions, and shall include all documentation per Rulebook on the content, manner and procedure of preparation and manner of control of technical documentation according to the classes and purposes of the objects ("Official Gazette of RS", No. 73/2019) specifically relating to purpose and contents of the preliminary designs for linear infrastructure objects.

The Preliminary Design will provide the precise position, functional characteristics and technical and technological solutions for the reconstruction and modernisation of the subject railway section, overhead line and electric power facilities, reconstruction and modernisation of telecommunications and the interlocking system and service points, as well as reconstruction and construction of new bridges and culverts, water protection and drainage, removal and reconstruction of road level crossings, in conformity with the requirements for the railway line infrastructural capacities and adopted international standards.

All specific parts of the Preliminary design must include:

* General documentation,
* Text documentation,
* Numerical documentation and
* Graphic documentation.

Contents of the textual and numeric documentation, graphic documentation scale and general level of detail prepared shall be done per laws, by-laws, standards and good engineering practices for preliminary designs of linear infrastructure objects. The indicative content of the Preliminary Design includes:

* Geodetic documentation (geodetic surveying and preparation of geodetic bases in the usual scale, acquisition of cadastral data, geodetic reports based on which changes in the property cadaster can be made, etc.)
* Geotechnical documentation (geotechnical investigation work for the Conceptual design level - exploratory drilling, engineering-geological mapping of boreholes, excavation of exploration pits, engineering-geological mapping of exploration pit cores, laboratory geomechanical testing, geotechnical conditions for the lower track structure, etc.)
* Design for railway traffic organization and operation
* Design for railway track substructure and superstructure
* Design for bridge structures (bridges, viaducts, underpasses, overpasses)
* Design for railway track arrangement on bridge structures
* Design for substructure openings, span up to 5.00m (culverts, etc.)
* Design for retaining and protective structures
* Hydraulic engineering Design
* Design for construction, reconstruction and displacement of roads - substructure and superstructure
* Design for auxiliary and maintenance road access to facilities
* Architectural and civil engineering Design - buildings and station complex design (station buildings with other accompanying facilities, areas, and technical infrastructure) as well as buildings for electrical engineering works, OCL section, with garages for TMD accommodation, workshop and warehouse space, etc.
* Design for Information and passenger movement guidance
* Design for protection and relocation of existing technical and utility infrastructure
* Design for Electrification Traction Power Substations - TPS, Stable Electric Traction Facilities - SETF, and Remote Control of Stable Electric Traction Facilities - RC SETF)
* Design of signaling and safety facilities and systems
* Design of telecommunication facilities and systems
* Design of mechanical installations
* Design for environmental protection and technical measures
* Design for technology and organization of works
* Design for railway traffic organization during construction
* Design for road traffic signalisation
* Expropriation design
* Technical infrastructure synchronization plan documentation (textual and graphic attachments)

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

1. **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,
* surveying and digitally recording existing terrain data, positions of all existing railway and nearby infrastructure, buildings, structures, visible installations and all other relevant objects. Special attention should be paid to adequately cover and represent any slopes, depressions, and similar terrain features at the location where the construction objects are planned, to avoid possible discrepancies with the on-site conditions.
* 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, as well as on the railway line where expropriation is required,
* performing of all other geodetic surveys for the purposes of preparing technical documentation,
* preparing geodetic elaborate analysis with the project for expropriation including field geodetic works for the purpose of implementing changes in the real estate cadaster in the process of expropriation.

**Geotechnical survey works** for obtaining detailed and reliable geotechnical data on conditions and parameters required for the design of the reconstruction and modernization of subject railway section, but should not be limited to:

* exploratory drilling and sample collection
* engineering - geological mapping of exploration wells,
* excavation of exploration pits,
* geophysics geoelectric surveys where needed
* detailed geotechnical core mapping
* laboratory geomechanically research,
* preparation of geotechnical bases and documentation

The number and depth of excavation pits, 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 the Client.

The program shall include the sufficient number of samples for all engineering objects, track substructure, buildings and borrow pits.

Geotechnical elaborates shall include, but not be limited to:

* Detailed collected sample profiles
* Longitude geotechnical terrain cryosections
* Relevant underground water levels presented in profiles and sections
* Laboratory results
* Conditions for structure foundations (bridges, viaducts, underpasses, culverts, overpasses, buildings)
* Hydro-geological conditions
* Conclusion with suggestions for substructure/soil replacement

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

For these services, the Consultant shall prepare E&S Management Plan Checklist, subject ot WB approval, compliant to ESF, WB EHSG and national legislation before exploration/survey activity commences, subject to Client’s approval.

1. **Preparation of Preliminary Design**

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

**General design conditions:**

* Design the railway line for the D4 loading scheme, with the maximum permissible axle load of 22.5 tons/axle and the maximum permissible weight per linear meter of 8 tons/m².
* Provide a line profile that allows safe and unhindered movement of railway vehicles with the loading gauge GC in the conditions of an electrified track system with 25kV/50Hz with remote managements for speeds up to 120km/h.
* Provide at each station, on a distance of 20 to 25 kilometers, sufficient track length for receiving and passing minimum 740m-long freight trains.
* Design station platforms with a height of 0.55m and a minimum length of 110m.
* Install standard canopies on the platforms.
* Arrange station complexes (station buildings with other accompanying facilities, areas, technical infrastructure, as well as buildings for electrical work) in accordance with the requirements of the official station and the projected workload.
* Provide technical solutions in stations to ensure safe passenger access to platforms (gradually elevated passenger access to platforms).
* Design all crossings of the railway line with existing and planned water supply, sewage, power lines, telecommunication, safety of communities and users, and mechanical installations in accordance with legal regulations and technical conditions of competent institutions, also considering also ESF, WB EHS and GIIP
* The design should promote social inclusion and equity by considering the needs and interests of all stakeholders, including vulnerable and disadvantaged groups.
* Design the installation of a video surveillance system with the necessary number of cameras and monitoring stations and install other technical security systems based on the previously prepared Risk Assessment Act for the protection of people, property, and business operations in accordance with the Law on Private Security ("Official Gazette of RS", No. 104/2013, 42/2015 and 87/2018), as well as Measures related to fire protection in accordance with the Law on Fire Protection ("Official Gazette of RS", No. 111/09, 20/2015, and 87/2018). Place the central equipment of the video surveillance system in a central facility from which the monitoring of images from the installed cameras in the video surveillance system will be carried out.
* Analyze the possibility of opening a new railway station, Šabac, at the triangle location, to enable passenger train traffic without entering Šabac station.
* Present a cost estimate of all works in dinars and euros within the Project.

All designs shall be developed considering the relevant national environmental, occupational and community health and safety regulations, labor management procedures and, WB EHSG where the stricter ones prevailing. Also, WB recommendations on Climate Change impact minimization need to be accounted for, as well as structures’ stability and safety as well as resistance to natural disasters and impacts attributable to Climate Change. Resulting design must be in line with measures and recommendations documented in the national EIA and WB ESIA, which will be prepared in parallel with Preliminary Design.

