

**Document type:**

## REPORT

**Subject:**

Targeted Road Safety Inspection on Road II-13 in a Section with Concentration of RTAs from km 65+440 to km 66+200



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**Reason for inspection:**

Upon initiative of the MB of NSTC

**Date of initial survey:**

12 August 2025 / from 17:30 to 18:30 GMT +3

**Phase:**

**Final Report**

**Revision:**

01-07



## ■ Introduction:

This represents an independent survey (targeted road safety inspection) of Road II-13, which constitutes an established Section with Concentration of Road Traffic Accidents (SCRTA)<sup>1</sup> from km 65+440 to km 66+200 for identifying hazardous conditions, deficiencies and problems related to all its elements that increase the risk of accidents and injuries.

This document expresses an independent opinion of a group of experts on the extent to which the condition of Road II-13 in the Section with Concentration of RTAs from km 65+440 to km 66+200 complies with the requirements of the current design and other regulatory documents. The inspection carried out covers: the road projection and road profile, condition of road restraint systems, four intersections, lighting, road signs, road markings, pavement condition and risk analysis of road traffic accident occurrence.

This study is conducted on the basis of Art. 36l, para. 1 and para. 3 of the *Roads Act (RA)*. As well as in connection with Art. 2, para. 1, item 4, Art. 5, para. 3 of the *Regulation on the procedures for road infrastructure safety management*. On the basis of Art. 30, para. 1 of the Regulation, the results of the targeted road safety inspection are summarized in this report, which is provided to the head of the administration managing the road.

## ■ Subject and scope of inspection:

**A targeted road safety inspection was carried out on Road II-13 from km 65+440 to km 66+200 in a section that is established and designated as a Section with Concentration of Road Traffic Accidents.** Through visual inspection of the condition of road restraint systems, asphalt pavement condition, condition of road signs and road markings, condition of roadside facilities and all other elements within the road scope, data has been collected and summarized in this report. Based on this data, a risk analysis of road traffic accident occurrence is prepared and measures to minimize the risk are proposed.

The inspection was conducted in dry weather, at an air temperature of 28°, dry pavement, clear and sunny weather with good visibility. The inspection began at 17:30 and ended at 18:30 local time, at low humidity. The inspection was carried out by walking and by car in both directions of the studied road section.

The road consists of one carriageway with two traffic lanes, shoulder, slope and earth ditch.

The inspected section is located in a combination of horizontal and vertical curves with a length of 760 m in direction (**the longitudinal profile shows an elevation difference of approximately 10.9 m, with maximum gradient -8.6% and average -2.7%**). The inspection started at km 65+440 at road signs B24+B26 (70 km/h). The end point is at km

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<sup>1</sup> List of SCRTAs, according to the official data of the State Agency "Road Traffic Safety" (DABDP): <https://www.sars.gov.bg/uchastatsi-s-kontsentratsia-na-patnotransportni-proizshestia-uktp/>

66+200 at road signs A40 and T1 (300 m). First, the southern carriageway was traversed in the direction of travel from Byala Slatina to Knezha, and then an inspection was carried out in the opposite direction, starting at km 66+200 at the group of road signs located on both sides of the carriageway and visible when traveling towards Byala Slatina. The road signs at the starting and end points have an additional outline with yellow-green fluorescent retroreflective background in accordance with Art. 11, para. 1 of *Regulation No. RD-02-21-1 of 23 November 2023 on road sign signaling*.

Road markings were measured with a device (retroreflectometer) with valid annual calibration from the manufacturer. Several control measurements were made in both directions, and this report includes a table with the measurement results (measured values) and the exact location where the measurement was taken. The obtained results are compared with the requirements of Art. 7, para. 4, para. 8 and para. 9 of *Regulation No. 2 of 2001 on road marking signaling*.

Road signs were checked by visual method for compliance with the requirements of Art. 6, para. 4 and Art. 12, para. 1 of *Regulation No. RD-02-21-1 of 2023 on road sign signaling*.

The slip/skid resistance of the road pavement was measured against the requirements of *BDS EN 13036-4:2012 Road and airfield surface characteristics. Method for measurement of slip/skid resistance of a surface*. The measurement results are checked and compared against the requirements of: “*Methodology for measurement and assessment of road surface roughness, approved by Order No. RD-22-312*” (GUP, 1986), “*Temporary instruction for assessment of road pavement roughness*” (GUP, 1972) and “*Technical rules and requirements for road maintenance*” (NAPI, 2009).

The reason for conducting the targeted inspection by the NSTC team is numerous signals about the poor condition of the road, as well as collected information about a large number of road traffic accidents that occurred in the studied Section with Concentration of Road Traffic Accidents (SCRTA) on Road II-13.

There is an increased risk of road traffic accidents in this road section, despite the fact that it is designated as a SCRTA and according to data from the Road Infrastructure Agency it was made safe in 2025. In connection with this information, the decision was made to conduct a survey (targeted road safety inspection) of this section of Road II-13 to identify hazardous conditions, deficiencies and problems related to all its elements.

This is a report following a targeted road safety inspection conducted by an inspection team of the Association *European Center for Transport Policies*, as an independent non-governmental organization, whose scope includes the possibility of conducting such inspections.

## ■ Regulatory framework:

The Roads Act regulates public relations related to the ownership, use, management, operation, construction, repair, maintenance and financing of roads, as well as with the management of road infrastructure safety in the Republic of Bulgaria. This law also

applies to streets in settlements that are simultaneously sections of republican or municipal roads.

Roads form a unified road network and serve mainly for the transport of passengers and goods. The road network should develop in accordance with the transport and social needs of society, the infrastructure of settlements and the requirements in regulatory acts related to national security, environmental protection and traffic safety. Republican roads are motorways, expressways and first, second and third class roads that provide transport connections of national importance and form the state road network. Republican roads are exclusive state property.

Sections of republican and municipal roads within the boundaries of urbanized territories and settlement formations should have limited connections with the street network and traffic on them is carried out with priority. The routes of republican and municipal roads along the street network of settlements and settlement formations are determined by the general development plan.

