

3 PROJECT DESCRIPTION

This Chapter provides an overview of the key elements of the Morava Corridor Motorway Project. Government of Serbia is the owner of the Project (represented by the Ministry of Finance as the borrower) and the Ministry of Construction, Transport and Infrastructure, represented by the Corridors of Serbia (CoS) is the implementing entity including land access and expropriation. Construction of the Project will be conducted by Bechtel ENKA UK Limited that is called as the Contractor.

Public Enterprise Roads of Serbia (RoS) is responsible entity for operation of the Motorway which includes, maintenance and preservation, exploitation, construction, reconstruction, organization and control of toll collection, development and management of I and II category state roads in the Republic of Serbia.

The Project information used for the Environmental and Social Impact Assessment (ESIA) studies is based on the preliminary design provided by the Employer and the Contractor for the preparation of the ESIA and does not include any subsequent design changes during detailed design phase.

The Contractor is responsible for the detailed design and construction of the Project. Any design changes required as a result of the ESIA studies will be incorporated into the Project as part of a Change Management Procedure to be prepared and implemented by the Contractor according to their quality management system requirements.

3.1 Project Development and Project Alternatives

Project development phase of the Morava Corridor Motorway Project has been started in 2008. At the initial design phase of the Project, general topographical condition of the West Morava River valley is considered mainly for the identification of route options. The hills bounding the North and South of the West Morava River valley limit the potential route option for the Project in terms of constructability regarding physical, environmental and financial point of views. The West Morava River together with the high number of settlements located along the river basin is other limiting factors for the Project route selection. In addition to these limiting factors, several variation options are considered from aspects to assess whether there are other feasible options that will result in less significant impacts during the development of the Project.

Other factors considered in the route selection processes are to i) avoid settlements as much as possible to minimize resettlement; ii) avoid natural and archaeological protected areas; and iii) comply with technical design specifications considering topographical and hydrological conditions of the basin. The whole process starting with the route selection, selection of intersection locations and selection of project facilities' locations are comprehensively carried out in order to avoid and minimize the potential impacts as much as practical.

The project development timeline provided in the Hydrotechnical Regulation of the Zapadna (West) Morava River Within the Infrastructure Corridor of Highway E-761 (see Appendix 10) indicates that the route selection process of the Project was proceeded during the project development together with the river regulation works. The project design activities performed since 2008 are provided in Table 3-1 and summarized below.

Table 3-1. Summary of the Project History

Activity/Design	Design subject
General Design of the Regulation of the West Morava River (2007)	Based on the conducted extensive field survey, the issue of the protection against the adverse impacts of the West Morava River was integrally considered within the General Design Report in 2007.
General Design and Pre-feasibility Study of the E-761 Motorway Pojate-Kraljevo-Preljina, km 000+000.00 - km 109+612.72 (2008)	Three variant solutions of the Motorway Route from Pojate to Preljina were analyzed in the General Design and Pre-feasibility Study Report of the E-761 Motorway in 2008. All analyzed routes pass through the West Morava River valley, with changes on the certain sections.
Preliminary and Main Design of the E-761 Motorway, Pojate - Preljina (2012-2013)	Preliminary and Main Designs of the E-761 Motorway were prepared in 2012-2013 by the HI (section Adrani - Preljina) and CIP (section Pojate - Adrani), and the investor was "Roads of Serbia". New designs were prepared in line with the previous design consideration, which was not provided for the institutional control.
Spatial Plan for the Special Purpose Area of the E-761 Motorway Infrastructure Corridor, Section Pojate – Preljina (SPSPA) (2013)	The SPSPA-2013 stated that the almost entire route of the Proposed Motorway was situated in the West Morava floodplain. Additionally, the Proposed Motorway Route was intersecting the West Morava River course at several locations, and at some zones the Proposed Motorway Route was significantly approaching to the river course of the West Morava.
Hydrotechnical Study of E-761 Motorway Route, Section Pojate-Preljina (HTS) (2016)	HTS-2016 was conducted in order to harmonize the motorway design with i) the water regime of the West Morava River, ii) existing water structures and water management plans, in accordance with the Scope of Work outlined by the Water of Serbia, as the Ministry competent for water management, and the Roads of Serbia. As it was requested in the Scope of Work, the hydraulic model for the West Morava River developed in 2007 (General Design Report) was used to define the basic parameters of flow regime for the altered hydrological conditions that was occurred after the floods in May 2014.
New SPSPA and Harmonized Preliminary Designs of the E-761 Motorway and Hydrotechnical Regulation of the West Morava River, 2017-2020	New SPSPA was carried out, due to: <ul style="list-style-type: none"> - New baseline data obtained during the detailed field survey carried out for the purposes of further elaboration of project documentation; - New alignment proposed by HTS-2016; - The reconsideration of the road structures locations and the accompanying contents of motorway and the harmonization with the new legislation, which was adopted in 2014. The new technical solutions were developed at the preliminary design level, through the constant

Activity/Design	Design subject
	harmonization of the motorway design and hydrotechnical structure design on the West Morava River.
Design for the Construction Permit (DCP) for Hydrotechnical Works and Structures (2020)	The preparation of DCP-2020 is in progress. According to the time schedule, the design for Section-1 will be completed during May 2020. Upon the performed technical review, which is mandatory under the Law on Planning and Construction, the investor will receive a construction permit. The design for Section-3 will be finalized by the end of May 2020, and the construction permit is expected at the end of June 2020. The drafting of the Section-2 design will follow the acceptance of the Preliminary Design, for the same sector, by the National Review Commission.

a) General Design and Pre-feasibility Study of the E-761 Motorway Pojate-Kraljevo-Preljina

General Design and Pre-feasibility Study Report (GDPFSR) was prepared by the Highway Institute (HI) from Belgrade for the investor "Roads of Serbia" in 2008. Three route variations for the Proposed Motorway, between Pojate and Preljina, were analyzed in the GDPFSR-2008. All the route variations were located in the West Morava River valley with variations on the certain sections. It was seen that the negative impacts of flood on the Proposed Motorway's construction and operation were not considered during the identification of the alternative options. Additionally, GDPFSR was not including the investment calculations for the protection measures required for the negative impacts of the river system.

b) Preliminary and Main Design of the E-761 Motorway Pojate – Preljina

Preliminary and Main Designs of the E-761 Motorway Report (PMDR) were prepared between the years 2012 and 2013 by the HI (section Adrani - Preljina) and CIP (section Pojate – Adrani) for the investor Roads of Serbia. In the PMDR, the route designs were prepared in accordance to the previous Law on Planning and Construction (LPC), which was amended in 2016, and the designs were not submitted to revision or technical control. The Environmental Impact Assessment (EIA) Studies have not been prepared for the drafted PMDR. Only for the section between Pojate and Kruševac, the Ministry of Environmental Protection provided the scope and the content of the EIA Study.

In the new design, several opinions developed by PWMC Srbijavode and Republic Hydrometeorological Service of Serbia (RHMS) was considered in order to minimize the hydrological impacts. In the study, surface elevation of the Proposed Motorway Route was determined based on the hundred year flood return period calculation (Q_{100}) performed in 2007 (General Design of the regulation of the West Morava River, 2007).

In the PMDR, the Proposed Motorway Route defined in 2008 was significantly changed. One of the major changes was observed on the increased number of river crossings. For example, 3 bridge crossing proposed in 2008 was increased to 6 bridges in the 2012 design. Therefore, depending on the route changes, impact of the Motorway on the West Morava River was

increased, whereas the impact of the West Morava River on the Motorway was increased as well. Consequently, investment cost of the Motorway was increased depending on 2012 design.

c) Spatial Plan for the Special Purpose Area for the E-761 Motorway Infrastructure Corridor

Spatial Plan for the Special Purpose Area (SPSPA) for the Motorway in 2013 was based on the route option developed in the revised PMDR that was in the drafting phase. And, SPSPA-2013 was concluded that:

- The embankments, which are proposed to control floodwaters and to protect the settlements and economic activities located in flood basin, were partially built along the course of the West Morava River. In other words, the embankments were constructed partially in the zone of larger settlements and zone of low coastal terrain where the impact of floods was at maximum level. By considering the Proposed Motorway Route, it was seen that the route crossed almost the entire floodplain zone of the West Morava River. Due to that reason, surface elevation of the Motorway should be raised above the flood level.
- The Proposed Motorway Route was intersecting at several location with the course of the West Morava River whereas at one location with the course of South Morava River. Additionally, at some zones, the Proposed Motorway Route was significantly approaching to the course of the West Morava River.

Consequently, it has been emphasized that all activities on the harmonization of proposed motorway infrastructure with water management infrastructure should be performed with the approval and control of the competent authorities for water management.

d) Hydrotechnical Study of E-761 Motorway Corridor, Section Pojate-Preljina in line with SPSPA-2013

As the outcome of the SPSPA-2013, a specific study, named as Hydrotechnical Study of E-761 Motorway Corridor Section Pojate-Preljina (HTS), was conducted in 2016 to harmonize the motorway design with the i) water regime of the West Morava River, ii) existing water facilities, and iii) water management plans.

HTS-2016 was prepared by Jaroslav Černi Water Institute (JCWI) in accordance to the contract signed with Roads of Serbia, and with Scope of Work agreed upon by PWMC Srbijavode, and the Ministry competent for water management.

Agreed Scope of Work for HTS-2016 dictated that the hydraulic model for the West Morava River developed in 2007 should be used to define the basic parameters of flow regime by considering the altered hydrological conditions after the floods in May 2014.

The new hydrological analysis was based on the observation data from the period 1955-2015. As the worst-case scenario, significantly higher calculated values of the maximum annual discharges of the West Morava River in the construction zone of the Motorway have been considered.

In order to determine the changes in the river course in the period 2007-2016 and to revise the hydraulic model of the West Morava River, new control profile locations at the locations of the proposed bridges on the Motorway were included in the revised study in addition to the control profiles surveyed in 2007. As a result, the study performed at total of 25 profile locations. The study showed that the significant changes of the river bottom geometry were not observed at the surveyed control profiles in parallel no significant erosion or backfilling at the bottom of the river course.

In the HTS-2016, special attention was also given to the identification of potentially critical sections, at which the unfavorable fluvial erosion processes could pose risk to the Proposed Motorway Route. The risk areas were presented into three (3) categories with respect to the distance between the Proposed Motorway Route and the river course as well as the condition of the riverbank. These categories are provided below, and the number of risk areas summarized in Table 3-2.

Category I: Riverbank is naturally stable or stabilized (there is a protective object) and the distance from the bank to the Proposed Motorway Route is less than 50 m; or the riverbank is unstable and the distance from the bank to the flood line is less than 100 m,

Category II: Riverbank is stable and the distance from the bank to the Proposed Motorway Route is 50-100 m,

Category III: All locations with a distance from the riverbank to the Proposed Motorway Route is greater than 100 m.

Table 3-2. Potentially critical locations along the proposed motorway route option

Sector of the Motorway	Total	I	II	III
Pojate - Kruševac	3	3	-	-
Kruševac (Koševi) - Adrani	8	3	2	3
Adrani - Mrčajevci	7	6	1	-
Mrčajevci - Preljina	4	2	2	-

Other technical considerations in the hydromorphological model are given below;

- 1D hydraulic calculation of the Q_{100} level for quasi steady-state conditions was performed in HEC RAS software in order to determine the impact of facility on the water regime of the West Morava River. In the study, two states of the West Morava River were modelled. These states were i) the existing state of the West Morava River Basin and ii) the new state regarding construction of the Proposed Motorway.
- In general, the hydromorphological model of the current status of the West Morava River was taken from the 2007 report, i) with the replacement and addition of the cross-section profiles with new surveys and ii) the minor route changes due to the occurrence of meander cut-off. Due to the use of the new data of detailed geodetic surveys along the motorway route and connecting roads, the topography of river inundation zones was defined in more detail than 2007.
- The hydromorphological model regarding the new status of the West Morava River Basin was made by including all designed facilities in addition to the existing state. With this intention, the Proposed Motorway Route with 8 bridges, access roads, loops and river regulation works proposed for the West Morava River were included in the modelling study. The existing embankments were also included, but with the assumption that their reconstruction was carried out by considering the conditions of Q_{100} in order to not have an overflow.

The study concluded that:

- The designed route of the Proposed Motorway was located, almost on its entire length, through the valleys of the Great, South and the West Morava and Čemernica Rivers. The Proposed Motorway Route is mostly located in the real flood zones, and the lesser extent in flood-protected areas (i.e. in potentially flood zones);
- The flood zones of the West Morava River for the existing and designed states are very similar. Although the major part of the Proposed Motorway Route was located in the floodplain, the Motorway did not block the flood. Therefore, the flood was expected on both sides of the Proposed Motorway;
- Surface elevation of the Proposed Motorway, in general immediate vicinity of the West Morava River, should be high enough to provide a protection from estimated Q_{100} level. It was estimated that the minimum freeboard of 1 m above the flood level calculated for Q_{100} . It was also concluded that longitudinal position together with other project structures of the Proposed Motorway and the changed hydrological conditions of the West Morava River after the big flood event occurred in 2014 should be taken into account;
- The study indicated that several critical locations, where the West Morava River and the Proposed Motorway Route intersect (i.e. the connecting roads), were required

to be changed due to design considerations such as bridge angle, width of the bridge opening, position of access roads etc.

- The Proposed Motorway Route was getting closer to the main river course at several localities, of which many of them were critical due to the high instability of the watercourse.
- The materials required for the construction of motorway body could be provided by dredging from the riverbed of West Morava River. According to the PHD-2012 Report, about 20,000,000 m³ of material was required for the construction of the Proposed Motorway and other infrastructures.

e) Final SPSPA and the Harmonized Preliminary Designs of the E-761 Motorway and Regulation of the West Morava River

In 2017, SPSPA-2013 was amended due to following reasons;

- The harmonization of the SPSPA-2013 in line with the outcomes of the HTS-2016.
- The results of the detailed field surveys were required to be elaborated to technical documentations.
- The review of the Proposed Motorway Route together with locations of the road facilities in accordance to the new LPC legislation which was adopted in 2014.

For the amendment of the SPSPA, at first stage, the issues identified in the HTS-2016 have been elaborated and the new technical solutions were provided at the level of preliminary design, through the process of harmonization of the proposed motorway design and design of the hydrotechnical facilities required for the regulation of the West Morava River. In this respect;

- New Preliminary Highway Designs (PHDs) were prepared by; i) CIP, for Sections 1 and 2, and ii) by HI, for Section 3, in accordance to the contracts signed with Roads of Serbia. In the new PHDs, technical solutions were defined in several phases, and the Motorway Route was subjected to significant changes in terms of the route location, location and shape of the interchanges, location of the parking and rest areas, as well as location of the road maintenance facilities.
- Preliminary Design of Hydrotechnical regulation of the West Morava River along the E-761 Motorway route (PDHTR) was prepared by the JCWI, under a separate contract with Roads of Serbia. The general goal of the PDHTR was to choose the optimal solution for the watercourse and coastal regulation, which will minimize the negative impacts of the proposed motorway construction on the water regime in the basin and, at the same time, provide a quantitative estimation for the material required for the construction of the Proposed Motorway. In PDHTR, in parallel to the proposed motorway design, works and measures required for the regulation of watercourse and for the coastal protection in several phases were predicted. In order

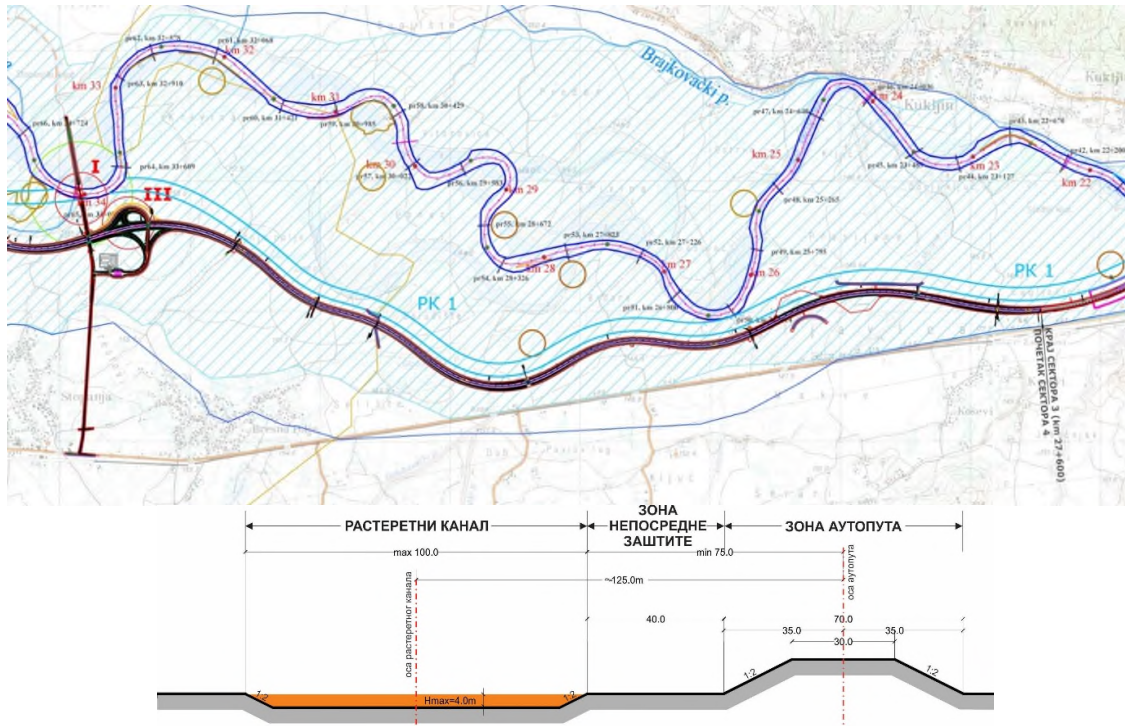
to perform of the hydraulic calculations in the PDHTR, the hydraulic model from the HTS-2016 was revised by inclusion of the new location of motorway project facilities. After that, the new locations of the project facilities were also changed and adapted.

PHD-2012 indicated that the most significant interactions between the Proposed Motorway Route and the river system were estimated at the Proposed Motorway Section-2 between Kruševac and Adrani. According to the PHD-2012, in this sector, the Proposed Motorway was guided in a high embankment through the floodplain zone of the West Morava. Several critical localities that have negative interactions were identified. In order to solve the problems at these locations, two phased approach has been performed.

At first phase, CIP has developed a new PHD along the same route regarding the change of surface elevation of the Proposed Motorway and interchanges in line with the recommendations of the hydraulic design engineers. At the same time, as the hydrotechnical design, construction of the flood relief channels for the discharge of flood of the West Morava River was analyzed with inclusion of inflow, outflow and stabilization facilities, in order to i) reduce the impact of the Proposed Motorway, ii) lower the Q_{100} level and iii) provide material for backfilling of the proposed motorway main body.

As it is given in the Figure 3-3, the flood relief channels were located adjacent to the Proposed Motorway, in order to direct use of the excavated material from the channel excavation in the motorway construction. Six flood relief channels have been designed between Čitluk near Kruševac and the mouth with Ibar River, with a total length of about 26 km. The channels had a trapezoidal cross-section, about 100 m wide at bottom level and with an average depth of about 4 m. The channels were supposed to be connected with the West Morava River only when the Q_{100} appears. As the design, the channels were regulated by the inflow and outflow structures located at both end of the channels. In the design of flood relief channel system, LIDAR survey of the river valley was performed and the existing 1D hydraulic model was updated.

A meeting was held on 25th of May 2018 by the Government of Serbia in order to determine the status of preparation of the technical documentation. The Commission concluded that the motorway solution from Kruševac to Adrani with the route in the West Morava valley was not sustainable due to the high flood risk and the need for a large amount of filling material. The commission requested development of a new variant option located outside of the floodplain, regardless of the high cost of the new exploration works and of the new design.



Source : Hydrotechnical Regulation of the Zapadna Morava River within the Infrastructure Corridor of Highway E-761 (JAROSLAV CERNI WATER INSTITUTE, 2020)

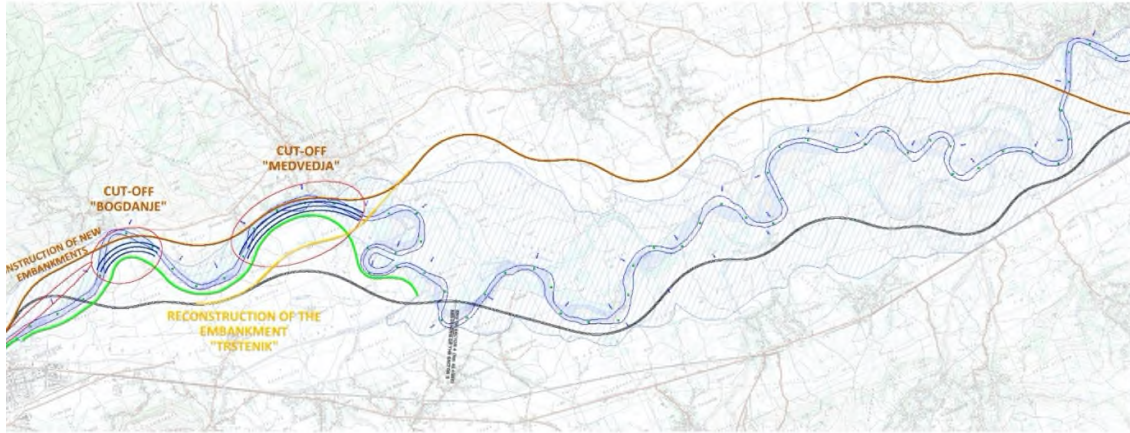
Figure 3-1. The route and Cross-section of Flood Relief Channels

At second phase, CIP-JCWI design teams worked in parallel from September 2018 to January 2020 for new variant options. The JCWI analyzed the several variant solutions for new motorway route in order to determine the impact of the route position on the West Morava River during flooding and to identify the height of the Proposed Motorway as well as to develop new hydrotechnical solutions.

After several iterations, Final PHDs were prepared with the adopted technical solution of the Proposed Motorway Route and its structures. Each PHD contains a separate book related to the design of the hydrotechnical structures of the West Morava River (PDHTR).

The figure showing the comparison of the initial and final motorway route variations at Section-2 is presented in Figure 3-2.

The PDHTR on the river reaches corresponding to Section-1: Pojate - Koševi (Kruševac) (km 0 - km 27.6) and Section-3: Adrani - Preljina (km 79 - km 97) received a positive evaluation from the National Review Committee. The expert control of the PDHTR for Section-2: Koševi (Kruševac) - Adrani (km 27.6 - km 81.476) is still in progress. The new SPSPA is adopted in January 2020 (Off. Gazette of the RS, No. 10/2020 on 6th February 2020).



Source : Hydrotechnical Regulation of the Zapadna Morava River within the Infrastructure Corridor of Highway E-761 (JAROSLAV CERNI WATER INSTITUTE, 2020)

Figure 3-2. Variant Options at Sector-2

The project development stages of the Project shows that alternative routes were considered as route variations. These variations were mainly based on technical considerations regarding flood risk of the West Morava River and River Regulation Works. Some of the variations were also proposed to minimize the impact on the settlements. As it can be seen in Table 3-3, the existing Proposed Motorway Route and previous route alternative have almost same land characteristics with minor changes.

Table 3-3. Land Characteristics of the Alternative Routes

Land Use for The Existing Route	Proposed Motorway Route		Previous Route Alternative	
	Area (ha)	Percentage	Area (ha)	Percentage
Intensive unmixed crops	634.49	76.52%	576.06	75.99%
Active opencast mineral extraction sites, including quarries	1.24	0.15%	3.17	0.42%
Residential buildings of city and town centers	8.15	0.98%	7,10	0.94%
Rural industrial and commercial sites still in active use	1.52	0.18%	0,39	0.05%
Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix	70.80	8.53%	68,06	8.98%
Thermophilous deciduous woodland	66.81	8.05%	60,86	8.03%
Road networks	25,45	3.07%	24,35	3.21%
Highly artificial non-saline standing waters	2.47	0.30%	2,51	0.33%
Permanent non-tidal, smooth-flowing watercourses	7.57	0.91%	6,55	0.86%
Permanent mesotrophic pastures and aftermath-grazed meadows	10.79	1.30%	9,06	1.19%
Total Area (ha)	829,77		758.11	

As it is stated above, the Proposed Motorway Route Alignment together with River Regulation Works has been identified in 12 years with several studies. As the outcome of these studies, major route option and River Regulation Works have been fixed before the start of the ESIA works and all other planning works such as Special Purpose Spatial Plan and local EIAs, which are already completed and/or are going to be completed in accordance to the identified route option and River Regulation Works. Therefore, “constraint mapping” process is used in order to avoid and minimize the further impact on habitats in line with ESIA findings. In this respect, all no-go areas are identified and provided to engineering group for identification of the new potential project unit locations as well as potential route modifications required by detailed design phase.

3.1.1 Zero Alternative

Zero alternative of the Project (i.e., no realization of the Project) means an alternative solution which will replace the motorway construction with the same purpose to enable the connection in the part Pojate - Kruševac - Kraljevo - Preljina, with branches to A1 and A2 state roads at its ends. Considering such options as railway or alternative route corridor, there is none to be considered in order to prefer zero alternative.

3.1.2 Technological Alternatives

For the Project of concern, the technological aspect is the safe and sound operation of traffic of passenger and freight motor vehicles, provision of services and regular-road maintenance using the accompanying facilities. Looking at vehicle movement as a technological process, alternatives are variations in traffic mode, in terms of regulating the speed of movement of traffic participants and directing them to individual lanes. That is mostly governed by the Law on Traffic Safety and Vertical and Horizontal Signaling and is not the subject of this study. All alternatives in terms of road maintenance and related content management are subject to specific projects. Fuel consumption depends on the traffic load, type and age of the vehicle, traffic participants, and is stochastic.

For the aspect of the technological treatment of drainage water from the pavement surface of the Motorway, the state of art closed system such as network of underground drainage pipe connected to oil separators through gullies and manholes will be undertaken. However, alternative equivalent system can also be considered during design development stage.