**Specific design conditions:**

#### Substructure and superstructure

* define the centreline, vertical alignment and all other track geometry parameters for speeds of up to 120 km/h;
* subgrade/foundation and substructure shall be designed per parameters defined in the geotechnical survey elaborates for loads of a D4 category main railway line (225 kN, 80 kN/m);
* substructure formation shape shall be designed with typical cross-section dimensions for D4 category main railway line, including widening of formation in curves, cable gutters and other needed installations;
* subgrade/foundation and substructure formation materials shall be planned economically justifiable and from nearby borrow pits, quarries and other sources as to avoid unnecessary transportation costs. As much as possible, no new borrow pits, quarries and similar exploitations of mineral resources will be opened for the purposes of the project. Still, existing ones with valid licenses and concessions can be used;
* Design a trackbed width of 6.60m, or determine the trackbed width so that the distance from the track axis to the edge of the trackbed is 3.30m. Substructure and trackbed drainage shall be designed to fully conform with standards and good engineering practices for soil and water level parameters presented in the geotechnical survey elaborates;
* detailed static calculations shall be done in accordance with the applicable regulations and standards for all engineering structures such as culverts, bridges, retaining walls and other similar structures to, first and foremost, ensure stability and safety of the infrastructure;
* Design widening of tunnels in accordance with requirements for traffic of vehicles with GC loading gauge;
* inspection and examination of all bridge and tunnel structures, retaining walls, culverts and all other engineering structures shall be performed in order to define the scope of works to be planned on those structures and included in the technical documentation, with those results also presented within the design documentation;
* Repair of existing tunnel structure and portal(s) shall be planned based on results of performed examinations;
* superstructure on the open track and the railway part of the station tracks should be designed with UIC60 rails on reinforced concrete sleepers measuring 2.6m and elastic fastenings in Category 1 crushed stone ballast prism of shape and dimensions in accordance with applicable regulations and standards.
* tracks will be designed as CWR tracks on the full length of the subject railway section;
* switches shall be designed per relevant standards and rulebooks to enable the most suitable functioning of the stations, specifically using simple switches and switch track connections.
* switches shall be designed as welded in CWR track,
* Rationalize the number of RLCs by reducing them to the necessary minimum (closing or deleveling, especially at points where the railway intersects with state roads of the first category). RLCs that remain in operation shall be designed to meet the minimum 60° angle parameter, constructed with modern rubber panel systems and in widths to accommodate common local cycling and pedestrian traffic, and with modern lighting installations,
* existing industrial track capacities in private sector ownership connected to stations in this project's scope shall be accounted for and their connection to the public railway designed and kept operational within the design unless specifically stated otherwise.

#### Bridges and culverts

* Bridges and culverts should be designed for the load category for which the railway is prepared (225kN/axle and 80kN/m') and provide a clear profile that allows safe and unimpeded movement of railway vehicles with the GC loading gauge.
* Design new bridges or perform structural analysis for existing ones in compliance with all applicable regulations, rules of the profession, considering all necessary influences according to their purpose, location, and load schemes for special vehicles.

#### Hydrotechnical facilities

The design should include all facilities that ensure the safety and usability of the railway line and associated structures from all types of water that may occur and have harmful effects during the intended operational period. Particular attention should be paid to the following:

* Drainage of the trackbed and structures
* Hydraulic verification of the capacity of culverts and bridges
* Protection of the riverbeds near the bridges
* Regulation works on watercourses and protection of the trackbed in the watercourse zones
* Water supply and wastewater drainage in stations (internal and external installations)
* Measures to protect water sources, etc.

#### Architectural objects

* Plan for the reconstruction of existing station buildings and the arrangement of station complexes (station buildings with other accompanying facilities, surfaces, and technical infrastructure) in stations, according to the planned scope of work and in accordance with the specific requirements of the Investor.
* Include the construction of new facilities for the accommodation of heavy motor trolleys (TMD) - a garage with two tracks, a channel for inspection and repair of TMD, office, and warehouse space for maintenance of OCL , at a location to be defined by the Investor.
* For the accommodation of signalling and safety equipment and telecommunication equipment, plan the construction of new buildings that fully meet all the requirements of the relevant laws and bylaws for the stated equipment.

#### Railway electrification

The electrical infrastructure of the railway line and station facilities should be designed in accordance with the technical specifications for interoperability of energy, control, management, and signaling structural subsystems.

The railway line Ruma - Šabac - Zvornik - State border is currently not electrified, and therefore the following steps are required:

* Plan the electrification of the single-track railway line and station facilities of Ruma - Šabac - Zvornik - State border using a 25 kV - 50Hz, system of fixed installations for electric traction (IFTE), with remote control.
* Design the catenary as a simple compensated contact line without a "Y" feeder for speeds up to 120 km/h. The contact wire height from the ground is 5500mm, and the normal overhead line height is 1400mm. The normal tension force for the catenary and contact wire is 10 kN. The contact wire should have a cross-sectional area of Ri 100 with 100 mm2, the supporting wire BzII with 65mm2 cross-sectional area, and the feeder and supply lines for 25kV should be made of Cu wire with a cross-sectional area of 150 mm2.
* Excavate pit foundations, pour concrete foundations for the pillars, portals, and anchors with minimum C25/30 concrete, using B500 ribbed reinforcement. Use fine-grain material for the cap of the foundations and C25/30 concrete. All these steps should be carried out in accordance with the geotechnical report for railway alignment.
* All sectioners, with or without the grounding knife, which are installed in the OCL, must be motor operated with remote control, except the sectioners for separating the IFTE facilities (ET substation, Sectioning facility and neutral section facility) on OCL, which are to be provided manually operated. These sectioners must be accessible from the railway (the fence of the facilities should not hinder access and operation). Each sectioner should be marked with numbers indicating its purpose and order in the station.
* Provide formation of new OCL sections and electrical power facilities (EPF).
* Construct new facilities for the accommodation of heavy motor trolleys (TMD) – a garage with two tracks, a channel for inspection and repair of TMD, office, and warehouse space for maintenance of OCL and EPF.
* Provide remote control of motor-operated sectioners from the central remote control center, the train dispatcher's office with remote terminal unit (RTU) cabinets with hierarchical control from the dispatch control unit (DCU), and local control at the sectioners locations. Place RTU cabinets in the train dispatcher's office.
* Install new supporting structures for the catenary: two-legged masts made of 2U profiles and two-legged portals made of 4L profiles, along with complete equipment for supporting, fixing positions, suspending and tensioning the catenary wires. Mechanical protection of the portals' legs should be provided at the loading ramps and tracks in the stations.
* Install complete sets of suspensions for the contact wire (single, double, and triple brackets) with fasteners.
* Install Mid-Point Anchor with fasteners on the pillars and rigid portals, using galvanized steel wire.
* Install devices for solid tensioning of the contact wire with fasteners and complete sets of AZ devices with fasteners, compensating plates, and concrete weights on the pillars and rigid portals.
* Ground the return conductor and the railway track. The method of installing the return conductor should be consistent with the applied signalling and safety system. Ground the supporting structures of the catenary and connect them to the return conductor following the technical solutions provided in TPE - KM 1, Part IV - Return Conductor and Grounding.
* Install track crossings, inter-rail and inter-track connections. Ground the pillars and rigid portals with FeZn 95mm² wire to the rail of the catenary return conductor.
* Ground the artificial structures (bridges, overpasses, footbridges, and other metal structures) to the rail of the catenary return conductor using spark gaps and special grounding electrodes (probes) with protective grids and signs "High Voltage - Danger to Life" in the zone within 8m from the track centerline.
* Implement dual grounding for pillars and rigid portals with disconnectors, plants (ETS and SF), pillars, and rigid portals located in the station, platform, and platform access area accessible to the public, as well as pillars and legs of rigid portals located on the left and right of the pedestrian crossing gates.
* Install new pedestrian crossing gates with concrete pillars, complete with upper and lower wires, warning signs "High Voltage - Danger to Life," and traffic sign "Limited Height 4.5m" at level crossings.
* Mark the pillars and portals with inscriptions: TOR (GIŠ) imprint, pillar or portal numbers, and distance from the OHC pillar axis to the track centerline.
* Install signal plates: "Signals for Electric Traction," "Beginning/End of Isolated Crossover," and signal sign "Maneuvering Limit."
* The design should include the delivery of spare parts for electrical infrastructure, up to 5% of the newly installed equipment.
* As part of the preparation of graphic documentation for the catenary network, provide:
* Projects of planned facilities with open railway and station dispositions.
* General sectionalization and power supply schemes for the catenary network.
* Specific sectionalization schemes for stations.
* Schemes for the return conductor and grounding.
* Technical documentation for the special technical solutions during the construction of the catenary network.
* Power supply to the catenary network from mast substations 25/0.23kV should be carried out based on the instructions "Temporary Provisions on Technical Conditions for Connecting Other Consumers of Electrical Energy to Stable Electric Traction Plants" (ZJŽ 14, number 28/85-123), or alternative solutions compliant with EU standards for railways in line with TSI.

