Appendix 2 – ToRs for RLCs

LOT 1

RLC 1

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 49+511, on the railway line Ruma -Šabac- junction Donja Borina- state border

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level raising, reconstruction and enhancement shall be carried for the level crossing at km 49+511 on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi), located on open railway line between service points Lešnica (at km 35+000) and Loznica (at km 51+400).

Level crossing is located at the intersection point of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Marko Radulović's street. Level crossing is provided with traffic signs on the road and required visibility zone.

Speed at the observed part of the railway line is 60km/h (80km/h DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Marko Radulović's street.
2.2. Layout plan of the intersection of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Marko Radulović's street location.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service points Lešnica and Loznica
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) at

km 495 + 511 and Marko Radulović's street location and Geodetic study are 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. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be derived from the distribution network, using the already existing connector at the station Loznica;

(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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Loznica. 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 service point and/or competent CTC center;

(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 signal,

along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security level raising, 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level raising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Lešnica i Loznica 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 protection 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 should 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, 43/2013- 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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 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.


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STOP

RLC 2

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 3+285, on the railway line Ruma -Šabac- junction Donja Borina- state border (Bađanovci)

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 security level, reconstruction, and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Bađanovci" at km 3+285 on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi), located on open railway line between service points Ruma (at km 0+000) and Bađanovci (at km 11+344).

Level crossing is located at the intersection point of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road. Level crossing is provided with traffic signs on the road. Required visibility zone does not exist on the level crossing (there is visibility only on the right side of the railway line and on the left side of the road in direction of chainage growth).

Speed at the observed part of the railway line is 70 *km/h* (*80 km/h* DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road.
2.2. Layout plan of the intersection point of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service points Ruma and Bađanovci
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Ruma – Šabac – rasputnica Donja Borina – state border – (Zvornik Novi) at km 3+285 and road and Geodetic Study are 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**. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be derived from the distribution network, using the already existing connector at the station Ruma;

(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 turn-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Ruma. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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

8.2 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 for service points Ruma i Buđanovci 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 protection 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 should 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, 43/2013- 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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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 situations in DWG format, shown in the model, must be found in the State's referent system.


STOP

RLC 3

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 67+660, on the railway line Ruma -Šabac- junction Donja Borina- state border

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing at *km 67+660* on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi), located on open railway line between service points Brasina (at km *65+354*) and Donja Borina (at *km 67+800*).

Level crossing is located at the intersection point of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road. Level crossing is provided with traffic signs on the road and required visibility zone. Roadway construction is made out of four rows of reinforced concrete slabs.

Speed at the observed part of the railway line is 60 *km/h* (*80 km/h* DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road.
2.2. Layout plan of the intersection point of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service points Brasina and Donja Borina
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) at km 67+660 and local road and Geodetic Study are 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**. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the left side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be derived from the distribution network, using the already existing connector at the station Brasina;

(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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Brasina. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Brasina i Donja Borina 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 protection 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 should 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, 43/2013- 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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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 layout in DWG format, shown in the model, must be found in the State's referent system.


STOP

RLC 4

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 29+048, on the railway line Ruma -Šabac- junction Donja Borina- state border (Klenak)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Klenak" at *km 29+048* on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi), located on open railway line between service points Platičevo (at km *21+344*) and Šabac. Station Klenak is located at *km 28+900.*

Level crossing is located at the intersection point of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Grabovački put street. Level crossing, with asphalt road, is provided with device, operated by point switch manning within journey safety from station Klenak, half-barriers with traffic light signals and traffic signs on the road (device *Siemens* which provides level crossing safety does not have switch-on and off contacts).

Speed at the observed part of the railway line is 70 *km/h* (*80 km/h* DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Grabovački put street.
2.2. Layout Plan of the intersection point of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Grabovački Put Street.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service pint Pančevo.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) at km 29+048 and Grabovački Put Street and Geodetic Study are 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. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be derived from the distribution network, using the already existing connector at the station Klenak facility;

(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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 point. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service point Platičevo 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 protection 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 should 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, 43/2013- 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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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.


STOP


STOP
STOP

RLC 5

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing km 62+425, on railway line Ruma -Šabac- junction Donja Borina- state border

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the following, security level rising, reconstruction and organization shall be carried out for level crossing "Zejtin Voda" in km *62+425* on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) located on open railway line between service points Loznica (km 51+400) and Brasina station (km 65+300).

Level crossing "Zejtin Voda" is located at the intersection point of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and state road IB order no. 26 at section Banja Koviljača-Mali Zvornik. Level crossing with asphalt roadway is provided with barriers and traffic signs on the road.

Speed at the observed part of the railway line is 60km/h (80km/h DMU) according to valid Timetable.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is:

2.1. Existing technical documentation for the track line at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and state road IB order no. 26 at section Banja Koviljača-Mali Zvornik.
2.2. Layout Plan of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and state road IB order no. 26 at section Banja Koviljača-Mali Zvornik.
2.3. Minute by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service points Borina station.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMETATION PREPARATION

3.1. Geodetic recording of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) km 62+425 and state road IB order no. 26 at section Banja Koviljača-Mali Zvornik and Geodetic Study for the design purposes is required.

3.2. Preliminary 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 ratio 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 signals for 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 security 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 correct 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) Estimate 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 stopping on the level crossing;

(8) Estimate 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be provided from the distribution network, using the already existing connector at the station Brasina (or form the level crossing hut).

(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 spotlight should 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 roadway on both sides of the level crossing, so that they can 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 placed 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 Brasina. 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 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 each. Third camera (optional) should cover the crossing, 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 review must be possible both locally and remotely(optional) via GSM modem;

(16) Realization and all the other activities, during the level crossing's security level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANEX E;

(17) Organization of roadway on the level crossing should 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 security 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 security 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 survey, road traffic redirection during the execution of works)

- Geodetic survey

Every design of the specified parts should contain:

5) General documentation;
6) Textual documentation;
7) Numerical documentation, proof of quantities, bill of quantities and cost estimate;
8) 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 station Brasina 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 security 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 N 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 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.


STOP


STOP

RLC 6

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 50+317, on the railway line Ruma -Šabac- junction Donja Borina- state border (Šabac road)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Šabački put" at *km 50+317* on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi), located on open railway line between service points Lešnica (at km *35+000*) and Loznica (at km *51+400*). Station Klenak is located at *km 28+900*

Level crossing is located at the intersection point of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Knez Miloš Street in Loznica A pathway for pedestrians and cyclists exists, on both left and right side of the railway line which ends in front of the level crossing.

Level crossing, with asphalt road, is provided with, half-barriers with traffic light signals and traffic light signs. Device is operated by level crossing guard, using local setting push button-LOB.