3.2 Project Elements and Alignment

The Proposed Motorway Route with a total length of approximately 112 km is divided into three Sections that are further divided into nine Sectors. The breakdown of the Sectors with respect to each Section and responsible parties is given in Table 3-4. In addition, the Western Morava River flowing along the road is 139 km and approximately 32 km river regulation along the entire route of the Motorway will be carried out within the Project. Detailed information about the project location and the River Regulation is provided in Table 3-5.

Table 3-4. The Sectors of the Project

Project Sectors		Length (km)	Expropriation	Construction Employer	Operator
Section-1: Pojate - Kruševac (Koševi)		27.83	CoS	CoS	Roads of Serbia (RoS)
Sector-1	Pojate – bridge across South Morava	9.06			
Sector-2	Bridge across South Morava – Makrešane	7.89			
Sector-3	Makrešane – Koševi	10.88			
Section-2: Kruševac (Koševi)-Adrani		53.89	CoS	CoS	RoS
Sector-4	Kruševac (Koševi) – Lopoška river	13.93			
Sector-5	Lopoška river – Trstenik	14.55			
Sector-6	Trstenik – Tovarnica river	11.61			
Sector-7	Tovarnica river – Adrani	13.80			
Section-3: Adrani-Preljina		30.66	CoS	CoS	RoS
Sector-8a	Adrani interchange – Mrčajevci	9.00			
Sector-8b	Mrčajevci– Preljina interchange	9.00			
Sector-9	Preljina interchange – Preljina (E-763)	12.66			
Responsibilities			Land cadastral maps Expropriation administration Payment. RAP execution	Supervision of design and construction (through and third party Consultant) Ownership of RAP Monitoring	Operation and maintenance of motorway

Table 3-5. Project Location

Section	Location	Sector		Cadastral Municipality
Section 1	The bridge on the South Morava is led by Pojate via Čičevac to Stalač - City on the right bank of the river Velika and South Morava (see Figure 3-3).	Sector 1:	Pojate - most on the South Morava river from km -0+229,75 to km 8+829,94 in length of 9.059,69 km	<ul style="list-style-type: none"> • Pojate, • Čičevac, • Lučina, • Varvarin selo, • Stalač • Town of Stalač
		Sector 2:	Bridge on the South Morava river - Makrešane (beginning bypass Kruševac) from km 8+829,94 to km 16+721,95 with a length of 7.892,01 km River Regulation: from km 10 + 500 to km 12 + 850 in length of 1.671 km	
		Sector 3:	Makrešane (beginning bypass around Kruševac) - Goals (end bypass around Kruševac) from km 16+721,95 to km 27+600,00 in the length of 10.878,05 km	
Section 2	Bridge in the South Morava - Makrešane, located in the Kruševac basin zone. The route was led by Stalaca - the city on the left bank of the river Morava to the village of Makrešane, where the route crosses the right bank of the West Morava river and fits into the existing main road M-5 (see Figure 3-2). The route is designed with an embankment across the West Morava alluvial.	Sector 4:	Krusevac (bins) - Lopaška River from km 27 + 600 to km 41+528,24 with a length of 13.928,24 km	<ul style="list-style-type: none"> • The town of Stalac • Maskare • Mrzenica • Bosnjane • Šanac • Makrešani
		Sector 5:	Lopaška River - Trstenik from km 41+528,24 to km 56+073,87 to length of 14.545,63 km	
		Sector 6:	Trstenik - Tovarnica River from km 56+073,87 to km 67+680,41 to length of 11.606,54 km	
		Sector 7:	River Tovarnica - Adrani from km 67+680,41 to km 81+476,86 to length of 13.796,45 km River Regulation: from km 75 + 750 to km 76 + 500 in length of 0.984 km River Regulation: from km 76 + 800 to km 78 + 200 in length of 1.626 km River Regulation: from km 79 + 100 to km 80 + 125 in length of 1.300 km River Regulation: from km 80 + 400 to km 81 + 477 in length of 1.145 km	
Section 3	Makrešane-Kosevi, located in the Kruševac basin zone, on the part of the existing main road M-5 and on the same section for which the expansion of the existing road is planned for ~ 15 m (see Figure 3-3). The route is led north of Kruševac with the alluvion of the Western Morava.	Sector 8:	Adrani - Mrčajevci from km 79 + 000 to km 97 + 000 in the length of 18,00 km River Regulation: from km 81 + 350 continues to the Sector 9 in length of 17.137 km	<ul style="list-style-type: none"> • Makrešane • Šanac • Bivolje • Lazarica • Jasika • Čitluk • Kukljin • Peplikac.
		Sector 9:	Mrčajevci - Prejlina from km 97 + 000.00 to km 109+663,80 in length of 12.663,80 km. River Regulation: from the end of the Sector 9 to km 104 + 750 in length of 7.836 km	

Section-1 from Pojate to Kruševac

This Section includes Sectors 1, 2 and 3, which connects the municipalities of Čičevac and Varvarin and the city of Kruševac. Map of Section route is given in Figure 3-3.

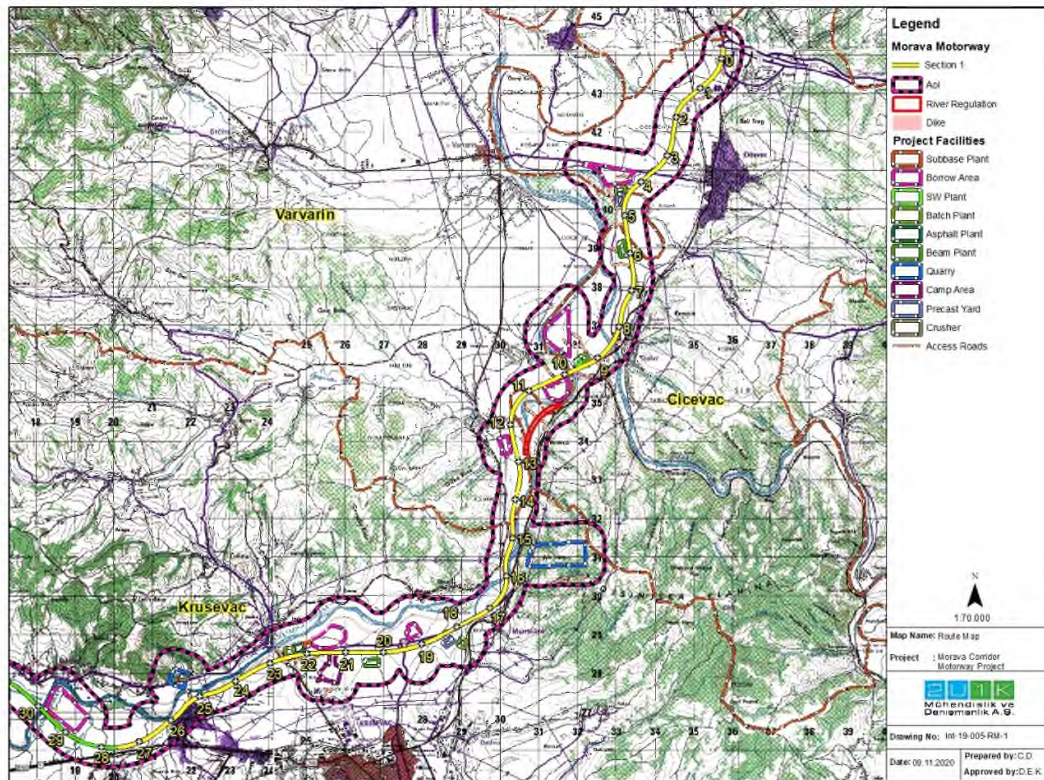


Figure 3-3. Route Map of Section-1

Section-2 from Kruševac to Adrani

This Section includes Sectors 4, 5, 6 and 7, connecting the municipalities of Trstenik, Vrnjačka Banja and the city of Kraljevo (see Figure 3-4 and Figure 3-5).

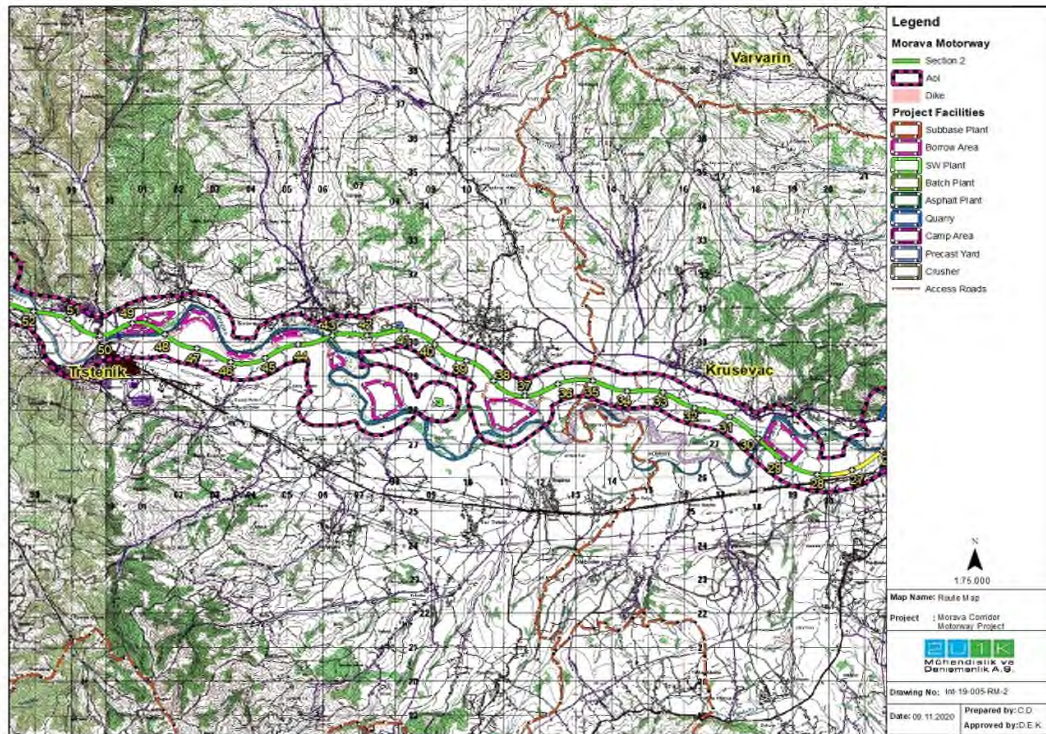


Figure 3-4. Route Map of the first part of Section-2

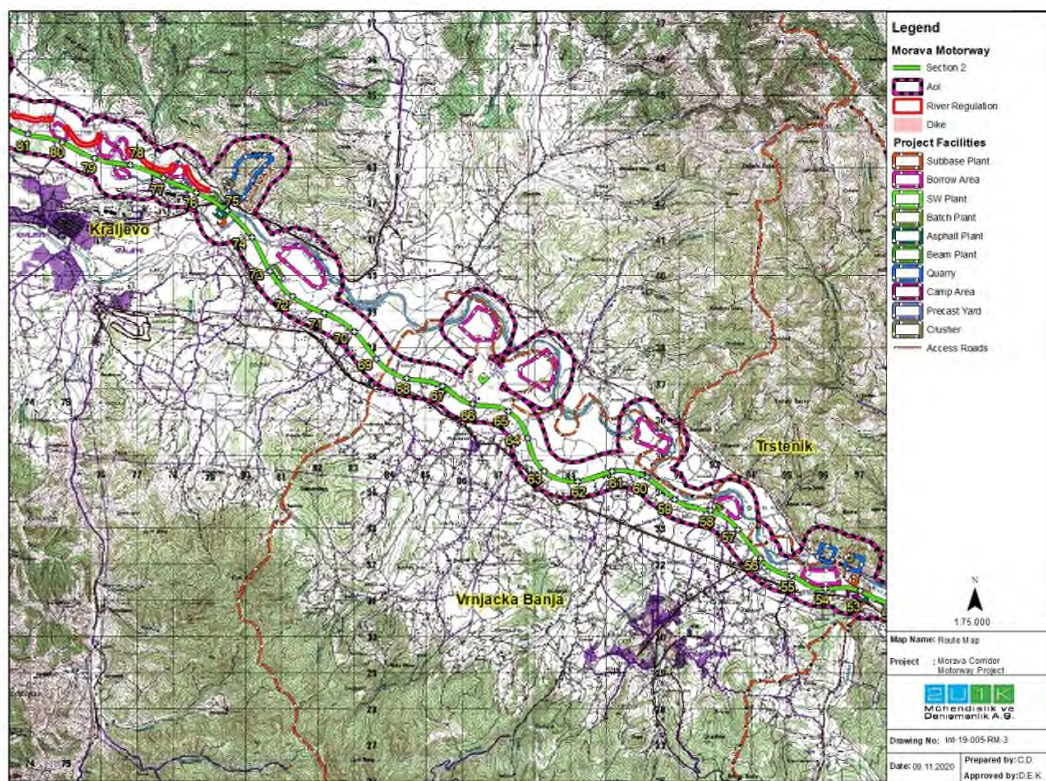


Figure 3-5. Route Map of the second part of Section-2

Section-3 from Adrani to Preljina

This Section of the Motorway includes Sectors 8 and 9, which connects the cities of Kraljevo and Čačak. The Section's route map is presented in Figure 3-6.

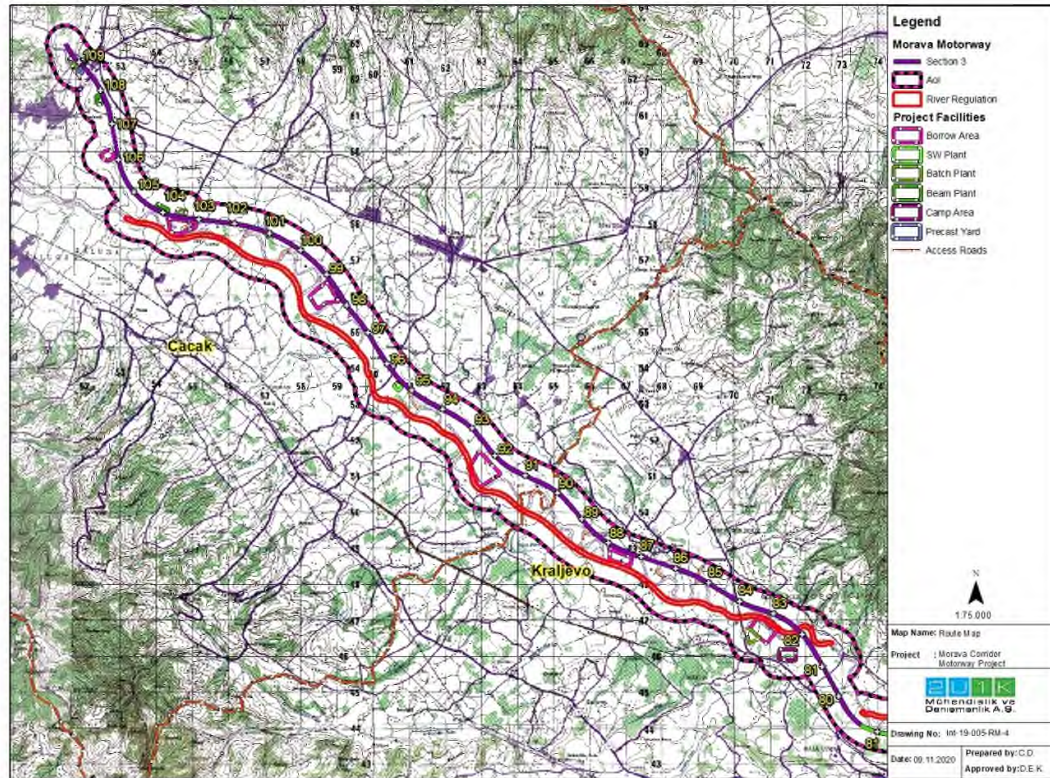


Figure 3-6. Route Map of Section-3

3.3 Design Criteria

Specific design elements of the Project are listed in the following table.

Table 3-6. Different Design Criteria of Morava Corridor Motorway Elements

General Information	
Project Design Speed (Vp)	130 km/h
Horizontal Profile	
Minimum Radius of Horizontal Curve (Rmin)	800 m
Minimum Length of Transition Length (Lmin)	115 m
Vertical Profile	
Minimum Radius of Vertical Concave Curve (R'min)	11,250 m
Minimum Radius of Vertical Convex Curve (R''min)	22,500 m
Minimum Longitudinal Slope	0.30%
Maximum Longitudinal Slope	4%
Cross Section	
Minimum Cross Slope of Pavement (i)	2.50%
Maximum Cross Slope of Pavement (i')	7%
Width of Traffic Lane	4 x 3.75 m
Width of Emergency Lane	2 x 2.50 m
Width of Shoulder	2 x 1.50 m
Width of Marginal Strip	2 x 1.50 m

Source: BEJV Design Team, 2019.

As per Schedule 2 of the Contract signed between CoS and the Contractor, the Contractor may work with other recognized standards and technical regulations where the Contractor in its absolute discretion considers the RSTS (*Public Enterprise Roads of Serbia Technical Specifications –Version E*) is antiquated, superseded, or there are equivalent or updated standards available for design, installation and/or testing purposes issued by a foreign standardization body such as ISO, EN, DIN, ASTM. Any conflict between the codes and standards shall be resolved by the Control Engineer (Supervisor) in accordance with the provisions of the Special Law (namely, Law on the Establishment of a Public Intersection and Special Procedures for the Implementation of the Project for Construction of the Infrastructure Corridor of the E-761 Motorway section Pojate-Preljina).

The width of the road corridor including the travel width is 900 m. This width is divided into six zones; i) 2 x 15 m motorway, ii) 5 m Emergency Zone on each side, iii) 15 m Fence Zone, iv) Immediate Protection Zone of 40 m on each side v) Wider Protection Zone of 40 m on each side and vi) Larger Protection Zone of 235 m on each side.

3.4 River Regulation and Drainage Control

The West Morava River is the left component of the Morava Basin. Length of the West Morava River to the point where it combines with the South Morava River is approximately 210 km and its basin area is 15,755 km². The valley of the West Morava River has significant agricultural

potential and prominent traffic role, and the West Morava River itself flows through a large number of settlements, some of them are significant industrial centers (e.g., Čačak, Kraljevo). Because of this fact, Western Morava does not only represent the interests of water management, but also it has broader socio-economic importance.

The nature of the West Morava River has many winding sections. Winding (i.e. meandering or bending) sections of rivers are almost the exact opposite of rapids; they are usually slow-moving parts of a river with a very minor downward grade and are most often found in plains or lowlands.

Main goals for the flood protection along the West Morava were set more than 50 years ago. These goals are: (a) protection of valuable assets in the riparian zone from flooding; (b) protection of roads and bridges; and (c) stabilization of the river route and control of fluvial erosion. In line with these goals, river regulation solutions for flood protection first General Design was prepared in 2008. According to this design report;

Flood protection: It has been planned to preserve the existing flood protection system, and to reconstruct the embankments in the area of Trstenik, in order to provide protection against flooding caused by 100-year return river flow (Q_{100}). The construction of new embankments was not planned, due to the fact that protection of the agricultural lands from floods was not a priority.

Flood protection of the main and regional roads: Existing roads were mostly protected from the negative impact of the watercourse. However, it has been noted that the designed route of the proposed motorway was in the impact zone of the river. Therefore, significant works on the regulation of river course proposed to protect the project facilities from the flooding.

River route stabilization and fluvial erosion control: Biotechnical measures were recommended for the protection of erosion-prone riverbanks of West Morava River to prevent the proposed motorway, embankments and other significant facilities located near to the river coastal area from erosion risk. In particular, a major river regulation works were suggested between r.km 96.5 and r.km 138.5 (the mouth of Čemernica River) of West Morava River, which has meanders freely through the river valley and thus poses a risk for the proposed motorway. At this part of West Morava River, a long river diversion channel (new river course) with smooth curves was proposed as river regulation measure. With the construction of the new river course, it was planned to eliminate the several consecutive sharp river bands as well as several sites of erosion-prone riverbanks.

With the above-stated goal of the study, it is aimed to estimate or propose measures for the regulation of watercourses and protection of coastal areas to minimize the negative impacts of construction of the Project on the water regime, the stability of the riverbed and other water resources' users in coastal areas. Also, the study defines the basic parameters of the water regime.

At the same time, considering the floods of May 2014 in Western Morava Flood Plains, the River Regulation and Drainage Control Study (officially named as “Hydrotechnical Study, Corridor of the Motorway E-761, Section Pojate-Preljina”) aimed to be designed to provide the level of protection of the Motorway from floods and erosion effects of watercourses. The Study was performed in 2016 by Jaroslav Černi Institute for the Development of Water Resources in Belgrade.

As it is stated above, the proposed regulation designs are to protect against flooding and eliminate more consecutive sharp bends and bank erosion. On the other hand, as the suggestion of the ESIA and local EIA’s prepared for Sector-8 and Sector-9, the flow in the old riverbed required to be maintained and it will not be completely interrupted to enhance aquatic and riparian habitat. In this respect, old riverbed will not be used as borrow area and not filled with unsuitable materials as it was recommended in the River Regulation and Drainage Control Study Report. Cross-section view of the regulated channel of the Morava Corridor Motorway Project is illustrated in Figure 3-7.



Source : Hydrotechnical Study Report

Figure 3-7. Typical Cross-Section of the Regulated Channel

3.5 River Regulation Design

As stated in Section 3.1, length of the Motorway from Pojate to Preljina is approximately 112 km, while the length of the Western Morava River on this part is about 139 km and approximately 32 km will be the total length of river regulation along the entire route of the Motorway. Based on the technical documentations developed by JCWI, following 18 structures along the West Morava River are suggested as river regulation works.

Section-1 Pojate - Kruševac (km 0+229,75 - km 27+600):

- **STRUCTURE 1:** The cut-off of the river curve from r.km 4.7 to r.km 7.1 near the village of Maskare (km 11 - km 11.6 of the highway). The meander cut-off is projected along the right inundation of the West Morava River in order to move the main river channel from the highway route, and thus reduce the negative impacts of the River.
- **STRUCTURE 2:** Protection of the left bank of the West Morava River (embankment) in the length of ~ 600 m, from r.km 8.63 to r.km 9.25 (km 14.1 - km 15 of the Motorway). Embankment protects the riverbank of the West Morava River near the Motorway from fluvial erosion.

- **STRUCTURE 3:** Reconstruction of the existing right bank dike of the West Morava River and the left bank dike of Rasina near Kruševac (cassette "Čitluk") in order to protect the Proposed Motorway Route, which passes through the flood zone (km 18.65 - km 24.6 along the Motorway). Total length of the dike is about 8 km.
- **STRUCTURE 4:** Protection of the right bank of the West Morava River (embankment) in the length of ~ 800 m from r.km 20.7 to r.km 21.26, i.e. km 25.7 - km 26.5 of the Motorway.

Section-2 Kruševac (Koševi) - Adrani (km 27+600 - km 81+476,86):

- **STRUCTURE 5:** Reconstruction of the existing dike on right bank of the West Morava River and the left bank dike of the Crnišavska River near Trstenik (cassette "Trstenik", (r.km 42.75 to r.km 55.32). Total length of the dike is 10.2 km.
- **STRUCTURE 6:** Reconstruction of the existing dike on left bank of the West Morava River near Trstenik (cassette "Zvezdan", r.km 55.32 - r.km 58.1) and construction of the dike along left bank of the Mala River up to the high terrain. Total length of the dike is about 2760 m.
- **STRUCTURE 7:** Construction of a new dike on left bank of the West Morava River from the mouth of the Ljubostinjska River (r.km 55.1) to the iron bridge in Trstenik (r.km 55.32), with a length of about 235 m.
- **STRUCTURE 8:** Construction of a new dike with the regulated river channel of the Ljubostinjska River from the Motorway to high terrain in Trstenik, in length of about 230 m.
- **STRUCTURE 9:** Protection of the unstable left bank of the West Morava River from the existing concrete bridge (r.km 54.77) to the iron bridge (r.km 55.32) that is near the Proposed Motorway Route.
- **STRUCTURE 10:** Protection of the unstable right bank of the West Morava River from r.km 62.45 to r.km 62.97 which is near the Proposed Motorway Route.
- **STRUCTURE 11:** Protection of the unstable right bank of the West Morava River from r.km 66.5 to r.km 67.15 due to proximity to the Proposed Motorway Route.
- **STRUCTURE 12:** Protection of the stable right bank of the West Morava River from r.km 87+880 to r.km 88+380 due to proximity to the Proposed Motorway Route.
- **STRUCTURE 13:** The cut-off of the river curve (from r.km 88+900 to r.km 90+970) at the location of intersection of the Proposed Motorway Route with the existing meander of the West Morava River.
- **STRUCTURE 14:** The cut-off of the river curve (from r.km 91.41 to r.km 95.19) at the location of intersection of the Proposed Motorway Route with the existing meander of the West Morava River.

- **STRUCTURE 15:** The cut-off of the river curve (from r.km 96.55 to r.km 98.53) at the location of intersection of the Proposed Motorway Route with the existing meander of the West Morava River.
- **STRUCTURE 16:** The cut- off of the river curve (from r.km 98.96 to r.km 101) at the location of intersection of the Proposed Motorway Route with the existing meander of the West Morava River.

Section-3, Adrani - Mrčajevci (km 79+000 - km 109+663,80):

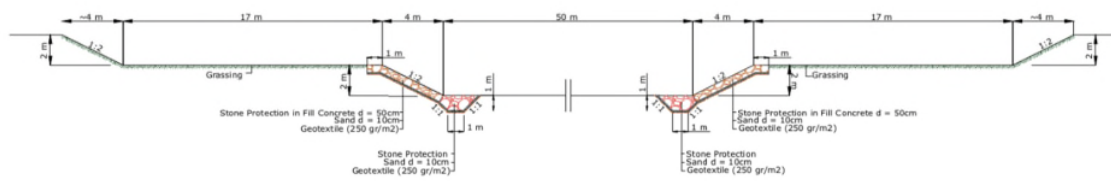
- **STRUCTURE 17:** The cut- off of the river curves of the on the reach Adrani - Mrčajevci (km 79 - km 97 of the Motorway, i.e. from r.km 100.8 to r.km 127.2).
- **STRUCTURE 18:** The cut-off of the river curves on the reach Mrčajevci - Preljina (km 97 - km 109.664, i.e. from r.km 127.2 to r.km 138.4).