#### Power supply facilities

The project aims to electrify the single-track railway line Ruma - Šabac - Zvornik - State border, which involves building stable electric traction facilities (ET substation, Sectioning facility and neutral section facility), 20(10)/0.4 kV transformer stations, lightning protection installations, platform lighting, internal electrical installations, and lighting with the installation of new distribution cabinets to increase the level of reliability and safety in traffic operations.

All station facilities should be equipped with energy-efficient solutions, such as solar power plants, LED lighting, and reactive power compensation in 20/0.4kV transformer stations.

The electrification of the railway line Ruma - Šabac - Zvornik - State border, in terms of building the IFTE and the required number of facilities (ET substation, Sectioning facility and neutral section facility),, as well as the required number of power supply points for OCL, shall be coordinated with the high-speed railway project on the Stara Pazova - Šid section to avoid reconstruction and redesign of facilities in the reconstruction through the high-speed railway project Stara Pazova - Šid.

Plan the construction of new ETSs based on the energy calculations, including the construction of the connecting lines (110 kV overhead lines and 110 kV overhead line fields) for supplying electric traction facilities, which should be carried out in accordance with the technical requirements of Elektromreža Srbije, the relevant Electric Distribution Company, and the Branch of the Distribution System Operator.

In addition to ETS facilities, plan the construction of sectioning facilities, following the ETS-SF-NSF-SF-ETS *(“EVP-PS-PSN-PS-EVP”)* principle. For facilities to be reconstructed through the high-speed railway project Stara Pazova - Šid, modify the project to expand the necessary number of power supply points for OCL (in the NS facility in Ruma) to ensure reliable power supply to existing and planned electrified railway sections. Sectioning facilities should be planned in station areas, as well as motor-driven disconnectors for supplying tracks or groups of tracks within the station area.

The number and location of motor-operated disconnectors should be planned based on the technical solutions for building the catenary network. The equipment for controlling the motor-driven disconnectors should primarily be powered from the distribution network.

Power supply to the catenary network from the pole substations 25/0.23kV should be done exclusively based on the instructions "Temporary Provisions on Technical Conditions for Connecting Other Consumers of Electrical Energy to Stable Electric Traction Plants" (ZJŽ 14, number 28/85-123), or alternative solutions compliant with EU standards for railways in line with TSI.

Implement a project for remote control of ET substation, Sectioning and neutral sectionfacilities, as well as motor-operated sectioners, from regional dispatch centers and a unified remote control center that is being designed and constructed in the station Beograd Ranžirna. Coordinate the remote control setup with the maintenance services of the electric traction infrastructure.

Plan the integration of remote control devices into the existing SCADA system in the dispatch centers.

**110/27.5kV Electric Traction Facility, 2x7.5/10 MVA**

* Construct 110kV supply lines and 110kV overhead line fields.
* Coordinate the Technical Control System (TSU) of the 110kV part of the facility with the operating rules of the transmission system and the specific requirements of the transmission system operator.

**110kV Switchyard**

* Install 110kV SF-6 gas circuit breakers and 110kV measuring transformers, with modern technological solutions and in compliance with the requirements of the transmission system operator.
* Plan the busbar systems for 110kV, following the technical design for connecting to the EMS and ODS transmission systems.
* Construct 110kV sectioners according to the standard design for electric traction substations.
* Purchase new 110/25kV power transformers with a capacity of 7.5/10 MVA if the railway project requires it.
* Install high-voltage equipment to enable regenerative braking in electric traction.
* Install two electronic tap changers (TAPCON) for regulating the secondary voltage and enabling individual/parallel operation of 110kV/27.5kV power transformers for each EVP.
* Install current transformers for Un = 110 kV.
* Install voltage transformers for Un = 110 kV.
* Install surge arresters for Un = 110 kV.
* The return conductor, operational, protective, and lightning grounding should be combined and connected to the basic grounding system with a lattice grounding system in the 110 kV field. Ground the fence and lighting poles with separate grounding devices. Install the grounding busbar with current measurement of the return conductor in a freestanding cabinet located between two power transformers.

**25kV Switchyard**

* Install 27.5 kV vacuum circuit breakers on all traction supply points and in the switchgear field mounted on carts with the required number of command and signal contacts.
* Install motor-operated disconnectors with a specific number of command and signal contacts.
* The circuit breakers and sectioners should be remotely operated from the USBU, the central station of the facility, locally from the device cell, and manually.
* Install motor-operated disconnectors that can be operated from the front side of the cell next to the doors.
* Provide electrical and mechanical interlocking for the operation of disconnectors and circuit breakers.
* Install current transformers for Un = 25 kV.
* Install voltage transformers for Un = 25 kV.
* Plan the construction of medium-voltage equipment to enable regenerative braking in electric traction.
* All internal medium-voltage equipment (copper busbars, grounding conductors, supporting and conductive insulators, etc.) should be installed according to the regulations for building electric traction facilities, using a protected busbar system.
* All low-voltage equipment should be installed with modern technology in cabinets with removable compartments for equipment (digital protection relays for transformers and catenary, voltage regulation, rectifiers for supplying auxiliary equipment, etc.) with the possibility of control from regional USBUs and JDCs and with visible confirmation of the device position change on the front side of the cabinet.
* The connection between external and internal equipment should be done with command and signal cables placed in appropriate cable channels.
* The power supply for equipment, lighting, and thermotechnical installations in ETS, SF, and NSF facilities should be primarily provided from the distribution network.
* As a backup power supply, provide stationary batteries 110 V DC, with suitable uninterruptible power supply devices, autonomy of at least 3 hours, and a diesel generator of appropriate power.
* For self-consumption of facilities, provide installation of a "house transformer" 25/0.231 kV, 100 kVA, with a manually operated switch for disconnecting from the busbar system.
* Install surge arresters for Un = 36 kV at the switchgear fields.
* Plan spaces for equipment storage, spare parts, and, for the EVP facility, rooms for temporary worker accommodation and sanitary facilities.

