

Appendix 2 – ToRs for RLCs

LOT 2

RLC 37

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 20+183, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 20+183* on part of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between service points Pinosava (at *km 17+900*) and Ripanj (at *km 21+300*), at the intersection point of single track line and local road, asphalt roadway. Railway line is equipped with CTC with automatic block.

Speed on the observed part of the railway line is *50 km/h* according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing and possibility by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road in Ripanj.
- 2.2.** Technical documentation for signaling-interlocking devices of station Ripanj, interstation distance Ripanj - Pinosava, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road in Ripanj.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Ripanj and Pinosava.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 20+183 and local road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are

used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Switch-on marks for signals should be installed at the places of switch-on devices installation. A dependency between the level crossing safety device and automatic block device shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Ripanj and from the competent CTC center. Device must have the possibility of on-site operation. Level crossing device shall be placed in the new level crossing hut, at the place of existing standard hut;
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the service point Ripanj;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On

level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design

8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works

- Geodetic Study)

Every design of the specified parts should contain:

- 1) General documentation;
- 2) Textual documentation;
- 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
- 4) Graphic documentation.

- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Pinosava and Ripanj should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)

- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures deafeened by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 38

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 21+858, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 21+858* on part of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in station area of the station Ripanj, at the intersection point of single track line and roadway in Ripanj.

Railway line is equipped with CTC with automatic block. Roadway on the level crossing is with rubber panels which should be replaced due to wornness.

For reasons of increased road traffic volume, rising of safety level on the level crossing and pass ability by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and roadway in Ripanj.
- 2.2.** Technical documentation for signaling-interlocking devices of station Ripanj, interstation distance Ripanj - Pinosava, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and roadway in Ripanj.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Ripanj and Pinosava.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 21+858 and roadway and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are

used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Ripanj and from the competent CTC center. Device must have the possibility of on-site operation. Level crossing device shall be placed in the new level crossing hut, at the place of existing standard hut;
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the service point Ripanj;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
- 2) Textual documentation;
- 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
- 4) Graphic documentation.

- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service point Ripanj should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments

to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)

- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

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The Designer is obliged to proceed according to the acquired location requirements.

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RLC 39

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 34+436, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 34+436* on part of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in station area of station Ralja. Railway line is equipped with CTC with automatic block.

Speed on the observed part of the railway line is *50 km/h* according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing and pass ability by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and roadway in Ralja.
- 2.2.** Technical documentation for signaling-interlocking devices of station Mladenovac, interstation distance Mladenovac - Kovačevac, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and roadway in Ralja.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service point Ralja.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 34+436 and roadway and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on

technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point RALJA and from the competent CTC center. Device must have the possibility of on-site operation. Level crossing device shall be placed in the new level crossing hut, at the place of existing standard hut;
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the service point Ralja;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
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- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service point Rajja should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);

- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 40

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 41+841, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 41+841* on part of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between service points Pinosava (at *km 17+900*) and Ripanj (at *km 21+300*), in the station area of the station Sopot Kosmajski. Railway line is equipped with CTC with automatic block.

Speed on the observed part of the railway line is *100 km/h* according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing and pass ability by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Sopot Kosmajski.
- 2.2.** Technical documentation for signaling-interlocking devices of station Mladenovac, interstation distance Mladenovac - Kovačevac, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Sopot Kosmajski.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Sopot Kosmajski.

- 2.6. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. **CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION**

- 3.1. Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 41+841 and town road in Sopot Kosmajski and Geodetic Study for the design purposes is required.
- 3.2. Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3. Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4. Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;

- (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Sopot Kosmajski and from the competent CTC center. Device must have the possibility of on-site operation. Level crossing device shall be placed in the new level crossing hut, at the place of existing standard hut;
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the service point Sopot Kosmajski;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On

level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (18) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
- 2) Textual documentation;
- 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
- 4) Graphic documentation.

- (19) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (20) Service point regulation of service point Sopot Kosmajski should be amended with suitable level crossing device operation regulations;
- (21) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)

- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank's Safeguard Policies and Procedures, including procedures and measures defined by the document "Environmental and Social Management Framework" (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of "Infrastructure of Serbian Railways" JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State's Referent System.