According to Law on Waters ("Official Gazette of RS", no. 30/10 and 93/12), the water and waterways, as well as goods of general interest, subject to special protection and can be used under the conditions provided by the law. In this respect, the law allows to use floodplains of the river system by considering the main factors given below;

- without causing an adverse effect on water coastal ecosystem;
- without causing impact on existing ground water quality and quantity.
- construction of water facilities and installation of devices intended for regulation of watercourses;
- preservation of river courses and water facilities;
- implementation of measures to protect water; and,
- implementation of protection from contamination;

The total of 32 km length of river channel will be constructed to a bed width of 50 m, top width of 100 m, depth of 4.00 m and bank slope of $\frac{1}{2}$ (shown on the plan and profile maps in Figure 3-8. The side slope of river channel is designed as $\frac{1}{2}$ considering the slope stability of sandy riverbanks. The typical cross section drawings from the Proposed River Regulation are shown in Figure 3-8.

TYPICAL CROSS SECTION OF RIVER REGULATION WITH STONE PROTECTION



TYPICAL CROSS SECTION OF RIVER REGULATION WITH GABION AND RENO MATTRESS

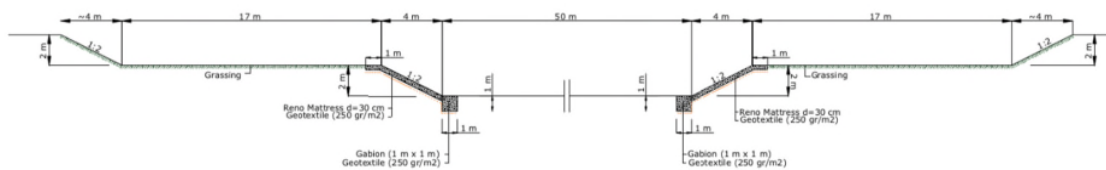


Figure 3-8. River Regulation Typical Drawings

The outline design drawings of the proposed cross sections show that high amount of excavation works will be required. The excavated material will be used during the construction works. The calculation shows that the amount of cut from the river regulation works will be fully used during the road construction. On the other hand, any remained excavated material due to unsuitability will be used for site arrangement and reinstatements of borrow pits used for road construction. Additionally, no additional material source (such as borrow area or quarry etc.) is required for the construction of river regulation works. Same material sources for road construction works will be used for the construction of the river regulation works.

According to the book of Freshwater Biodiversity: importance, threats, status and conservation challenges (Dudgeon, ve diğerleri, 2006), there are 4 types of River Regulation that are i) dam construction markedly alters flow conditions to which riverine biota are adapted, ii) channelization, iii) flow reduction due to water abstraction, and iv) water transfers between drainage basins. In this Project, when it comes to river regulation, it is about channelization which is defined as river flow characteristics altered by channel straightening and constraints of rip raps along the riverbanks; increased rate of runoff in engineered channel. As stated in the reference book, channelization may cause entirely destroyed habitat, if natural river channel replaced by channel with concrete sides and base. However, the Morava Corridor Motorway Project does not propose such concrete sides/banks or coverage of base of the riverbed.

In the Project, existing river channel at river regulation areas will be protected and flows in the old riverbed will not be completely interrupted to enhance aquatic and riparian habitat. The side slopes, which are under the effect of the continuous flow, will be strengthened by the

implementation of “gabions” or “reno mattress” depending on the flow conditions. The river section comprising upper bank will be left for natural vegetation and riverbed of new channel will be left as much as natural. With this intention, channelization with the proposed design of river regulation in the Project does not possess major impacts like those of regulation by dams, water transfer between the basins. Some of the proposed river regulation structures are provided in between the Figure 3-9 and Figure 3-13.

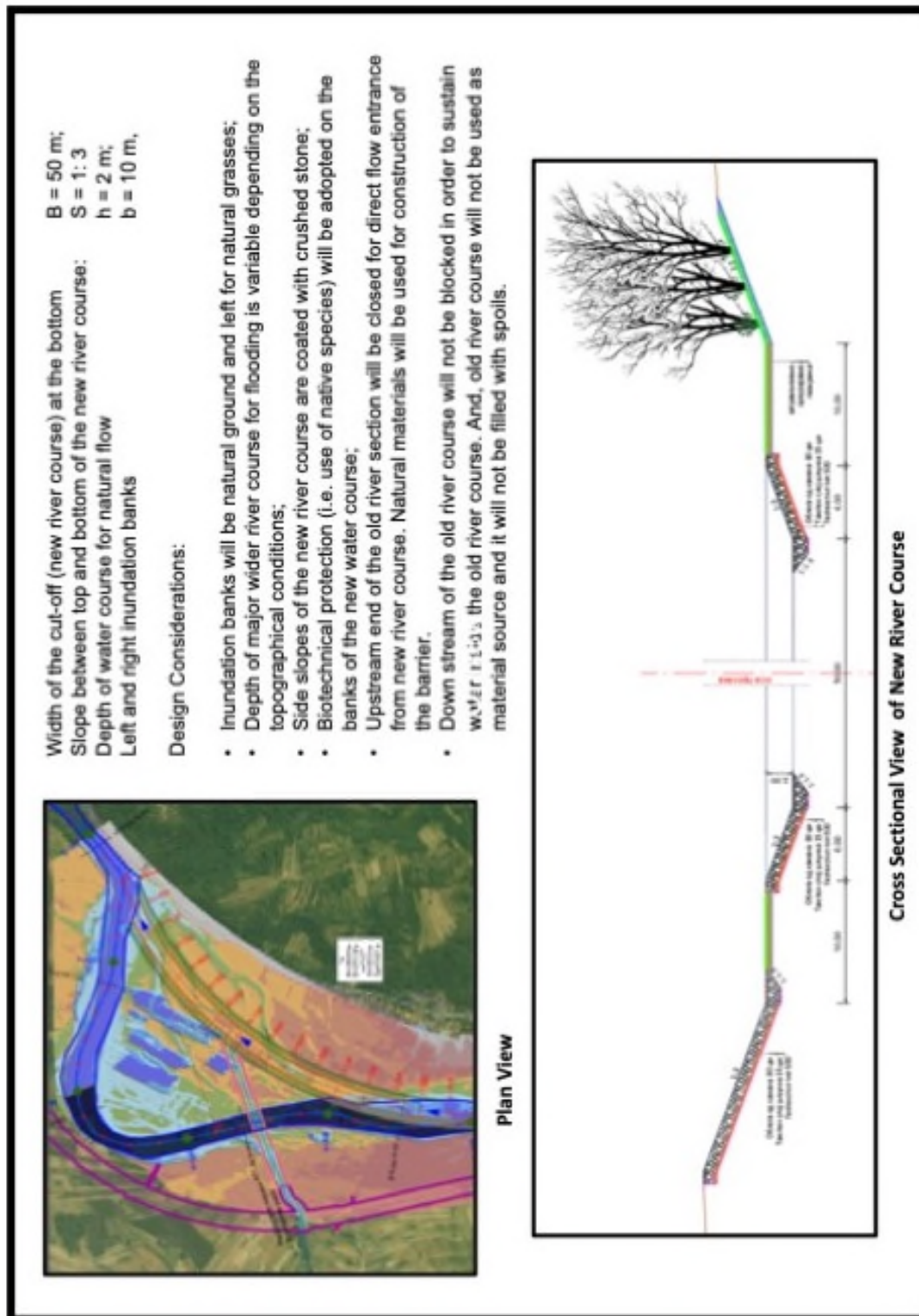


Figure 3-9. The route and typical cross-section of the Structure 1, Section-1

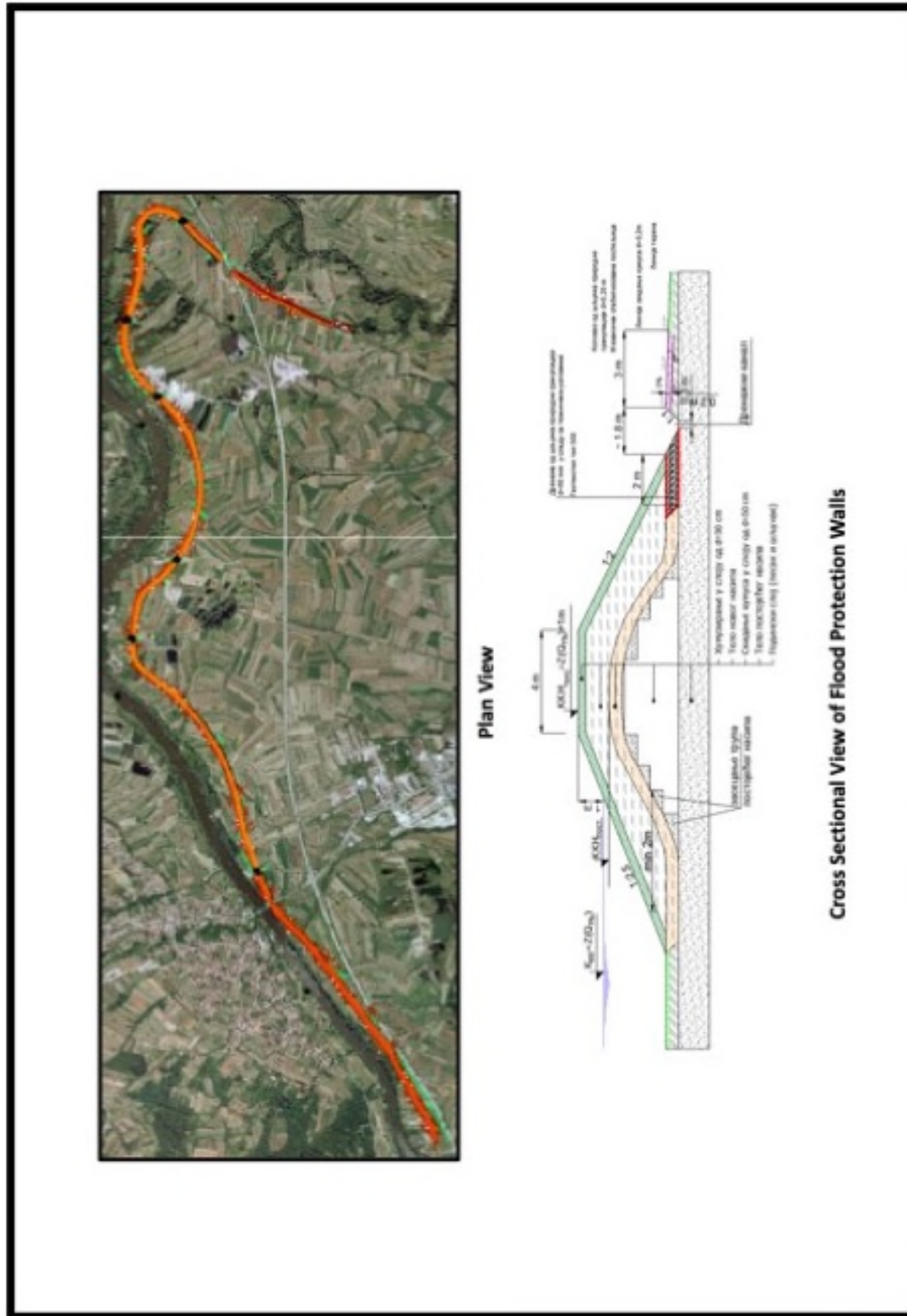


Figure 3-11. The route and typical cross-section of the Structure 3, Section-1

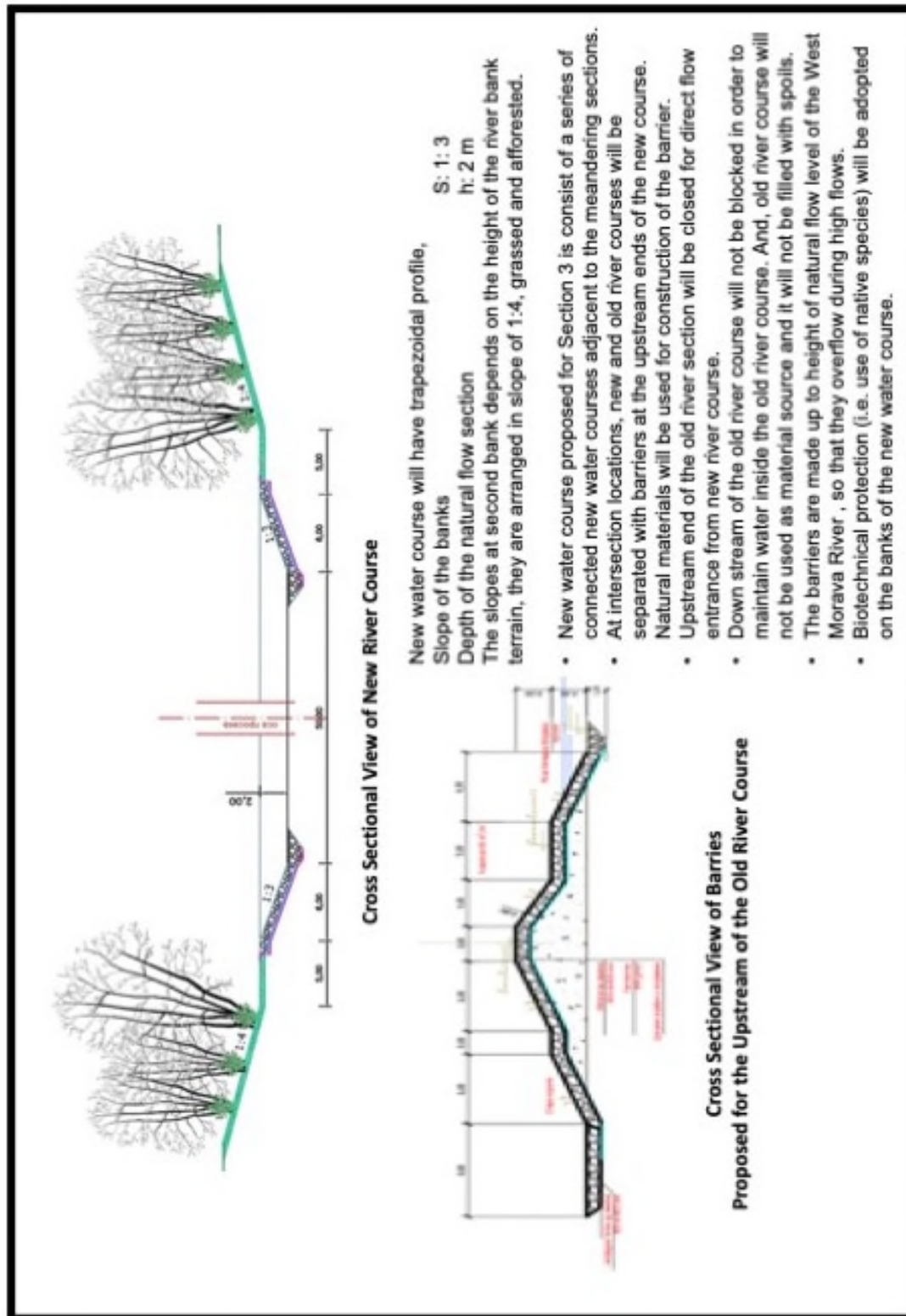


Figure 3-13. Typical cross-section of the Structure 17, Section-3

3.6 Above Ground Structures and Key Infrastructure

Information about the bridges, overpasses and interchanges along the Proposed Motorway Route are presented in Table 3-7.

Table 3-7. Number of Bridges, Overpasses and Interchanges along the Sections of the Motorway

	Section-1	Section-2	Section-3
Bridge	10	31	15
Overpass	8	19	4
Underpass	1	15	9
Culvert	19	19	15
Interchange	4	5	2

Bridge: Bridge is a structure built to span “physical obstacles such as streams, lakes”.

Overpass: It is a bridge, road, railway or similar structure that crosses over another “road” or “railway”.

Underpass: It is a road or a pedestrian passage in a tunnel that runs underneath a “road” or “railroad”.

Culvert: A culvert is a structure that allows water to flow under a road, railroad, trail, or similar obstruction from one side to the other side.

Interchanges: Interchanges are the components of the Project for the connection of the Motorway with the existing and planned road network in the region. The location of interchanges is determined according to the position of the designed alignment route in relation to the existing road network. The design of the intersections is a result of secondary road ranking. Interchanges are designed with full connections. The dimensions of the layout elements of the interchanges are related to the existing spatial constraints. The following table is the list of interchanges designed in the Morava Corridor Motorway Project.

Table 3-8. List of Interchanges of the Morava Corridor Motorway Project

Sections	Sectors	Station	Interchange List
Section-1	Sector-1	752+720	Pojate Interchange
	Sector-1	3+087	Čičevac Interchange
	Sector-3	20+041	Kruševac East Interchange
	Sector-3	21+851	Kruševac West Interchange
Section-2	Sector-4	34+791	Velika Drenova Interchange
	Sector-5	47+546	Trstenik Interchange
	Sector-6	57+407	Vrnjačka Banja Interchange
	Sector-7	71+325	Vrba Interchange
	Sector-7	77+994	Kamidzora Interchange
Section-3	Sector-8	80+950	Adrani Interchange
	Sector-9	107+263	Preljina Interchange

The following figures show the sketches of the proposed interchanges designed in the Morava Corridor Motorway Project.

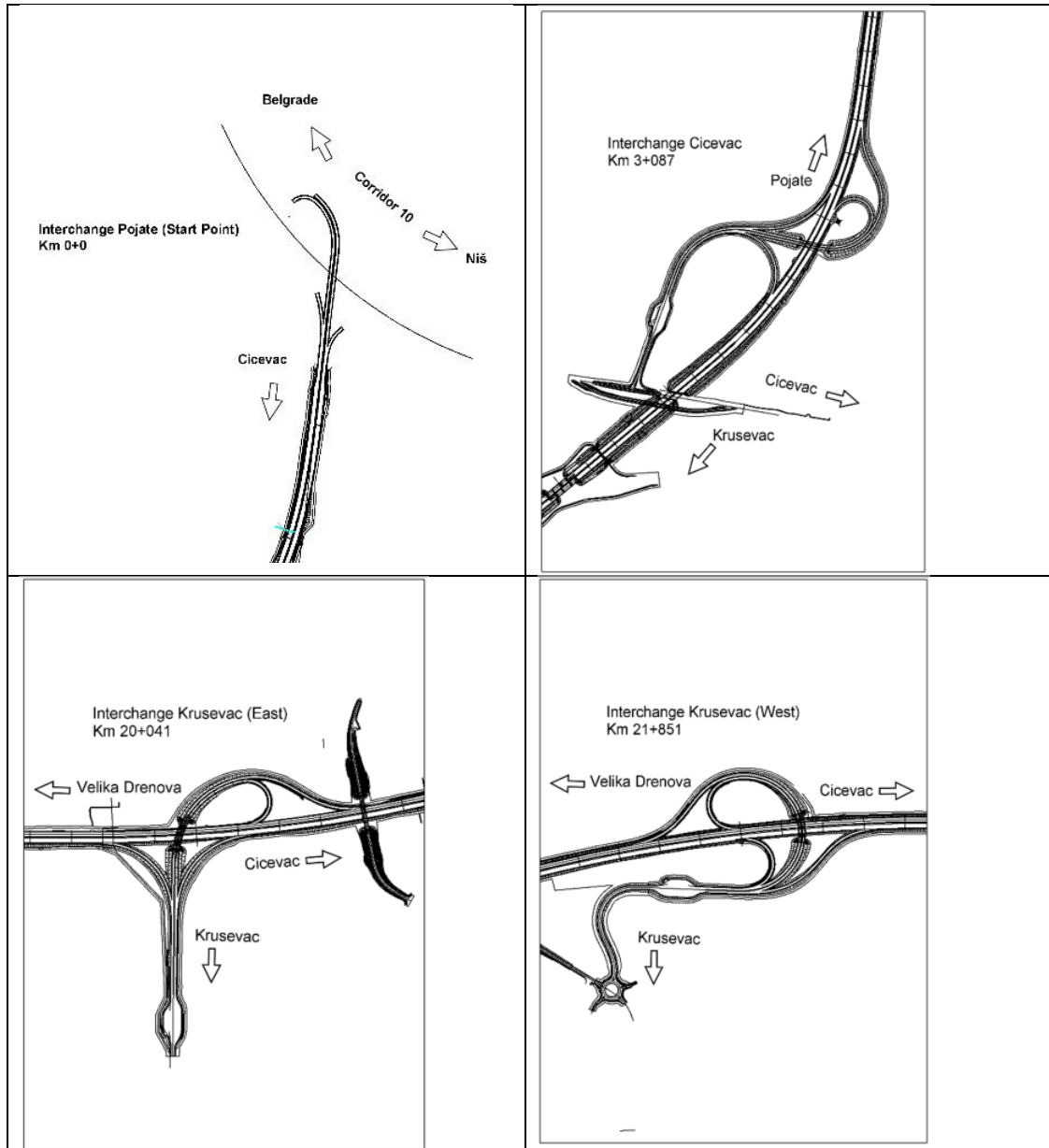


Figure 3-14. Sketches of the Interchanges planned along the Motorway.

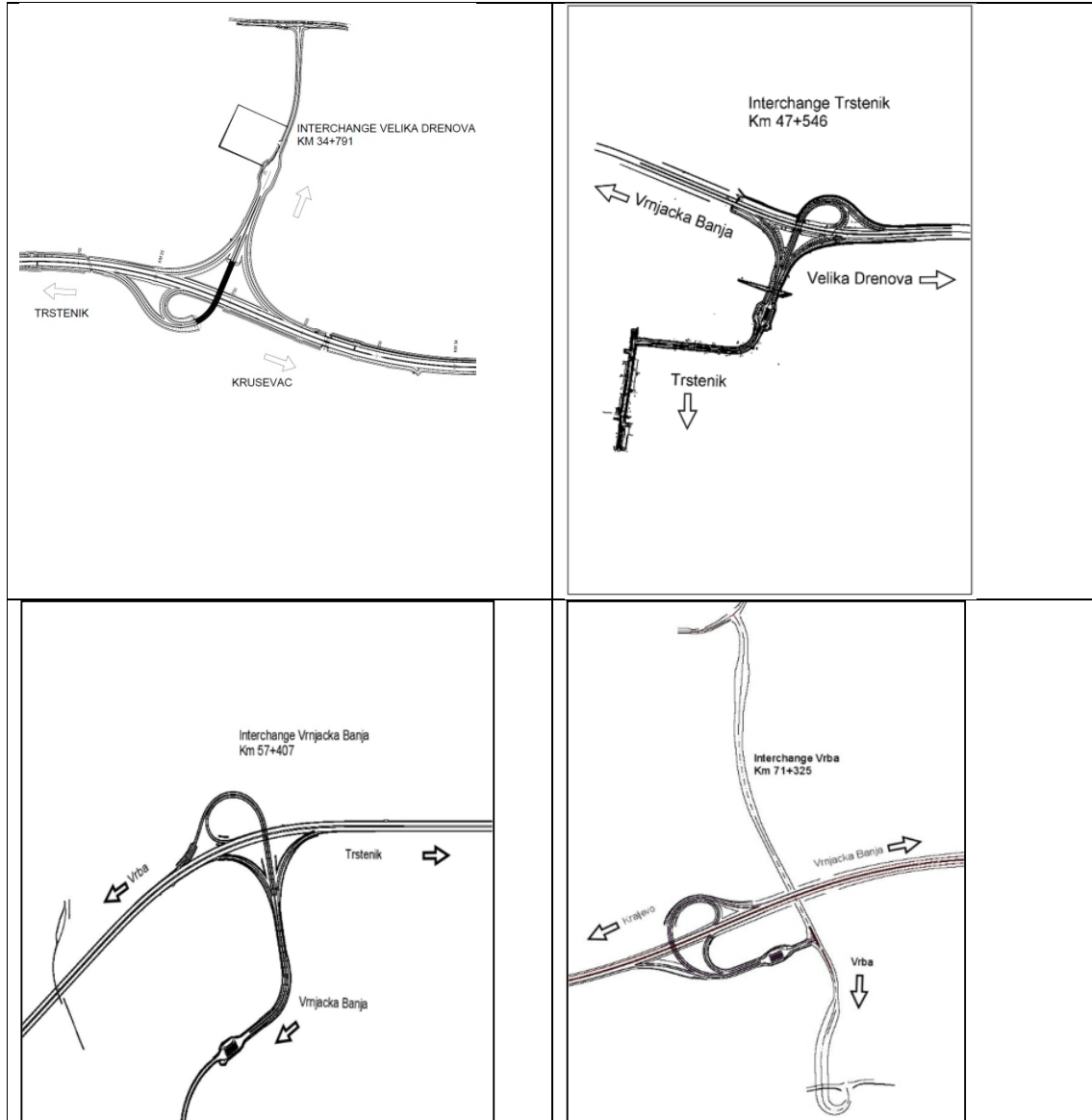


Figure 3-15. Sketches of the Interchanges planned along the Motorway.