Republican roads are managed by the Road Infrastructure Agency. Road management includes: operational planning of construction - design and construction, and maintenance of roads; provision of road projects and construction, including procurement and concessions for these activities; organizing, commissioning, financing and control of activities directly related to the design, construction, management, repair and maintenance of roads; organizing and implementing road protection, including road facilities and road accessories; ensuring public use of roads through regulation and control of motor vehicle traffic, issuing permits and introducing prohibitions on road use; exercising control over vehicles with regard to the proper operation of roads and their protection from damage; providing information and forecasts for road traffic; other activities determined by this law and its implementing regulations, which are not related to use and disposal.

The Agency carries out the activities related to the construction, repair and maintenance of republican roads. The Agency and municipalities jointly carry out, by mutual agreement, the activities related to the construction, maintenance and repair of republican roads within the boundaries of urbanized territories under the conditions and in the manner determined by the implementing regulations of the law. The construction, repair and maintenance of underground facilities, sidewalks, bicycle lanes, parking lots, pedestrian underpasses, lighting and roadside landscaping along republican roads within the boundaries of urbanized territories are organized by the respective municipality.

According to the Roads Act, an official who fails to fulfill his obligation under Art. 36b, para. 7 of the RA for carrying out the procedures under Art. 36b, para. 1, items 2 – 5 of the RA, shall be punished by a fine of 500 BGN, if the act does not constitute a crime. In case of a repeated violation under para. 1, the fine is in the amount of 1000 BGN.

Laws, subordinate regulatory documents and other official documents on which the present report:

1. Road Traffic Act (RTA);
2. Road Act(RA);
3. Regulation on the procedures for road infrastructure safety management of 2022;
4. Regulation №2 of 2001 on road marking signaling (N2);
5. Regulation №18 of 2001 on road sign signaling (N18);
6. Regulation № RD-02-21-1 of 2023 on road signaling with road signs (RD-02-21-1-PZ)
7. Ordinance on the procedures for road infrastructure safety management;
8. Regulation № RD-02-21-1 from 1 October 2024 on the conditions for construction or installation of artificial unevenness on the carriageway and other means of limiting traffic speed and the requirements for them (RD-02-21-1-IINN);
9. Regulation № RD-02-20-2 of 2022 on the organization of traffic on roads open for public use;
10. Regulation № RD-02-20-2 of 28 August 2018 on road design (RD-02-20-2-PP);
11. Regulation № RD-02-20-1 of 2024 on the conditions and procedure for the use of road restraint systems and the requirements for them (RD-02-20-1-RRS);
12. Data provided under the Access to Public Information Act (APIA) from RIA and Regional Road Administration (RRA) Vratsa.

## ■ Findings from the inspection carried out:

### 1. Road projection and road profile

- **Visibility distance**

The study is conducted in a section representing a combination of horizontal and vertical curves. The total length of the study between the starting point at km 65+440 to km 66+200 is 760 m<sup>2</sup>.

In the considered section of road II-13 – between km 65+438 and km 66+200 (length 746 m) – there is a combination of horizontal and vertical curves, which has a direct influence on the actual visibility for the driver. According to the longitudinal profile data, the elevation difference in this section is approximately 10.9 m, as the road begins with a descent (maximum gradient around –8.6%), after which it transitions to a slight ascent (+0.7%) and then levels out again. This geometry forms a vertical sag curve, combined with a horizontal right curve in plan.

As a result, the driver's line of sight is limited in the middle part of the section – the zone between 200–500 m, where the lowest elevation is observed (around 147 m above sea level). With such a profile, the driver traveling from km 65+438 towards km 66+219 does not have a direct visual connection with oncoming vehicles located in the lower part of the sag vertical curve. This significantly reduces the stopping sight distance, especially when traveling at high speed. At a standard driver eye height of 1.1 m and an object (obstacle) height of 0.1 m, the effective visibility distance in this zone may drop below 100–120 m, which is below the minimum permissible value for a speed regime of 90 km/h (requirement – minimum 160–180 m according to Ordinance No. RD-02-20-2).

The situation is complicated by the fact that the section includes a horizontal right curve, which further shifts the line of sight beyond the road centerline. In the presence of vegetation in the shoulder or roadside plantings, the actual visibility distance may be reduced to 70–80 m. This creates conditions for improper overtaking, delayed reaction upon the appearance of oncoming vehicles and an increased risk of head-on collision.

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<sup>2</sup>For the purposes of this report, it is assumed that the carriageway in the direction from town Byala Slatina to town Knezha is the right lane (southern lane), and in the opposite direction, from town Knezha to town Byala Slatina is the left lane (northern lane).





Figure 1 – Visibility study in the inspected road section II-1.

The visibility distance in the section km 65+440 to km 66+200 is marginally permissible for a speed regime up to 50 km/h, as currently in force. At this speed, the minimum regulatory value for stopping sight distance is approximately 65–70 m, which is approximately provided at the lowest point of the vertical curve. Nevertheless, the combination of horizontal right and vertical sag curves continues to limit visual contact between oncoming vehicles and reduces the possibility of timely reaction in the event of a hazard occurring.

Therefore, although formally the speed limit of 50 km/h compensates for some of the geometric deficiencies, the section remains risky, especially on wet pavement, nighttime or by drivers who do not comply with the limits. It is recommended that the current speed limit be maintained, supplemented by warning signage for limited visibility, and periodic mowing of vegetation in the inner shoulder area to ensure real visibility distance corresponding to safe braking.

- **Speed limits**

In the section between km 65+440 and km 66+200 on road II-13, the available field of visibility is strongly influenced by the combination of a horizontal right curve and a vertical sag curve. The road geometry creates a visibility limitation in the middle part of the section, where the longitudinal profile reaches its lowest point. In this zone, the line of sight is interrupted by the vertical sag curve, and the horizontal trajectory further shifts the visual ray towards the inner shoulder. The presence of vegetation, slopes, or other objects on the inner radius of the curve can significantly reduce or worsen the actual visibility distance. This creates conditions where drivers do not have a direct visual

connection with oncoming vehicles, especially when traveling in a northeasterly direction, where the descent is observed.

During the dark hours of the day, visibility further deteriorates as the headlight beam at sag curves is projected onto the pavement and does not illuminate sufficiently ahead.

The speed limit of 50 km/h, introduced in this section, is justified given the geometric characteristics. At this speed the driver has more time to react and a shorter braking distance, which partially compensates for the reduced visibility distance. However, on wet pavement, dirty road or slippery surface, the actual adhesion can be significantly reduced, and the braking distance can increase. For this reason, even at 50 km/h, traffic in this section requires special attention and compliance with the limit.