Speed at the observed part of the railway line is 60 *km/h* (*80 km/h* DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

- **2.1.** Existing technical documentation of the track line at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Knez Miloš Street.
- **2.2.** Layout plan of the intersection point of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and Knez Miloš Street.
- **2.3.** Minutes of the railway committee on the level crossing's existing condition
- **2.4.** Service point regulation for service points Lešnica and Loznica.
- **2.5.** Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) at km 50+317 and Knez Miloš Street and Geodetic Study are 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. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the left side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be derived from the distribution network, using the already existing connector at the station Loznica;

(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 turn-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Loznica. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Lešnica and Loznica 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 protection 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 should 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, 43/2013- 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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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)

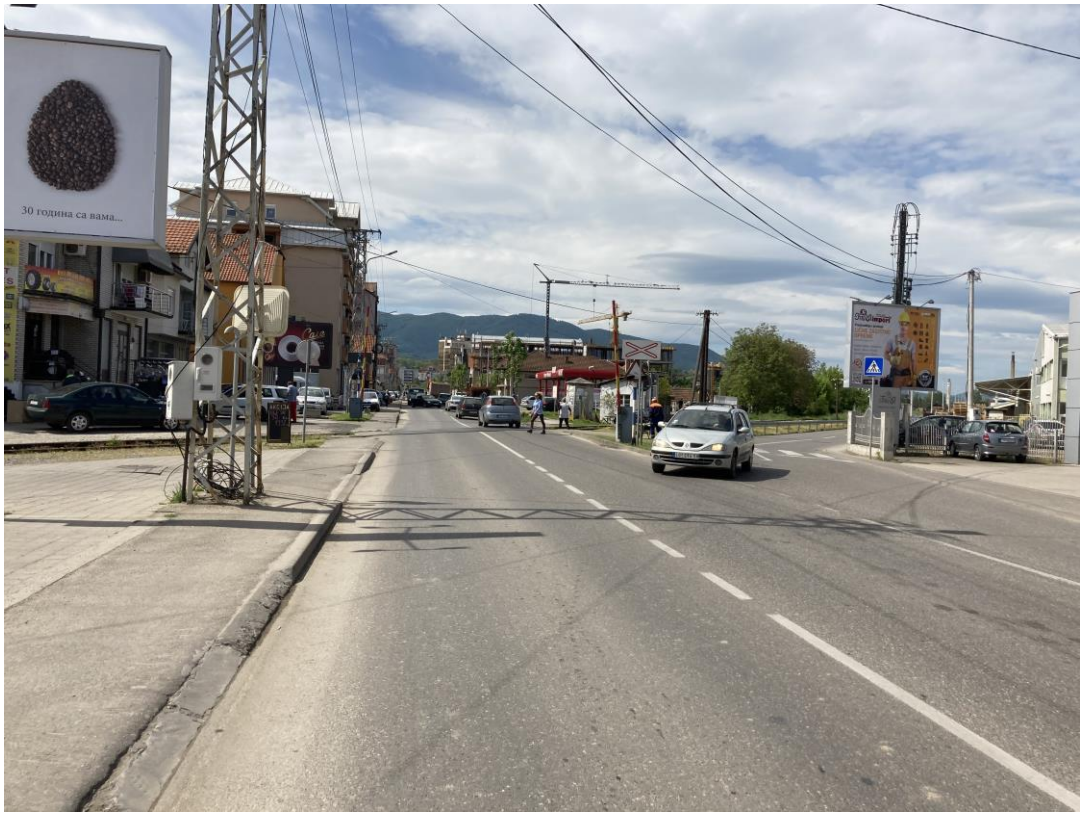
- Related standards and norms SRPS N from this field, regulations and valid documentation;
- Environmental protection and social principles defined by World Bank's Safeguard Policies and Procedures, including procedures and measures deafened by the document "Environmental and Social Management Framework"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

These Terms of Reference are a 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 layout in DWG format, shown in the model, must be found in the State's referent system.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RLC 7 and RLC 8

TERMS OF REFERENCE

for drafting of Conceptual Design and Preliminary Design for reconstruction and rising the safety level on level crossing at km 52+471 (Ilićevo 1) and at km 52+741 (Ilićevo 2) on the railway line Ruma -Šabac- junction Donja Borina- state border

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 are being carried out for level crossing "Ilićevo 1" at *km 52+471* and level crossing "Ilićevo 2" at *km 52+741* on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) which are located in the open track between service points Loznica (km 51+400) and Brasina (km 65+300).

Level crossing "Ilićevo 1" at *km 52+471* is located at the intersection point of one track of the regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road. Level crossing with asphalt roadway is provided with barriers and traffic signs on the road. Device is operated by level crossing guard.

Level crossing "Ilićevo 2" at *km 52+741* is located at the crossing point of one track of the regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road. Level crossing with asphalt roadway is provided with barriers and traffic signs on the road. Device is operated by level crossing guard.

Speed on the observed part of the railway line is 60km/h (80km/h DMU) according to valid Timetable data.

Due to increased road traffic volume, it is necessary to increase the possibility and traffic safety on the level crossing by replacing the existing level crossing device with new electronic equipment.

2. DOCUMENTATION BASIS FOR DRAFTING OF PRELIMINARY DESIGN

Documentation basis for technical project documentation preparation is as follows:

2.1. Existing technical documentation for the track line at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road.

2.2. Layout plan of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local road.

2.3. Minutes prepared by the railway committee on the level crossings' existing condition.

2.4. Service point regulation of service points Loznica and Kovijača.

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

3. CONDITIONS FOR TECHNICAL DOCUMETATION PREPARATION

3.1 Geodetic surveying of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and local roads according to assigned chainages for level crossings "Ilićevo 1" at km 52+471 and "Ilićevo 2" at km 52+741 and geodetic study for the design purposes is required.

3.2 Conceptual Design for both level crossings 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 relationship of designed railway installations and equipment and already existing ones in the Preliminary Design, based on technical requirements. Technical requirements are a constituent 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 the approval for execution of works on the above stated level crossing, according to the following requirements:

(1) Level crossings shall be equipped with automatic electronic devices with signals for 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); It is necessary for the level crossings to be coupled (mutual dependence) and to be simultaneously activated with joint single switch on devices and to have joint control signals, and each of them separate double switch off devices.

(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 enables control of operation 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. 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) 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, size 2m x 2m, on the concrete foundations dim. 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 and in direction of chainage growth. LC "Ilićevo 2" at km 52+741 is coupled with LC "Ilićevo 1" at km 52+471 and all internal equipment for safety and monitoring of level crossings is placed in the hut for level crossing "Ilićevo 1" at km 52+471.