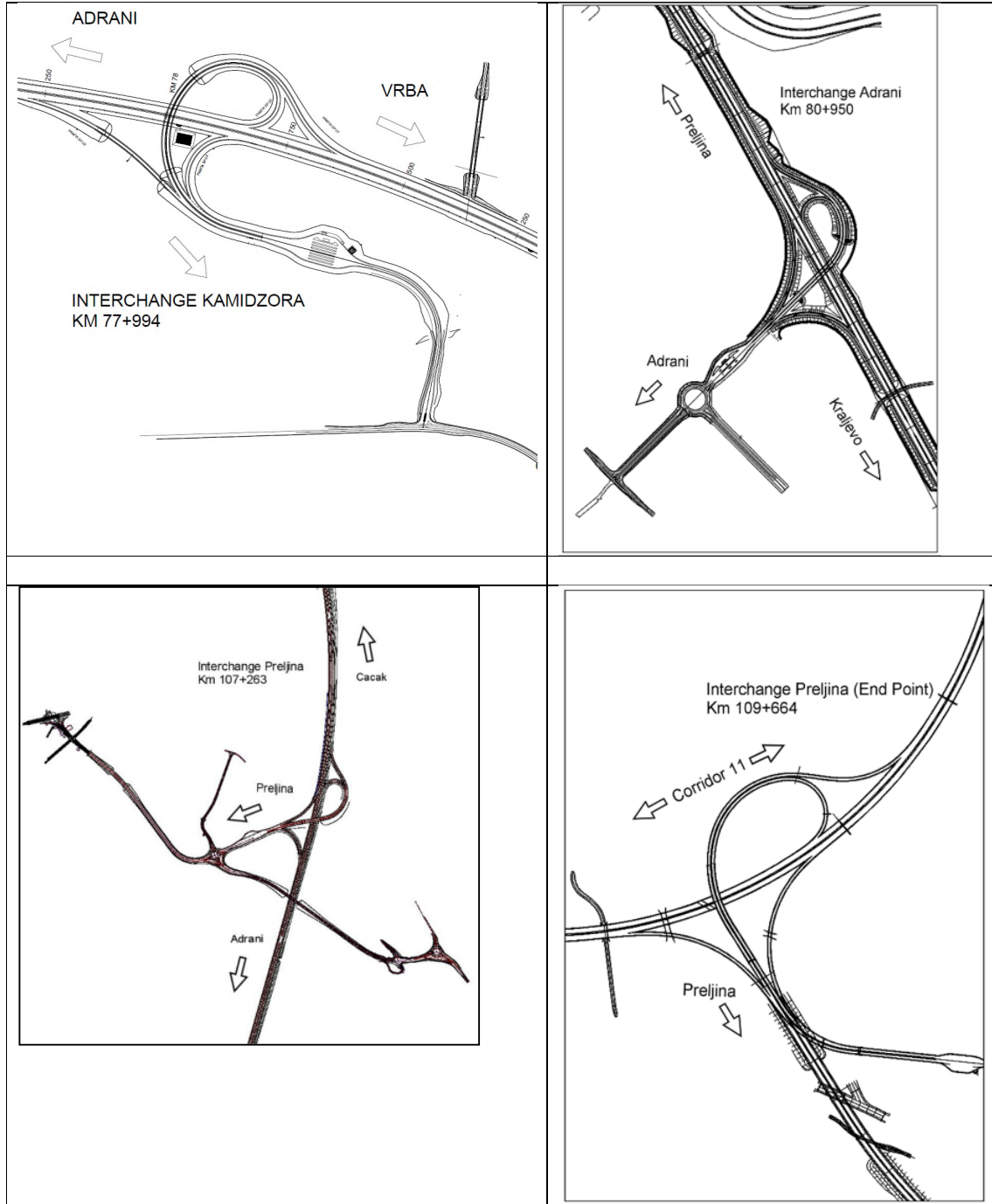


Figure 3-16. Sketches of the Interchanges planned along the Motorway.

3.7 Project Facilities

Third party facilities, that are also funded as a part of the Project are considered as the project components. These facilities' construction and operation are also considered in the context of the ESIA studies.

Among others, the main project facilities to be considered in the ESIA are the followings:

- Quarries and borrow pits;
- Camp sites and storage areas;
- Crushers, concrete batching plants and asphalt plants;
- Access roads; and
- Power lines, communication cables and substations.

3.7.1 Camp Sites, Storage Sites

In the context of the Project's construction activities, there will be three campsites and five precast storage yards of which currently planned locations and layouts can be seen in the following table and figures. There will be no additional campsite for the river regulation works. There will be a total of max. 3,800 workers, accommodated in 3 camps.

Table 3-9. Camps and Precast Yards

Description	Amount
Camp (office and accommodation)	3
Precast Yard	5

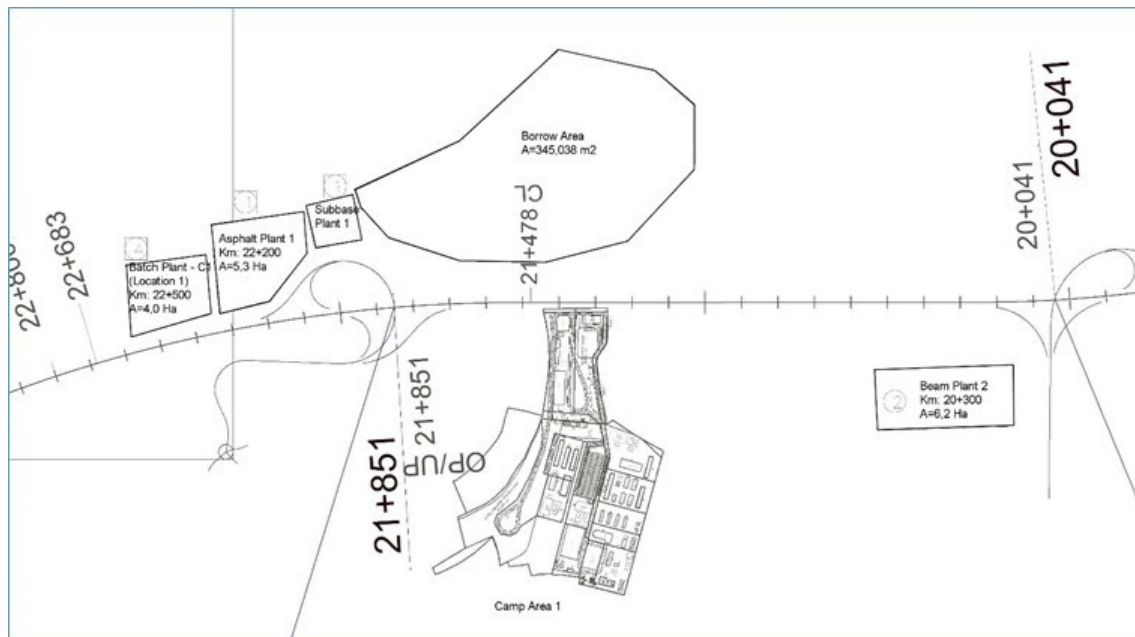


Figure 3-17. Camp Area – 1 in Section-1.

Current layout of the camp area, that might be changed in the final design phase, can be seen in Figure 3-18 below and the figure shows the types of the facilities to be installed within the camp area.

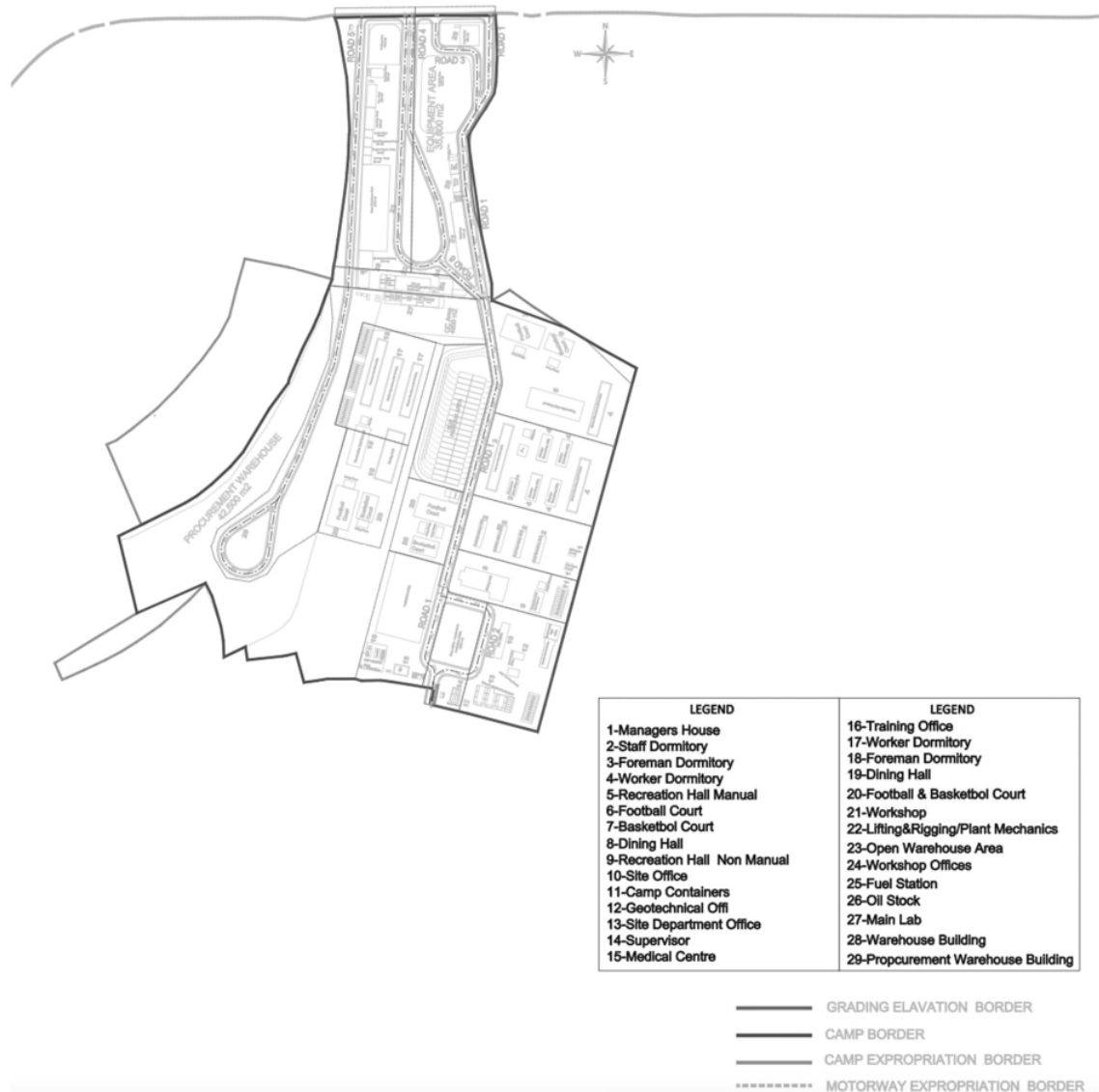


Figure 3-18. Layout of Camp Area in Section-1 (Krusevac).

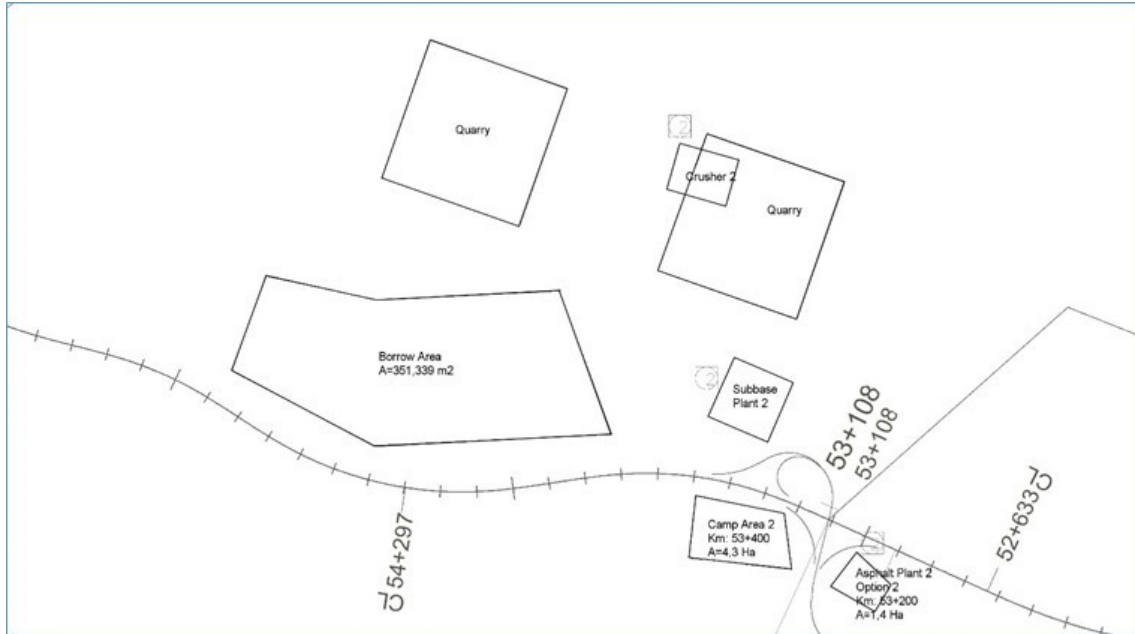


Figure 3-19. Camp Area – 2 in Section-2.

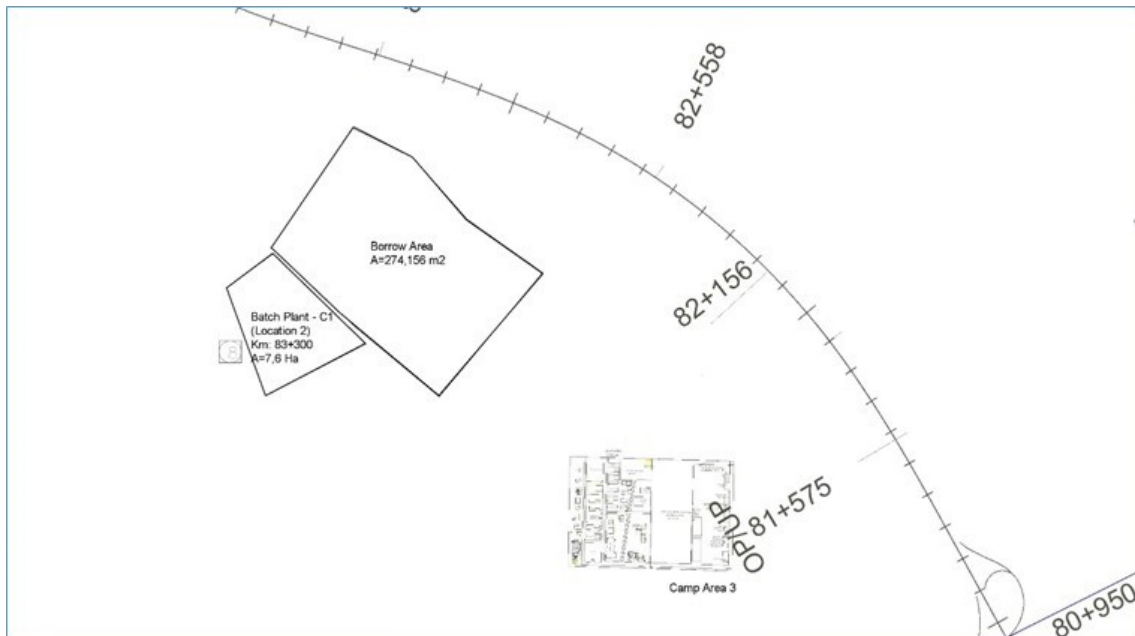


Figure 3-20. Camp Area – 3 in Section-3.

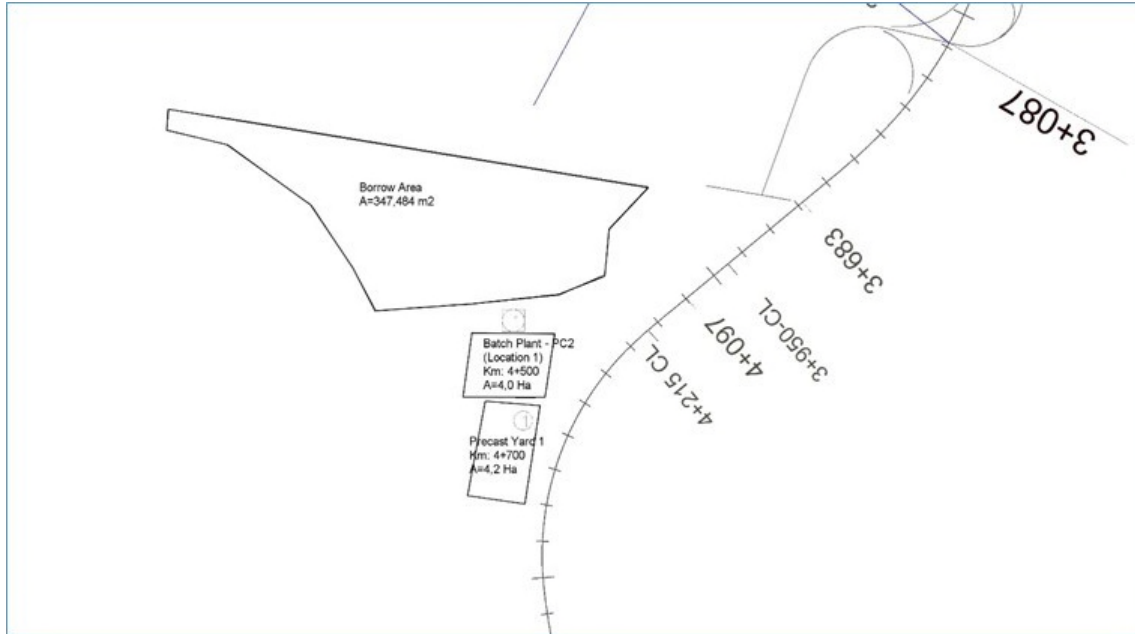


Figure 3-21. Precast Yard-1

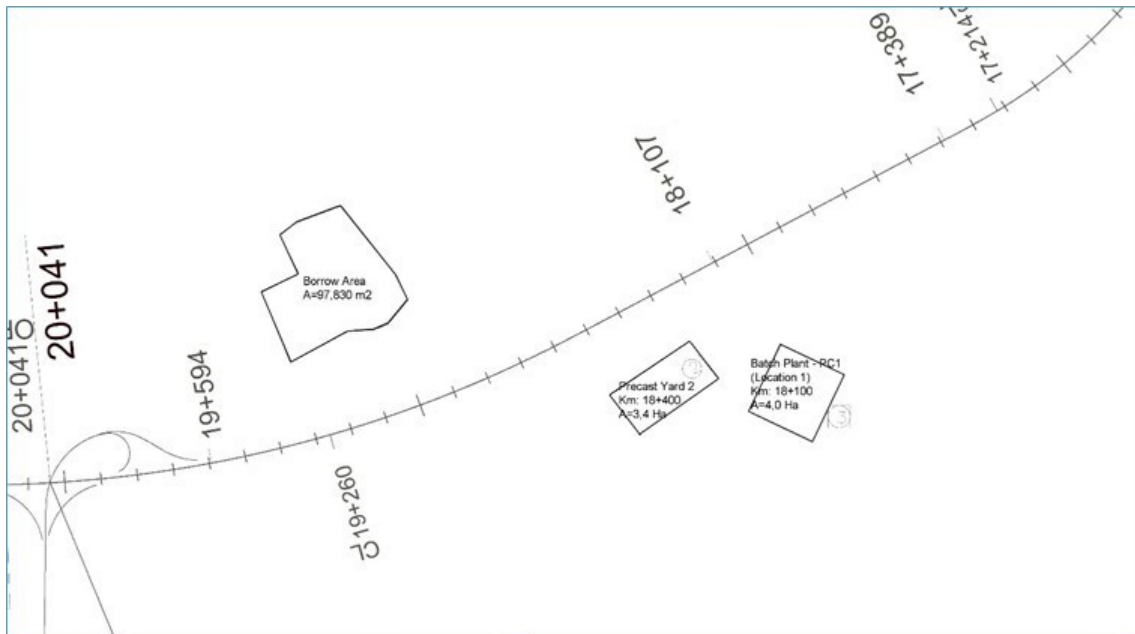


Figure 3-22. Precast Yard-2

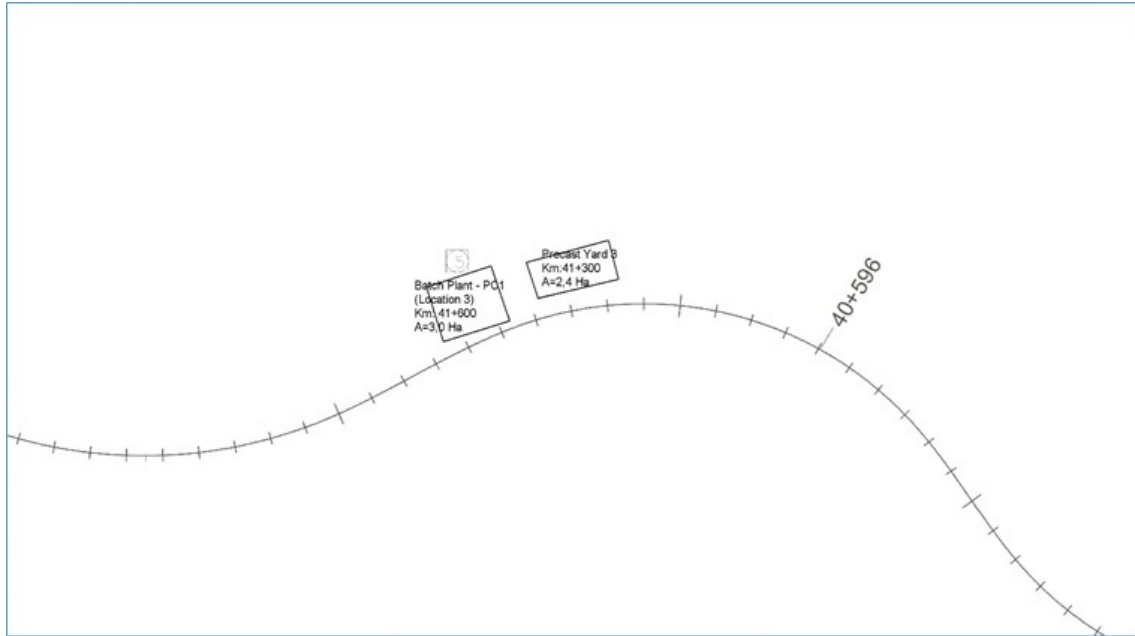


Figure 3-23. Precast Yard-3

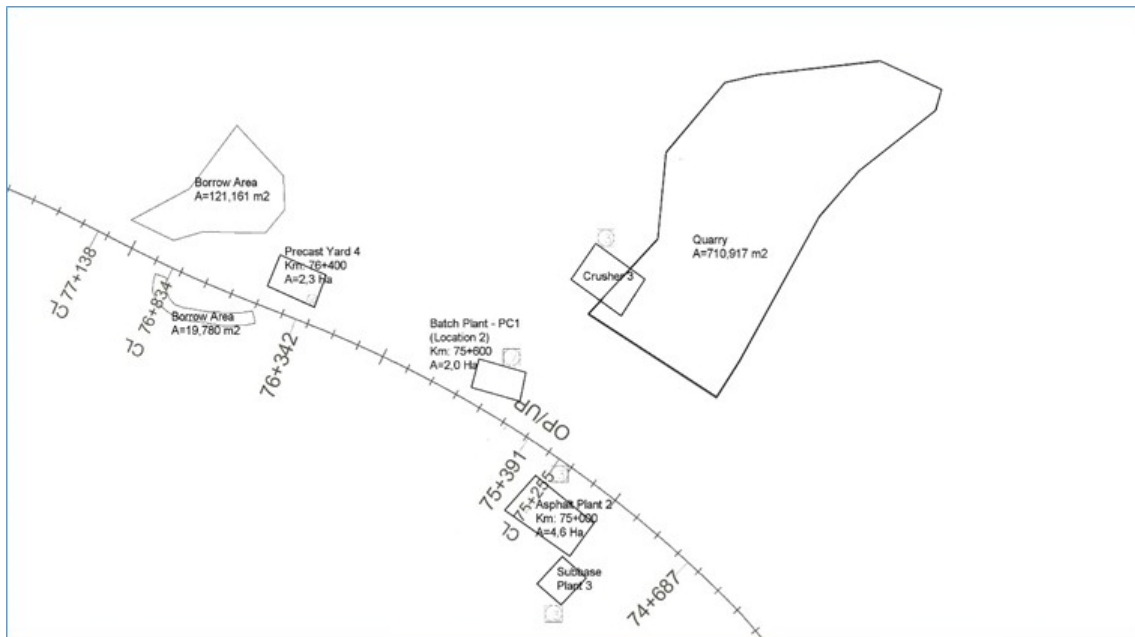


Figure 3-24. Precast Yard-4

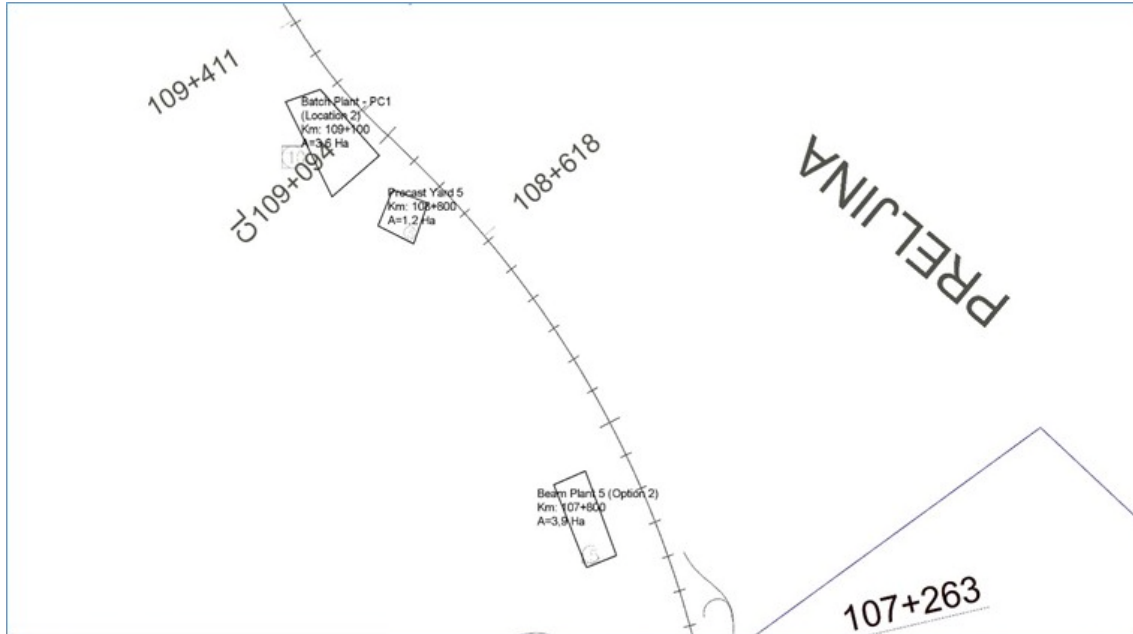


Figure 3-25. Precast Yard-5

3.7.2 Quarries and Borrow Pits

There will be various borrow pits and quarries, that have been identified by the Employer and the Contractor along the Proposed Motorway Route, to be used in the construction phase of the Project (See Table 3-10).