RLC 41

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 78+247, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 78+247* on part of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in station area of station Palanka. Railway line is equipped with CTC with automatic block.

Speed on the observed part of the railway line is *100 km/h* according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing and possibility by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1. Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Palanka.
- 2.2. Technical documentation for signaling-interlocking devices of station Palanka, interstation distance Mladenovac - Palanka, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3. Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Palanka.
- 2.4. Minutes by the railway committee on the level crossing’s existing condition.
- 2.5. Service point regulation of service point Palanka.
- 2.6. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 78+247 and town road in Palanka and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;

- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Palanka and from the competent CTC center. Device must have the possibility of on-site operation. Level crossing device shall be placed in the new level crossing hut, at the place of existing standard hut;
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the station Palanka;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS

messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
-
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service point Palanka should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);

- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 42

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 79+362, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 79+362* on part of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in station area of the station Palanka. Railway line is equipped with CTC with automatic block.

Speed on the observed part of the railway line is *100 km/h* according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing and possibility by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road in Palanka.
- 2.2.** Technical documentation for signaling-interlocking devices of station Mladenovac, interstation distance Mladenovac - Kovačevac, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Palanka.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service point Palanka.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 79+362 and town road in Palanka and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are

used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Palanka and from the competent CTC center. Device must have the possibility of on-site operation. Level crossing device shall be placed in the new level crossing hut, at the place of existing standard hut;
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the station Palanka;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study)

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service point Palanka should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments

to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)

- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.



RLC 43

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 99+939, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 99+939* on part of main arterial electrified double-track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located station area of service point Markovac, at the intersection point of double- track line and roadway in Markovac, Railway line is equipped with automatic block.

Speed on the observed part of the railway line is *50 km/h*, on the left track (*70km/h* DMU), according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing and possibility by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road at service point Markovac.
- 2.2.** Technical documentation for signaling-interlocking devices of station Markovac, interstation distance Velika Plana - Markovac, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Markova.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service point Markovac.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 99+939 and town road at service point Markovac and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are

used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the station Markovac and from the competent CTC center. Device must have the possibility of on-site operation. Level crossing device shall be placed in the new level crossing hut, at the place of existing standard hut;
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the station Markovac;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
- 2) Textual documentation;
- 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
- 4) Graphic documentation.

- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service point Markovac should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);

- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 44

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 100+976, on main arterial line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 100+976* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in the station area of station Markovac (km 100+400). Railway line is equipped with automatic block.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Markovac.
- 2.2.** Technical documentation for signalling-interlocking devices of station Markovac, interstation distance Velika Plana - Markovac, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road in Markovac.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service point Markovac.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 100+976 and town road at service point Markovac and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are

used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16);

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Markovac. Device must have the possibility of on-site operation using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the service point Markovac;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fibre cable, minimum fibre 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC centre is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service point Markovac should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments

- to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
 - Related standards and norms SRPS EN from this field, regulations and valid documentation;
 - Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 45

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 105+545 on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 105+545* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located between service points Markovac and Lapovo town junction- station (*at km 106+300*). Railway line is equipped with automatic block.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road at service point Lapovo Town.
- 2.2.** Technical documentation for signalling-interlocking devices of station Mladenovac, interstation distance Markovac – Lapovo Town- Lapovo, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town road at service point Lapovo Town.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service point Lapovo Town.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 105+545 and town road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system, with a note of stopping of trains at station Lapovo Town;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;

- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Switch-on marks for signals should be installed at the places of switch-on devices installation. A dependency between the level crossing safety device and automatic block device shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Lapovo Town. Device must have the possibility of on-site operation using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the service point Lapovo Town;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already

existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fibre cable, minimum fibre 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC centre is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing’s safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway (“Official Gazette of RS” no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures (“Official Gazette of RS” no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility (“Official Gazette of RS” no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing

- 5 Telecommunications and signal installations design of the level crossing
- 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
- Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service point Lapovo Town should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)

- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 46

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 114+196, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 114+196* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between stations Lapovo (at *km 109+600*) and Bagrdan (at *km 120+300*), at the intersection point of double- track line and local road, near station Brzan. Railway line is equipped with automatic block.