(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 distribution network, at the station Loznica;

(13) Level crossing zone should be lighted in accordance with standard EN12464-2;

(14) Technical conditions should be provided for the telephone connection establishment between the level crossing and station Loznica. 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. Every barrier along with access roads, should be covered by one high resolution IP camera. Third camera should cover tracks between 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 via GSM modem;

(16) Implementation and all procedures during the level crossing's safety level rising should be carried out in accordance with SRPS EN 50126 – ANNEXE;

(17) Enhancement of roadway on the level crossing should be foreseen according to valid railway regulations (Law on Railway ("Official Gazette of RS" no. 41/2018) and Rulebook on crossing of railway line and road, pedestrian or bicycle path, at the place where the crossing 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 Road design- civil engineering improvement of the level crossing

4 Power supply 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 survey, 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 station Loznica and Koviljača 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 matter 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, 121/2012, 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-other 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 Interlocking of Railway Line and Road, 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 the 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 reference system.

RLC 9

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 27+764, on the railway line Ruma -Šabac- junction Donja Borina- state border (Prnjavor Mačvanski)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Prnjavor Mačvanski" at km 27+764 on regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi), located on open railway line between service points Petlovača (at km 22+031) and Prnjavor Mačvanski (at km 22+031).

Level crossing, with asphalt road, is located at the intersection point of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and state road II order. Level crossing is provided with barriers and traffic signals on the road.

Speed at the observed part of the railway line is 60 km/h (80 km/h DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of regional non-electrified single track line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and state road II order.
2.2. Layout plan of the intersection point of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) and state road II order.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service points Petlovača and Prnjavor Mačvanski.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Ruma – Šabac – junction Donja Borina – state border – (Zvornik Novi) at km 27+764 and state road II order and Geodetic Study are 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. 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) Considering that the station Prnjavor Mačvanski is not manned with a train dispatcher, level crossing shall be technically provided with level crossing automatic device with signal for control and switching device 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) In case the station shall be manned with a train dispatcher, the possibility of a train dispatcher operating the level crossing device within journey (according to article no. 28 Rulebook on technical requirements for signaling-interlocking devices) should be foreseen;

(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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be derived from the distribution network, using the already existing connector at the station Prnjavor Mačvanski;

(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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Šabac. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Petlovača and Prnjavor Mačvanski 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 protection 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 should 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, 43/2013- 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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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.


STOP


STOP


STOP

RLC 10

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 17+545, on the railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita) (Pivarski)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Pivarski" at *km 27+764* on part of main arterial electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita), located on open railway line between service points Pančevo Main (at *km 22+031*) and Pančevo Town (at *km 18+206).*

Level crossing is located at the intersection point of main arterial electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and Skadarska Street. Level crossing, with rubber panel roadway, is provided with traffic signs on the road and required visibility zone.

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

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of main arterial electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and Skadarska Street.
2.2. Layout plan of the intersection point of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and Skadarska Street.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service points Pančevo Main and Pančevo Town.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita at km 17+545 and Skadarska Street and Geodetic Study are 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. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device

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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the left side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 security device for the level crossing should be derived from the distribution network, using the already existing connector at the station Pančevo 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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Pančevo Town. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Pančevo Main and Pančevo Town 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 protection 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 should 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, 43/2013- 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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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.


BG 795-UE


STOP

RLC 11

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 17+545, on the railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita) (Watch-house 11)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Watch-house 11" at *km 49+577* on part of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita), located on open railway line between service points Vladimirovac (at *km 45+855*) and Alibunar (at *km 53+554).*

Level crossing is located at the intersection point of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and state road. Level crossing, with asphalt roadway, is provided with mechanical level crossing traffic safety device, operated by level crossing guard, on-site, with barriers and traffic signs on the road.

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

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and state road.

2.2. Layout plan of the intersection point of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and state road.

2.3. Minutes of the railway committee on the level crossing's existing condition

2.4. Service point regulation for service points Vladimirovac and Alibunar.

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

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita at km 49+577 and state road and Geodetic Study are 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. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the left side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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) Considering that stations and Vladimirovac and Alibunar are located at a distance of 3722m and 3977m form the level crossing, the designer should propose a method for power supply for level crossing device;

(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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Vladimirovac and Alibunar 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 protection 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 should 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, 43/2013-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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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.


STOP

RLC 12

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 19+836, on the railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita) (Watch-house 2)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Watch-house 2" at *km 19+836 on* part of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita), located on open railway line between service points Pančevo Town (at *km 18+206*) and Banatsko Novo Selo (at *km 34+007).*

Level crossing is located at the intersection point of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and Kozaračka Street. Level crossing, with reinforced concrete slab roadway, is provided with barriers and traffic signs on the road.

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

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and Kozaračka Street.
2.2. Layout plan of the intersection point of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and Kozaračka Street.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service points Pančevo Town and Banatsko Novo Selo.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita at km 19+836 and Kozaračka Street and Geodetic Study are 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. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 level crossing safety device must be provided from the level crossing guard's hut, located on the right side of the railway line in front of the level crossing;

(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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Pančevo Town. 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 service point and/or competent CTC center;

(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 signal, along with access

roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Pančevo Town and Banatsko Novo Selo 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 protection 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 should 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, 43/2013-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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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.


JAVOR


OPASNOST
GASOVOD

RLC 13

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing at km 58+060, on the railway line Belgrade Center –Pančevo main- Vršac- state border (Stamora Moravita) (Watch-house 22)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above stated, security level rising, reconstruction and enhancement shall be carried for the level crossing "Watch-house 22" at *km 58+060* on part of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita), located on open railway line between service points Alibunar (at *km 53+554*) and Banatski Karlovac (at *km 59+041).*

Level crossing is located at the intersection point of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and state road IB order Belgrade-Pančevo-Vršac-state border with Romania. Level crossing, with reinforced concrete slab roadway, is provided with barriers and traffic signs on the road.

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

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the track line at the intersection of main arterial non-electrified single track line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and state road IB order.
2.2. Layout plan of the intersection point of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita and state road IB order.
2.3. Minutes of the railway committee on the level crossing's existing condition
2.4. Service point regulation for service points Alibunar and Banatski Karlovac.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection location of railway line Belgrade Centre –Pančevo main- Vršac- state border (Stamora Moravita at km 58+060 and state road IB order Belgrade-Pančevo-Vršac-state border with Romania and Geodetic Study are 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. 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 signal for control and switching device 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 security 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the 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 of switch-on interlocking area for road vehicles, maximum length 25m, is required;

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. 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 signal should be installed at the places of switch-on device 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 of 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 tasters 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, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) on the right side of the rail line, in front of the level crossing and in direction of chainage growth. The base 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 level crossing safety device must be provided from the level crossing guard's hut, located on the left side of the railway line in front of the level crossing;

(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 switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlight should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed 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 Alibunar. 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 service point and/or competent CTC center;

(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 signal, along with access roads should be covered with one high resolution IP camera each. Third camera (optional) should cover the crossing, i.e. area between half-barriers. Cameras should 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) Realization and all the other activities, during the level crossing's security 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 should 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 security 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 necessary 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 should be solved in order to avoid accumulation of atmospheric water in the track;

(19) Contents of the Preliminary Design for the level crossing should 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 security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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 for service points Alibunar and Banatski Karlovac 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 protection 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 should 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, 43/2013-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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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.