Table 3-10. Quarries and Borrow Pits

Description	Amount
Identified Borrow Pit (Alluvial Deposit)	49
Identified Quarry (Rock Material)	5
Eruptive Quarry	2
Crusher	4

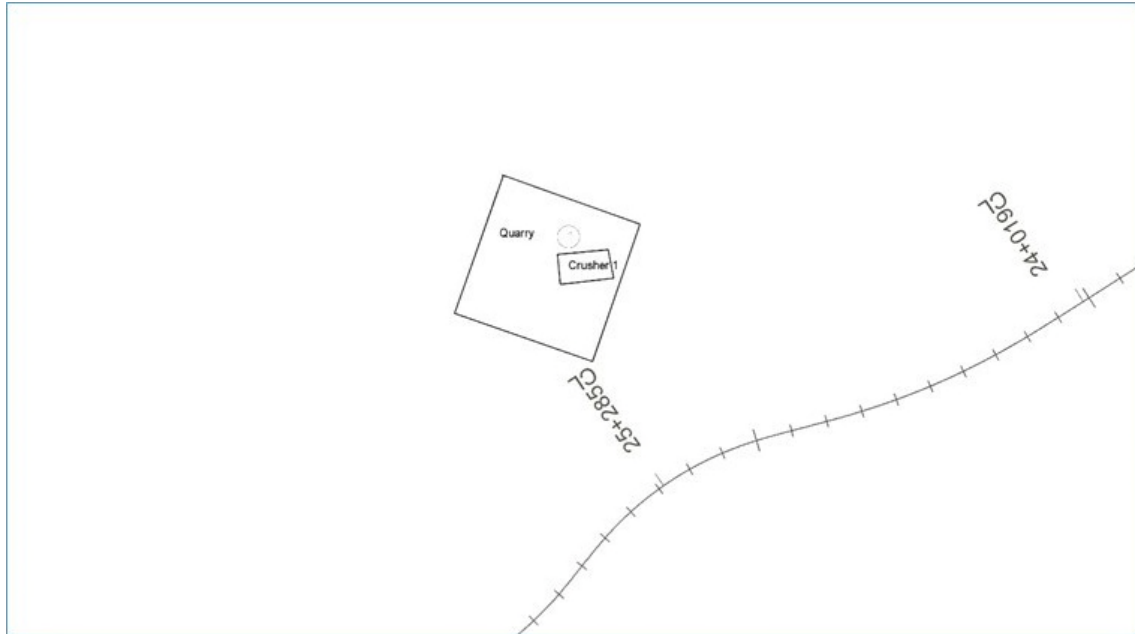


Figure 3-26. Quarry with Crusher-1

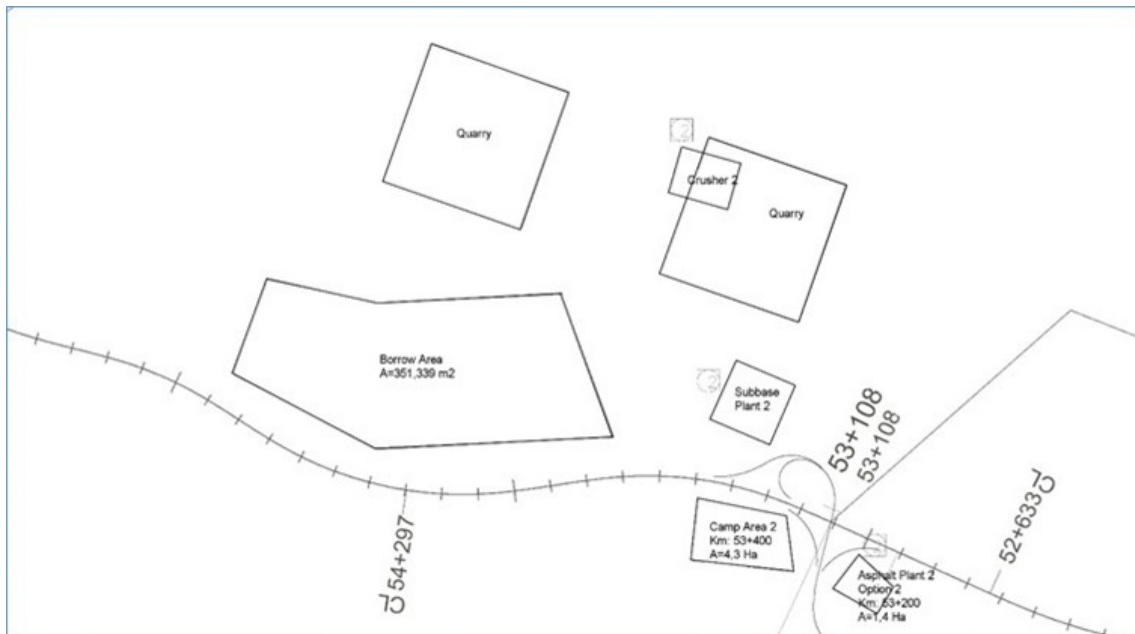


Figure 3-27. Quarry with Crusher-2

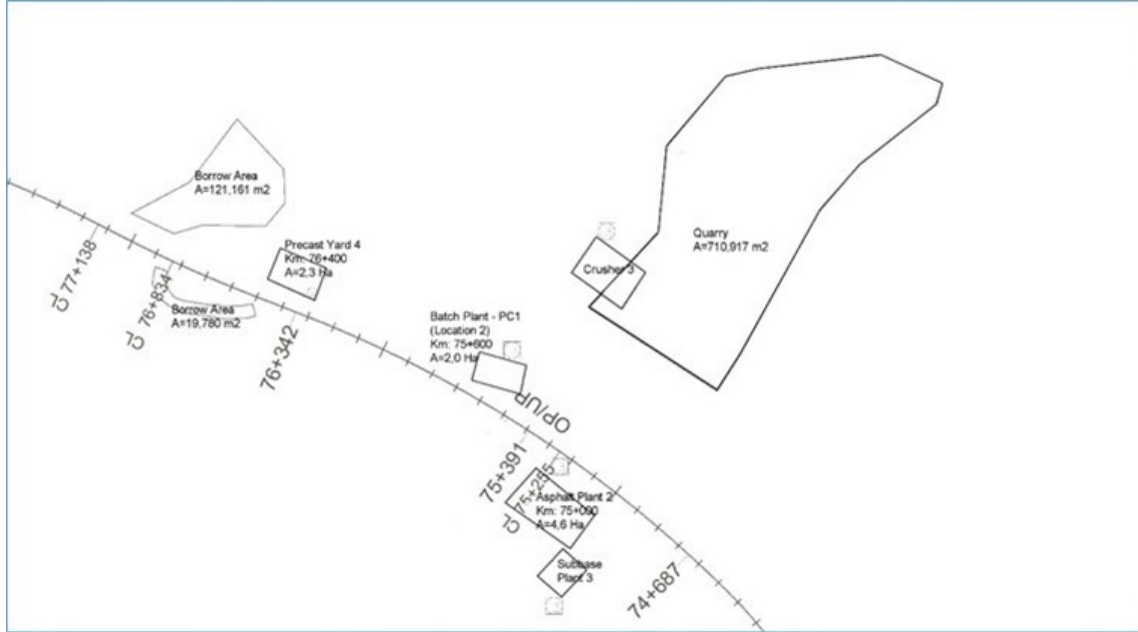


Figure 3-28. Quarry with Crusher-3

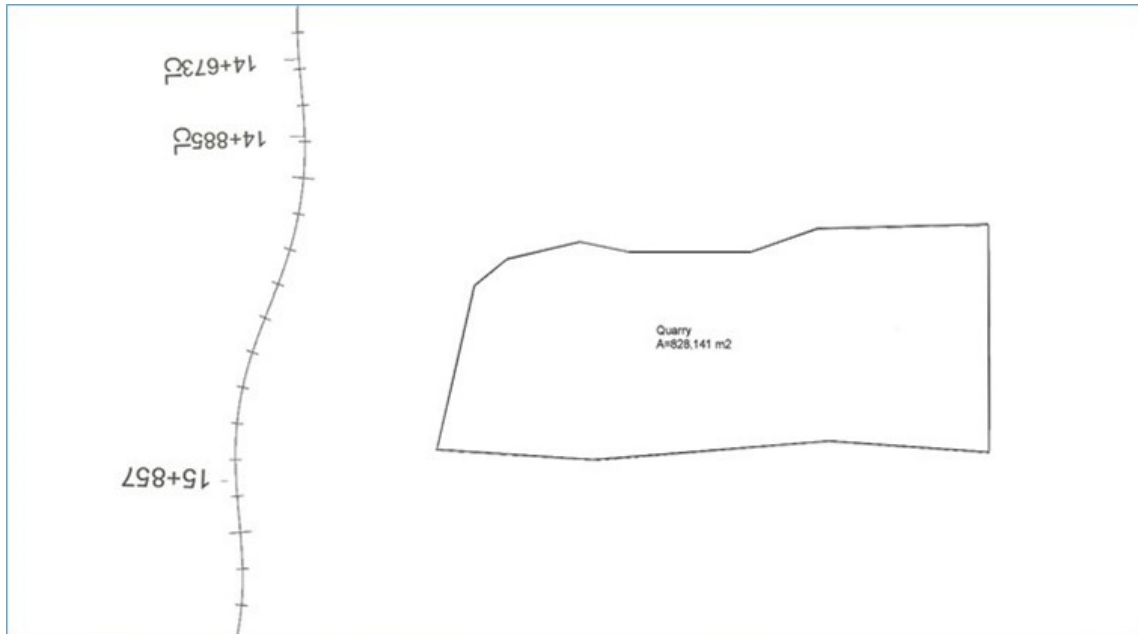


Figure 3-29. Quarry

During the site selection of borrows and quarries, the locations proposed by design team were assessed by 2U1K in terms of environmental (in particular ecological features such as natural habitats) and social constraints. Some areas proposed were rejected and alternatives were proposed and evaluated. The locations of different borrow pits proposed for the project's material need supply are provided in Appendix-5.

3.7.3 Concrete Batching, Beam, Subbase, Asphalt and Screen – Wash Plants

There will be various plants for production of asphalt, subbase, beams and batching to be used in the construction phase of the Project (see Table 3-11 and Figure 3-30 to Figure 3-37). Planned working duration is 10 hours for batch plants. It is planned to consume 280 tons of cement as daily average and it is estimated that concrete production will be 750 m³ as daily average. Two asphalt plants with 300 tons per hour (tph) and 150 tph capacity will be erected. Planned working duration for asphalt plants is 10 hours. It is estimated to have 3,000 tons of asphalt production as daily average. As an option, bitumen can be used in the asphalt and in such cases it will be purchased from Pančevo Refinery.

Table 3-11. Different Plants such as batch, asphalt, subbase, beam and screen and wash plants

Description	Amount
Batch Plant	9
Asphalt Plant	3
Subbase Plant	3
Beam Plant	4
Screen & Wash Plant	4

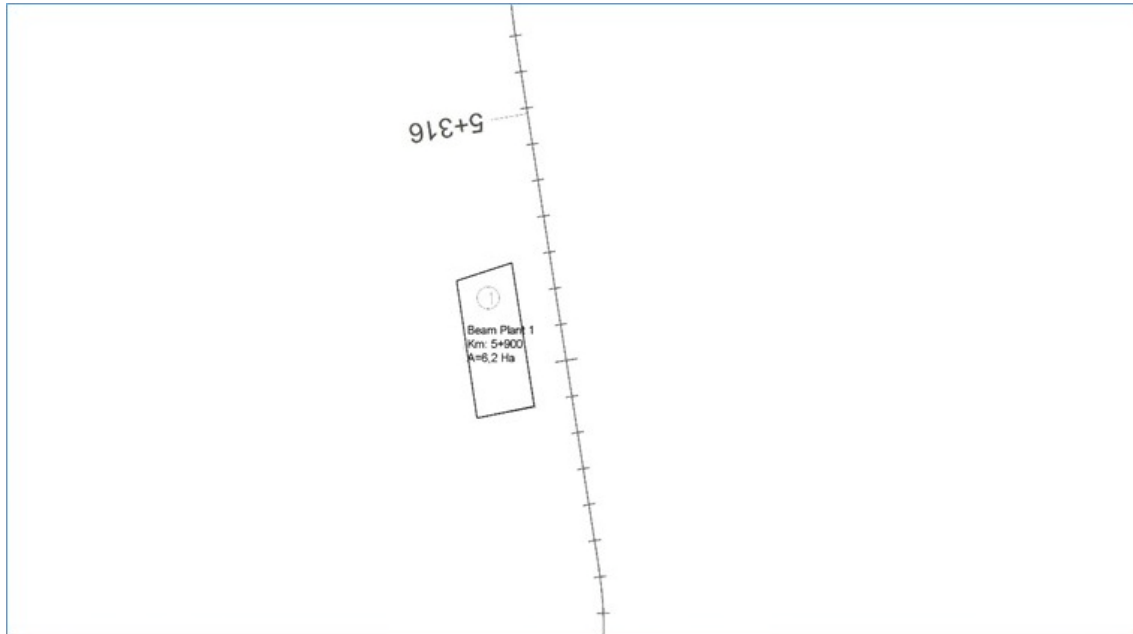


Figure 3-30. Beam Plant-1

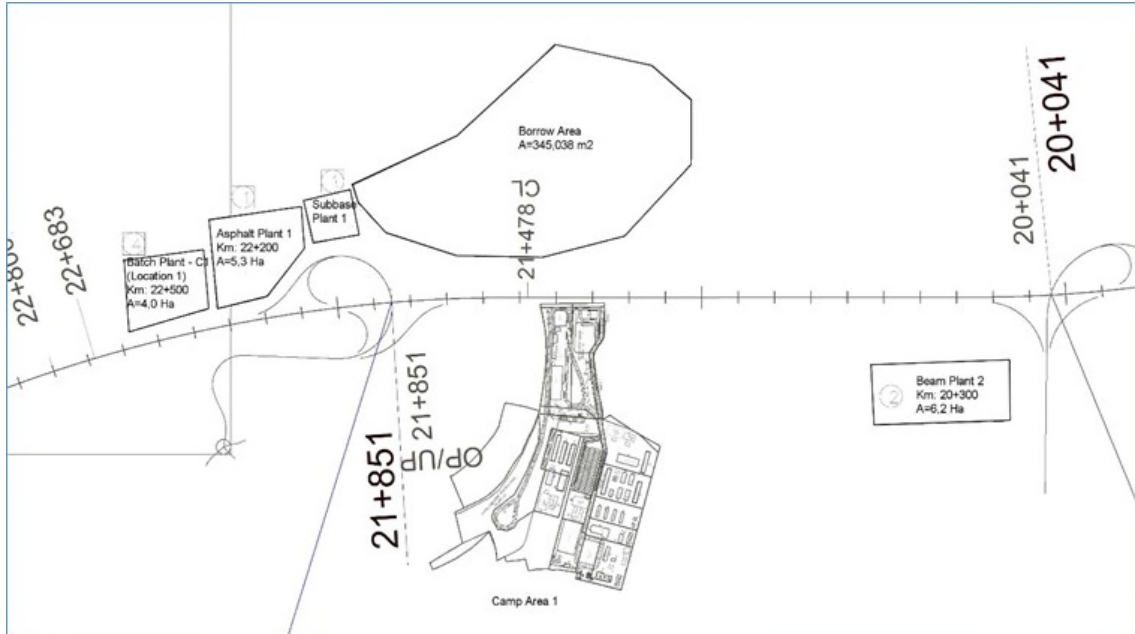


Figure 3-31. Batch Plant-1, Asphalt Plant-1, Beam Plant-2 and Subbase Plant-1

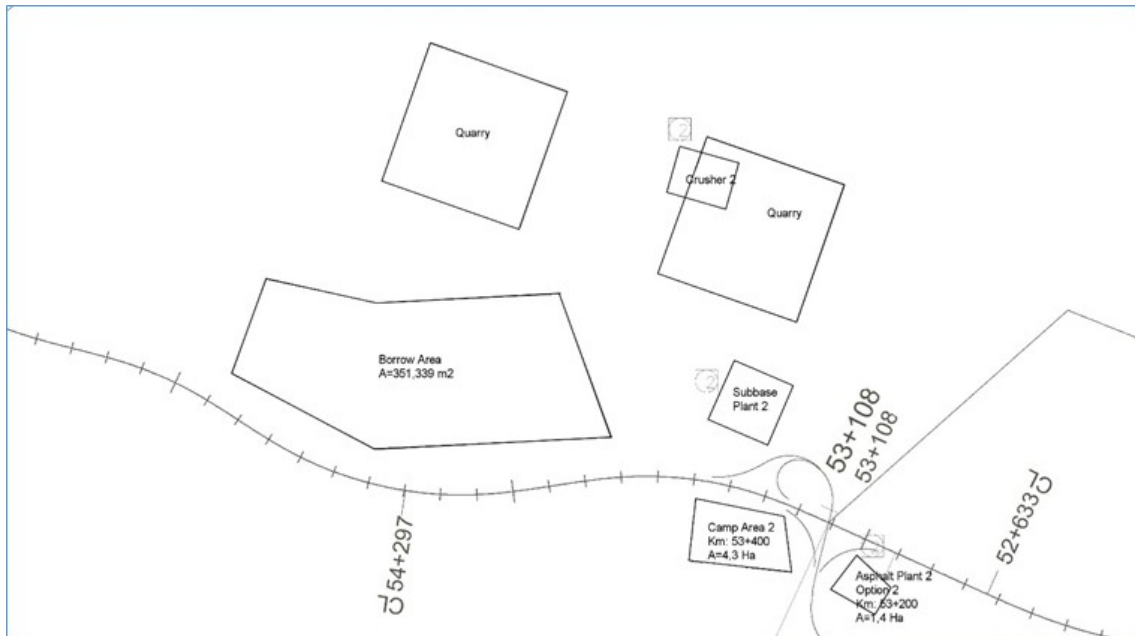


Figure 3-32. Asphalt Plant-2 and Subbase Plant-2

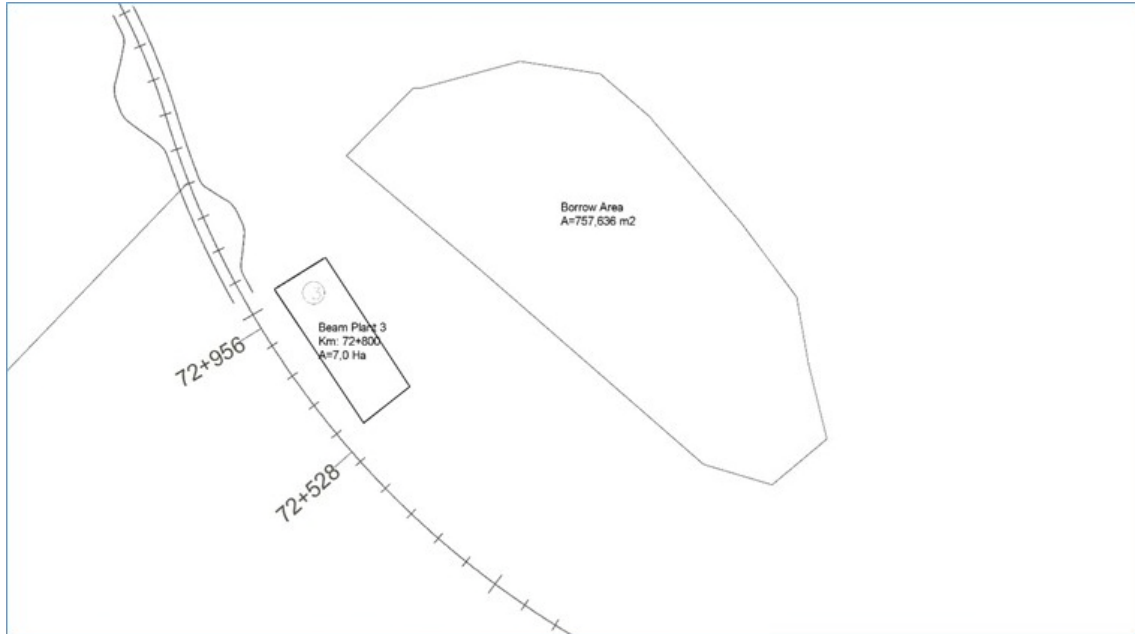


Figure 3-33. Beam Plant-3

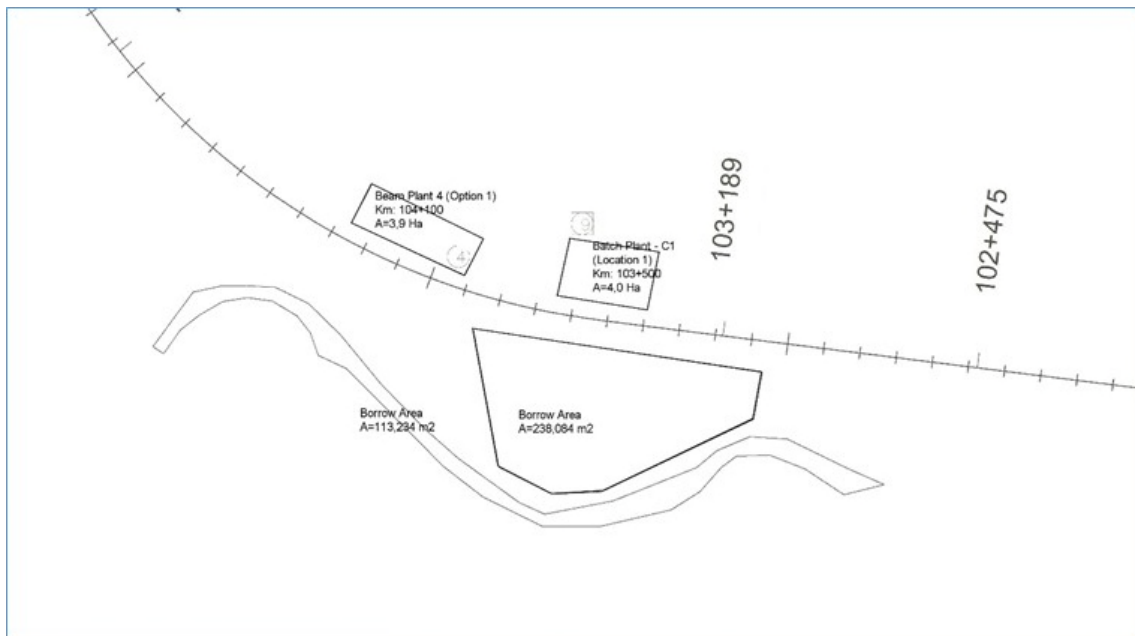


Figure 3-34. Beam Plant-4

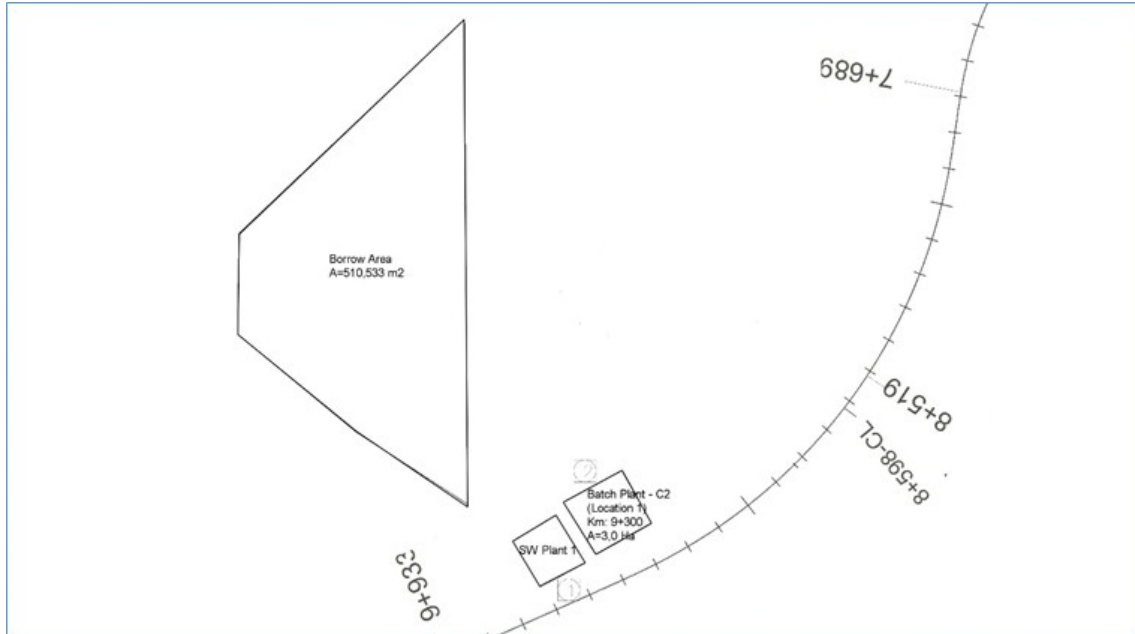


Figure 3-35. Screen and Wash Plant-1

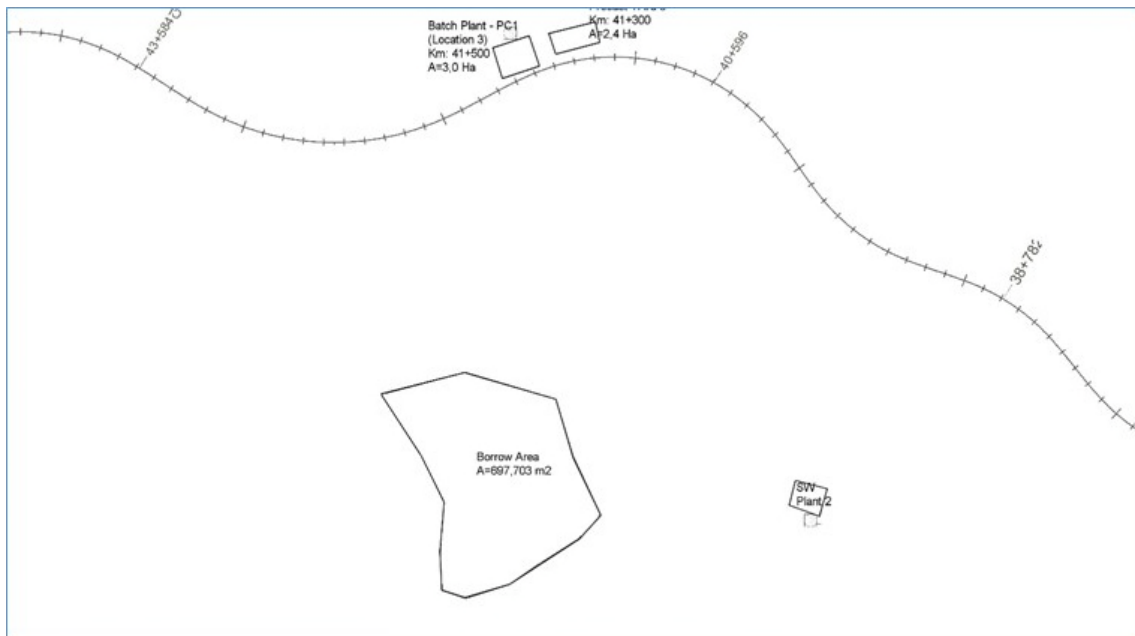


Figure 3-36. Screen and Wash Plant-2

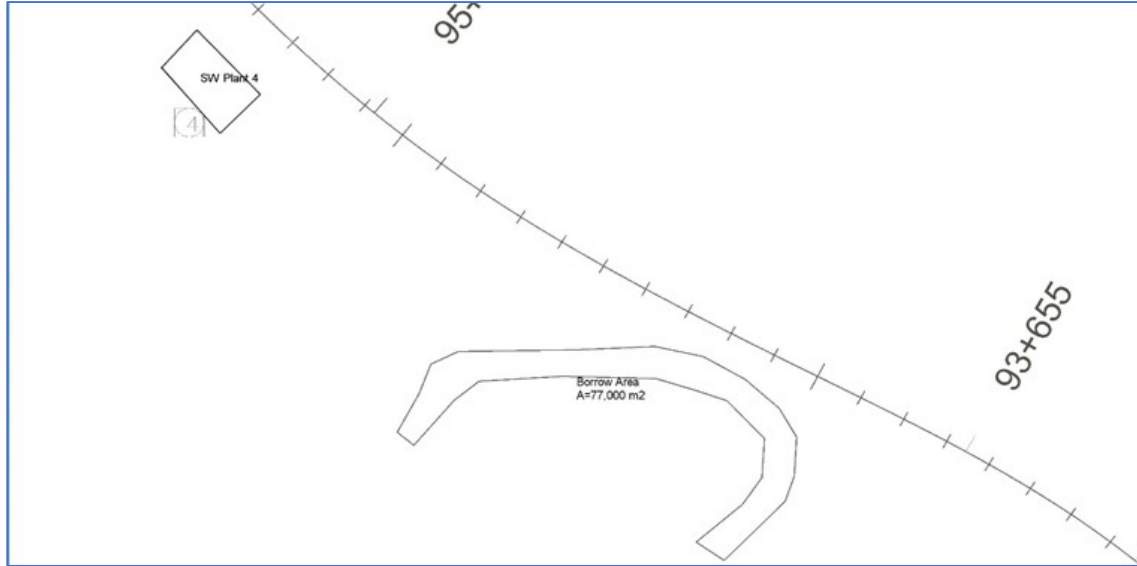


Figure 3-37. Screen and Wash Plant-4

3.7.4 Temporary Access Roads

Access roads will be required to reach motorway alignment locations from existing local/national roads. These existing roads will also be used to reach the area where river regulation works are carried out, including on-farm roads. Furthermore, in addition to these existing roads, temporary access roads will be constructed for transportation to the Project Site. The locations and layout of these temporary access roads will be developed by the Contractor in consultation with the local authorities. The length of the temporary access roads will be approximately 66,000 m in total. If any requirement, arrangements will be made on existing roads. The figure below illustrates the typical cross section of access roads. As it seen in the Figure, 30-40 cm thick of topsoil will be stripped from the existing surface and at least 30 cm thick of filling material will be used to stabilize the road.