**Metering and Protection Equipment**

* Plan the installation of relay protection equipment for the power supply points for the catenary with microprocessor technology (distance protection relays with at least two stages of settings and backup overcurrent protection). Install digital relays for distance protection and backup overcurrent protection in the PS facilities.
* Provide appropriate protection for power transformers, including at least overcurrent and short-circuit protection, boiler protection, differential protection, buchholz protection, and thermal protection.
* Enhance the capabilities for measuring and controlling electrical quantities in the facilities, including the ability to determine the location of faults on the 25 kV lines either through the secondary function of the metering relays or by installing separate devices. The measurements should include the effective values of currents and voltages, with the ability to detect changes in these quantities. Extend the functionality for monitoring the status of power transformers (thermal imaging, insulation status).
* Connect to the regional USBU and JDC via optical cables.
* Measure the return conductor current and compare it with the currents of the power supply points in a separate freestanding above-ground cabinet located between the transformer fields.

**Power Supply Devices**

* Plan a separate 220 V distribution cabinet with a main switch, undervoltage relay, metering instruments, and the ability to transmit measured values to the regional USBU and JDC. Provide sufficient number of outlets for all consumers and reserve outlets for possible system expansion.
* Plan a separate 110 V DC distribution cabinet. Provide reserve outlets as well.
* Install two separate rectifiers 220/110 V, a supervisory unit, 110/220 V inverter, and rectifiers for supplying remote control devices that are compatible with or identical to the new system (for the high-speed railway Stara Pazova - Šid currently under design). The new rectifiers should be resistant to possible overvoltage conditions to ensure continuous operation and safety/protection of the powered equipment even under the most challenging conditions.
* Install 110 V accumulator batteries.
* Provide control-signal and power cables for connecting devices to distribution panels, relay-command stands, and the remote-control center. Lay the cables in cable channels.
* Place all equipment and gel technology-based accumulator batteries in closed cabinets with the necessary ventilation for cooling the components.

**Remote Control (RC)**

* Plan a new RC system based on modern solutions, connected to regional and central remote control centers. The new devices in controlled locations should provide sufficient signals/commands and enable data/information transmission according to the projected state of devices and equipment in the facilities. Provide real-time data transmission for all measurements conducted in the facility.
* Ensure data/information transmission to the transmission system operator in accordance with the operating rules of the transmission system and specific requirements of the transmission system operator.
* Ensure a 20% data/information transmission backup system.
* In the controlled location, plan one switch for selecting remote/local control.
* Connect to the remote-control center via optical cables, with mandatory redundancy for the transmission path.

**Miscellaneous**

* Plan electrical installations, external and internal lighting, operational, protective, and lightning grounding. The grounding should be interconnected with the steel grid grounding of the ETS. The metal fence surrounding the ETS, at least 2.5 meters high, should have separate grounding with barbed wire on top.
* Install a video surveillance system for the interior and exterior of the ETS, SF, and NSF facilities, as well as access control and signal transmission to the dispatch center for security.
* Provide fire protection installations, fire alarm control panel, and a system for access control and unauthorized entry detection into the facility.
* Include necessary thermal equipment for cooling/heating electronic equipment.
* Plan electrical installations for lighting the interior and exterior for normal operation and emergency/reserve (110V DC) lighting, Schuko outlets for connecting portable devices to 220V AC and 110V DC in line with standard solutions for electric traction facility buildings.
* In all official locations, equip the facilities with energy-efficient solutions, such as photovoltaic power plants for power generation and self-consumption, LED lighting, and reactive power compensation in (20)10/0.4kV transformer stations.

#### Signalling safety and interlocking facilities

Due to the existing condition of the signalling-safety and interlocking facilities, as a consequence of long exploitation, theft, damages and the inability to regularly supply spare parts, it is necessary to replace these facilities and devices (internal station devices, open railway devices, level crossing devices) with new modern electronic devices.

The signalling-safety and interlocking design shall include:

* The existing signalling safety and interlocking devices must be replaced with modern electronic devices. Electronic devices must be in compliance with SRPS EN 50126-1, SRPS EN 50126-2, SRPS EN 50128, SRPS EN 50129 standards;
* For electronic SS devices in stations, open track SS devices and SS devices for RLCs, the safety integrity level must be 4 in accordance with SRPS EN 50129, for complete SS device.
* Newly installed devices must be connected to neighboring railway stations through a suitable interface;
* Installation of devices and facilities for interstation dependence (ID);
* Service points and sections of open track must be equipped with conventional electronic signal-safety devices with light signals and track devices for precise control of train speed, allowing the speed of trains equipped with the locomotive part of the auto-stop device (I-60 automatic stopping system) at speeds up to 160 km/h, as well as equipping them with the European train control system (ETCS) level 1, in accordance with the Specification of user/functional requirements on the IŽS railway network.
* Issuing commands and monitoring the condition of individual elements of the device by the traffic operator; for this purpose, provide an operator workstation based on a PC, which together with peripheral devices (monitor, keyboard, mouse) form a human-machine interface (HMI). Equip the operator's workstation with both an active and a backup workstation. Include within the design, the required number of monitors with clear visual representation of the complete track with the safety elements. Control shall be provided via keyboard and mouse. The display of the SS and interlocking elements shall be provided in accordance with the graphics adopted by IZS and the latest attached catalog of symbols;
* In all stations, the switches must be equipped with electrical switching devices with connecting accessories adapted for concrete sleepers;
* Installation of an electric heating system of switches with power supplied from the OCL;
* Installation of new cables for connecting internal and external SS and interlocking devices. Insulated polyethylene (PE) cables shall be provided for connecting external safety elements in stations and on interstation distances and/or dedicated optical cables for needs of SS. Provide separate cable networks and separate cable cabinets for signals, for switches, for axle counters, for devices for automatic stopping and control, and electrical switch heating system. The cables must be protected against the disturbing effects of traction electrical current;
* Data transmission, command and control for dependency shall be provided through vital signaling network and dedicated SS fibers in fiber optic cable. Provide physical redundancy of the vital signal network both in terms of active components (layer A and layer B) and in the form of two optical cables that are routed along independent routes on one and the other side of the tracks.
* All level crossings that are to be secured in accordance with the design of traffic technology must be designed in electronic technology. The existing level crossing devices must be replaced with modern electronic devices with replacement of complete cable network connecting the external elements of the RLC with the internal device. Existing level crossing facilities must be adapted or replaced in accordance with the applicable technical conditions and standards regarding the accommodation and installation of the aforementioned equipment. The safety integrity level of RLC devices made in electronic technology must not be less than 4 in accordance with SRPS EN 50129. The electronic RLC device must have a failure detection system and provide indications of failures (disruptions and malfunctions). All disruptions and malfunctions must be recorded;
* Video surveillance shall be provided for all level crossings, with at least 3 cameras per RLC and remote access to the video surveillance device, with the possibility of control at the corresponding center.
* Provide lighting of the level crossing intersections in populated areas, as well as away from populated areas with a shielded light source. In the event that it is technically impossible to supply the power to lighting of intersections outside populated areas from the network which powers the devices of the railway infrastructure, provide it using solar technology with lighting autonomy during nighttime for 365 days a year. The solar panel, LED reflector and battery shall be integrated as one product.
* Signalling-safety and interlocking devices in stations shall be provided with interfaces for connection to the future remote traffic management system (CTC), with all the necessary equipment for integration into the planned regional and Unified Dispatch Center (JDC).
* Power supply in service points shall be provided in the form of an uninterrupted power supply system in accordance with the requirements of the installed equipment. The power supply of the device shall be realized in three levels with regular, auxiliary and backup power supply. The transition from one type of power supply to another type of power supply is done automatically and must not cause changes to the existing state of the SS device. Parts of the devices for powering SS and interlocking devices in stations are dimensioned and supplied in such a way as to enable power supply to SS and interlocking devices at the interstation distance and devices for securing level crossings. In the event of a failure on the network from which the regular power supply is provided, power shall be switched to the auxiliary power automatically, and then, within a maximum period of 60 seconds, to the backup power supply;
* For accommodation and housing of SS, interlocking and telecommunication equipment, construction of new facilities, fully in accordance with all requirements for the specified equipment as well as all recommendations of the equipment suppliers;
* All SS and interlocking devices and facilities designed in accordance with applicable valid Rulebooks;
* Supply of spare parts for SS and interlocking devices, in amount of 5.0% of the value of newly installed equipment.