STOP

RLC 14, RLC 15 and RLC 16

TERMS OF REFERENCE

for Conceptual design and Preliminary design drafting, for reconstruction and rising the security level on level crossing in km 128+340, in km 128+854 on the railway line Subotica -Bogojevo- state border (Erdut) (Watch-house 105)

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 security level, reconstruction and enhancement of 58 level crossings in order to increase the security of railway and road traffic.

In accordance with the above mentioned, security level rising, reconstruction and organization of the level crossings "Watch box 105"in km 128+340, in km 128+854 on part of main arterial non-electrified single track Subotica -Bogojevo- state border (Erdut), located on open railway line between official locations Bajmok (km 105+172) and Subotica (km 131+900) shall be carried out.

Level crossing at km 127+680 located at the intersection point of main arterial non-electrified single track line Subotica – Bogojevo – state border (Erdut) and Jasenovačka, Street, secured by barriers (operated by level crossing guard via mechanical device, located beside the Watch-house 105) and traffic signs on the road has a small traffic frequency and should be closed in order to enable security of the other two level crossings, and adjust technical traffic solution according to the designed situation. Road signalization is incomplete.

Level crossing at km 128+340 is located at the intersection point of main arterial non-electrified single track line Subotica -Bogojevo- state border (Erdut) and state road (Karađorđev put Street). Level crossing is secured by barriers (operated by level crossing guard via mechanical device, located beside the Watch-house 105) and traffic signs on the road. Road signalization is incomplete.

Level crossing at km128+854 is located at the intersection point of main non-electrified single track line Subotica -Bogojevo- state border (Erdut) and Kozaračka Street. Level crossing is secured by barriers (operated by level crossing guard via mechanical device, located beside the Watch-house 105) and traffic signs on the road. Road signalization is incomplete.

Speed at the observed part of the railway line is 60km/h (80km/h DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for the preparation of project documentation is as follows:

2.1. Existing technical documentation of the railway track line at the intersection of main arterial non-electrified single track line Subotica – Bogojevo – state border (Erdut) and Jasenovačka, Street, i.e. state road (Karađorđev put Street, i.e. Kozaračka Street).

2.2. Layout of the intersection of railway line Subotica – Bogojevo – state border (Erdut) and Jasenovačka, Street, i.e. state road (Karađorđev put Street, i.e. Kozaračka Street).

2.3. Minutes of the railway committee on the level crossing's existing condition

2.4. Service point regulation for service points Bajmok and Subotica

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

3. CONDITIONS FOR TECHNICAL DOCUMENTATION PREPARATION

3.1. For the purposes of design, geodetic recording of the intersection point of main arterial non-electrified single track line Subotica – Bogojevo – state border (Erdut) in km 127+340 and state road (Karađorđev put Street), in km 127+680 railway line and Jasenovačka Street, in km 128+854 railway line and Kozaračka Street location and Geodetic Study are required.

3.2. Preliminary 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. 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 ratio 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 crossings in km 128+340 and in km 128+854 shall be equipped with level crossing automatic device with switch-on and off marks, 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 in km 127+680 with small traffic frequency should be closed in order to enable security of the other two level crossings. Coupling of the level crossings is required, they should also be switched on by joint single switch-on devices and should have joint control signals and double switch-off devices each their own. Control device for level crossing in km 128+340 is the main device for signal control and managing, and control device for level crossing in km 128+854 delivers data to the main device. Placement of the level crossing

control devices into the containers near the level crossings in km 128+340 and in km 128+854, respectively, shall be foreseen;

(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 security principles (with computer architecture) "2 out of 2";

(3) Electronic processing device must enable registering of all regular occurrences, disturbance and failures, connected to level crossing operation (minimum 5.000 records), as well as local reading 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 (interruption/malfunction/pole breakage) to three cellular phones: dispatchers and maintenance department staff of the corresponding SI section SMS modem shall be installed on the main device in km 128+340 and it shall be sending messages regarding both level crossings.

(4) Road signals must be made in LED-modular technology, which provides operation control and correct 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) Estimate of switch-on interlocking area for road vehicles, maximum length 25m, is required.

(7) Level crossing security device must be switched on and off automatically by the railway vehicle. Estimate of 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.

(8) Device must have the possibility of on-site operation using the local setting tasters LOB installed on the wall of the container, located in the suitable locker protected from unauthorized access (Elzet lock).

(9) Level crossings devices should be placed in new containers, size 2m x 2m, on the concrete base size 3,4m x 3,4m (with utilization as a pathway around the container, width 0,7m) in km 128+340 and in km 128+854, on the right side of the rail line, in front of the road, and in direction of chainage growth. The base 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.

(10) 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.

(11) Power supply for the security device for the level crossing should be derived from the already existing connector of the distribution network, from the Watch-house 105, via special fuses.

(12) Level crossing zone should be lighted in accordance with standard EN12464-2, using two LED spotlights, minimal power 30W, with photo sensor for automatic switch-on in cases of decreased visibility. Spotlights are powered by the level crossing's container, voltage 230V, 50Hz. LED spotlights should 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 roadway on both sides of the level crossing, so that they can 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 camera should be installed, which will be placed on a pole right next to the container or on the console on the roof of the container.

(13) Technical conditions should be provided for the telephone connection establishment between the level crossing and station Subotica. 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 service point and/or competent CTC center.

(14) 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, along with access roads should be covered with one high resolution IP camera each. Third camera should cover the track line between half-barriers. Cameras should be mounted on the existing poles, in case there aren't any suitable poles, installation of the new ones shall be foreseen. Device for recording based on NAS server should be set up in the facility for placement of devices for the level crossing. Access to the recordings and live review must be possible both locally and remotely (optional) via GSM modem;

(15) Realization and all the other activities, during the level crossing's security level rising, as well as during the lifespan of devices, should be carried out in accordance with SRPS EN 50126 – ANEX E;

(16) In the level crossing zone in km 128+340 pedestrian pathways and enhancement of roadway on level crossings 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 security 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 necessary works on the track panel. Replacement of the entire track panel should be foreseen as well (new rails, sleepers, track fastenings);

(17) Drainage in the level crossing zone should be solved in order to avoid accumulation of atmospheric water in the track.

(18) Contents of the Preliminary design for the level crossing should 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).