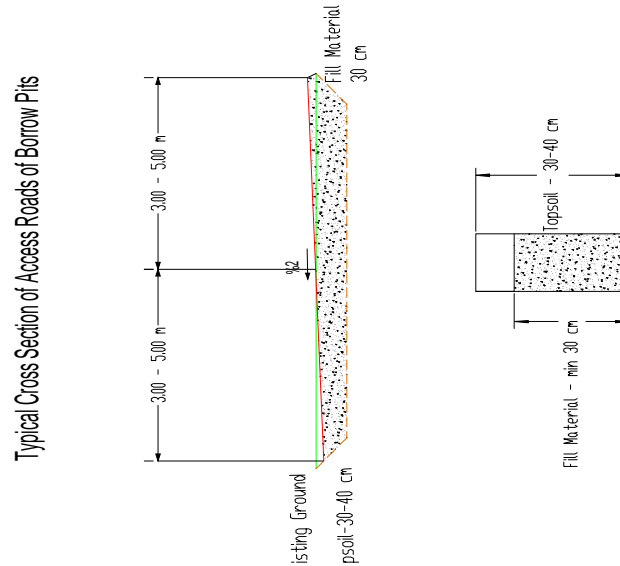


Figure 3-38. Typical Cross Section of Access Roads

3.8 Third Party Utilities

In linear development projects such roads as Morava Corridor Motorway, the route traverses third party utilities that are the existing structures or planned ones. These third-party utilities may include roads, railways, dams, overhead energy transmission lines, pipelines, telecommunication cables etc. The following tables include the river, lake/pond, road and railway crossings along the proposed motorway project.

Table 3-12. River Crossings (via Bridge)

Sections and Sectors	KP	Length (m)	River
Section-1 and Sector-1	8+519	100	Morava
Section-1 and Sector-2	9+933	100	Morava
Section-1 and Sector-2	15+857	150	Morava
Section-2 and Sector-4	29+911	100	Morava
Section-2 and Sector-4	43+150	80	Morava
Section-2 and Sector-5	48+100	100	Morava
Section-2 and Sector-5	52+100	100	Morava
Section-2 and Sector-7	71+000 Ratina Interchange	75	Morava
Section-2 and Sector-7	74+687	100	Ibar
Section-3 and Sector-8	82+150	50	Morava

Source: Design Team of Contractor, 2019.

Table 3-13. Pond Crossings

Artificial Pond Crossing		
KP Start	KP End	Length (m)
4+900	5+100	200
15+850	15+900	50
80+850	80+950	100
81+600	81+700	100
84+700	84+750	50
Total Length (km)		0.5

Source: GIS Department of Consultant, 2019.

Table 3-14. Road Crossings

Sectors	KP	Type of Crossing
Sector-1	00+216	Overpass
Sector-1	03+087	Overpass
Sector-1	05+316	Overpass
Sector-1	07+689	Overpass
Sector-3	19+594	Overpass
Sector-3	20+041	Overpass
Sector-3	21+851	Overpass
Sector-3	22+683	Overpass
Sector-4	34+792	Overpass
Sector-4	35+167	Overpass
Sector-4	36+373	Overpass
Sector-4	38+088	Overpass
Sector-5	44+534	Overpass
Sector-5	46+283	Overpass
Sector-5	55+044	Overpass
Sector-6	57+407	Overpass
Sector-7	71+325	Overpass
Sector-7	71+865	Overpass
Sector-7	73+086	Overpass
Sector-7	75+359	Overpass
Sector-7	77+994	Overpass
Sector-8	80+950	Overpass
Sector-9	101+644	Overpass
Sector-9	106+891	Overpass
Sector-9	107+263	Overpass
Sector-3	17+389	Underpass
Sector-4	27+936	Underpass
Sector-4	31+041	Underpass
Sector-4	32+565	Underpass
Sector-4	39+149	Underpass
Sector-4	40+173	Underpass

Sectors	KP	Type of Crossing
Sector-6	63+232	Underpass
Sector-6	64+819	Underpass
Sector-6	67+386	Underpass
Sector-7	68+339	Underpass
Sector-7	70+012	Underpass
Sector-7	70+813	Underpass
Sector-7	70+977	Underpass
Sector-7	75+441	Underpass
Sector-7	78+717	Underpass
Sector-7	80+308	Underpass
Sector-8	79+650	Underpass
Sector-8	80+595	Underpass
Sector-8	81+575	Underpass
Sector-8	83+390	Underpass
Sector-8	85+350	Underpass
Sector-8	86+897	Underpass
Sector-8	89+740	Underpass
Sector-8	93+655	Underpass
Sector-9	106+619	Underpass

Source: Design Team of Consultant, 2019.

Table 3-15. Railway Crossings

RWX (KP)	Remarks
1+322	Two-line railway crossing via bridge
75+465	Underpass

Source: Design Team of Consultant, 2019.

Table 3-16. Powerline Crossings

Type of Power Line	KP
Existing 110 kV	25+050
	77+000
	106+400
Existing 35 kV	6+500
	37+500
	43+500
	74+300
	86+100
	98+100
	111+800
Planned 400 kV	72+700
Planned 110 kV	110+900

Source: GIS Department of Consultant, 2019.

Table 3-17. Gas Pipeline Crossings

Type	KP
Over 16 Bar	7+000
	10+200
	4+800
	15+750
	19+100
	19+850
	22+500
	24+300
	25+900
	26+700
	50+200
	50+500
	52+500
	53+100
	56+850
	56+050
	56+400
	58+550
	58+600
	59+950
	60+250
	61+400
	64+850
	65+050
	70+000
	71+300
	74+400
75+000	
77+250	
81+550	
83+000	
86+450	
111+150	
Up to 16 Bar	111+500

Source: GIS Department of Consultant, 2019.

In addition, there are waste disposal sites in the settlements around the Project Site and these areas were evaluated during the field studies. The communal waste disposal sites to be potentially used within the scope of the Project are as follows;

- **Ćićevec and Varvarin**¹ JKSP Razvitak from Ćićevec and JKP Varvarin from Varvarin are engaged for collection, transport and disposal of communal waste. Collected communal waste from Ćićevec and Varvarin Municipalities is disposed on non-hygienic dumpsite located in abandoned river valley, approximately 500 m from Great Morava River and 4 km from the road Ćićevec – Varvarin. The dumpsite has been used for more than 20 years and it occupies surface of approximately 1 ha. Annual disposal of communal waste from both companies is estimated on approximately 10,600 m³. There are no protective measures and very limited activities for compacting of disposed waste (with bulldozer). Certain amounts of construction and animal waste are disposed also.
- **Kruševac**² JKP Kruševac is engaged for collection, transport and disposal of communal waste. Communal waste is disposed on the Srnje dumpsite, location used since 1984, located approximately 6.5 km from Kruševac and between three villages: Srnje, Velika Kruševica and Padež. Total surface of complex is 37 ha of which 20 ha is dedicated for the communal waste disposal. There are no drainage canals on the dumpsite and other protective measures. Daily disposal of non-hazardous waste is estimated on 150 t. The bulldozer and loading shovel are used for manipulation with collected communal waste. JKP Kruševac holds one separate operational unit for sorting and recycling of PET packaging, glass and cardboard/paper/PVC folia.
- **Trstenik**³ JKSP Komstan Trstenik is engaged for collection, transport and disposal of communal waste on the city landfill. Annual disposal of waste is 9,000 t for communal waste and 2,000 t for the waste from the industry. Industrial waste is presented with sludge and waste chemicals, which are disposed in dedicated concrete cassettes. The landfill is located in Osaonica, in the place called “Dzamski potok”, approximately 3 km from the city of Trstenik. Total surface of the landfill is 7.5 ha. The landfill is edged with fence, with access road, plateau, system for extracting of landfill gases, drainage water system, installed piezometers, etc.
- **Vrnjačka banja**⁴ Vrnjačka banja Municipality has signed the contract with sanitary landfill in Lapovo for collection, transport and disposal of communal waste.
- **Kraljevo**⁵ JKP Čistoća is engaged for collection, transport and disposal of communal waste on dumpsite “Kulagića Ada”, located approximately 150-200 m from West Morava River. The dumpsite is formed in 1971 and the communal waste is disposed since then. It occupies a surface of approximately 8 ha. Approximately 36,000 t of waste is disposed on

¹ Document: LEAP for the Municipality of Ćićevec for 2017-2021, dated: December 2017 and Strategy of sustainable development of the Municipality of Varvarin for 2007-2017, dated: March 2007.

² Document: Local program for environmental protection 2015-2024, dated: March 2015.

³ Document: Program for environmental protection in the Municipality of Trstenik 2017-2021, dated: February 2017.

⁴ Publicly available information.

⁵ Document: LEAP for the Municipality of Kraljevo, dated: 2012.

this dumpsite annually. It is characterized as a dumpsite without minimal protective measures according to applicable Laws.

- **Čačak**⁶ Čačak Municipality with other 8 Municipalities in Serbia have founded Duboko regional sanitary landfill in Užice and they are engaged for collection, transport and disposal of communal waste since 2005. Daily collected communal waste in Čačak is approximately 70 t. In addition, the Municipality of Čačak has opened transfer station in March 2016, as a central place for collection and primary sorting of waste in Čačak.

3.9 Project Construction Activities

The construction of the Project will require approximately 2,700 ha of land area including the Construction Project Facilities. The construction of the Project is planned to be completed in four years. The earthworks start dates for each Section are as follows;

- Section-1 in April 2020;
- Section-2 in April 2021; and
- Section-3 in August 2020.

Construction phase of the Project was planned to be completed in late November 2023 when the motorway will be operational.

The average number of the construction workers will be 3,100 and the peak number of the project workers will be approximately 3,800 in 2022. The labour requirement for the construction of the Project will be primarily sourced from Serbia, local labour force and complemented by expats.

Almost all sections of the Motorway are on flat farmland and next to the West Morava River, which is on a large flood plain. The Proposed Motorway Route is easily accessible due to the proximity of local roads and access points. Construction plan comprises passing through agricultural areas. All expropriation and land access provisions are the responsibility of the Employer.

Typical road construction works begin with clearing the terrain in the area defined by the project design boundaries. These works involve the removal of vegetation and structures in the area. The next activities consist of earthworks (cut and fill sections` excavation and embankment activities) for which graders, dozers, concrete skippers, rollers and other similar machinery are used. This is followed by the construction of culverts and drainage systems as well as the construction of larger structures (bridges, retaining walls, etc.). Upon completion of these works, finishing works and pavement of the constructed road starts, i.e., the lower carrier layer,

⁶ Publicly available information.

the upper carrier layer and the pavement. The final stages are the installation of ancillary equipment (fencing, signaling etc.) and the preparation of the road belt (greening).

The planned design and construction sequence provided by the Contractor, is as follows:

- Design for Construction (Contractor's Scope);
- River Regulation Design (Employer's Scope);
- Expropriation for project facilities such as camps (other expropriation is Employer's scope);
- Utility Relocations Completion;
- Mobilization;
- Earthworks;
- Drainage⁷;
- Structural Concrete;
- Paving;
- Finishing Works; and
- Open to Traffic.

Typical construction activities provided by the Contractor, which will subject to change as per detailed design, are outlined in this section of the Report. The list given in Figure 3-41 shows the possible construction equipment to be used in the construction activities. Permits for "Access to Site" and "Access to Geotechnical Investigation and Survey Locations" as well as "Provision of Borrow Pits/Quarries and Waste Areas" will be obtained by Employer prior to the start of these activities of the Contractor.

3.9.1 Description of Methods of Earthworks

Clearing and grubbing involves the removal from the alignment of surface vegetation and material unsuitable as part of the motorway structure. Bulldozers will generally be used for the clearing and piling the material for hauling. Hydraulic excavators will be required for the demolition of existing obstructions.

For the Project, the cleared and grubbed material will be removed, loaded and transported to a site provided by the Employer and disposed of in an acceptable manner. Hydraulic excavators will be used to load the material into suitable hauling equipment (off-highway or on-highway trucks).

These activities will not include the clearance, removal, or disposal of any hazardous waste, including unexploded ordinance or similar substances.

⁷ Drainage design targets a solution in order to achieve that all storm or surface runoff water from pavement surface are effectively collected and taken for the treatment and discharge to the receiving body. Rainwater from cut and fill slopes are collected with trenches and concrete channels along the right of way fence.

For river regulation methodology, the EIA Reports of Sectors 8 and 9 were evaluated. According to the EIA Report for Sector-8, a geotextile filter layer is applied to the sharp slope areas that have the risk of scoring in Sector-8, through which is applied a layer of gravel and then a stone that is poured with cement mortar to the minor troughs.

The shore of the River is secured by a dump of broken stone of the required volume. In regulation curves, it is necessary to cover the slopes of major troughs of concave curves, in the same way as the slopes of minor troughs. The slopes of the major trough on the convex curves and the banks along the entire regulation, must be covered with grass mixture.

According to the EIA Report for Sector-9, a heat-treated geotextile is applied to the sharp slope in Sector-9, through which are applied reno mattresses filled with gravel from the excavation of the regulated trough.



Figure 3-39. Example of Reno Mattress

Mixed herbaceous vegetation will also be made. Thus, while maintaining slope stability, it also enables riparian vegetation formation like in Figure below.



Figure 3-40. Example of Riparian Vegetation Formation

The blade is formed by gabions that are also filled with gravel from the excavation of the regulated trough.

In regulation curves, it is necessary to cover the concave slopes of major troughs, in the same way as the slopes of minor troughs. Reno mattresses are filled at the installation site to form a flexible and porous, monolithic structure.

3.9.2 Excavation of Topsoil

Topsoil excavation is the removal of soil material to the depth specified in the design. This work includes the excavation, removal of any deleterious material not suitable for inclusion in usable topsoil and loading usable topsoil material and hauling of this material to a temporary storage area within the work limits (or a temporary storage area, which will be provided by the Employer outside the work limits).

Bulldozers will strip and push the topsoil material to the storage areas near the expropriation limits (out of the way of follow-on construction activities) (see Figure 3-42 and Figure 3-43).

Equipment	Needed Equipment
Sedan Car	7
SUV 4*4	34
Passenger Bus	23
Worker Bus	36
Pick Up	163
Ambulance	8
Mechanic Pick-up	0
Boom Truck	38
Cargo Truck	0
Bitumen Distributor Truck	1
Repair Truck	7
Lube Truck	8
Tire Truck	6
Fuel Truck	16
Wash Truck	3
Potable Water Truck	4
Water Truck	23
Truck Tractor	25
Heavy Truck Tractor	1
Transit Mixer 6X4	41
Concrete Pump Truck	6
Dump Truck 8X4	24
Dump Truck 6X4	688
Truck with Snow Plow	1
Wet Shotcrete Machine	0
Highbed Trailer	28
Lowbed	10
Cement Silo Truck	1
Water Trailer (30,000 Liter)	0
Farm Tractor Trailer	9
Manlift	2
Forklift	11
Twin Boom Platform Lifter	0
High Pressure Washer	4
Rough Terrain Crane 30 Tons	9
Rough Terrain Crane 26 to 50 Tons	8
Rough Terrain Crane 51 to 100 Tons	8
Tower Crane	9
Gantry Crane	8
Wheel Loader	47
Backhoe Loader	22
Steer Skid Loader	7
Dozer (CAT D4 or equivalent)	3
Dozer (CAT D6 or equivalent)	0
Dozer (CAT D8 or equivalent)	24
Dozer (CAT D9 or equivalent)	1
Excavator (Hitachi ZX33 or equivalent)	3
Excavator (Hitachi ZX690 or equivalent)	19
Excavator (Hitachi ZX490 or equivalent)	5

Figure 3-41. Tentative List of Construction Equipment

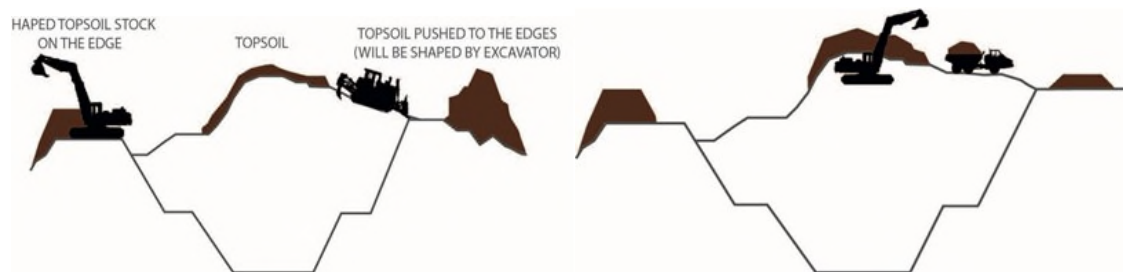


Example of area to be cleared and grubbed. (not from this project)

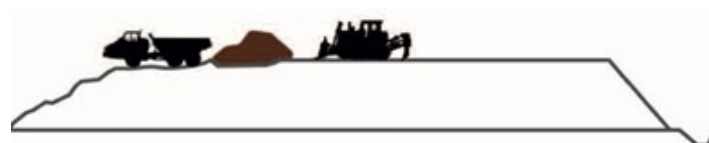


Stockpiling the cleared and grubbed material at disposal area.

Figure 3-42. Photos from Typical Clearing and Grubbing Works



Hauling the excessive topsoil to determined stockpile areas.



Stockpiling excess topsoil in designated areas.

Figure 3-43. Topsoil Excavation and Stockpiling within the Alignment

3.9.3 Excavation of Any Material Except Topsoil

'Excavate any material except topsoil' covers the excavation of all materials within the alignment to the depth specified in the design. This entails staking out the existing horizontal and vertical layout of the alignment at regular increments. From this, grade control is established and maintained during the earthworks operation until the formation is completed.

The excavation operation encapsulates all types of naturally occurring materials, and includes:

- Common excavation to fill or waste (disposal);
- Excavation of rock to fill or waste (disposal); and
- Mixed material to fill or waste (disposal).

The selection of excavation equipment depends on the type of soil, height and length of the surface to be excavated, quantity of the soil to be excavated, transport distances and the schedule.

3.9.3.1 Common Excavation

Excavation commences with bulldozers or excavators and includes the formation of the slopes. The material excavated by hydraulic excavators will be directly loaded into trucks; material excavated by bulldozers will be loaded by loaders into trucks. These trucks will transport excavated material to the fill, stockpile, or disposal area.

3.9.3.2 Replacement of Unstable Soils at Formation

This work covers activities that are required to improve the bearing capacity of the alignment formation (foundation) level by means of soil replacement with stronger material. This is beneficial to the finished quality of the Motorway and provides a working platform from which it is possible to operate without being affected by day to day adverse weather conditions. This will improve schedule certainty, as it (barring significant weather events) materially reduces weather productivity losses.

In the case of unstable soil at formation level, it is assumed that the weak soil will be replaced with borrowed material.



Excavation of common material with excavator.

Cutting of slopes with excavator.

Figure 3-44. Similar Excavation Photos

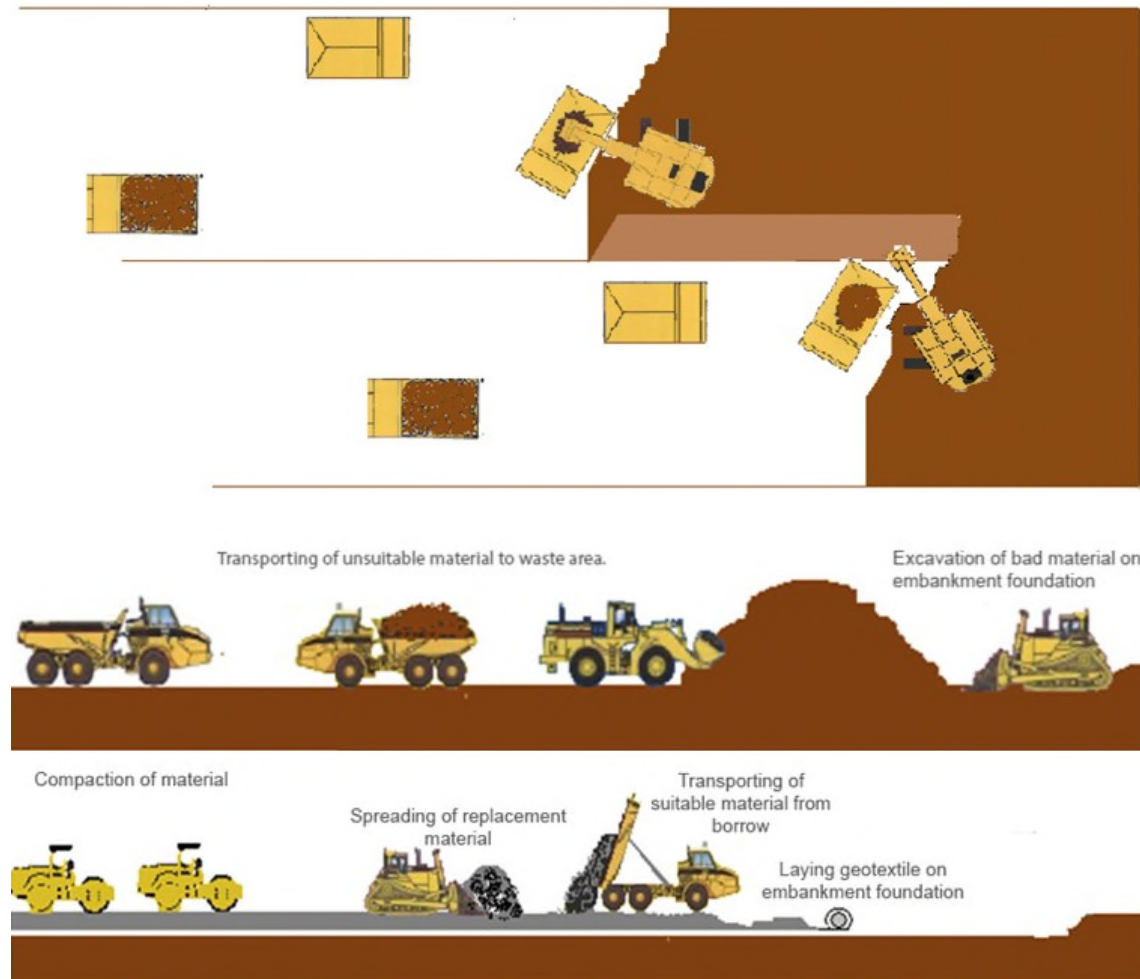


Figure 3-45. Example of Excavation and Hauling as well as Compaction Works along the Alignment



Figure 3-46. Example of Replacing of Embankment Formation (Foundation) with Geotextile and Suitable Material

3.9.3.3 Rock Excavation

Even though it is not expected to face rock excavation in general, rock materials are strong materials where blasting may be required to perform the excavation. The speed of the drilling and blasting operation is on the critical path for the earthworks schedule where rock material prevails.