#### Telecommunication, information and communication plants and facilities

General conditions for design of technical documentation:

The design of the telecommunications system must be harmonized with the dynamics of realization and construction of the JDC project, the project of modernization and reconstruction of the railways on the territory of the Republic of Serbia, section Stara Pazova - Šid, as well as other projects that include or are adjacent to the section in question if works have already been carried out on telecommunication systems that are the subject of this project.

General conditions for housing telecommunication and information-communication equipment:

* Arrangement of space for the accommodation of the equipment shall be provided, in order to meet the climatic and mechanical characteristics required by the equipment.
* All necessary technical solutions for power supply and grounding required by telecommunication system devices shall be provided, in accordance with valid regulations in this area.
* The design shall include rack cabinets for telecommunication systems and IT equipment with the corresponding local computer network.

General conditions for cable infrastructure:

* On concrete bridges subject to reconstruction or renovation works, replacement of all concrete cable troughs shall be provided;
* Replacement of concrete cable troughs shall be provided also on concrete bridges that are not subject to works if the troughs or their covers are damaged;
* On steel bridges subject to reconstruction or renovation works, replacement of all tin cable troughs shall be provided;
* Replacement of tin cable troughs shall be provided also on steel bridges that are not subject to works if the troughs or their covers are damaged;
* In stations, all damaged conrete cable troughs and their covers shall be replaced.

Cable infrastructure for laying of optical pipes:

* New cable infrastructure for laying PEHD pipes, along the entire route, should consist of Ø40 PEHD pipes laid in a trench, concrete or plastic troughs, tin troughs, cable ducts, inlet shafts, into which optical cables will be blown in as well as 2 PEHD pipes which will represent a reserve backup. Only one optical cable can be blown into one PEHD pipe;
* On the open track, at places where a new trench for railway copper cables is planned, the pipes should be placed in the same trench;
* On the open track, at places where a new trench for railway copper cables is not planned, a trench at a minimum distance of one meter from the route of the railway cables shall be provided. Where this is not possible, a technical solution shall be provided;
* The depth of the cable trench must not be less than 0.8 m;
* In stations in which there are existing concrete troughs , PEHD pipes Ø40 shall be laid in them. Where this is not possible, a technical solution shall be provided;
* Installation of the optical cable in stations shall be done by using the existing shaft for the installation of other cables. Where this is not possible, a technical solution shall be provided;
* Crossing over bridges shall be done by using existing metal troughs, through which existing cables pass. Where this is not possible, a technical solution shall be provided;
* Passages under the railway or road shall be done at a depth of 1.2m, where 4 PVC pipes Ø110mm shall be laid.

Railway cables:

* Cables shall be relocated and/or protected in such a way that they are completely safe from construction work on substructure, superstructure and structures. Following the cable intervention, correct operation of all existing telecommunication, signalisation and safety, insterlocking and remote control systems that are in operation shall be ensured/established.
* If necessary, railway and local cables may be temporarily moved in order to secure the necessary connections, and following the completion of the construction works, they must place at their final position.
* Railway cable (copper type STA or optical with equivalent characteristics), in terms of characteristics and capacity, shall be adapted to telecommunication, signalisation, safety and interlocking and other systems that are intended to operate on it, taking into account the construction and electrification of the railway (25 kV, 50Hz). The railway cable must meet the conditions for laying it adjacent to the electrified railway, as well as be appropriately certified by the Directorate for Railways, while the construction and type of the cable shall be determined by the systems that operate on it and the impact of the electric traction current.
* In all stations, a new local cable network shall be designed, which shall connect all facilities in the station area for the operation of telecommunication connections and information and communication equipment.
* In all station facilities, plan a local computer network that will be integrated into the existing Intranet network of IZS.

Optical cables:

* Plan the installation of railway and interstation optical cables on subject sections. In all stations, plan for the installation of a full structure railway optical cable, with the forwarding of certain fibers in accordance with needs and the intended purpose of the optical fibers;
* Flexible optical cables are singlemode with 96 and 48 optical fibers in accordance with G.657A1 standard. A 48-fiber fiber optic cable, which is represents the redundance to a 96-fiber fiber optic cable, shall be planned if required by critical services and SS and EE systems;
* Optic cables shall be laid underground, along independent routes on both sides of the railway, on the subject section of the railway, alternatively one (redundant) per OCL, and in the stations in accordance with the civil engineering plan of the station;
* An additional interstation optical cable with 24 optical fibers, in accordance with G.657A1 standard, shall be used for the operation of telecommunication, energy, signalisation-safety and interlocking, and other systems in service points and points along the railway (level crossings, energy facilities, railway radio stations) in which installation of optical cable is planned, which would be laid between all stations of the subject section. The additional interstation optical cable shall be laid through a separate laid optical tube in relation to the track optical cables. It shall be installed with a full construction into the stations;
* The optical cable shall be in accordance with the ITU-T standard, non-metallic, reinforced, with protection against rodents and moisture penetration;
* Provide local cable networks in stations for systems that require fiber optic operation;
* The railway optical cable should have 12 optical fibers per tube;
* The optical cable is intended to be blown into one Ø40 PEHD pipe along the entire route.
* The factory length of the optical cable shall be at least 4 km and 500m for PEHD pipes;
* Optical splitters shall be 19" with E2000-APC connectors;
* As optical cable reserve, 15m per 1km shall be left; 15m is left on the extensions on both sides; in each room where the cable is to be installed, leave a 15m reserve. In addition to the reserves defined by the conditions, leave a reserve at stops, level crossings, bridges, tunnels and facilities where the installation of optical cable is not planned.