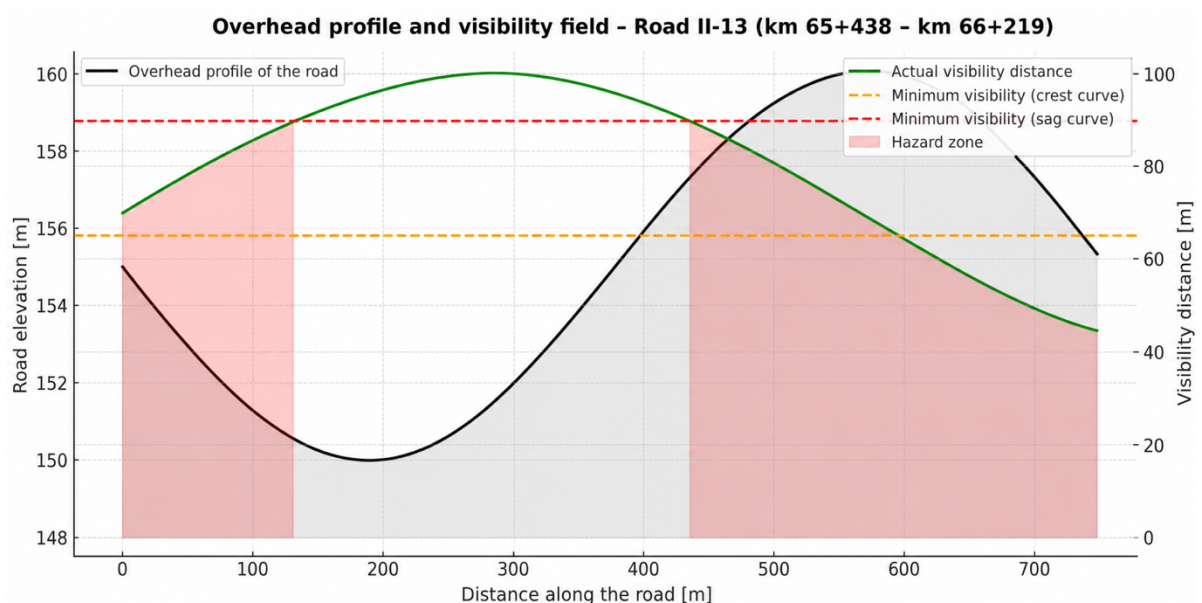


Figure 2 – Overhead profile and visibility field – Road II-13 from km 65+438 to km 66+200.

The minimum required stopping sight distance at a speed of 50 km/h, calculated under standard conditions (reaction time 2 seconds, eye height 1.1 m, road gradient up to 8.6%), is in the range between 60 and 70 meters on dry pavement with good adhesion. On wet pavement with reduced adhesion, the required distance may reach 90–100 meters. This means that the visibility in the considered section is at the limit of what is normatively permissible, and under adverse weather conditions it may prove insufficient. Therefore, the speed limit of 50 km/h should be maintained, with regular mowing and maintenance of the inner shoulder, removal of obstructing vegetation and placement of warning signs for limited visibility. These measures would ensure real safety and correspondence between the road geometric characteristics, the speed regime and the required distance for safe braking.

- **Projection**

In plan, the road forms a **right horizontal curve**, inserted in a relatively short straight section at the beginning and a longer straight section towards the end. The curve is not

isolated: before and after it there are no sufficiently long tangents for “calming” of the trajectory, which creates a sense of interrupted horizontal continuity (short straight + curve + straight). The interior of the curve borders a drained ditch and vegetation (shrubs/low tree belt), while the outer side faces arable fields with an open area. This asymmetry in the environment and surroundings leads to optical narrowing and “pulling” of the trajectory towards the inner shoulder. In combination with the sag vertical curve, the line of sight “breaks” in the zone of the lowest elevation and actually reduces the available visibility in plan towards oncoming traffic and obstacles in the curve.

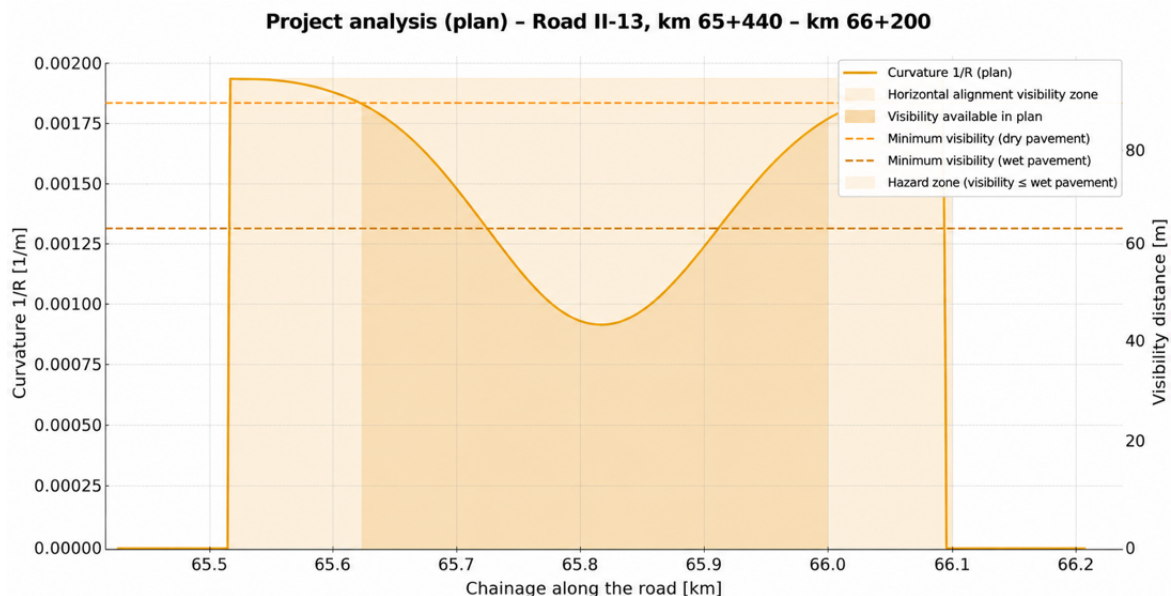


Figure 3 – Analysis of the plan projection – Road II-13 from km 65+440 to km 66+200.