Excavation method, drilling method, spacing of boreholes and the size of explosive charge will be decided after completion of the review of the geotechnical investigation reports. Hydraulic drills will perform the drilling of boreholes for blasting operations (See Figure 3-47). The number of the boreholes will be decided according to the blasting plan in order to reduce to a minimum any need for secondary blasting of rock.

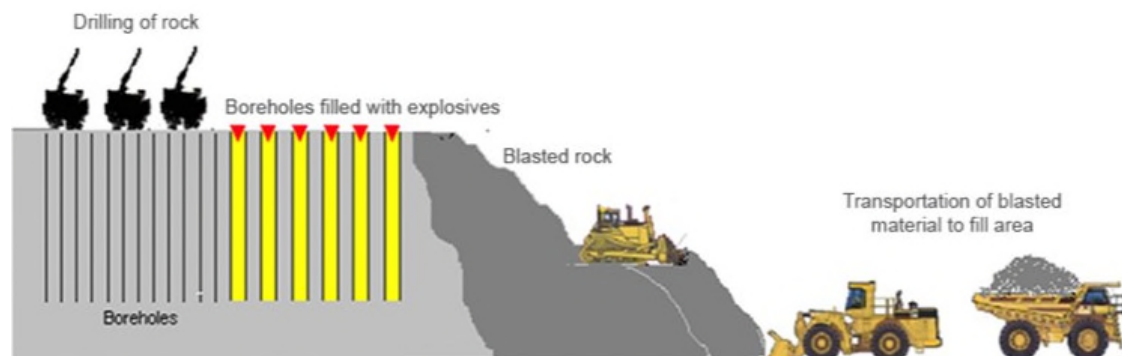


Figure 3-47. Excavation Procedure Using Blasting Technique



Rock drilling.



Location ready for filling with explosives.



Loading of blasted material.



Loading of blasted material with hydraulic excavators.

Figure 3-48. Typical Pictures from Excavation Procedure Using Blasting Technique.

3.9.4 Mixed Material to Waste or Fill

Mixed materials are materials defined as semi-solid rock materials. In this class of material, the excavation will be performed partly by mechanical equipment and partly by blasting. The scope of blasting operations is relatively small when compared with the mechanical excavation.

Bulldozers will do the excavation and hydraulic loaders, or excavators will be used to load the trucks. The material will be hauled either to the fill area or disposal area, as appropriate.

Slope inclination in cuttings and side-cuts will be realized according to the design.

The trimming of the slopes will be done either with excavators and pick-hammers or with the drilling and blasting operations.

During the excavation, drainage of the cut platform will be achieved by forming transverse slopes on the alignment and constructing temporary drainage ditches. Water will be removed from the alignment as described earlier, since the excavation of mixed material, like common excavation, is very sensitive to climatic conditions.

3.9.5 Spreading and Compacting of Fill

Spreading and compacting of fill involves the spreading of fill material in layers, levelling, and compacting the fill material to the standards specified.

Fill material for the embankment will be provided from the borrow pits provided by the CoS. Suggested locations are identified by the Contractor. In order to extract the embankment fill from borrow pits, the topsoil above the borrow-pit area will be removed to the sides of excavation. Following that, excavators that can be operational in water conditions will excavate and load the excavated gravel material onto the trucks or to the nearest side, depending on the water content of materials. The depth of gravel material suitable for fill at the borrow pits is expected to be 4 m to 6 m under the 40 cm to 1m-thick topsoil. Removal of topsoil above borrow pits will be performed as explained in the topsoil excavation section above. Embankment material transported from borrow pits will be spread with dozers or graders at the appropriate thickness, which will be determined by trial fill sections in advance. Compaction tests will be performed by plate-load tests prior to starting the next level of embankment fill. Spreading and compaction of earth material means the spreading of non-rock material in layers, levelling and compacting the material to standards specified.

Benches will be provided where the embankment is to be placed on existing slopes, or where new embankments are to be constructed against existing embankments. If the slope of the existing ground is too steep, steps will be provided equal in the height to the fill layer thickness, with a proper width and down- slope cross fall. The embankment surface will be kept free from precipitation by providing temporary drainage.

Figure 3-49 shows the spreading and compaction of gravel and earth materials along the road construction alignment.



Figure 3-49. Spreading and Compaction of Gravel and Earth Materials

3.9.6 Reinforced Concrete Piles

Reinforced concrete piles, cast in situ to the specified diameter, will be used when the bearing capacity of the soil underlying the foundation is not sufficient to support the design pressure of the structure. The work consists of drilling the shaft for the in-situ pile, providing for bentonite slurry or casing the shaft in extremely poor ground conditions, and the placement of concrete using a tremmie pipe and curing.

There may also be cases where nearby borehole test results will indicate strong-enough foundation soils to allow shallow foundations in the design, but where the real site condition is different, for example due to weaker soil or higher water table. In areas with dubious soil conditions, design consultants make available alternative piled-foundation designs so that the Project's progress is not unnecessarily adversely affected.



Figure 3-50. Pile Casting

3.9.7 Lean Concrete

Lean concrete (15 N/mm²) applies to the supply and placement of lean-mix concrete, including any required formwork (including blockouts) and waterproofing.

The lean-mix concrete will be batched, transported to the required location along the alignment, placed directly onto the prepared ground, consolidated, finished, and cured. The concrete will either be placed directly from the concrete mixer truck, with a concrete pump, or with a concrete bucket, which will be lifted by either a mobile crane or tower crane. After the curing period all formwork will be removed and prepared for reuse.



Figure 3-51. Lean Concrete Placement for Stepped Structural Foundation

3.9.8 Foundation Concrete

'Reinforced concrete in foundation' applies to the provision of all required aggregates, cement, additives, water, and equipment to mix, transport, place, compact, finish, protect, and cure foundation concrete. This concrete will be placed below grade and act as a foundation for walls, piers and/or abutments.

This work item commences when the excavation for the foundation is complete, piling placed, sub-grade is proofed, and lean concrete completed. Localized control and pumping of water may be required to maintain the integrity of the sub-grade.

Foundations will normally be constructed in single lifts. First, the sides of the foundation are formed using panel type formwork and supported. Then the rebar is installed, per design drawings. Concrete is then placed using concrete pump or concrete bucket in layers, each layer being compacted using vibrators. After completion, the surface is finished by trowel and cured. Once cured, the formwork is removed.



Figure 3-52. Foundation Concreting Operation

3.9.9 Wall Concrete

Abutment walls and retaining walls are considered in this work category. Formwork for this kind of structural element consists of panel-type formwork systems. Panels are connected on the ground to the required overall dimension, and then lifted to the final position with a mobile or tower crane to form one side of the wall. After the wall rebar is installed, the opposite side of the form is assembled on the ground and lifted to close the formwork.

Concrete is placed by pump. Care must be taken during concreting in order to not exceed the permissible speed, which is dependent on the height of the wall and load-bearing characteristics of the formwork. Approach is to use well designed formwork systems, permitting walls of up to 10 m in height to be cast in lifts (4-5m). In order to prevent segregation at the lower parts of the wall during concreting, the hose of the concrete pump must be of sufficient length to assure a concrete dropping height not in excess of 1.5 m. Concrete will be placed in continuous lifts and will be well compacted using vibrators, as shown below.



Figure 3-53. Abutment Wall Ready for Concreting.

3.9.10 Pier Concrete

3.9.10.1 Piers for Viaducts

It was assumed that the construction design of piers for viaducts will be of a hollow type. These types of piers are cast in lifts of 4 - 5m height using special climbing formwork sets.

3.9.10.2 Piers for Overpasses

Piers for overpasses are typically of a solid design and smaller in size and height. They are cast in one lift, with panel-type formwork. Panel sizes are chosen according to pier dimensions and assembled on the ground. Pier rebar can be prefabricated and erected using mobile cranes. After rebar installation, formwork is closed and properly supported on all four sides, and the concrete is placed by pump or bucket.

3.9.10.3 Pier Heads for Overpasses

These are small in size, and as the pier height for overpasses is small, scaffolding is used to support the formwork for this type of pier head. Before erecting the scaffold, the ground is compacted and steel spreader plates are placed under the legs of the scaffold frames. At pier-head level a platform is built to form the bottom of the pier head and to serve as a working platform. The rebar cage at ground level will be prefabricated or installed in situ and lift it into position by mobile crane. The side forms are then closed, and concreting can proceed.

3.9.11 Pier Heads for Viaducts

These types of pier heads are typically larger in size and can be constructed at considerably higher elevations; we therefore utilize the formwork and pier-head concrete, is supported by a system of truss girders anchored to the pier by special connections (see Figure 3-54).



Figure 3-54. Pier Concreting

3.9.12 Beam Transportation

Within the beam production yard, two-gantry cranes will be used.

For short distance transportation (< 500 m), mobilifts with a proper capacity will be used. They will work in groups of two, each lifting one end of the beam with specially designed lifting attachments. Mobilifts will be used to haul the beams from the beam-production yard to nearby storage areas, or from temporary storage close to the structure to the launching girder (or cranes) for beam installation. They are not meant for off-road use, so proper access roads between the beam plant, temporary storage areas and structures will be arranged.

For longer hauling distances (> 500m), which will constitute the majority of beam transportation on this Project, special beam trailers will be used (see Figure 3-55). To use this type of beam trailer, earthworks must be completed, therefore structure construction and earthwork activities will be closely coordinated.



Figure 3-55. Specialist Trailer Transportation

3.9.13 Beam Installation

There are two possibilities for installing the beams, either by launching girder or with cranes.

Beam installation by crane is faster; however, it is limited by structure height and access. Cranes will be stationed between the piers and the beams will be brought either by Mobilifts or beam trailer to a location adjacent to the cranes for pick up. It is assumed that with cranes 4 to 8 beams per day can be installed, dependent on the beam-hauling distance. If the structure is higher than 20m, it is likely that the lifting radius may exceed our crane's capacity. In addition, a higher structure means a deeper valley, and therefore steeper access – and slopes greater than 5-6% are beyond Mobilifts or beam-trailer capacity. In such cases, launching girders will be used.



Figure 3-56. Preparation of Beam Installation

3.9.14 Deck Slab Concrete

For structures with precast concrete beams, the deck slab is cast on top of the beams to form the carriageway of the structure. For structures without precast beams, scaffolding and formwork is required to support the deck slab concrete.

First, the side forms to the deck are erected, then the rebar is installed. Following the final check of the top elevation, concrete is placed by pump. To achieve a smooth concrete surface, vibrating screeds will be used. Proper curing control is important to prevent cracking on such a large surface area.

3.9.15 Description of Drainage Work Methods

Drainage works will follow the completion of earthworks activities up to sub-grade level. Excavators will perform drainage-pipe excavation. Slip-form pavers will be used for channels and gutters to achieve the shortest installation time, whilst delivering excellent quality. Similarly, the use of prefabricated culverts is proposed to shorten the construction period. Drainage works can be classified as follows:

- Internal Drainage: Collector pipes, cross pipes, manholes, water inlets, perforated drainage pipes, concrete channels, bridge drainage and separators; and
- External Drainage: Culverts, drainage ditches, lagoons, and down chutes.

The aim of internal drainage is to collect water coming from concrete ditches and down chutes, and to take the discharge of water from the internal.

The aim of external drainage is to collect water coming from concrete ditches and down chutes, and to take the discharge of water from the internal drainage system and collect it all in

lagoons. These lagoons facilitate the precipitation of solid wastes, resulting in the discharge of clean water to natural watercourses.

For drainage excavation in general, it is planned on utilizing the following equipment:

- Excavators for collector, cross pipe and separator excavation; and
- Rubber tire excavators for water inlet excavation.



Figure 3-57. Lagoon Construction

3.9.15.1 Internal Drainage

3.9.15.1.1 Collector Pipes

Excavation will be executed as per design, and the excavated material will be kept adjacent to the trench to act as a safety barricade.

The pipes will be backfilled as per design, and thereafter with selected suitable excavated material.

3.9.15.1.2 Cross Pipes

After excavation, the pipe will be placed onto lean concrete and will be protected as per design. Since the backfill depth is shallow, excavated material is unsuitable for cross- pipe backfill. It is usual and common practice to use 0 - 25 or 0 – 30 mm crushed aggregate on these backfills to prevent deformation at the asphalt surface over the cross pipes in the future. But use of material for backfilling will be proceeded as per design.

3.9.15.1.3 Slotted Pipes

Medium-slotted pipes might be used to collect water coming from the asphalt surface.

3.9.15.1.4 Channel and Gutters

Channels will be applied on cut sections, and gutters will be applied on fill sections. Sub-base will be spread and compacted, and our survey crews will set up offset wires for the slip form paver. Typical internal drainage system works are shown below.

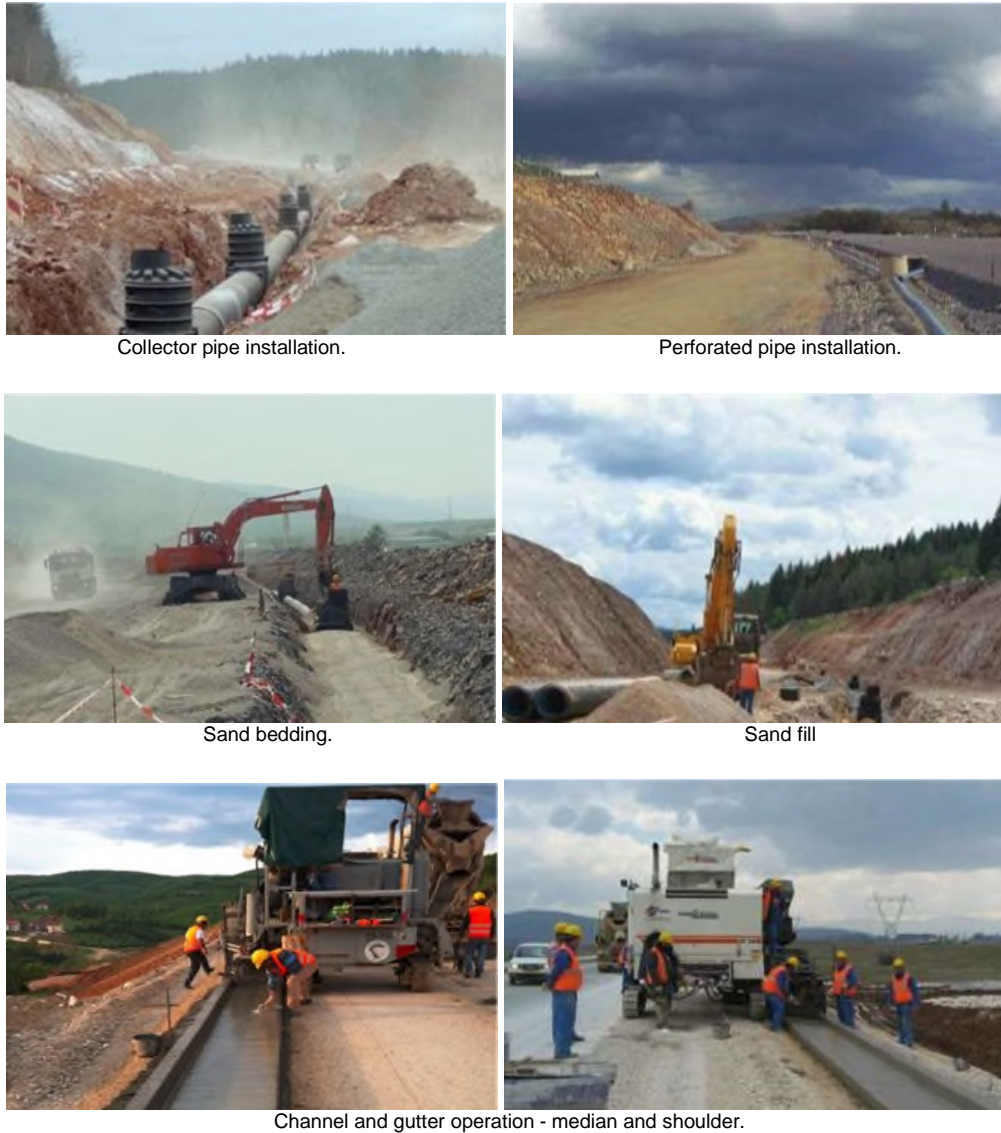


Figure 3-58. Drainage Components' Installation and Finishing Works

3.9.15.2 External Drainage

3.9.15.2.1 Culverts

Culvert operations start with earthworks operation. There are two types of culverts: box culverts and pipe culverts.

3.9.15.2.2 Box Culverts

Either prefabricated (precast) or cast in situ method can be used. Preference is the precast culvert method, as this permits acceleration of the earthworks. According to the experience of the Contractor, a box culvert (of 1.5 m x 2.0 m size) can be constructed by the precast method 75% faster than the cast in situ method. In addition, the production quality will be better, and the operation will not be weather susceptible. Precast culvert plants will be located adjacent to our precast beam plants.

Larger culverts (> 2.0 m x 2.0 m size) will be constructed in situ, as precast elements of this size or bigger become too heavy to lift with standard cranes.

3.9.15.2.3 Pipe Culverts

Pipe culverts usually will be constructed on local and parallel roads. It is expected that the pipe diameters to be between 60 and 140 cm. After the placing of lean concrete, the pipes will be laid and covered by concrete. Finally, the inlet and outlet structures will be constructed.

3.9.15.2.4 Drainage Ditches

Drainage ditches will be constructed as V type or trapeze type to collect water coming from the top of the cut or fill slopes and transfer it to the culverts or absorption wells.

3.9.16 Description of Paving Work Methods

Paving operations will start with sub-grading works, following the completion of drainage works. In order to meet the schedule and quality requirements, high capacity quarries, crushers, sub-base and asphalt plants are needed to support the paving laydown operations. As with all critical path activities, it is committed to achievement of the schedule through a variety of shift patterns. A rotation system will be implemented to ensure our operators have sufficient rest time between shifts. Detailed execution planning for the paving works is described below.

3.9.16.1 Preparation of Sub-Grading – Capping Layer

Preparation of the sub-grading capping layer relates to the spreading and compacting of suitable material over the completed cut, or last layer of fill, to improve the bearing capacity of the roadbed under the sub- base and asphalt layers.

The sub-grade crew will execute sub-grade capping layer works. The material is spread by graders up to the defined thickness and compacted with rollers to achieve required compaction and density, as shown below.



Sub-grade placement.



Spreading the sub-base.



Concrete ditches and down chute construction.

Figure 3-59. Sub-base and Ditches Construction and Finishing Works

3.9.16.2 Mechanical Sub-Base

'Mechanical sub-base' is the provision of the specified aggregate mixture, transported to site, and spread and compacted according to the specifications.

Mechanically prepared sub-base material is transported to the site by truck. Spreader boxes driven by bulldozers spread the first layer of sub-base. This layer is then compacted by the rollers. The final (second) layer is spread by pavers to achieve a smooth and precise level and is compacted. Typical photographs of this operation are shown in Figure 3-60.

3.9.16.3 Asphalt Concrete Binder Course

'Asphalt concrete binder course' is the preparation of plant-mix surfacing mixtures by hot mixing in a central batching plant, loading and transporting the material to the site, placing the materials by means of finishers with electronic controls, and compacting. Setting the baseline for finishes with electronically guided sensors, preparation of the adjusted offset line to help set elevations, staking, levelling, and monitoring of the asphalt placement will be performed as part of this item.

Asphalt material will be transported from the asphalt plants, with the quantity matching the placement capacity. Due to the width of the paved surface, 2 pavers side by side to place the asphalt layer will be required. The joints will be provided under the traffic line between the lanes. Sufficient double-drum and rubber-tired rollers will be used to compact the layer.



Figure 3-60. Drumrollers Compact the Asphalt Layer

3.9.16.4 Asphalt Concrete Wearing Course

Asphalt Concrete Wearing Course is the preparation of plant-mix surfacing mixtures by hot mixing in a central batching plant, loading and transporting the material to the site, placing the materials by means of finishers with electronic controls, and compacting. Setting the baseline for finishes with electronically guided sensors, preparation of the adjusted offset line to help set elevations, staking, leveling, and monitoring of the asphalt placement will be performed as part of this item.

3.9.17 Finishing Works Methods

Finishing works will start in parallel with related construction operations. These works will be performed by direct hire forces or by subcontractors. Finishing works can be summarized as follows:

- Erection of cage-type fence
- Installation of safety barriers (guardrails) on the alignment
- Installation of bridge protective barriers (guardrails) on the bridges
- Installation of vertical signs
- Erection of sign gantries
- Horizontal painting
- Telecom ducts
- Grassed areas and hydroseeding.



Figure 3-61. Finishing Works

3.10 Project Operation Activities

In the current condition (preliminary data of the “Roads of Serbia” for 2018), the value of average annual daily traffic between Pojate and Preljina ranges from 3,609 vehicles/day (section Ratina - Kraljevo (Kamidžora)) to 12,743 vehicles/day (section Mrčajevci - Preljina). The average value, which accounts for the lengths of individual sections, is 8,205 vehicles/day. After constructing the Motorway, part of this traffic will stay on the existing roads and other part will be on the new motorway sections.

In the operational phase of the Motorway, the transit time between Pojate and Preljina will be reduced from two hours to less than one hour. It is planned to make the motorway operational in October 2023. Forecast values of Annual Average Daily Traffic (AADT) on motorway sections for the first and the last year of traffic analysis are set forth here below.

Table 3-18. Motorway sections forecast AADT (vehicles/day)

Section-1: Forecast Study Results (2018)						
Section	Year	PC*	BUS	LFV+MFV*	HFV+TT*	Total
Pojate - Čičevac	2023	4664	49	266	706	5686
	2043	7773	69	413	1124	9380
Čičevac - Kruševac east	2023	6001	224	449	1031	7706
	2043	10002	316	697	1644	12658
Kruševac east - Kruševac west	2023	3853	0	315	899	5067
	2043	6420	1	489	1434	8344
Kruševac west - Koševi	2023	3570	0	383	566	4520
	2043	5957	0	593	904	7455

Section-2: Forecast Study Results (2011)						
section	year	PC	BUS	LFV+MFV	HFV+TT	total
Koševi - Velika Drenova	2015	9477	176	328	511	10493
	2035	19704	280	640	1008	21631
Velika Drenova - Trstenik	2015	7774	134	301	508	8716
	2035	16292	214	596	1001	18103
Trstenik - Vrnjačka Banja	2015	7749	123	306	528	8705
	2035	16238	196	605	1040	18080
Vrnjačka Banja - Ratina	2015	7798	162	322	557	8839
	2035	16342	259	638	1098	18336
Ratina - Kamidžora	2015	8141	122	276	482	9021
	2035	17061	194	546	938	18739
Kamidžora - Adrani	2015	4380	143	255	519	5298
	2035	9158	225	498	1019	10899

Section-3: Forecast Study Results (2018)						
section	year	PC	BUS	LFV+MFV	HFV+TT	total
Adrani - Mrčajevci	2023	5193	118	387	982	6680
	2042	8526	165	595	1542	10828
Mrčajevci - Preljina	2023	8682	181	630	1266	10759
	2042	14895	252	969	1988	18104
Preljina - Preljina AP	2023	11623	233	625	1402	13883
	2042	19081	324	962	2202	22569

* PC: Private Cars, LFT: Light Freight Vehicle, MFT: Medium Freight Vehicle, HFT: Heavy Freight Vehicle, TT: Tractor Trailer

Toll Collection

All junctions are designed according to closed toll fee payment system and include control access to the Motorway through the toll platforms. In other words, toll payment collection will be performed by paying directly to toll staff at booths or by toll card (electronic pre-paid payment system).

Table 3-19. Financial effects-income from toll and commercial income (Million €)

Year	Pojate- Kruševac (Koševi)	Kruševac (Koševi)-Adrani	Adrani-Preljina	TOTAL Pojate-Preljina (all 3 sections)
2023	3.93	8,66	5.35	17.94
2044	17.22	35.75	21.47	74.44

The following table shows unit rate for toll collection, by basic vehicle type in Serbia.

Table 3-20. Unit rates by basic vehicle type-category in Serbia





Vehicle categories			
I	II	III	IV
			
Rate in EUR/km			
0.03	0.05	0.10	0.20

Table 3-21. Facilities for the operational phase of the Morava Corridor Motorway Project

Sections	Sector	KP	Operational Project Facility ⁸
1	Sector-1	7,200 m	Parking Area
2	Sector-4	33,750 m	Service Area
2	Sector-4	34,790 m	Maintenance Area
2	Sector-5	44,875 m	Parking Area
2	Sector-6	64,000 m	Service Area
2	Sector-7	73,400 m	Parking Area
3	Sector-8	80,950 m	Maintenance Area
3	Sector-9	99,600 m	Parking Area

The Motorway connecting Preljina near Čačak with Pojate on the A1 Motorway (the North-South motorway in central Serbia) through Kruševac, provides a linkage for the residents (more than 500,000 people) and 21,000 companies. This will include better accessibility for businesses in the Region to expand their geographical markets and resources to other areas and countries.

The Motorway is expected to attract more investors in the Region. The increased investment will bring in more employment opportunities to the local people, including diversification of economic activities. This is quite significant considering the fact that majority of the expropriated land are agricultural lands, and PAPs whom may be affected economically can shift and continue to attribute their income through newly introduced economic fields.

⁸ Operational Project Facilities include parking area, service area and maintenance area.

In order to develop local economy throughout the operation phase of the Motorway, the Spatial Plan indicates that there will be two maintenance facilities throughout the alignment in which is expected to employ local community within its departments. Also, the Project will establish amenities including; parking lots, rest areas, motels, gas station (including grocery, cafes and restaurant in which is expected to increase benefits to local economy. Therefore, after the establishment of the Project, roadside businesses may enhance and facilitate trade along the Proposed Motorway Route.

For procurement services, the Project will be subject to regular maintenance, including summer and winter maintenances, in which will provide procurement opportunities of local and national contractors. This is expected to further induce employment opportunities and increase of livelihood of PAPs. Other induced impacts are considered to be mostly in the service sector such as tire repair services, on the road assistance and auto mechanics.

3.11 Resource Management

During the design and construction phase of the Project, there will be different types of resources usage including water consumption for domestic needs in camps, production needs in concrete batching plants etc. The estimated amount of water use for labor camps is 25,000 tons in total of 2 camps as monthly average. If the number of camps is to be 3 then this estimate will yield as 38,000 tons per month. Water will mainly be supplied from the water wells.