Speed on the observed part of the railway line is *70 km/h*, on the left track and *50 km/h* on the right track, according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road, near station “Brzan”.
- 2.2.** Technical documentation for signalling-interlocking devices of station Mladenovac, interstation distance Lapovo - Bagrdan, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road near station “Brzan”.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Lapovo and Bagrdan.

- 2.6. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1. Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 114+196 and local road and Geodetic Study for the design purposes is required.
- 3.2. Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3. Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4. Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;

- (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Switch-on marks for signals should be installed at the places of switch-on devices installation. A dependency between the level crossing safety device and automatic block device shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Lapovo. Device must have the possibility of on-site operation using the local setting push button installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the station Lapovo or from the automatic block- BJ1 hut, provided that existing system satisfies requirements. A power supply system from the overhead contact line should be considered as well;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall

be mounted on a pole right next to the container or on the console on the roof of the container;

- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fibre cable, minimum fibre 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC centre is required;
- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing’s safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway (“Official Gazette of RS” no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures (“Official Gazette of RS” no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility (“Official Gazette of RS” no. 73/2019);

- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
- 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Lapovo and Bagrdan should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)

- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 47

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 116+995, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 116+995* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between stations Lapovo (at *km 109+600*) and Bagrdan (at *km 120+300*), at the intersection point of double- track line and local road, near station “Miloševo” (at *km 117+000*). Railway line is equipped with automatic block.

Speed on the observed part of the railway line is *50 km/h* on the right and *70 km/h* on the left track, according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing and by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road near station “Miloševo”.
- 2.2.** Technical documentation for signalling-interlocking devices of station Mladenovac, interstation distance Lapovo Passenger station - Bagrdan, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road near station “Miloševo”.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Lapovo and Bagrdan.

- 2.6. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1. Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 116+995 and local road and Geodetic Study for the design purposes is required.
- 3.2. Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3. Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4. Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system. Special attention should be payed to the stopping of trains at station “Miloševo”;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;

- (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Switch-on marks for signals should be installed at the places of switch-on devices installation. A dependency between the level crossing safety device and automatic block device shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop” (no passage over the level crossing);
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Bagrdan. Device must have the possibility of on-site operation using the local setting push button- LOB, installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzset lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of railway line, in front of the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the service point Bagrdan;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;

- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;
- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing’s safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway (“Official Gazette of RS” no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures (“Official Gazette of RS” no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility (“Official Gazette of RS” no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume

- 2/2 Roadway design- civil organisation of the level crossing
- 4 Electrical installations design of the level crossing
- 5 Telecommunications and signal installations design of the level crossing
- 7 Organization of the execution of works design with Utility Plan
- 8.1 Railway traffic technology and organization design
- 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
- Geodetic Study)

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service points Lapovo and Bagrdan should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)

- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 48

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 131+308, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 131+308* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between stations Bagrdan (at *km 120+300*) and Jagodina (at *km 135+300*), at the intersection point of double- track line and local road. Railway line is equipped with automatic block.

Speed on the observed part of the railway line is *100 km/h* on the left and *50 km/h* on the right track, according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road at station “Bukovče”.
- 2.2.** Technical documentation for signalling-interlocking devices of station Jagodina, interstation distance Bagrdan - Jagodina, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Bagrdan and Jagodina.

- 2.6. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. **CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION**

- 3.1. Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 131+308 and local road and Geodetic Study for the design purposes is required.
- 3.2. Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3. Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4. Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;

- (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Switch-on marks for signals should be installed at the places of switch-on devices installation. A dependency between the level crossing safety device and automatic block device shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the service point Jagodina. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the railway station Jagodina or from the substation;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;

- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;
- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing’s safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway (“Official Gazette of RS” no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures (“Official Gazette of RS” no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility (“Official Gazette of RS” no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:

- 0 Main volume
- 2/2 Roadway design- civil organisation of the level crossing
- 4 Electrical installations design of the level crossing
- 5 Telecommunications and signal installations design of the level crossing
- 7 Organization of the execution of works design with Utility Plan
- 8.1 Railway traffic technology and organization design
- 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works)
- Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service points Bagrdan and Jagodina should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)

- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 49

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 138+649, on main arterial line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) (Končarevo)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing “Končarevo” at *km 138+649* on main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line with automatic block with traffic on both sides, between service points Jagodina (at *km 135+236*) and Paraćin (at *km 155+108*).