By geometric behavior, the curve can be classified as medium to large radius (visually smooth, but sensitive at higher speeds). With the introduced speed limit  $V = 50$  km/h the plan projection is tolerably safe, but remains vulnerable to:

- Reduced adhesion (a glossy texture, wet/mud, leaf litter)
- side obstacles on the inner radius (vegetation, stopped vehicles),
- undisciplined overtaking maneuvers on the short straight section before the curve.

The danger points in plan are: the curve entry (short preceding straight, risk of unprepared entry), the apex (limited side visibility from the inner strip vegetation/ditch) and the exit (transition to a longer straight where drivers often accelerate prematurely). These locations coincide with the zones where we have already identified insufficient stopping sight distance under wet conditions.

The projection is geometrically acceptable for 50 km/h, but due to the combination with the vertical sag curve, the inner green strip and the short tangent before the curve, the section has increased risk of late perception and delayed reaction. To achieve real safety, the plan requires supporting measures: cutting/lowering of vegetation on the inner radius, maintaining a free lateral zone/shoulder, prohibition of stopping and overtaking in the curve (central marking M2/M3 with high retroreflection), dense



delineation (delineators), repetition of the speed limit 50 km/h before the entry and high-performance road marking and/or rumble strips, as well as increasing skid resistance at the apex and 50–70 m before it. These interventions directly address the weaknesses of the plan projection, visible in the satellite view.

- **Access to adjacent properties**

Upon inquiry in the Cadastral Administrative Information System (CAIS) and on-site inspection, four intersection crossings between Road II-13 with agricultural/ farming/ and forest roads were identified in the studied section:

*Intersection №1:*

The intersection represents a crossing between Road II-13 and an agricultural/forest road at km 65+433 (mileage is according to the project for permanent traffic organization and safety 12/2007, sheet 05-005-0). Upon inquiry in CAIS, it was established that this crossing between the main direction and the agricultural/ forest road does not appear as an established and regulated road for the purpose of serving the adjacent agricultural/ farming/ forest lands.

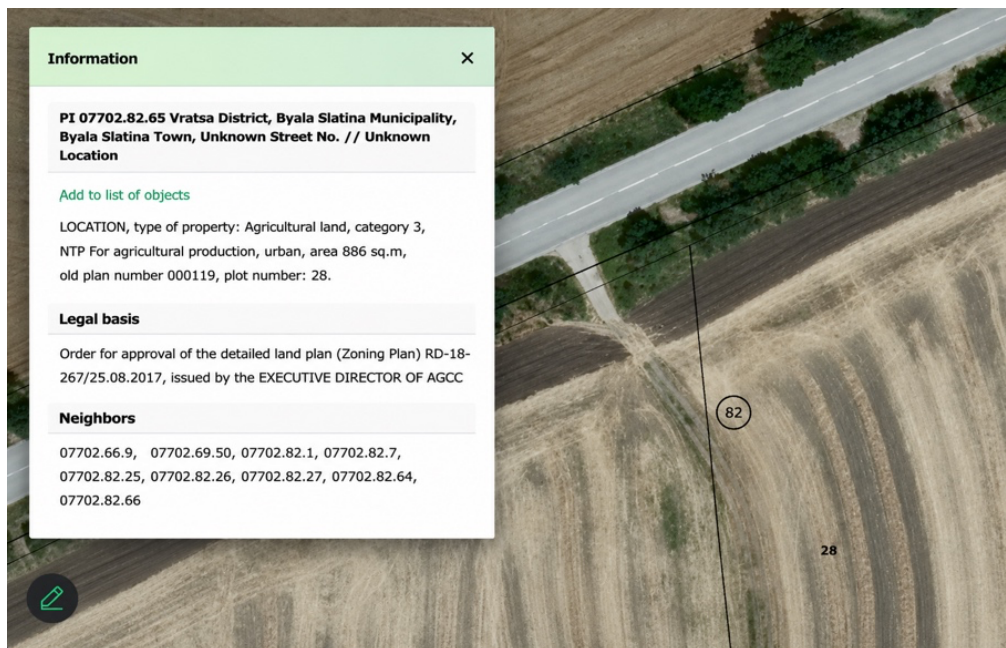


Figure 4 – Inquiry from CAIS for property with identifier 07702.82.65.

Parallel to the alignment of Road II-13 (representing a property with identifier 07702.66.9), runs a property with identifier 07702.82.65, representing an area designated for agricultural/ forest/ departmental road. In CAIS there is no information about a designated area representing a perpendicular connection to the main direction of the republican road.

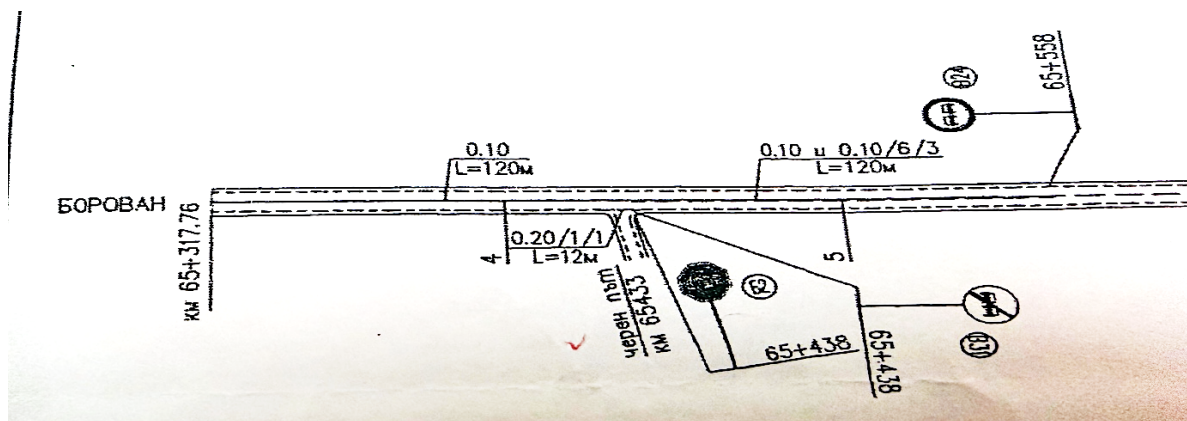


Figure 5 – An excerpt from the PPBD (old project) reflecting the presence of road sign B2 at km 65+438, sign B31 at km 65+438, and on the opposite side sign B24 at km 65+558. None of these signs is currently installed within the road scope.