For batch plants, water consumption of 10,000 tons is estimated as monthly average. Batch plants will work year-round. Amount of raw material to be used will be about 36,000 tons of aggregate and 7,500 tons of cement in order to produce 20,000 m³ of concrete as monthly average. Around 25 dump trucks will be used for raw material transportation to batch plants. 750 m³ of concrete production is estimated as daily average. For this purpose, 280 tons of cement will be consumed as daily average. Amount of daily water use for batch plant is foreseen as 400 tons per day.

Regarding the consumptions of resources in asphalt plants, it is estimated to consume 3,500 tons of water as monthly average. Asphalt production of 3,000 tons is planned on a daily basis average.

Amount of aggregate required for the construction for Sections 1, 2 and 3 are estimated as 1,984,000 m³, 3,894,500 m³ and 2,277,900 m³, respectively. These amounts will include reserves of alluvial gravel, aggregate of carbonate origin (limestone), used for the construction of the upper supporting layers of pavement structure and concrete. These materials will be provided from different locales. For instance, according to the national EIA Report of Section-1, "Ladjevci", "Chokoće", "Plana" are planned to be such areas where the construction raw material including aggregates will be provided. Likewise, aggregates of Andensitic origin used for the construction of the upper pavement layers (bonding and wear layer) are being exploited at two sites in the wider zone of corridor E-761: "Kamenica" and "Strana". All listed sites of the rock aggregate are located 20-30 km from the construction site. All materials used for

installation in embankments, as well as for the construction of lower and upper bearing pads must meet the requirements defined by national standards.

In addition, excavation materials to be obtained as a result of river regulation works will also be used in the construction of the Motorway. The amount to be obtained after this regulation works is calculated as 9.968.980 m³. Regulation works will not include filling operations in the River bottom.

3.12 Waste Management

Construction activities of the Project will cause all sorts of wastes including hazardous and non-hazardous as well as inert wastes such as excess excavated material that needs to be dumped properly. If wastes are not inadequately managed, this can lead the major environmental impacts.

According to the national EIA studies, the evaluation of the spillage of the materials was made on the basis of experience arising from 20-year studies where the quantities of solid and liquid deposit per unit of road surface for reference traffic load (average annual daily traffic – 8,700 vehicles) are given annually. For the forecast traffic load on the sections of the Motorway Pojate-Koshevo, oil and lubricant spills are calculated proportionally and are estimated at 1.9-3.3 kg / ha annually.

A Waste Management Plan (WMP) will be prepared and maintained by the Contractor and its subcontractors. The WMP will determine the types and quantities of wastes that are likely to form during the construction phase, including: excavated materials and construction wastes;

- Most of the excavated material will be reused, if practical and proper in the way to serve as filling material or reinstatement / restoration /landscape works in the scope of the environmental mitigation implementations;
- In the pre-construction activities, location of the proper landfills will be determined in order to be used for the disposal of the wastes and it should be covered in the WMP.

Waste materials generated by the regular operation of the Motorway are as follows:

- solid municipal waste within project facilities,
- solid municipal waste from uncontrolled emissions of road users on slopes (wild landfills),
- waste oils and sludge accumulated in separators for the purification of atmospheric wastewaters from roadways,
- waste resulting from regular and periodic road maintenance.

Waste management regarding the operational phase of the Motorway will be mainly composed of food, paper, and packaging waste generated by passengers that would use the parking

places and gas stations along the Motorway. With the appropriate number of waste collection bins and containers are going to be provided at the parking places and cooperation with local public utility companies for waste disposal, the significance of the impact is to be negligible.

Any hazardous, contaminated wastes to be generated from the operation and maintenance facilities as well as gas stations will be disposed according to the national requirements. Private gas station facilities are responsible for their own operations in terms of the environmental compliances. Furthermore, during regular traffic, release of liquid substances may occur in the sense of leaking tanks, or engine parts, with fuel, engine oil and antifreeze remaining on the Motorway.

3.13 Employment

The Project will result in temporary employments for the duration of the construction phase (expected to be 4 years, see Figure 3-62). The average number of the construction workers will be 3,100 and the peak number of the project workers will be approximately 3,800. Majority of the unskilled workforce are expected to be hired from the locals of Social Aol, on the other hand, majority of the skilled construction workers are expected to be recruited from expat employees.

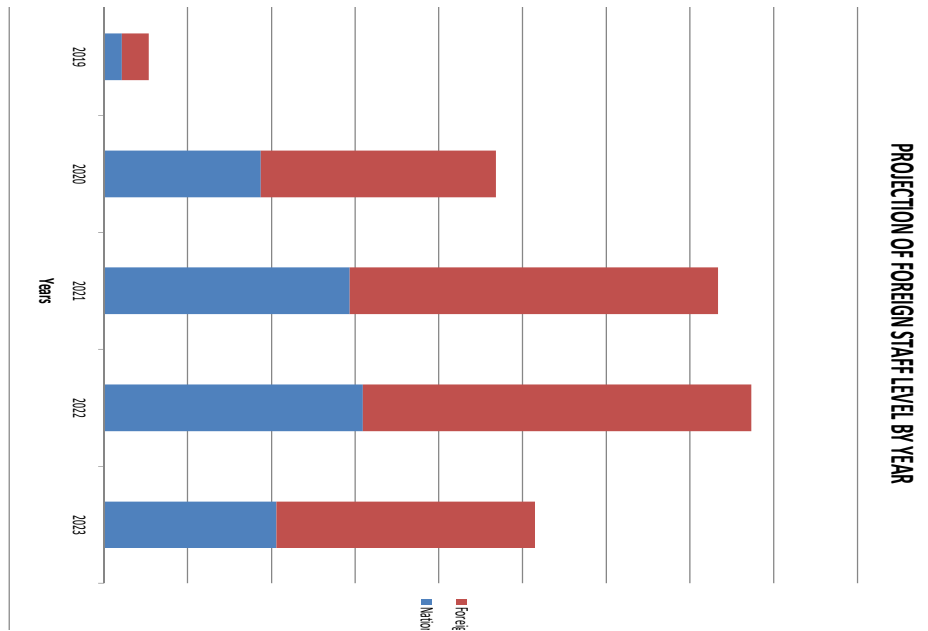


Figure 3-62. Construction Employment Projection

Operational period employment strategy is discussed in Section 3.16.

3.14 Land use / Land take and resettlement

There will be loss of agricultural, forest, municipal, village and private land as a result of the Project. The existing land use of the social Aol will be affected by the construction of the Project and its opponents as well as by the project facilities.

The Project execution will require permanent acquisition of land by using expropriation. The Project is expected to cause economic displacement and physical resettlement, however, at this stage, the magnitude of displacement is not completely known. Identification of the landowners for Section-1 started in February 2019 and the expropriation process started in April 2019, which is planned to be completed in May 2020 by Corridors of Serbia. On the other hand, Location Conditions⁹ for Section 2 and 3 is currently in progress; therefore the exact amount of expropriated land is currently unknown.

The CoS will be responsible for the expropriation activities for each section of the Project. Responsible Institutions and their roles on land acquisition and expropriation for the Project is provided in Table below.

Table 3-22. Responsible Institutions on Land Acquisition & Expropriation

Sections	Expropriation Roles
Section-1	CoS
Section-2	CoS
Section-3	CoS
Responsibilities	<ul style="list-style-type: none"> • Land cadastral maps • Expropriation administration • Payment • RAP implementation

All sections of the Motorway are on flat farmland and next to the West Morava River, which is on a large flood plain. The site is accessible due to the proximity of local roads and access points. However, in addition to local roads, temporary access roads are needed to access the Site. Land use for the access roads Construction plan comprises passing through agricultural lands. All expropriation and Land Access provisions are the responsibility of the Government of Serbia. Within the scope of the Project land acquisition activities, the *number* of houses and businesses to be physically displaced is going to be determined exactly at this stage (in particular when the EIA for Section-2 is prepared and submitted for approval by CIP).

According to the data obtained by CoS and observations of the ESIA Consultant, arable land (non-irrigated arable land) and heterogeneous agricultural areas (with complex cultivation patterns) covers the largest area along the Aol, which covers 500 m on each side of the motorway along the Proposed Motorway Route. The Aol also includes urban fabric, industrial,

⁹ The Project has previously prepared the separate National "Environmental Impact Assessment (EIA)" Reports for each section of the Project route alignment and received approvals from related authorities. However, these EIA Reports are being revised due to the fact that, in the Spring of 2014, Serbia faced a tragic flood disaster that has affected houses, infrastructure, livelihood, agriculture, and industries. Therefore, the Project started a new Location Condition Collection in order to receive national EIA for the re-proposed Project, for all sections.

commercial and transport units, mine, dump and construction sites, artificial, non-agricultural vegetated areas, pastures, heterogeneous agricultural areas, forests, scrub and/or herbaceous vegetation associations, inland wetlands, Inland waters. Total area of land to be used in the Aol is estimated about 18,437 ha, details can be found in Table 3-23 below.

The Project will also require some temporary land take for construction routes, construction laydown areas and camps, temporary storage of excavated materials/soil, cut trees etc. Temporary land and property impacts (for borrow pits, excess material disposal sites, storage, access roads and worker camps) will affect the landowners during the construction phase of the Project. Total area of land to be used for the temporary access roads, project facilities and motorway is estimated approximately 2.493 ha, details can be found in Table 3-23.

Table 3-23. Land Use Areas in Aol

Land Use (for The Aol)	Area (ha)	Percentage
Intensive unmixed crops	11,312.16	61.4
Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix	2,710.59	14.7
Thermophilous deciduous woodland	2,211.62	12.0
Residential buildings of city and town centres	863.65	4.7
Permanent non-tidal, smooth-flowing watercourses	685.95	3.7
Permanent mesotrophic pastures and aftermath-grazed meadows	188.42	1.0
Rural industrial and commercial sites still in active use	142.92	0.8
Road networks	130.83	0.7
Highly artificial non-saline standing waters	116.62	0.6
Active opencast mineral extraction sites, including quarries	74.43	0.4
Total Area (ha)	18,437.19	100.00%

Table 3-24. Land Use Areas for the Temporary Access Roads, Project Facilities and Motorway

Land Use (for the Temporary Access Roads, Project Facilities and Motorway)	Area (ha)	Percentage
Intensive unmixed crops	1,696.80	68.06
Thermophilous deciduous woodland	338.90	13.59
Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix	319.94	12.83
Road networks	29.22	1.17
Permanent mesotrophic pastures and aftermath-grazed meadows	67.82	2.72
Residential buildings of city and town centres	21.15	0.85
Permanent non-tidal, smooth-flowing watercourses	4.64	0.19
Highly artificial non-saline standing waters	3.35	0.13
Active opencast mineral extraction sites, including quarries	1.54	0.06
Rural industrial and commercial sites still in active use	9.72	0.39
Total Area (ha)	2,493.08	100.00%

Detailed information on the Project Owner's commitments for the Project Affected People and physical, economic displacement and livelihood impacts caused by Project implementation in all Project phases can be found in Resettlement and Livelihood Restoration Framework (RLRF) prepared as a part of ESIA Disclosure Package.

Also, Resettlement Action Plan (RAP) is currently being prepared by an independent consultant company in line with IFC Performance Standard 5 in order to:

- mitigate adverse social and economic impacts of expropriation and temporary or permanent losses by providing compensation for losses of property on the basis of replacement costs and ensure implementation of the activities of displacement with appropriate data disclosure, consultations and participation of the PAPs,
- at a minimum, re-establish sources of income and living standards of resettled persons to the level before Project impact.

The Project Employer will prepare and make available to all PAPs and interested stakeholders the summary document of the RAP, after final RAP has been adopted, in addition of appropriate full RAP disclosure.

In addition to land acquisition, the Proposed Motorway Route may divide the land parcels or abrupt access to remaining land. During the disclosure of the draft Spatial Plan on August 2019, the landowners and land users underlined the importance of the accessibility to their agriculture lands. Hence the Commission for Conducting the Public Insight of the Spatial Plan stated that the Project will take necessary measures such as interchanges, overpasses, bridges and underpasses in order to sustain the accessibility of the land owners and users to these areas in order to minimize any adverse impact on the livelihood resources.

The Project will avoid the acquisition of lands or land use rights that result in any physical or economic displacement where applicable. If the land acquisition and displacement is unavoidable, the Project will apply the measures to minimize the impacts of displacement.

3.15 Social Engagement

Stakeholder engagement is a two-way process of communication between the project parties and its stakeholders. It is a key part of the ESIA process, allowing stakeholders to express their views about the Project.

The Stakeholder Engagement Plan (SEP) presented in Appendix-3 has been developed with the aim of explaining how the Project will communicate with stakeholders that may be directly or indirectly affected by and / or interested in the Project. The SEP summarizes engagement activities undertaken to date and includes details of the approach and mechanisms proposed for future engagement with stakeholders. It also includes details of a grievance mechanism for stakeholders to raise any concerns related to the Project. In accordance to international best practice, objectives of the Stakeholder Engagement are to:

Chapter 3: Project Description

- build and maintain a constructive relationship with and among the stakeholders, in particular project-affected communities,
- promote environmental and social performance via effective stakeholder engagement,
- promote and provide effective means for adequate engagement with project-affected communities throughout the project cycle on issues that could potentially affect them so that their concerns are addressed accordingly and to ensure that meaningful environmental and social information is disclosed to them and to other stakeholders,
- ensure that all stakeholders have ways to access project information and raise issues,
- ensure that project-affected people (PAPs) have accessible and effective means to raise issues and grievances, and the Contractor respond to and manage such issues and grievances appropriately.

For the scope of ESIA studies following stakeholder engagement activities were carried out.

Table 3-25. Past Stakeholder Engagement Activities within the Scope of ESIA Studies

Engagement Activity	Details	Date																
Gap Assessment Studies for ESIA	For the initial stakeholder analysis, 2U1K conducted Key Informant Interviews (KII) carried out in order to: <ul style="list-style-type: none"> •understand the Justification of the Project; •obtain updated information on the EIAs prepared for the different phases of the Project; and •understand the possible environmental and social impacts and the approach to mitigations of the impacts. 	March 2019																
ESIA Consultation Phase	Following number of surveys and interviews conducted respectively and following sub-sections provide details of the surveys conducted. <table border="1" data-bbox="487 1134 1161 1459"> <thead> <tr> <th>Type of Survey/ Interview</th> <th>Number of Surveys/Interviews/ Meetings</th> </tr> </thead> <tbody> <tr> <td>Household Surveys</td> <td>1563</td> </tr> <tr> <td>Community Level Surveys</td> <td>48</td> </tr> <tr> <td>Key Informant Interviews (KIIs) during the Gap Assessment</td> <td>6</td> </tr> <tr> <td>KIIs with Non-Governmental Organizations</td> <td>9</td> </tr> <tr> <td>KIIs with Affected Municipalities</td> <td>7</td> </tr> <tr> <td>Focus Group Discussions</td> <td>7</td> </tr> <tr> <td>Business Surveys</td> <td>110</td> </tr> </tbody> </table>	Type of Survey/ Interview	Number of Surveys/Interviews/ Meetings	Household Surveys	1563	Community Level Surveys	48	Key Informant Interviews (KIIs) during the Gap Assessment	6	KIIs with Non-Governmental Organizations	9	KIIs with Affected Municipalities	7	Focus Group Discussions	7	Business Surveys	110	August 2019 – October 2019
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Focus Group Discussions	7																	
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Disclosure of the Resettlement and Livelihood Restoration Framework (RLRF)	In the third quarter of February 2020, public participation meetings for RLRF disclosure were conducted to share the scope of the Framework for each affected municipality.	Third quarter of February 2020																
ESIA Disclosure	On September 23-30, seven open air Public Participation Meetings were conducted in each affected municipalities. (Summary of the meetings can be found in Chapter 9 of this report and SEP).	September 2020																

It is important to note that, the Stakeholder Engagement Program, through an Informed Consultation and Participation (ICP) process, includes set of actions with targeted audience and responsibilities in order to ensure the maximum engagement level for all relevant stakeholders. The ICP process comprises all Project Phases including; pre-construction phase, construction phase and operation phase. Details of the engagement methods structured for the Project phases can be found in Chapter 9 of this Report and SEP.

3.16 Construction Management

The contractor will prepare its management plan covering the construction method statement that considers the commitments in the ESIA Report and its appendices (in particular Environmental and Social Management and Monitoring Plan (ESMMP) and its supporting sub-plans). The Construction time schedule that covers the important milestones of the construction works is provided in Figure 3-63. It should be noted that the construction works to be carried out by the contractor will be supervised by the CoS.

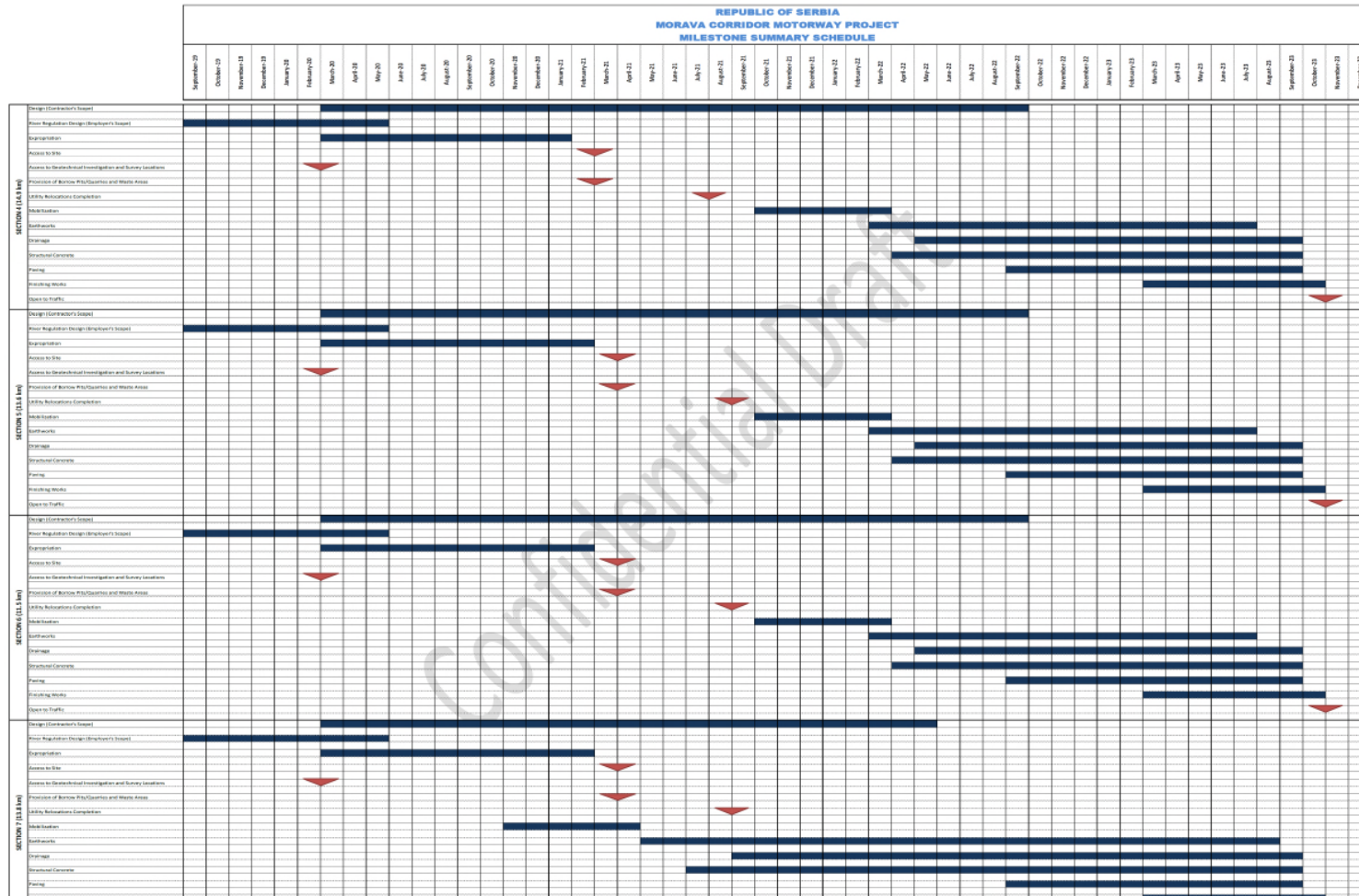


Figure 3-64. Construction Time Schedule (for all sectors) (Continue)

The Contractor's proposed construction management organizational structure for the execution of the Project is provided in Figure 3-66.

The management and monitoring of mitigations proposed in the ESIA, and which are the responsibility of the Contractor will be implemented by the appropriate department within the Contractor's organization. The implementation of environmental, health, safety and social commitments will be managed in line with the national and international requirements. The Contractor will prepare policies, plans and association procedures for this purpose.

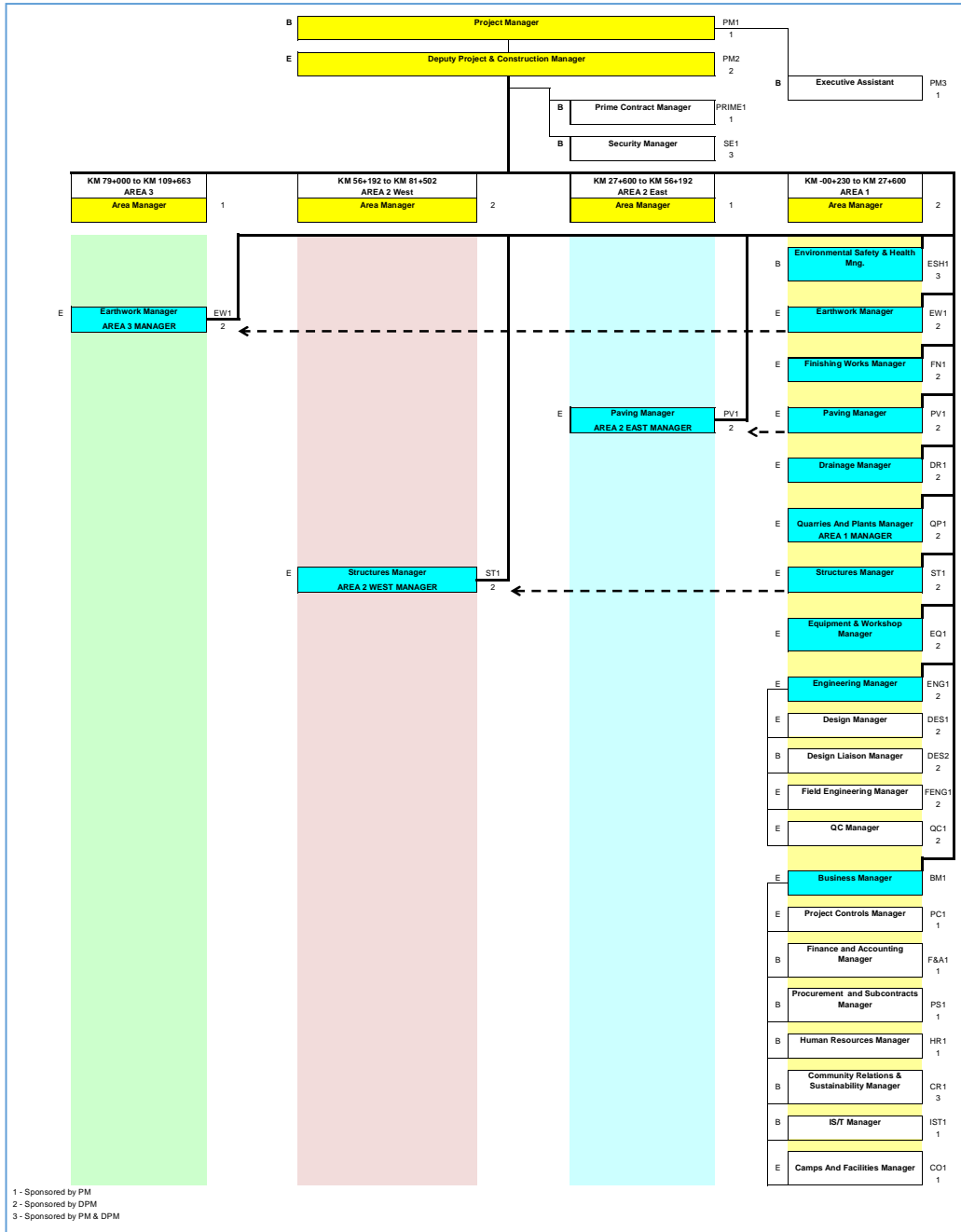


Figure 3-66. Proposed Construction Management Organization Structure

3.17 Operation Management

The Project is expected to be completed and commissioned in 2023, with 22 years of operation period (overall horizon of analysis is 25 years and it includes the period of investment and the period of operation). Corridors of Serbia (CoS) will operate the Motorway after its construction is completed for Section-1 and Section-2. On the other hand, Roads of Serbia (RoS) will be the responsible authority of the operation of Section-3 under the coordination of the CoS.

In order to develop local economy throughout the operation phase of the Motorway, the Spatial Plan indicates that there will be two maintenance facilities throughout the alignment in which is expected to employ local community within its departments. Also, the Project will establish amenities including; parking lots, rest areas, motels, gas station (including grocery, cafes and restaurant in which is expected to increase benefits to local economy. For national level, the primary benefit will be derived from the toll collection for the Motorway.

The National Highways in Serbia are under tolling. Therefore, the primary national benefit will be derived from the toll collection for the Motorway. Furthermore, the Motorway will significantly shorten the travel time and the Social Area Influence will benefit from the improved carriageway with higher quality transport movement and safer infrastructure. This will improve the facilitation of goods transport costs and commune of financial resources within the country, in general.

3.18 Operational Employment

Employees will be required for the operation of the toll collection and service facilities, the maintenance of the Motorway, and environmental health and safety staff such as the Emergency Response Team (ERT).

Based on the economic indicators of the previous motorway projects, it is expected that between 20 and 50 permanent local employees will be hired for the tolling station and toll collection of the Motorway.

The average number of personnel to be employed is expected to range between 300 and 400 full time equivalents throughout the years, including all contractors. These estimates will be further developed during detailed design and implementation. Many of the persons will be employed by the Operation and Maintenance (O&M) Contractor.