Dispatchers and railway telephone devices:

* In all stations, dismantle the existing station dispatcher telephone devices and telephones at the entry and exit signals. Dismantle all telephones on the open track. Align the disassembly of the elements of railway and dispatch devices with the technology of the works, while establishing the necessary temporary connections for communication;
* Install new digital station dispatch telephone devices in all stations (central devices with TK desk and anti-vandal telephones). On the open railway, install telephones in anti-vandal housings: with selective transmitters at spatial signals and telephones at level crossings. Provide replacement of telephones. In the dispatch centers of CTC, USBU and JDC, aligned with the SS and EE designs, install the dispatcher line telephone USBS and USBEV systems, which are made with modern technology (switchboard with TK desk);
* In the dispatch centers of CTC, USBU and JDC, aligned with the SS and EE projects, install the dispatcher line telephone USBS and USBEV systems, which are done with modern technology (switchboard with TK desk);
* Dispatch telephone devices in stations and dispatch centers shall have the ability to work with both copper pairs and optical fibers;
* The design of railway telephone devices and the dispatch telephone system must be in accordance with the traffic technology, the technology of the SS system and the technology of the electric traction system, in order to provide means of communication to the necessary personnel in accordance with the mentioned technologies, if required;
* Provide the appropriate number of register phones in service points in accordance with the Traffic Technology;
* Provide the necessary equipment, material and works for the implementation of temporary telephone connections for regulation of traffic after the disconnection of signaling and safety devices and the dismantling of station railway telephone devices for proven communication of traffic personnel;

Radio dispatch system:

* Main railway lines, regardless of train speed, as well as other railway lines for a train speed of 100 to 160 km/h, must be equipped with a radio dispatch system. The exact number and location of railway radio stations can be determined based on EM field measurements.
* Describe the necessary activities with stated costs for the measurement of the EM field and the preparation of the Elaborate of the measurement of the coverage of the track with the EM field of the radio-dispatching system and other necessary technical documentation required by the regulatory bodies for this type of device.
* The RD switchboard and railway radio stations shall be provided implemented in modern technology in accordance with traffic technology, and recommendations of UIC 751-3.
* Possibility of connecting the RD center and railway radio stations by copper pairs and optical fibers shall be provided.

Station telecommunication systems

All stations and service points in scope of the project shall be equipped with the following telecommunication systems:

* Installation of a common communication network:
* The installation of the common communication network should be carried out according to the principle of structural cabling. This means that computer and telephone sockets are the same, type RJ-45 minimum cat. 6. the layout of the RJ-45 sockets shall be adjusted according to the needs of the users.
* Railway automatic telephone network (ŽAT):
* Provide a centralized VoIP telephony system for the communication of railway staff on the entire section of the railway. The VoIP telephony central device is planned at the location where the regional VoIP ŽAT switchboard is located, which should be dimensioned to accept all users of this section with the possibility of expansion. Provide local VoIP telephony devices at the location of the regional ŽAT switchboard. Enable independent operation of local devices if communication with the central device is interrupted. Connections with the existing ŽAT network can be made through the ŽAT headquarters in Belgrade, Nemanjina 6 street, in the office building of “Serbian railways infrastructure” jsc.
* Keep the existing numbering applied in the ŽAT network. Provide in each station interface devices of appropriate capacity for connecting analog telephones to the VoIP system.
* Provide a monitoring system for monitoring/supervising the operation of the VoIP system with all its elements.
* VoIP switchboards must have the option of receiving SIP trunks or some new technology for connecting to the public telecommunications network of Telekom.
* Provide rack cabinets for placement of equipment as well as office furniture for placement of workstations.
* Clock System:
* Clock system designed on IP technology and equipment shall be provided. In all service points where this system is planned, install secondary IP clocks. The central equipment of the clock system is the master clock and GPS receiver in the station Belgrade center. Redundant “parent” clock with GPS receiver should be placed in a suitable station.
* Provide a monitoring system for monitoring/supervising the correct operation of the clock system with all its elements.
* Provide rack cabinets for equipment placement as well as office furniture for workstation placement.
* Public address system:
* Provide a modern digital public address system, which should work in both local and central mode. The local mode involves informing the passengers by the train dispatcher via the microphone console. The central mode implies system integration with central systems for providing information. The public address system should be connected to the integrated audio and visual passenger information system (AVIS). Through the AVIS system, the public address system announces predefined messages. Spaces and rooms where movement and stay of passengers is planned, must be equipped with loudspeakers. Provide a monitoring system for monitoring/supervising the correct operation of the public address system with all its elements.
* Provide rack cabinets for equipment placement as well as office furniture for workstation placement.
* Information board system:
* In service points in which this system is planned to be installed, IP information boards shall be placed. Provide a visual passenger information system based on IP technology and equipment. Information boards can be platform or separate collective (information boards for displaying the timetable for arrival and information boards for displaying the timetable for departure). The visual passenger information system should be connected to the existing AVIS system. Through the AVIS system, information boards display pre-defined messages.
* Provide a monitoring system for monitoring/supervising the correct operation of the information board system with all its elements.
* Provide rack cabinets for equipment placement as well as office furniture for workstation placement.
* Connect the system to the central database of IŽS for tracking the trains operation.
* Business information system:
* The business information system consists of an intranet computer network, based on a structural cable system, for connecting the telephone system, data transmission system and other non-critical systems. Terminal endings should be defined with an RJ45 socket of minimum category 6. The minimum number of connections per employee's workplace should be 3 or more depending on needs.
* The business information system should be supported with a server structure for the needs of the business information system.
* The server structure must be done according to the principle of virtualization and in accordance with the platforms used in the intranet network.
* The server structure should enable the operation of several servers necessary for network operation as well as for the operation of the business system, as well as have the option of storing backup data from critical workstations, employee workstations and servers.
* Connection shall be done by optical connections to all facilities in stations and interstation distances for connecting facilities and services along the railway for the purposes of connecting employees to the Intranet network and by copper structural cabling to all employees in station facilities.

Transport system

Equip the railway section with transport systems consisting of IP/MPLS systems for the transmission of non-critical services. Systems of non-critical services must be integrated into the intranet network of IŽS. Active equipment of non-critical systems (L2, L3, MPLS) must be located in IT premises.

Railway level crossing video surveillance system

* Provide video surveillance on all level crossings with at least 3 cameras per crossing and remote access to the video surveillance device.
* Provide a video surveillance system based on IP technology and equipment. Enable recording, monitoring and review of recorded material, monitoring in real time, recording continuously and according to parameters. Secure the storage of recordings from the cameras for up to 30 days.
* Provide a monitoring system for monitoring/supervising the correct operation of the video surveillance system with all its elements.
* Provide rack cabinets for equipment placement as well as office furniture for workstation placement.

#### Operation and organization of traffic

Within the design for traffic operation and organization, the following aspects need to be included:

* Technical and Operational characteristics of the Designed Railway Solution
* Technical elements of the track and speeds on sections.
* Relevant gradients of the track profile.
* Arrangement and position of official stations.
* Signaling system on the track, stations and other service points.
* Telecommunication devices on the track, stations and other service points.
* Line scheme of the newly designed state of the track and stations, showing the position of all signals and signal indications on the track.
* Use methods of traffic modeling simulations with specialized software for this purpose.
* Principles of Organizing Passenger and Freight Traffic on the railway line
* Types and categories of trains.
* Tasks of stations in traffic organization.
* Capacity of the track.
* Infrastructure Capacity and Working Technology of Stations
* Display basic data on tracks and platforms (disposition, purpose, and lengths), signaling, telecommunication, information systems, basic information about station buildings (position, size, and purpose of rooms), organization of space for passengers, functionality of connecting station facilities and the surrounding area.
* Technology of train reception and dispatch, technology of passenger and cargo handling, staff (number, structure, and tasks of employees), accommodation facilities for staff, and communication between services.
* Technology of servicing industrial tracks.
* Operation and organization of train traffic during construction works: This solution should be developed in accordance with the technology and dynamics of construction, traffic needs, and the given intervals for construction works in accordance with the conditions of IZS. Present the traffic regulation during construction works on the track, as well as works in buildings accommodating devices and traffic personnel involved in traffic regulation.
* Traffic Analysis: Traffic data should serve as the basis for analyzing existing traffic trends and determining the patterns of development. This activity involves a detailed analysis of traffic parameters (number of passenger and freight trains per timetable, number of dispatched passengers per stations, freight traffic on the track, characteristics of public passenger transport, characteristics and traffic load of roads with traffic flow structure, unevenness in directions) in the gravitational area of the railway line. If the available data are not sufficiently covered by the traffic database, appropriate additional measurements should be conducted. Forecasts should be made for different scenarios of area and traffic development for a planning period of 20 years. The conclusions from the obtained results should be formulated in a way that is directly applicable for further design and CBA analysis.