Level crossing is located at the intersection point of double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road. Level crossing with asphalt road is provided with traffic signs on the road and required visibility zone.

Speed on the observed part of the railway line is *100 km/h*, according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.2.** Layout plan of the intersection location of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.3.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.4.** Service point regulation of service points Bagrdan and Jagodina.
- 2.5.** environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 138+649 and local road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;

- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16);
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the railway line, behind the level crossing and in direction of chainage growth. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the station Jagodina;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and station Jagodina. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to

the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works

- Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Jagodina and Paraćin should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012,

- 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
 - Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
 - Related standards and norms SRPS EN from this field, regulations and valid documentation;
 - Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures deafened by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.



RLC 50

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 155+535, on main arterial line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) (Paraćin)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing “block 2 station Paraćin” at *km 155+535* of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between stations Bagrdan (at *km 120+300*) and Jagodina (at *km 135+300*), at the station area of station Paraćin. Railway line is equipped with CTC with automatic block.

Level crossing with reinforced concrete slab roadway is located at the intersection point of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and Town Street.

Level crossing is provided with mechanical device for level crossing traffic safety, operated by level crossing guard, half-barriers and traffic signs on the road.

Speed on the observed part of the railway line is *50 km/h*, according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of main arterial electrified double-track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town street.
- 2.2.** Layout plan of the intersection location of main arterial electrified double-track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and town street.
- 2.3.** Minutes by the railway committee on the level crossing’s existing condition.

- 2.4. Service point regulation of service point Paraćin.
- 2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1. Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 155+535 and town street and Geodetic Study for the design purposes is required.
- 3.2. Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3. Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4. Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16).;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;

- (7) Level crossing safety device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16);
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzset lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the left side of the railway line, behind the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the station Paraćin;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and Paraćin station. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;
- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all

weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;

- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
- 2) Textual documentation;

- 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service point Paraćin should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)

- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 51

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 162+516, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 162+516* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between stations Paraćin (at *km 155+200*) and Čičevac (at *km 171+600*), at the intersection point of double- track line and local road. Railway line is equipped with CTC with automatic block.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.2.** Technical documentation for signalling-interlocking devices of station Paraćin, interstation distance Paraćin - Čičevac, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Paraćin and Čičevac.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 162+516 and local road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS”

- no. 18/16). Switch-on marks for signals should be installed at the places of switch-on devices installation. Switch-off interlocking area (short track circuit) function must be provided on the level crossing, which disables switching-off of level crossing's device while a railway vehicle is standing on the level crossing;
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
 - (9) Proper working of the device shall be controlled constantly from the station Paraćin, from competent CTC centre. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
 - (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
 - (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
 - (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the railway station Paraćin or from the substation;
 - (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
 - (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of "Infrastructure of Serbian Railways" JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing

- telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;
- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
 - (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
 - (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
 - (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
 - (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
 - (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Paraćin and Čičevac should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);

- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.



RLC 52

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 163+819, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 163+819* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on open railway line between stations Paraćin (at *km 155+200*) and Čičevac (at *km 171+600*), at the intersection point of double- track line and local road. Railway line is equipped with CTC with automatic block.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.2.** Technical documentation for signalling-interlocking devices of station Paraćin, interstation distance Paraćin - Čičevac, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Paraćin and Čičevac.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 163+819 and local road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS”

- no. 18/16). A dependency between the level crossing safety device and automatic block device shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state "Stop";
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
 - (9) Proper working of the device shall be controlled constantly from the station Paraćin, from competent CTC centre. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
 - (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
 - (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
 - (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the railway station Paraćin or from the substation;
 - (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
 - (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of "Infrastructure of Serbian Railways" JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;

- 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service points Paraćin and Čičevac should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78/2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on

- Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
 - Related standards and norms SRPS EN from this field, regulations and valid documentation;
 - Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.