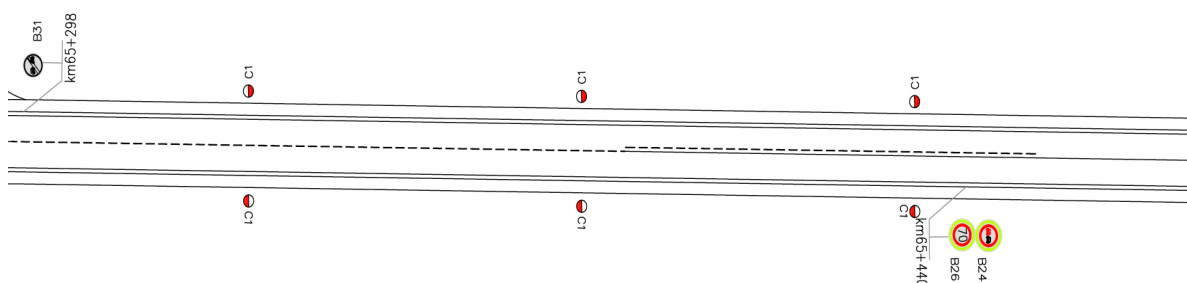


Figure 6 – An excerpt from the PPBD for the UKTP (new project): sign B31 at km 65+298 to sign B24+B26 at km 65+440 (there is a discrepancy between the actual location of the road signs and their location according to the PPBD). The unregulated intersection is located approximately between the second guiding post C1 and the third from the PPBD excerpt, in the direction of travel from village Borovan to town Knezha.

In the project for permanent traffic organization and safety – old project (12/2007, sheet 05-005-0), this connection is marked as a dirt road and has a planned road sign B2 at km 65+438. In project No. 06-26, drawing No. 01-0, representing the PPBD for the UKTP, this road does not appear. Before or after the intersection, despite the fact that the connection to the agricultural road is asphalted, there is no planned warning road sign A27 and A28.



*Figure 7 – Unmarked agricultural/forest road, located on the right side of the traffic lane in the direction from town Byala Slatina to town Knezha, at the beginning of the inspected section.*

During the on-site inspection, it was established that a crossing with an agricultural/ forest/ departmental road actually exists; although this connection is unregulated, it is even asphalted. A significant problem is also the uncleared vegetation, which substantially obscures and limits the field of visibility.

#### *Intersection №2*

The intersection represents a crossing between an unregulated agricultural/ forest/ farming road and republican road II-13. Upon detailed inquiry with CAIS, it was established that this intersection does not exist. The intersection with the dirt road is located at km 65+717 (old project). In the PPBD for the UKPTP, the agricultural/ farming/ forest road is marked, despite being unregulated and not supposed to exist. In the old project, road sign B2 was planned to be installed at km 65+722; in the PPBD for the UKPTP, the installation of sign B2 was not planned at all. During the on-site inspection, it was established that this road sign does not exist.

Before and after the intersection, neither in the old nor in the new project was it planned to install warning signs A27 and A28, despite the fact that in one of the projects sign B2 was planned.



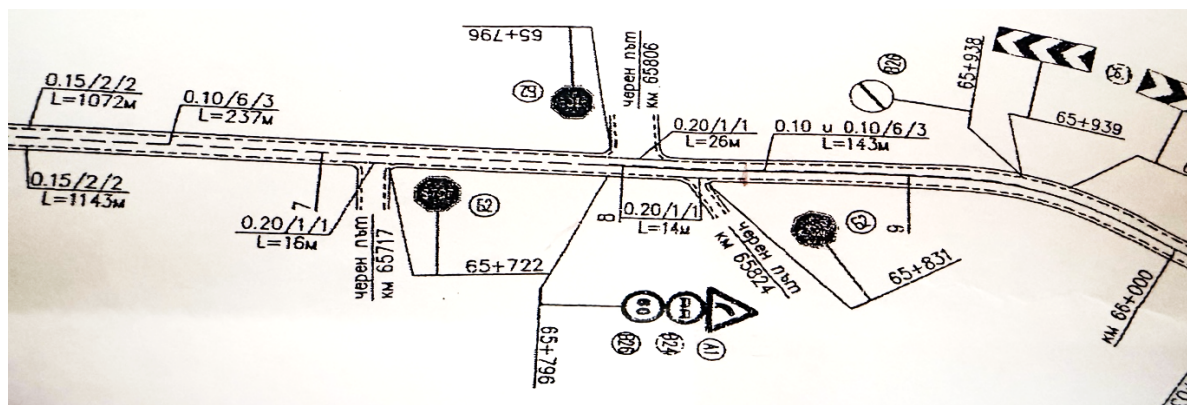


Figure 8 – Excerpt from the old project (12/2007, sheet 05-005-0), on which road sign B2 is planned at km 65+722.