#### Cost estimates

Cost estimates in Serbian dinars and euros prepared based on Preliminary design and BoQ (to be a deliverable separated from the Preliminary design).

#### Synchron plan

On the situational plan, at a scale of 1:1000, it is necessary to provide an overall representation of all projected technical facilities, pipelines, and installations.

#### Expropriation

For the proposed railway, it is necessary to determine the areas affected in municipalities and cadastral municipalities, including the expropriation line and the area of occupied parcels. Additionally, it is required to obtain property sheets with data on the properties to be expropriated. The expropriation line should be analytically defined by coordinates of key points.

#### Technology for works execution

Within the Preliminary Design, a proposal for the technology, organization, and schedule of work execution should be provided, taking into account the characteristics of the designed facilities and the required quality, with minimal necessary interruptions of traffic on the existing single-track railway. This should be done based on the conditions provided by IZS through the Client. Furthermore, indicate the locations where the existing equipment and materials, such as rails, sleepers, track accessories, ballast, electrical equipment, and similar, should be deposited, in accordance with the requirements of IZS through the Client.

1. **Feasibility Study** shall be made on the basis of the Preliminary Design, previously approved by the Client, and in accordance with the Rulebook on the content and scope of previous works, previous Feasibility study and feasibility studies ("Official Gazette of RS", No. 1/2012) and shall determine, in particular, the spatial, environmental, social, financial, market and economic justification of the investment for the selected solution, developed by the Preliminary design.

**Feasibility study** with **Preliminary design** is subject to audit (expert control) of the State Revision Committee appointed by the Client and other competent and state bodies. Thus, the Consultant shall be obliged to, in a timely manner and at own costs, eliminate all deficiencies in the Preliminary Design with Feasibility Study, according to the findings of the State Revision Committee and other competent and state bodies in order to obtain required approvals.

The Preliminary Design with Feasibility Study shall be prepared in four (4) printed copies and six (6) copies on a USB and submitted to the Client on Serbian and English language. The documentation on the USB must be identical to the printed copies in terms of presentation, content and order of data. All drawings, textual and graphic attachments submitted on the USB must be submitted in \* .pdf format and in open files (\* .doc, \* .xls, \* .dwg, \* .mpp, ...) where at all situation models in the DWG format must be in the National (Spatial) Reference System.

**Sub-activity 2.4: Preparation of the Environmental Impact Assessment Study**

The Consultant is obliged to prepare the Environmental Impact Assessment study according to the Serbian regulation 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:

* Preparing the Request for screening, 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);
* Preparing the **Request for determination of the scope and content**, if the competent authority decide that EIA is needed, 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;
* 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.

The Environmental Impact Assessment will comply with both the Serbian legislation and the World Bank Environmental and Social instruments[[2]](#footnote-2) prepared for this Project. The WB ESIA document will be prepared by other consultancy firm externally contracted by the Client. The Consultant will be available for meetings and exchange of all necessary information during the preparation of the WB ESIA.

### Activity 3: Support in preparation of procurement documents

Within this Activity, the Consultant will prepare:

* technical scope of Client’s requirements and schedule of prices based on a template to be provided by the Client that will be part of the tender document;

# Location and timing

### Location

During the project timeline, the Consultant is obliged to establish an operational base on his own premises.

Regular meetings between the Client, SRI and the Consultants representatives shall be held on agreed locations.

### Commencement date and period of implementation

The intended commencement date is May 2024, but the actual commencement date will be defined with the signature of the Contract. The period of implementation of the Contract will be **23 months** starting from the commencement date, but no later than 31 December 2026, as Project completion date.

Table 1: Indicative timeline for the assignment



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

# Consultant requirements

The Consultant firm will be selected in accordance with QCBS (Quality-and Cost-Based Selection) method set out in the World Bank’s Procurement Regulations for IPF Borrowers (July 2016, revised November 2017, August 2018 and November 2020). The Client intends to shortlist up to eight eligible firms to whom a subsequent Request for Proposals (RFP), both technical and financial, shall be sent. Consultants may associate with other firms to enhance their qualifications but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected.

## Personnel

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

The Consultant 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. 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.

### 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 2 Key experts for the assignment

|  |  |  |
| --- | --- | --- |
| **Title** | **Qualifications/Experience** | **Skills** |
| **Team Leader** | Education:  Have as a minimum MSc Degree in civil engineering or another relevant engineering field;  Relevant professional experience:  At least 15 years of general engineering experience; at least 7 years of relevant experience in preparation technical documentation for the railway sector; Experience as a team leader/project manager /in successfully implemented at least 2 railway projects related to the designing of for (re) construction / rehabilitation of railway track. Work experience as team leader/project manager on international projects shall be considered advantageous. | Excellent command of the English language.  Computer literacy.  Knowledge of Serbian language will be an advantage |
| Railway Civil Engineer | Education:  Have as a minimum MSc Degree in civil engineering.  Relevant Professional Experience:  Experience: at least 10 years of general experience; at least 7 years of relevant 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 public railway infrastructure. Work experience as designer on international projects shall be considered advantageous. .  Valid license: 315 (or new licence number equivalent) | Communication skills, fluency in English. Knowledge of Serbian language will be an advantage |
| Civil Engineer for Engineering Structures | Education:  Have as a minimum MSc Degree in civil/structural engineering or another relevant field;  Relevant Professional Experience:  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 rail engineering structures. Work experience as designer on international projects shall be considered advantageous. .  Valid license: 310 (or new licence number equivalent) | Communication skills, fluency in English. Knowledge of Serbian language will be an advantage |
| Railway electrical engineer – OCL expert | Education:  Have as a minimum MSc Degree in electrotechnical engineering;  Relevant Professional Experience:  Experience: at least 10 years of general experience; at least 7 years of relevant 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 overhead contact line construction/reconstruction. Work experience as designer on international projects shall be considered advantageous. .  Valid license: 350 or 351 (or new licence number equivalent) | Communication skills, fluency in English. Knowledge of Serbian language will be an advantage |
| Railway electrical engineer – Signalling and interlocking / telecommunication expert | Education:  Have as a minimum MSc Degree in electrotechnical engineering;  Relevant Professional Experience:  Experience: at least 10 years of general experience; at least 7 years of relevant 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 signalling, interlocking or telecommunication system installation or modernisation. Work experience as designer on international projects shall be considered advantageous. .  Valid license:352 or 353 (or new licence number equivalent) | Communication skills, fluency in English. Knowledge of Serbian language will be an advantage |
| Railway operation expert | Education:  Have as a minimum MSc Degree in traffic and transport;  Relevant Professional Experience:  Experience: at least 10 years of general experience; at least 7 years of relevant 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 railway as a traffic expert and /or responsible designer. Work experience as designer on international projects shall be considered advantageous. .  Valid license: 368 (or new licence number equivalent) | Communication skills, fluency in English. Knowledge of Serbian language will be an advantage |
| Environmental Expert | Education:  Have as a MSc Degree in an environmental discipline or equivalent;  Relevant Professional Experience:  Minimum 7 years of professional experience in the environmental protection sector. Significant previous experience in the preparation of ESIA/EIA for transport infrastructure projects. Leading (as an authorized EIA expert) of at least 3 ESIA/EIA studies for transport infrastructure-related projects. Experience in working with World Bank Safeguard/ESF practices will be considered as advantage. | Communication skills, fluency in English and knowledge of Serbian language is mandatory. |