(19) Preliminary design for the security level rising of the level crossing, should be drafted according to concrete case, existing documentation, so that it contains the 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

(20) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary design.

(21) Service point regulation for service points Bajmok and Subotica should be amended with suitable level crossing device operation regulations.

(22) Preliminary design should be made in accordance with Environmental and Social principles defined by the policies and procedures for protection 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 should 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, 43/2013-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. 135/18)
- Rulebook on implementation process of united procedure, electronically ("Official Gazette of RS" no. 68/2019)
- Rulebook on technical requirements for signaling and safety equipment ("Official Gazette of RS" no. 18/16 and 89/16)
- Rulebook on intersection of railway line and roadway, pedestrian or bicycle path, at the place where the intersection is possible, and traffic security measures ("Official Gazette of RS" no. 89/16)
- 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 N 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 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 layout in DWG format, shown in the model, must be found in the State's referent system.

127+680

128+340

128+854

RLC 17

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing km 76+073, on railway line Vrbas –Sombor (Kljajićevo)

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 "Kljajićevo" at km 76+073 on part of local railway non-electrified single track line Vrbas– Sombor. Level crossing is located in station area of the station Kljajićevo, between entrant signal from station Sombor and entry point at station Kljajićevo (at *km 75+500*).

Level crossing at km 76+073 is located at the intersection point of local railway non-electrified single track line Vrbas - Sombor and state road (Jasenovačka Street). Level crossing used to be provided with half-barriers and traffic light signs on the road, however half-barriers have been dismantled because the station has not been manned since November 2017.

Speed on the observed part of the railway line is 20km/h (40km/h DMU) according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is:

2.1. Existing technical documentation for the track line at the intersection point of part of local railway non-electrified single track line Vrbas – Sombor and state road.
2.2. Layout plan of the intersection location of local railway non-electrified single track line Vrbas – Sombor and state road.
2.3. Minutes by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service points Sombor and Kljajićevo.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMETATION PREPARATION

3.1. Geodetic surveying of the intersection location of railway line Vrbasa – Sombor – at km 76+073 and state road (Jasenovačka 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 signals for 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). It is required to consider the possibility of auxiliary control signal installation. In case of the last station it shall be foreseen that the train dispatcher shall be able to operate the level crossing device, from station Kljajićevo;

(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). 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) 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 the railway line, in front of 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 distribution network, at the station Kljajićevo.

(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 Sombor. 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) Organization 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 Kljajićevo and Sombor 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 18

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 155+449, on railway line Lapovo- Kraljevo-Lešak- Kosovo Polje- Đeneral Janković –state border (Kazanovići)

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 "Kazanovići" at *km 155+449* on main arterial non-electrified single track line Lapovo- Kraljevo-Lešak- Kosovo Polje- Đeneral Janković –state border (Volkovo), located on open railway line between service points Raška (at km 152+300) and Rudnica (at km 162+000).

Level crossing is located at the intersection point of main arterial non-electrified single track line Lapovo- Kraljevo-Lešak- Kosovo Polje- Đeneral Janković –state border (Volkovo) and state road IB order Raška- Leposavić-Kosovska Mitrovica-Vučitrn-Priština- Uroševac- state border with FYR Macedonia (border crossing Đeneral Janković).

Level crossing, with asphalt roadway, is provided with barriers and traffic light signs and incomplete road signalization.

Speed on the observed part of the railway line is *60km/h*, according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is:

2.1. Existing technical documentation for the track line at the intersection point of main arterial non-electrified single track line Lapovo- Kraljevo-Lešak- Kosovo Polje- Đeneral Janković –state border (Volkovo) and state road IB order.

2.2. Layout plan of the intersection location of railway line Lapovo- Kraljevo-Lešak- Kosovo Polje- Đeneral Janković –state border (Volkovo) and state road IB order.

2.3. Minutes by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service points Raška and Rudnica.
2.5. Environmental and Social Management Framework (ESMF) for Western Balkans Trade and Transport Facilitation Project.

3. CONDITIONS FOR TECHNICAL DOCUMETATION PREPARATION

3.1. Geodetic surveying of the intersection location of railway line Lapovo-Kraljevo-Lešak- Kosovo Polje- Đeneral Janković –state border (Volkovo) at km 155+449 and state road IB order Raška- Leposavić-Kosovska Mitrovica-Vučitrn-Priština- Uroševac- state border with FYR Macedonia 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 signals for 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). 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) 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 level crossing guard's hut.

(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 Raška. 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 Raška and Rudnica 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 19

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing km 33+243, on railway line Lapovo-Kraljevo-Lešak-Kosovo Polje-Đeneral Janković- state border (Stanovo)

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 "Stanovo" at *km 33+243* on part of main arterial non-electrified single track line Lapovo-Kraljevo-Lešak-Kosovo Polje-Đeneral Janković- state border, located in station area of the station Grošnica, between entrant signal and entry points at station Grošnica (at *km 33+091*).

Level crossing is located at the intersection point main arterial non-electrified single track line Lapovo-Kraljevo-Lešak-Kosovo Polje-Đeneral Janković- state border and the street. Level crossing is provided mechanical traffic safety device on the level crossing, operated by level crossing guard on-site, barriers and traffic signs on the road.

Speed on the observed part of the railway line is *40km/h* according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is:

2.1. Existing technical documentation for the track line at the intersection point of part of main arterial non-electrified single track line Lapovo-Kraljevo-Lešak-Kosovo Polje-Đeneral Janković- state border and the street.
2.2. Layout plan of the intersection location railway line Lapovo-Kraljevo-Lešak-Kosovo Polje-Đeneral Janković- state border and the street.
2.3. Minutes by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service point Grošnica.
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 Lapovo-Kraljevo-Lešak-Kosovo Polje-Đeneral Janković- state border (Stanovo) at km 33+243 and the 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 signals for 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) 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).

(8) 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.

(9) 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.

(10) Power supply for the safety device for the level crossing should be provided from the level crossing guard's hut.

(11) 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.

(12) Technical conditions should be provided for the telephone connection establishment between the level crossing and station Grošnica. 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.

(13) 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;

(14) 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;

(15) 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);

(16) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track.

(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 station Grošnica 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 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.


10
STOP


STOP

RLC 20

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing km 30+043, on railway line Lapovo –Kraljevo- Lešak-Kosovo Polje-Đeneral Janković- state border (Pivara)

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 30+043 on part of main arterial non-electrified single track line Lapovo –Kraljevo- Lešak-Kosovo Polje-Đeneral Janković- state border and state road II order (Stojan Protić Street) in Kragujevac (at *km 28+829*).

Level crossing is located at the intersection point of main arterial non-electrified single track line Lapovo –Kraljevo- Lešak-Kosovo Polje-Đeneral Janković- state border and state road II order (Stojan Protić Street) in Kragujevac.