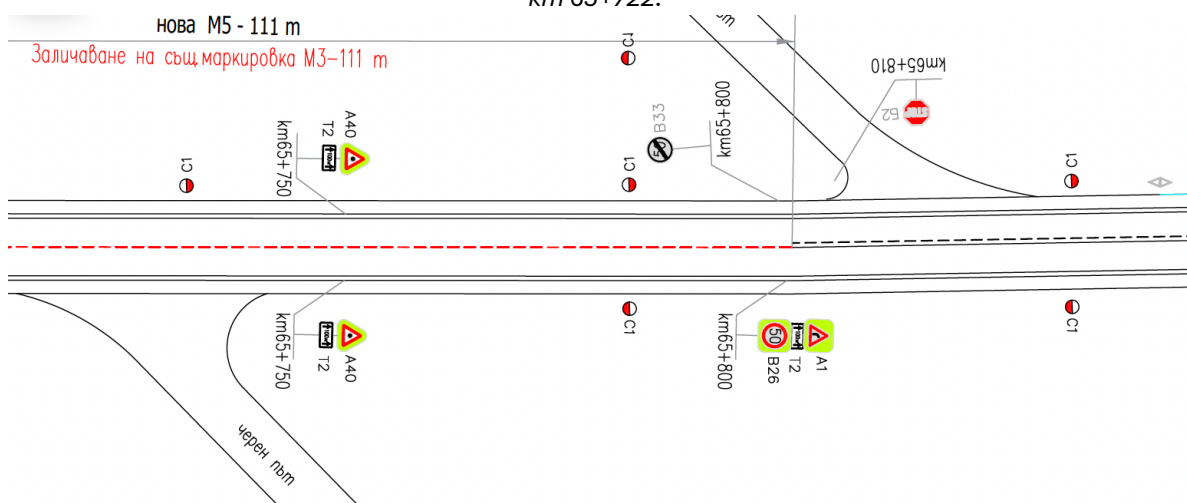


Figure 9 – Excerpt from the PPBD for the UKPTP (new project), on which it is visible that the unregulated dirt road is marked. The project does not reflect that sign B2 is missing, as it is in the old project. This road should have been closed with the design solution for securing the section with a concentration of road accidents.

There are significant discrepancies between the old and new PPBD projects. The two projects are independent of each other and in no way do they complement one another. The PPBD for the UKPTP should complement the existing project. In this case, the two even contradict each other to a certain degree. The old road signs that should be removed are not marked.

A substantial omission in the project is the fact that in the considered section, a dirt (earth) road has been left open and functioning, which does not appear in CAIS and is accordingly not reflected as an element of the republican road network. This represents an unregulated connection to road II-13, which is in direct contradiction with the applicable regulatory requirements and creates a precondition for the occurrence of road traffic accidents. Such a connection leads to uncontrolled entry of agricultural and construction machinery, which disrupts the continuity of traffic, reduces visibility and increases the risk of side and head-on collisions, especially in combination with the limited geometric visibility in this section.

Connections of service and field roads to republican roads are designed only when necessary, with the opening of new approaches prohibited in curve sections, in sections

with limited visibility and at other locations where this creates danger to traffic. In the specific case, the connection is located in the zone of combination of a horizontal and vertical curve, where visibility is already limited below the minimum required values. This makes the violation particularly risky.

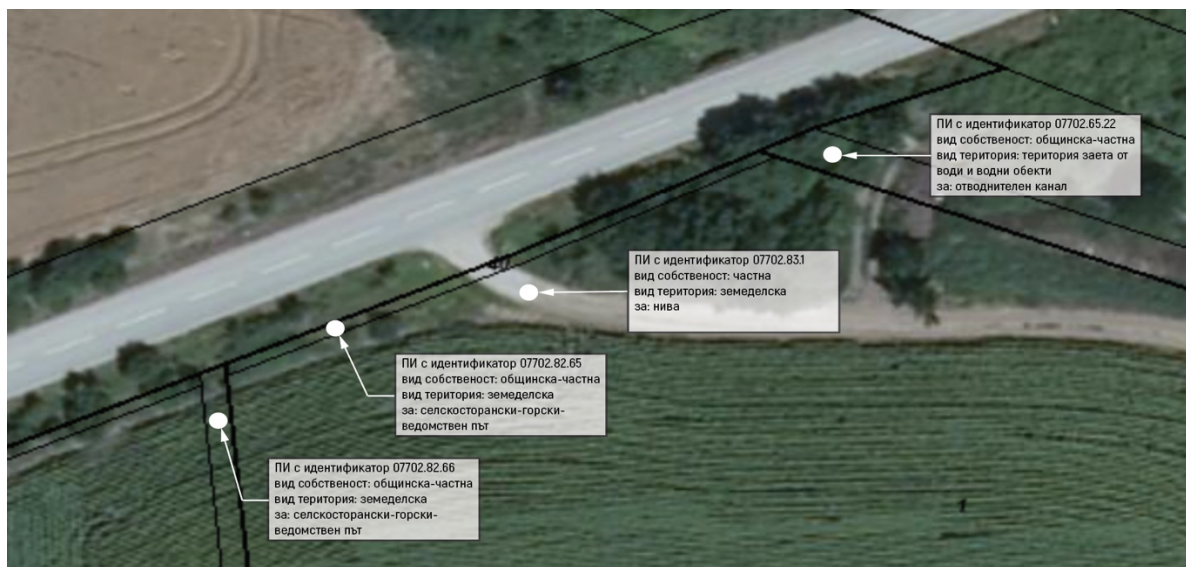


Figure 10 – CAIS excerpt with precise definition of the types of territories and purpose of the different properties.

In accordance with the requirements of the Roads Act, within the road scope, no objects may be constructed or used that are not related to its service, maintenance or traffic safety, without permission from the administration managing the road. Therefore, the presence of an unregulated road approach represents an unauthorized intervention in the scope of a republican road, which must be removed or physically restricted by construction of an earth embankment, protective fence or road restraint system. Furthermore, the designer was obliged to provide a controlled service connection to the side network if there had been a real need for access to agricultural properties, rather than leaving an open unregulated alignment that compromises overall road safety.



Figure 11 – Established the presence of asphalt pavement at the turn-off for the agricultural/forest road and the absence of road sign B2 on the right side in the direction from town Byala Slatina to town Knezha.





*Figure 12 – Condition of the unregulated intersection between road II-13 and an agricultural-dirt road at km 65+717. Excerpt from surveying performed by the ECTP using the remote sensing method.*

Another substantial omission is the absence of warning road signs A27 and A28, indicating respectively “intersection with a road without priority”. In this manner, drivers traveling on the main direction are not warned of the possible entry from a dirt road, while drivers exiting from it have no visual information about the nature of the connection and their obligation to yield to traffic. This is a direct violation of Ordinance No. RD-02-21-1 of 23 November 2023 on road signing with road signs. The principle established in this subordinate regulatory act is that before every location of merging or crossing of roads, the respective warning signs shall be installed, especially when visibility is limited or traffic is intensive.

Leaving a dirt road unreflected in the cadastral and road system, which leads directly to a republican road, is a serious omission in design and execution control. This contradicts both the requirements of Ordinance No. RD-02-20-2 and the Roads Act, and must be immediately remedied by physical closure of the approach and reassessment of accesses in this section in accordance with the principles of infrastructure safety.