RLC 53

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 171+810, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 171+810* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in the station area of service point Čičevac (at *km 171+600*), at the intersection point of double- track line and regional road. Railway line is equipped with CTC with automatic block.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and regional road.
- 2.2.** Technical documentation for signalling-interlocking devices of station Čičevac, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and regional road.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Paraćin and Čičevac.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 171+810 and regional road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system;
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-

off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16);

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the station Paraćin, and from competent CTC centre. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the railway station Čičevac;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (22) Service point regulation of service points Paraćin and Čičevac should be amended with suitable level crossing device operation regulations;
 - (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments

to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)

- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 54

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 201+565, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 201+565* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in the station area of service point open railway between stations Đunis (at *km 195+000*) and Donji Ljubeš (at *km 205+700*), at the intersection point of double-track line and local road near station Donji Ljubeš (at *km 200+900*). Railway line is equipped with CTC with traffic on both sides.

Speed on the observed part of the railway line is *100 km/h*, according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.2.** Technical documentation for signalling-interlocking devices of station Korman, telecommunication and signalling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Đunis and Korman.

2.6. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 201+565 and local road and Geodetic Study for the design purposes is required.

3.2. Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.

3.3. Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.

3.4. Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:

- (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system (CTC with traffic on both sides). Special attention should be paid to stopping of trains at station Donji Ljubeš;
- (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
- (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
- (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
- (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;

- (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
- (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16) A dependency between the level crossing safety device and signals on regular and neighbouring track shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the station Korman, and from competent CTC centre. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the railway station Korman;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already

existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing’s safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway (“Official Gazette of RS” no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures (“Official Gazette of RS” no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility (“Official Gazette of RS” no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing

- 7 Organization of the execution of works design with Utility Plan
- 8.1 Railway traffic technology and organization design
- 8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works
- Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Đunis and Komran should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)

- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures deafened by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.





RLC 55

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 208+192, on main arterial line (Belgrade Centre) – Junction “G” – Rakovica – Mladenovac – Lapovo – Niš – Preševo - state border - (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 208+192* on part of of main arterial electrified double- track line (Belgrade Centre) – Junction “G” – Rakovica – Mladenovac – Lapovo – Niš – Preševo - state border - (Tabanovce), which is located on the open line between stations Korman (at *km 205+700*) and Aleksinac (at *km 214+300*), at the intersection point of double- track line and the local road. Railway line is equipped with CTC with traffic on both sides.

Speed on the observed part of the railway line is *100 km/h*, according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1. Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.2. Technical documentation of signal-safety devices of Aleksinac station, inter-station distance Korman - Aleksinac, telecommunication and signal cables and stable electric traction plants on the railway.
- 2.3. Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.4. Minutes by the railway committee on the level crossing’s existing condition.
- 2.5. Service point regulation of service points Korman and Aleksinac.
- 2.6. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 208+192 and local road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system (CTC with traffic on both sides).
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-

off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signalling-interlocking devices (“Official Gazette of RS” no. 18/16) A dependency between the level crossing safety device and signals on regular and neighbouring track shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the station Korman, and from competent CTC centre. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signalling-interlocking devices at the railway station Korman or from a pole substation;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighbouring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On

level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organisation of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design

8.2 Traffic and traffic signalisation design (horizontal and vertical signalisation, temporary and permanent along with a study, road traffic redirection during the execution of works

- Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
- 2) Textual documentation;
- 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
- 4) Graphic documentation.

- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Komran and Aleksinac should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signalling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)

- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures deafened by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.



RLC 56

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 212+914, on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 212+914* on part of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on the open railway line between stations Adrovac (*at km 210+600*) and Aleksinac (*at km 214+300*), at the intersection point of double- track line and street. Railway line is equipped with CTC with traffic on both sides.

Speed on the observed part of the railway line is *100 km/h*, according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and street.
- 2.2.** Technical documentation for signaling-interlocking devices of station Aleksinac, interstation distance Adrovac- Aleksinac, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and street.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Adrovac and Aleksinac.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 212+914 and street and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system; (CTC with traffic on both sides);
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a lap-top with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical

requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16) A dependency between the level crossing safety device and signals on regular and neighboring track shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the station Aleksinac, and from competent CTC center. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the railway station Aleksinac or substation;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing

- telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;
- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
 - (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
 - (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
 - (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
 - (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
 - (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Adrovac and Aleksinac should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);

- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.