Level crossing is provided with barriers and traffic signs on the road. Level crossing, with asphalt roadway, is located between entry signal from station Grošnica and signal "Granica Manevrisanja".

Speed on the observed part of the railway line is 40km/h according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is:

2.1. Existing technical documentation for the track line at the intersection point of part of main arterial non-electrified single track line Lapovo –Kraljevo- Lešak-Kosovo Polje-Đeneral Janković- state border and state road II order (Stojan Protić Street).
2.2. Layout plan of the intersection location of railway line Lapovo –Kraljevo- Lešak-Kosovo Polje-Đeneral Janković- state border and state road II order (Stojan Protić Street).
2.3. Layout plan of the intersection location of railway line Lapovo –Kraljevo- Lešak-Kosovo Polje-Đeneral Janković- state border (Volkovo) and state road IB order.
2.4. Minutes by the railway committee on the level crossing's existing condition.
2.5. Service point regulation of service points Kragujevac and Grošnica.

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 Lapovo –Kraljevo-Lešak-Kosovo Polje-Đeneral Janković- state border at km 30+043 and state road II order (Stojan Protić Street) in Kragujevac 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 semi-automatic electronic device with level crossing light signals and half-barriers which shall be operated by train dispatcher (according to article no. 28 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) 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.

(8) 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).

(9) 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 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.

(10) 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.

(11) Power supply for the safety device for the level crossing should be provided from the level crossing guard's hut, located on the left side of railway line, in front of level crossing.

(12) 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.

(13) Technical conditions should be provided for the telephone connection establishment between the level crossing and station Kragujevac. 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.

(14) 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;

(15) 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;

(16) 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);

(17) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track

(18) 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);

(19) 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.

(20) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design.

(21) Service point regulation of service points Kragujevac and Grošnica should be amended with suitable level crossing device operation regulations.

(22) 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.


STOP


STOP


УЛИЦА
СТОЈАНА
ПРОТИЋА
51

RLC 21 and RLC 22

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 40+967 (Šumadija) and at km 41+715 of railway line Stalać –Kraljevo-Požega (Trstenik)

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 "Šumadija" at *km 40+967* and "Trstenik" at *km 41+715* on part of regional railway non-electrified single track line Stalać– Kraljevo-Požega.

Level crossing "Šumadija" at km 40+967 is located on the open railway line between entry signal (*41+660*) and pre-signal (*40+874*) from station Trstenik (at *km 42+455*) at the intersection location of railway and state road II order in Trstenik. Level crossing used to be provided with barriers and traffic signs on the road, however barriers have been dismantled because there were no staff to operate mechanical level crossing device, for a longer time period. Consequently, it is the obligation of neighboring service points to notify the train crew that the level crossing is not operational and that they should proceed according to the provisions of article 61, item 12 and article 63, item 5 of the Rulebook on Traffic 2.

Level crossing "Trstenik" at km *41+715* is located in the station area of railway station Trstenik (in km *42+455*) at the intersection point of railway and local road in Trstenik and it is provided with traffic signs on the road and with required visibility zone.

Speed on the observed part of the railway line is *40km/h* according to valid timetable data.

2. DOCUMENTATION BASIS

Documentation basis for project documentation preparation is:

2.1. Existing technical documentation for the track line at the intersection point of regional railway non-electrified single track line Stalać- Kraljevo- Požega and state road order II, i.e. local road.

2.2. Layout plan of the intersection location of railway line Stalać- Kraljevo- Požega and state road order II, i.e. local road.

2.3. Minutes by the railway committee on the level crossing's existing condition.

2.4. Service point regulation of station Trstenik.

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 Stalać-Kraljevo-Požega level crossing "Šumadija" at km 40+976 and state road II order as well as the intersection location of railway line at km 41+715- level crossing "Trstenik" and state road is required. Geodetic Study for the design purposes is required also.

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 crossings at km 41+715 and km 40+967 shall be equipped with level crossing automatic electronic device with switch-on and switch-off marks, with level crossing light signals, half-barriers and control signals (according to provisions form the Rulebook on technical requirements for signaling-interlocking devices ("Official Gazette of RS" no. 18/16). It is required for the level crossings to be interconnected, switching-on of device for both level crossings from the direction of Stalać shall be the executed automatically by the passage of train's first axis over the switch-on contacts which will execute the switching-on of both level crossings with a time delay. Level crossing at km 1+715 must establish dependency with the station device. For the journeys from the direction of Kraljevo, it should be foreseen for the train dispatcher to perform the switching –on of level crossing device at the station, using suitable push buttons, when the station Trstenik is manned. In case the station is not manned, it shall be foreseen for the switching-on to be performed automatically by the train's passage over the switch-on contacts. Possibility of the switching-on of level crossings device from the level crossing hut, in km 41+175, shall be foreseen along with the registering of executive operation;

(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;

(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. Level crossing device should be installed in the new level crossing 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 left side of the railway line, in front of 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 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 power supply room for the signaling-interlocking devices, at the station Trstenik;

(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 according to the neighboring occupied official places. 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 at km 40+967 and at km 41+715 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 at km 40+967 and at km 41+715 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 Trstenik 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 21

RLC 22

RLC 23

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 74+044, on railway line Stalać –Kraljevo-Požega (Španac)

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 74+044* of regional railway non-electrified single track line Stalać –Kraljevo-Požega, located on open railway line, between service points Kraljevo (at *km 71+621*) and Adrani (*at km 78+637*).

Level crossing is located at the intersection point of regional railway non-electrified single track line Stalać-Kraljevo-Požega and Tika Kolarović Street. Level crossing is provided with traffic signs on the road, required visibility zone and asphalt roadway.

Speed on the observed part of the railway line is *55km/h* according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing 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 regional railway non-electrified single track line Stalać-Kraljevo-Požega and Tika Kolarović Street.
2.2. Layout plan of the intersection location of regional railway non-electrified single track line Stalać-Kraljevo-Požega and Tika Kolarović Street.
2.3. Minutes by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service points Kraljevo and Adrani.
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 Stalać-Kraljevo-Požega at km 74+044 and Tika Kolarović 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 signals for 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). 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) 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, in front of 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 distribution network;

(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 Kraljevo. 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 Kraljevo and Adrani 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 24

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 29+701, on railway line Stalać –Kraljevo-Požega (Stopanja)

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 29+701* of regional railway non-electrified single track line Stalać –Kraljevo-Požega, located on open railway line, between service points Kruševac (at *km 14+559*) and Trstenik (*at km 42+455*).

Level crossing is located at the intersection point of regional railway non-electrified single track line Stalać-Kraljevo-Požega and state road I order. Level crossing, with asphalt roadway, is provided with half- traffic signs on the road and required visibility zone.