### *Intersection No. 3*

The intersection represents a combination of a regulated crossing with a dirt road and an unregulated one. In the direction of travel from village Borovan to town Knezha (from the south side of the traffic lane) at km 65+824, there is a marked dirt road on project No.



12/2007 sheet 05-005-0 (old project). Upon inquiry with CAIS, it was established that it does not exist as an agricultural/ farming/ forest road.

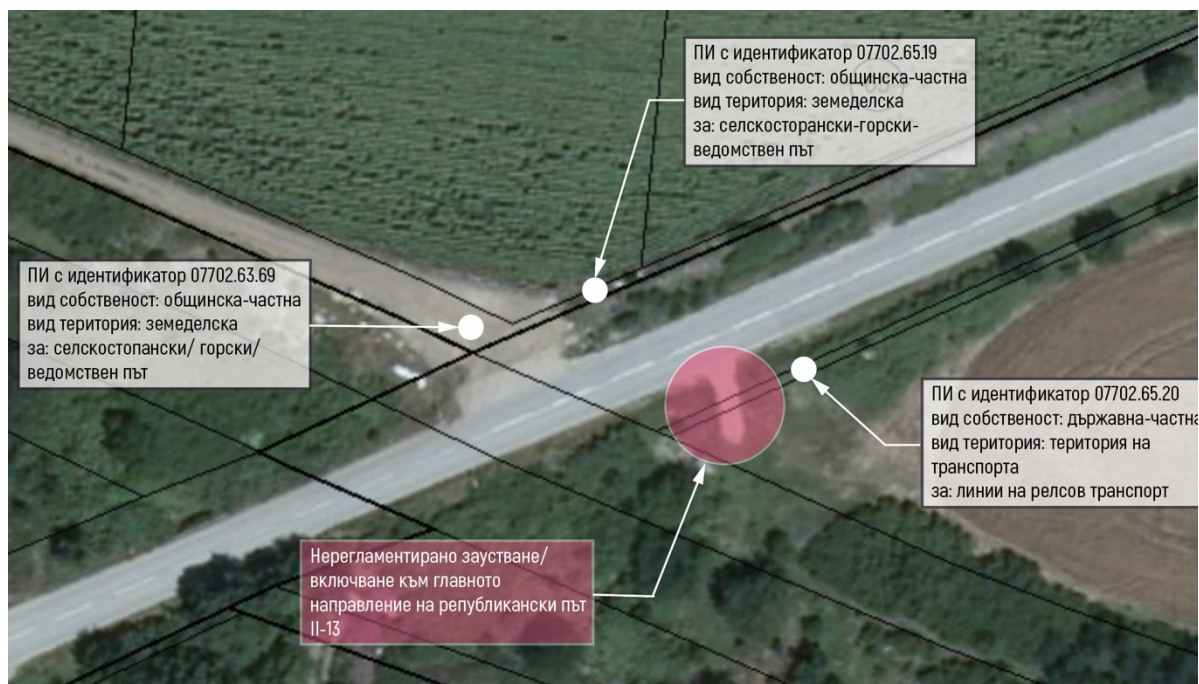


Figure 13 – CAIS inquiry reflecting the type of ownership, type of territory, purpose and number (identifier) of the property.

On the south side of the traffic lane, running parallel, is a property with identifier 07702.65.20, which has the purpose: “rail transport lines”, which currently does not exist there.



Figure 14 – Direct joining of an unregulated dirt road to the alignment of republican road II-13. In the PPBD (old project), the installation of road sign B2 was planned for this road (at km 65+831), while the dirt road is located at km 65+824.





Figure 15 – Unregulated connection at km 65+824. Excerpt from surveying by the remote sensing method in May 2025, performed by the EUCTP team.

Upon comparison between the old PPBD project and the new PPBD project for the UKPTP, a discrepancy was established. In the old project at km 65+824, a “dirt road” is marked and road sign B2 at km 65+831, while before this intersection there is no warning sign A26 “Intersection with a road without priority from both sides”. In the new project, the crossing from the south side does not exist. On-site inspection established that no road signs are installed – neither warning signs nor B2 – at the asphalted part of the dirt road (at its joining to the alignment of the main direction).

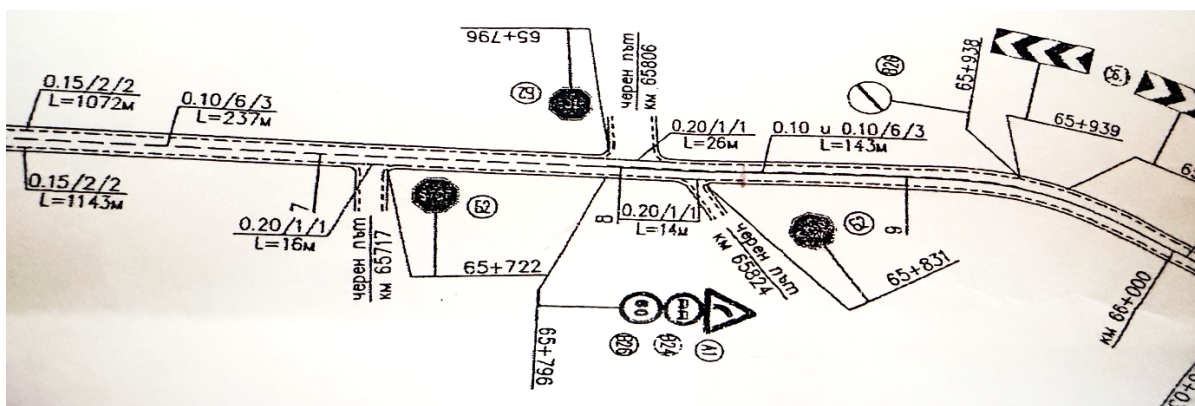


Figure 16 – Excerpt from the old project (12/2007, sheet 05-005-0), on which road sign B2 is planned at km 65+831.