RLC 57

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 222+057 on main arterial line (Belgrade Centre) –Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing at *km 222+057 on* part of main arterial electrified double- track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located on the open railway line between stations Aleksinac (*at km 214+300*) and Grejač (*at km 224+800*), at the intersection point of double- track line and regional road. Railway line is equipped with CTC with traffic on both sides.

Speed on the observed part of the railway line is *100 km/h*, according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing by replacing existing relay device with new electronic equipment is required.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and regional road.
- 2.2.** Technical documentation for signaling-interlocking devices of station Aleksinac, interstation distance Aleksinac - Grejač, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- 2.3.** Layout plan of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and regional road.
- 2.4.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.5.** Service point regulation of service points Aleksinac and Grejač.
- 2.6.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1.** Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 222+057 and regional road and Geodetic Study for the design purposes is required.
- 3.2.** Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3.** Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4.** Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16). Level crossing safety device must have certain characteristics so it can be integrated into the already existing safety system; (CTC with traffic on both sides);
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;
 - (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-

off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16) A dependency between the level crossing safety device and signals on regular and neighboring track shall be established, so that, in case of failure of the level crossing safety device, corresponding automatic block signals shall be set up to state “Stop”;

- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Proper working of the device shall be controlled constantly from the station Grejač, and from competent CTC center. Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) at the place of existing standard hut. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the railway station Grejač or substation;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On

level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Enhancement of roadway on the level crossing shall be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic safety measures ("Official Gazette of RS" no. 89/2016)), roadway construction with rubber panels in accordance with European norms and technical specifications for roads and railways with all required works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);
- (18) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;
- (19) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (20) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design

8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works

- Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
- 2) Textual documentation;
- 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
- 4) Graphic documentation.

- (21) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
- (22) Service point regulation of service points Aleksinac and Grejač should be amended with suitable level crossing device operation regulations;
- (23) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)

- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures deafened by the document “Environmental and Social Management Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.



RLC 58

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 353+833, on main arterial line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) (Vranje)

1. PURPOSE OF PROJECT DOCUMENTATION PREPARATION

Within the Western Balkans Trade and Transport Facilitation Project, funded by the Loan provided by the World Bank, “Infrastructure of Serbian Railways” JSC plans to carry out rising of the safety level, reconstruction and enhancement of 58 level crossings in order to increase the safety of railway and road traffic.

In accordance with the above stated, safety level rising, reconstruction and enhancement shall be carried out for level crossing “Block 2 station Vranje” at *km 353+833* on part of main arterial line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce), located in the station area of station Vranje (at *km 354+205*), at the intersection point of double-track line and regional road. Railway line is equipped with CTC with automatic block.

Level crossing is located at the intersection point of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.

Level crossing with rubber panel roadway is provided with mechanical device for level crossing traffic safety device, operated by point switch manning within provision of journey safety, barriers and traffic signs on the road

Speed on the observed part of the railway line is *90 km/h*, according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is as follows:

- 2.1.** Existing technical documentation for the track line at the intersection point of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.2.** Layout plan of the intersection location of main arterial electrified single track line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) and local road.
- 2.3.** Minutes by the railway committee on the level crossing’s existing condition.
- 2.4.** Service point regulation of service point Vranje.