Speed on the observed part of the railway line is *25km/h* (*40km/h DMU*) according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing 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 regional railway non-electrified single track line Stalać-Kraljevo-Požega and state road I order.
2.2. Layout plan of the intersection location of regional railway non-electrified single track line Stalać-Kraljevo-Požega and state road I order.
2.3. Minutes by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service points Kruševac and Trstenik.
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 Stalać-Kraljevo-Požega at km 29+701 and state road I order 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 signals for 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). 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) 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 Stopanja;

(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 nearest service point. 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 Kruševac and Trstenik 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.


VIBBET
MAN

RLC 25

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 68+336, on railway line Stalać –Kraljevo-Požega (Kamidžora)

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 "Kamidžora" at *km 68+336* of regional railway non-electrified single track line Stalać –Kraljevo-Požega, located on open railway line, between service points Trstenik (at *km 62+455*) and Kraljevo (*at km 71+600*). At *km 68+900*, service point Sirača is located.

Level crossing is located at the intersection point of regional railway non-electrified single track line Stalać-Kraljevo-Požega and state road IB order no. 15 Batočina-Kraljevo-Kragujevac.

Level crossing, with asphalt road, is provided with barriers and traffic signs on the road.

Speed on the observed part of the railway line is *25km/h* (*40km/h DMU*) according to valid timetable data.

For reasons of increased road traffic volume, rising of safety level on the level crossing 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 regional railway non-electrified single track line Stalać-Kraljevo-Požega and state road IB order.
2.2. Layout plan of the intersection location of regional railway non-electrified single track line Stalać-Kraljevo-Požega and state road IB order.
2.3. Minutes by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service points Kraljevo and Trstenik.
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 Stalać-Kraljevo-Požega at km 68+366 and state road IB order no. 15 Batočina-Kraljevo-Kragujevac 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 signals for 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). 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) 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 level crossing guard's hut;

(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 manned service point. 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 Kraljevo and Trstenik 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.


STOP


STOP

RLC 26

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 39+605, on railway line Crveni Krst –Zaječar- Prahovo pristanište (Svrljig)

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 1 st. Svrljig" at *km 39+605* on a part of regional railway non-electrified single track line Crveni Krst –Zaječar- Prahovo pristanište, located in station area of the station Svrljig (*at km 40+000*).

Level crossing is located at the intersection point of regional railway non-electrified single track line Crveni Krst –Zaječar- Prahovo pristanište and industrial track and regional road Niš-Zaječar (Dušan Trifunac Street) in Svrljig.

Level crossing, with asphalt roadway over both tracks, is provided with mechanical device for traffic on the level crossing, barriers operated by train dispatcher within the road safety and traffic signs on the road.

Speed on the observed part of the railway line is *30km/h* (*40km/h DMU*) 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 regional railway non-electrified single track line Crveni Krst –Zaječar- Prahovo pristanište and industrial track and regional road Niš-Zaječar (Dušan Trifunac Street).
- **2.2.** Layout plan of the intersection location of regional railway non-electrified single track line Crveni Krst –Zaječar- Prahovo pristanište and industrial track and regional road Niš-Zaječar (Dušan Trifunac Street).
- **2.3.** Minutes by the railway committee on the level crossing's existing condition.
- **2.4.** Service point regulation of service point Svrljig.
- **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 Stalać-Kraljevo-Požega at km 74+044 and Tika Kolarović 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 semi-automatic device with level crossing light signals and half-barriers which shall be operated by train dispatcher (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) 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;

(8) 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);

(9) 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 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;

(10) 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;

(11) Power supply for the safety device for the level crossing should be provided from the station Svrljig;

(12) 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;

(13) Technical conditions should be provided for the telephone connection establishment between the level crossing and station Kraljevo. 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;

(14) 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;

(15) 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;

(16) Pedestrian pathways in the level crossing zone and 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). On the industrial track, mounting of the rubber panels on the concrete sleepers' B 70 on the existing track panel shall be foreseen;

(17) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;

(18) 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);

(19) 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.

(20) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;

(21) Service point regulation of station Svrljig should be amended with suitable level crossing device operation regulations;

(22) 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 27

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 105+561, on railway line Pančevo Glavna– Zrenjanin- Kikinda- state border (Jimbolia) (Melenci)

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 "Melenci" at *km 105+561* on part of regional railway non-electrified single track line Pančevo Glavna– Zrenjanin- Kikinda- state border (Jimbolia), located in station area of station Melenci. Neighboring service points are Elemir (at *km 97+475*) and Kumane (*at km 112+701*).

Level crossing is located at the intersection point of regional railway non-electrified single track line Pančevo Glavna– Zrenjanin- Kikinda- state border (Jimbolia) and state road (Melenci- Kumane). Level crossing, with asphalt roadway, is provided with mechanical device for traffic on level crossing, operated by train dispatcher from distant place, i.e. level crossing guard, depending on manning of the station Melenci, barriers with traffic light signs and traffic signs on the road.

Speed on the observed part of the railway line is *40km/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 part of regional railway non-electrified single track line Pančevo Glavna– Zrenjanin- Kikinda- state border (Jimbolia) and state road.
2.2. Layout plan of the intersection location of regional railway non-electrified single track line Pančevo Glavna– Zrenjanin- Kikinda- state border (Jimbolia) and state road.
2.3. Minutes by the railway committee on the level crossing's existing condition.
2.4. Service point regulation of service points Elemir and Kumane.
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 Pančevo Glavna–Zrenjanin- Kikinda- state border (Jimbolia) at km 105+561 and state road (Melenci-Kumane) 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 signals for 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). 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) 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, in front of 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 Melenci;

(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 Melenci. 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 Elemir and Kumane 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.


STOP


STOP

RLC 28

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 20+497, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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+497* of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located between service points Resnik (at *km 14+000*) and Vreoci (*at km 37+200*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and local road.

Speed on the observed part of the railway line is *85km/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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and local road.
2.2. Technical documentation for signaling-interlocking devices of station Barajevo, interstation distance Barajevo- Veliki Borak, telecommunication and signaling cables and stable plants for electric traction on the railway line.
2.3. Layout plan of the intersection location of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) 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 Resnik and Vreoci.
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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 20+497 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 signals for 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station 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 Barajevo and from the 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 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 service point Barajevo. 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 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 points Resnik and Vreoci 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 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.


STOP


STRAIL


4.5m

RLC 29

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 24+269, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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 24+269* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located between service points Veliki Borak (at *km 23+100*) and Stepojevac (*at km 30+600*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and local road.

Speed on the observed part of the railway line is *90 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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and local road.
2.2. Technical documentation for signaling-interlocking devices of station Veliki Borak, interstation distance Veliki Borak- Stepojevac, telecommunication and signaling cables and stable plants for electric traction on the railway line.
2.3. Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) 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 Veliki Borak and Stepojevac.
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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 24+269 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 signals for 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station 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 Veliki Borak and from the 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) 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 Veliki Borak. 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 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 points Veliki Borak and Stepojevac 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 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.