### Non - Key experts

Non-key experts in the following areas of expertise are foreseen: Transport planner/Transport economist, Financial and Economic Expert, Structural and Civil engineers, Architectural engineer, Geological engineer; Geodetic engineer; Electrical engineers, Environmental specialists, Occupational Health and Safety Expert, Fire-protection Expert, Social Development and Safeguards Specialist, pool of Experts for The Spatial plan for the special-purpose area.

The Consultant must indicate clearly which profile they have so it is clear which fee rate in the budget breakdown will apply. All experts must be independent and free from conflicts of interest in the responsibilities they take on.

The pool of non-key experts is expected to support/complement all the activities of the key experts. Possession of relevant Serbian design license (personal license) would be required, as applicable.

The Consultant is expected to include other positions they consider necessary for the assignment in their proposals.

## Office accommodation

Office accommodation for each expert working on the Contract is to be provided by the Consultant. The Consultant shall ensure that all key and non key experts are adequately supported and equipped. In particular, the Consultant 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 and PIU as part of this service contract or transferred to the Client or beneficiaries at the end of this Contract.

# Outputs

## 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** |
| 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 activities. If there are any proposed modifications to the original ToR due to changed circumstances through information gathering activities, 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 by the Client | No later than 1 month after the commencement date | Digital and 4 hard copies in English and Serbian language |
| Early public insight of Spatial plan | Elaborate for early public insight of The Spatial plan for the special-purpose area of Infrastructure Corridor Ruma – Sabac – Zvornik– state border should be prepared in accordance with the Rulebook on the content, manner and procedure of preparation of spatial and urban planning documents ("Official Gazette of RS", No. 32 of May 3, 2019), in appropriate scale.  Subject to approval by the Client | No later than 2 months from the date of the Decision on the preparation of the Spatial plan for the special-purpose area issued by GoS | Digital and 4 hard copies in Serbian language |
| Spatial plan for the special-purpose area | The Spatial plan for the special-purpose area of Infrastructure Corridor Ruma – Sabac – Zvornik - state border should be prepared in accordance with the Rulebook on the content, manner and procedure of preparation of spatial and urban planning documents ("Official Gazette of RS", No. 32 of May 3, 2019), in appropriate scale.  Subject to approval by the Client | No later than 12 months from the date of the Decision on the preparation of the Spatial plan for the special-purpose area issued by the Government of RoS | Digital and 4 hard copies in Serbian language |
| Preliminary Solution | Preliminary Solution in terms of scope and content should be done in accordance with applicable laws, regulations, codes, instructions and standards that for subject of design.  Subject to approval of the Client. | No later than 1 months from Spatial plan approval | 2 printed copies and 4 digital copies on a USB on Serbian |
| Preliminary Design with Feasibility Study | Preliminary Design with Feasibility Study 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 Client and approval of Republic audit Commission for experts control of technical documentation | No later than 2 months from the date of submission of the Location Conditions to the Consultant. | 4 printed copies in Serbian and 6 digital copies on a USB in Serbian and English |
| 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 Client | No later than 2 months from the date of the public discussion | 5 printed copies and digital copies on a USB on Serbian (working version) for public inspection  3 final printed copies in Serbian and 3 digital copies on a USB on Serbian and English for approval of Ministry |
| Client’s Requirements for bidding documents | Preparation of Client’s Requirements that will be part of the design and build biding documents.  Subject to pre-approval by IZS and approval of the Client. | No later than 2 months from the date of the approval of the Preliminary Design by the State Revision Committee | Digital, Serbian and English |
| **Regular status reports** | | | | |
| Quarterly Reports | Description of the level of completed documentation, possible problems and proposals for their solution, review of adopted design options by variations and explained proposal for change. Quarterly reports must also contain an overview of all receivables submitted by the Contractor since the beginning of the Contract. This overview should be made in a convenient form that allows consideration of requests, previous activities and key deadlines for resolving requests. (up to 20 pages). | Not later than 1  week after the  end of quarter | Digital, Serbian and English | |
| Final design report | On completion of design and procurement documentation, the Consultant shall submit the final design report to the Client. The final report contains:   * + An overview/timeline of the actual progress of the contract/design detailing reasons for design delays and/or extensions of time   + All relevant conditions, approvals and permits presented in the design timeline   + Details of design/technical difficulties encountered and how these were overcome.   + Details of administrative difficulties encountered and how these were overcome   An appraisal of the strengths and weaknesses in the contract documents (including but not limited to the, technical specifications, schedules, deadlines and design details) with recommendations on how improvements could be made for future contracts. | No later than 30 days after approval of drafted procurement documents. | Digital and 4 hard copies in Serbian and 2 hard copies in English language | |

## Requirements for drawings and reports

The detailed content of engineering documents, which shall be prepared by the Consultant and submitted for approval to the Client, shall be fit for purpose. The Client will reject all documents and designs in cases where he considers them to be unsatisfactory, not in compliance with these requirements or not sufficiently detailed.

The documents and drawings to be submitted by the Consultant shall take their final form after approval by the Client.

Design Documents and drawings shall be numbered systematically and the Consultant shall maintain an electronic register of all reports, documents and drawings to be used under the Contract.

Amendment and revision to any document shall be recorded and only the latest approved version shall be considered valid.

## Submission and approval of outputs

All reports and other outputs shall be written in English and translated into Serbian language. The draft version of the reports (electronic copy, fully editable) shall be submitted to the Client through the PIU. The commenting period for the outputs is 3 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 the Review period of the relevant authorities, such as the Republic audit 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:

* Creation and adoption of the Spatial plan for the special-purpose area: **12 months**,
* Issuance of location conditions: **2 months**,
* Receiving a positive report of the State Review Committee: **2 months**,
* Approval for the Environmental Impact Assessment Study: **2 months** from the date of the public discussion, or/and approval Tehnical Commission Ministry of environmental protection.

All deliverables will be sent as electronic copies to PIU.

Hard copies will be send to the following addresses:

* PIU, Uzun Mirkova 3, 11000 Beograd, Republic of Serbia.

# Conflict of Interest

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

1. Preparation of Spatial Plan of the Republic of Serbia from 2021 to 2035 is currently under preparation. [↑](#footnote-ref-1)
2. <https://www.worldbank.org/en/projects-operations/environmental-and-social-framework> [↑](#footnote-ref-2)