2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

- 3.1. Geodetic surveying of the intersection location of railway line (Belgrade Centre) – Junction “G”- Rakovica- Mladenovac- Lapovo- Niš- Preševo- state border- (Tabanovce) at km 353+833 and local road and Geodetic Study for the design purposes is required.
- 3.2. Conceptual Design shall be made on geodetic bases and parcels within borders of railway land, with representation and specification of all the data required for determination and location requirements provision.
- 3.3. Designer is obliged to solve the ratio of designed railway installations and equipment and already existing ones in the Preliminary Design, based on location requirements. Technical requirements are a component of location requirements, provided by public authority holder within railway land.
- 3.4. Preliminary Design shall be made on the updated geodetic bases in suitable scale for this documentation level, within border of railway land in order to obtain approval for execution of works on the level crossing, according to the following requirements:
 - (1) Level crossing shall be equipped with level crossing automatic device with remote control and switching devices with level crossing light signals and half-barriers (according to article no. 30 Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);
 - (2) Device must be made in technology for electronic processing device. It is required that the device satisfies safety integrity level SIL 4 according to SRPS EN 50126, SRPS EN 50128, SRPS EN 50129. It is required that it satisfies complete electronic control of all external elements. Level crossing device must be implemented in accordance with safety principles (with computer architecture) “2 out of 2”;
 - (3) Electronic processing device must enable registering of all regular occurrences, disturbances and failures connected to level crossing operation (minimum 5,000 records), as well as local sensing of mentioned registering connected to level crossing operation, using a laptop with suitable diagnostic software, with the possibility of remote sensing (optional). Device must have the possibility of sending coded SMS messages (disturbance/failure/pole breakage) to three cellular phones: dispatchers and maintenance department for corresponding SI section;
 - (4) Road signals must be made in LED-modular technology, which provides operation control and proper working of signals;
 - (5) The device must provide safe motion of trains, road vehicles, pedestrians and cyclists (where it is applicable) over the level crossing;
 - (6) Calculation for switch-on interlocking areas for road vehicles, maximum length 25m, is required;

- (7) Level crossing security device must be switched on and off automatically by the railway vehicle. Electronic switch-on and switch-off devices are used for switching on and off, in accordance with Rulebook on technical requirements for signaling-interlocking devices (“Official Gazette of RS” no. 18/16);
- (8) Calculation for level crossing elements for the minimal speed of 20km/h and maximal speed according to the designed speed of 120km/h shall be carried out;
- (9) Device must have the possibility of on-site operation, using the local setting push button- LOB installed on the wall of the container located in the suitable cabinet protected from unauthorized access (Elzet lock);
- (10) Level crossing device should be placed in a new container for level crossing, dim. 2m x 2m, on the concrete foundation size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the left side of railway line behind the level crossing. The foundation should be connected to the closest side of the road by a concrete pathway, 0,7m wide. Container should be secured by metal door and Elzzet lock in order to prevent unauthorized access;
- (11) Internal device for level crossing must be placed inside the container in accordance with standards for the placement of such equipment without heating and cooling units;
- (12) Power supply for the safety device for the level crossing should be provided from the power supply room for signaling-interlocking devices at the railway station Vranje;
- (13) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switching-on in cases of decreased visibility. Spotlights are powered by the level crossing’s container, voltage 230V, 50Hz. LED spotlights shall be mounted on the suitable poles for lighting or clearance gates (if there are any), which should be set up in suitable places, beside the road on both sides of the level crossing, so that they provide good lighting of the entire level crossing zone. In case of the crossing zone itself not being well lit by the previous two spotlights, a 3rd spotlight should be installed, which shall be mounted on a pole right next to the container or on the console on the roof of the container;
- (14) Technical conditions should be provided for the telephone connection establishment between the level crossing and neighboring manned service points. Level crossing should be connected to the already existing connection system of “Infrastructure of Serbian Railways” JSC on the railway line. Should the cable be set up from the station to the level crossing for the purposes of power supply, a telecommunication cable and an optical fiber cable, minimum fiber 16, must be set up. On level crossings without the possibility of connecting to the already existing telecommunication connections system, transfer of SMS messages to the closest manned service point and/or competent CTC center is required;