4.5m
7
50 m
4.5m
7
50 m


STOP
STOP

RLC 30

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 32+022, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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 32+022* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located between service points Stepojevac (*at km 30+600*) and Vreoci (at *km 37+200*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.

Speed on the observed part of the railway line is *90 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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.
2.2. Technical documentation for signaling-interlocking devices of station Stepojevac interstation distance Stepojevac- Vreoci, telecommunication and signaling cables and stable plants for electric traction on the railway line.
2.3. Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.
2.4. Minutes by the railway committee on the level crossing's existing condition.
2.5. Service point regulation of service points Stepojevac and Vreoci.
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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 32+022 and state 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 signals for 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station 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 Stepojevac and from the 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) 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 Stepojevac. 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 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 points Stepojevac and Vreoci 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 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.


STOP
4.5m


4.5m

RLC 31

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 33+484, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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+269* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located between service points Stepojevac (at *km 30+600*) and Vreoci (*at km 37+200*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and local road.

Speed on the observed part of the railway line is *90 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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and local road.
- **2.2.** Technical documentation for signaling-interlocking devices of station Stepojevac, interstation distance Stepojevac- Vreoci, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- **2.3.** Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) 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 Stepojevac and Vreoci.
- **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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 33+484 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 signals for 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station 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 Vreoci and from the 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) 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 Stepojevac. 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 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 points Stepojevac and Vreoci 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 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.


4.5m
7
STOP


STOP

RLC 32

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 53+795, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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 53+795* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located between service points Lajkovac (at *km 52+600*) and Slovac *(y km 59+000*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and local road.

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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and street.
2.2. Technical documentation for signaling-interlocking devices of station Lajkovac, interstation distance Lajkovac - Slovac, telecommunication and signaling cables and stable plants for electric traction on the railway line.
2.3. Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and street.
2.4. Minutes by the railway committee on the level crossing's existing condition.
2.5. Service point regulation of service points Lajkovac and Slovac.
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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 53+795 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;

(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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station 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 Lajkovac and from the 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) 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 Lajkovac. 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 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 points Lajkovac and first manned service point 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 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.


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RLC 33

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 66+716, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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 66+716* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located in the station area of station Divci (*y km 67+100*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.

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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.
- **2.2.** Technical documentation for signaling-interlocking devices of station Divci, telecommunication and signaling cables and stable plants for electric traction on the railway line.
- **2.3.** Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.
- **2.4.** Minutes by the railway committee on the level crossing's existing condition.
- **2.5.** Service point regulation of service point Divci.
- **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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 66+716 and state 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station signals shall be set up to term "Stop";

(8) Calculation for level crossing elements for the minimal speed of 20 km/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 Valjevo and from the 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) 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 Divci. 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 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 points Divci and Valjevo 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 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.


STOP
4.5m


STOP


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RLC 34

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 75+705, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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 75+705* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located in the station area of station Divci (*y km 67+100*) and Valjevo (at km 77+724). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.

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 by75+705 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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.
- **2.2.** Technical documentation for signaling-interlocking devices of station Valjevo, interstation distance Divci- Valjevo telecommunication and signaling cables and stable plants for electric traction on the railway line.
- **2.3.** Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and state road.
- **2.4.** Minutes by the railway committee on the level crossing's existing condition.
- **2.5.** Service point regulation of service point Divci.

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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 75+705 and state 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station signals shall be set up to state "Stop";

(8) Calculation for level crossing elements for the minimal speed of 20 km/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 Valjevo and from the 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) 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 Valjevo. 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 station Valjevo. 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 points Divci and Valjevo 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 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.


4.5m
10
40
ПОЛИЦИЈА


STOP


STOP

RLC 35

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 225+878, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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 225+878* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located at the station Priboj (at *km 225+300*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and non-categorized road.

Speed on the observed part of the railway line is *30 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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and non-categorized road.
2.2. Technical documentation for signaling-interlocking devices of station Priboj, telecommunication and signaling cables and stable plants for electric traction on the railway line.
2.3. Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and non-categorized road.
2.4. Minutes by the railway committee on the level crossing's existing condition.
2.5. Service point regulation of service point Priboj.

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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 225+878 and non-categorized 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station signals shall be set up to term "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 Priboj and from the 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) In case of a semaphore device installation, possibility of dependency establishment between semaphore devices at the intersection and level crossing automatic device, so that it is signalized to the semaphore devices at the moment of switching-on of level crossing device at the latest, which shall provide traffic participants in the level crossing area with safe exit from the level crossing zone before lowering of the barriers. In case of failure or switching-off of semaphore device, regulation must be such that the road over the railway line must be considered as a major road, regardless of the road categorization of intersecting roads;

(11) 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;

(12) 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;

(13) 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 Priboj. A power supply system from the overhead contact line should be considered as well;

(14) 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;

(15) Technical conditions should be provided for the telephone connection establishment between the level crossing and Priboj 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;

(16) 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;

(17) 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;

(18) 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);

(19) Drainage in the level crossing zone shall be solved in order to avoid accumulation of atmospheric water in the track;

(20) 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);

(21) 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.

(22) Investor shall form Review Committee- technical documentation inspection and approval, after executed technical inspection of the Preliminary Design;

(23) Service point regulation of service point Priboj should be amended with suitable level crossing device operation regulations;

(24) 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 36

TERMS OF REFERENCE

for Conceptual Design and Preliminary Design drafting, for reconstruction and rising the safety level on level crossing at km 253+549, on railway line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje)

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 253+549* on part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje), located between service points Prijepolje (at *km 252+600*) and Prijepolje Freight (*at km 255+900*). Railway line is equipped with CTC.

Level crossing is located at the intersection point of part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and non-categorized road.

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 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 part of main arterial electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and non-categorized road.

2.2. Technical documentation for signaling-interlocking devices of Prijepolje Passenger station, interstation distance Prijepolje- Prijepolje Freight, telecommunication and signaling cables and stable plants for electric traction on the railway line.

2.3. Layout plan of the intersection location of main arterial non-electrified single track line (Belgrade Centre) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) and non-categorized road.

2.4. Minutes by the railway committee on the level crossing's existing condition.

2.5. Service point regulation of service points Prijepolje and Prijepolje Freight.

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) –Resnik-Požega – Vrbnica- state border- (Bijelo Polje) at km 253+549 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 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). 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 station devices shall be established, so that, in case of failure of the level crossing safety device, corresponding station signals shall be set up to term "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 Prijepolje and from the 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) 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 Prijepolje. 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 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 Prijepolje and Prijepolje Teretna 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.