- (15) Video surveillance should be provided on the level crossing, in order to enable continuous and clear visibility in the level crossing zone in all weather conditions with the possibility to save recordings for the period of one week, along with described lighting. Every half-barrier and level crossing signal, along with access roads, should be covered by one high resolution IP camera. Third camera (optional) should cover the intersection, i.e. area between half-barriers. Cameras shall be mounted on the poles/clearance gates on which spotlights should be mounted. Device for recording should be set up in the container for placement of devices for the level crossing. Access to the recordings and live viewing must be possible both locally and remotely (optional) via GSM modem;
- (16) Implementation and all other procedures, during the level crossing's safety level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANNEX E;
- (17) Contents of the Preliminary Design for the level crossing shall be prepared in accordance with Rulebook on content, drafting procedure and inspection process of the technical documentation based on class and purpose of the facility ("Official Gazette of RS" no. 73/2019);
- (18) Preliminary Design for the safety level rising of the level crossing shall be drafted according to concrete case, existing documentation, so that it is comprised of following parts:
 - 0 Main volume
 - 2/2 Roadway design- civil organization of the level crossing
 - 4 Electrical installations design of the level crossing
 - 5 Telecommunications and signal installations design of the level crossing
 - 7 Organization of the execution of works design with Utility Plan
 - 8.1 Railway traffic technology and organization design
 - 8.2 Traffic and traffic signalization design (horizontal and vertical signalization, temporary and permanent along with a study, road traffic redirection during the execution of works
 - Geodetic Study

Every design of the specified parts should contain:

- 1) General documentation;
 - 2) Textual documentation;
 - 3) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
 - 4) Graphic documentation.
- (19) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;
 - (20) Service point regulation of service point Vranje should be amended with suitable level crossing device operation regulations;

- (21) Preliminary Design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protective measures of the World Bank and National legal framework for the environmental protection, with all according to the opinion of Ministry of Environmental Protection, dated 25th of June 2020.

4. TECHNICAL DOCUMENTATION PROCESSING

During the process of designing all regulations and standards regulating the design subject shall be applied.

- Law on Planning and Construction (“Official Gazette of RS” no. 72/2009, 81/2009- correction 64/2010- Constitutional Court decision, 24/2011, 121/2021, 42/2013- Constitutional Court decision, 50/2013- Constitutional Court decision, 98/2013- Constitutional Court decision, 132/2014 and 145/2014, 83/2018, 31/2019, 37/2019-state law and 9/2020 and 52/2021).
- Law on Railway (“Official Gazette of RS” no. 41/18)
- Law on Railway Traffic Safety (“Official Gazette of RS” no. 41/18)
- Law on Interoperability of Railway System (“Official Gazette of RS” no. 41/18)
- Law on Environmental Impact Assessment (“Official Gazette of RS” no. 135/2004 and 36/2009)
- Rulebook on Implementation Process of United Procedure, Electronically (“Official Gazette of RS” no. 68/2019)
- Rulebook on Technical Requirements for Signaling and Interlocking Equipment (“Official Gazette of RS” no. 18/16 and 89/16)
- Rulebook on Intersection of Railway Line and Roadway, Pedestrian or Bicycle Path, the Place Where the Intersection is Possible, and Traffic Safety Measures (“Official Gazette of RS” no. 89/16)
- Rulebook on Traffic Signalization (“Official Gazette of RS” no. 85/17 and 14/2021)
- Rulebook on Motor Vehicles and Connecting Vehicles Classification and Technical Requirements for Vehicles and Technical Requirements for Vehicles in Traffic on the Roads (“Official Gazette of RS” no. 40/2012, 102/2012, 19/2013, 41/2013, 102/2014, 41/2015, 78,2015, 111/2015, 14/2016, 108/2016, 7/2017-correction, 63/2017, 45/2018, 70/2018);
- Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Superstructure Maintenance (“Official Gazette of RS” no. 74/16)
- Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 39/2016), Rulebook on Amendments to the Rulebook on Technical Requirements and Railway Line Substructure Maintenance (“Official Gazette of RS” no. 74/16)
- Related standards and norms SRPS EN from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank’s Safeguard Policies and Procedures, including procedures and measures defined by the document “Environmental and Social Management

Framework” (ESMF) for the Western Balkans Trade and Transport Facilitation Project.

These Terms of Reference are a constituent component of Conceptual Design and Preliminary Design and must be bound right after table of content.

The Designer is obliged to proceed according to the acquired location requirements.

Preliminary Design shall be made in three (3) bound copies and three (3) copies on a CD or USB and delivered to the Development Department of “Infrastructure of Serbian Railways” JSC for validation.

All delivered drawings on a CD must be open files in PDF and DWG format, all layouts in DWG format, shown in the model, must be found in the State’s Referent System.