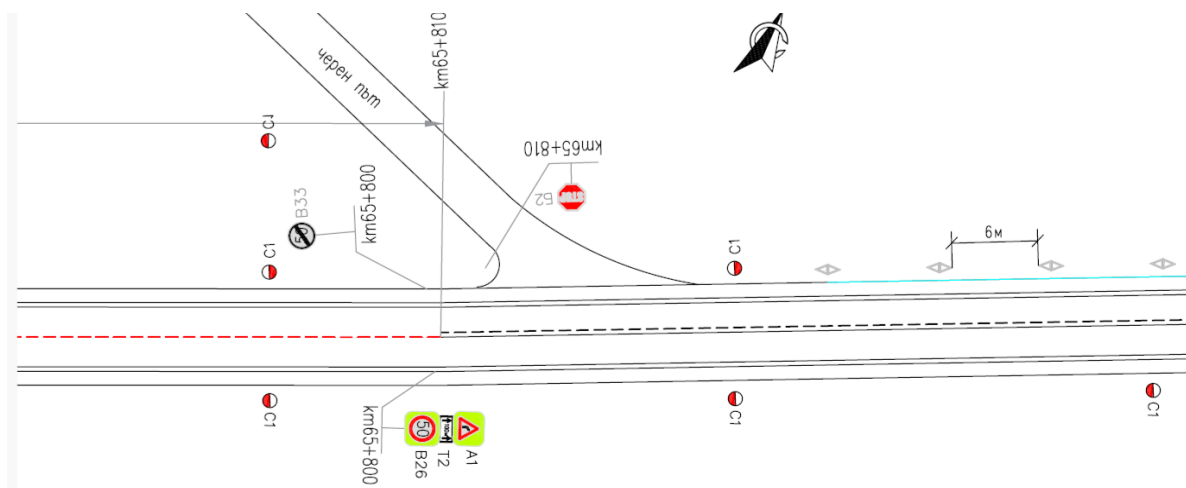


Figure 17 – Excerpt from the PPBD for the UKPTP (new project), on which it is visible that the unregulated dirt road is not marked. The project does not reflect the presence of sign B2, as it is in the old project. This road should have been closed with the design solution for securing the section with a concentration of road accidents.

On the north side of road II-13 (at km 65+806 – old project), there is a connection from an agricultural/ forest/ farming road. It exists both in the CAIS inquiry and in the old project and in the new one. In the old project, road sign B2 is present at km 65+796, while in the new one it is indicated that the road sign is located at km 65+810. There is some discrepancy in the kilometer position, which should be clarified as to what it is due to and whether certain discrepancies arise in installing the road signs at their exact locations.



Figure 18 – The presence of asphalt pavement at the turn-off for the agricultural/forest road and the presence of road sign B2 on the left side in the direction from town Byala Slatina to town Knezha were established. Sign A26 is missing.

This intersection is also not marked with warning road sign A26. If we assume that the connection from the south side is unregulated, then there should have been signs A27 and A28. The absence of warning road signs is a substantial deficiency directly affecting safety. Nothing warns road users that within the road scope they should expect the appearance of agricultural, forest machinery or other vehicles exiting this intersection. In this manner, drivers do not have the necessary and correct information to adapt their behavior to the actual road conditions.



On 09 September 2025, a road traffic accident occurred when a bus turning left towards the intersection at km 65+806 (old project) from the main direction was hit by a car, because the car was overtaking within the scope of the intersection. In principle, the car driver had no way of knowing that there was an intersection there and consequently to take this into account and not undertake the overtaking maneuver. As a result of the occurred accident, the passenger car rolled over onto its roof, and the driver and passenger were injured.



Figure 19 – Photo of the car that collided with the bus.



Figure 20 – Photo of the bus involved in the accident.

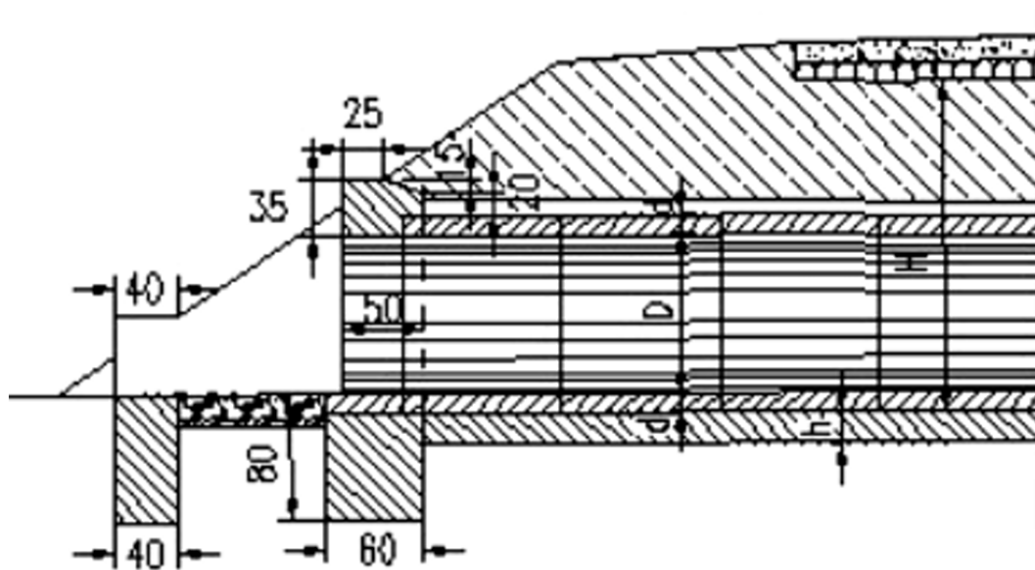
In zones that represent sections with a concentration of road traffic accidents, it is necessary to approach unregulated connections with particular caution. Every unmarked possibility for joining the main alignment represents a risk, and every risk leads to error. Unregulated connections must be closed, while others must be marked in the appropriate manner with road signs and road markings.

- **Access for emergency vehicles and service vehicles**

Access for emergency vehicles and service vehicles to the studied section is easy, without any preconditions or circumstances that could have a negative impact and impede this access. If necessary, fire engines, ambulances and service vehicles can easily reach the section that is the subject of the present report.

- **Maintenance of bridges and culverts**

In the studied road section, one culvert of pipe culvert type was identified, located at km 65+770 (new project). During the on-site inspection, it was established that the culvert and its adjacent road infrastructure are in an advanced stage of structural and operational deterioration. There are signs of erosion, undermining, destruction of concrete elements and deformations in the road pavement in the zone above the structure.



*Figure 21 – Prefabricated pipe culverts are executed as road drainage structures in the presence of embankments with a height not exceeding 15 m. Prefabricated pipe culverts are executed with prefabricated foundations (footings) or with monolithic foundations. The inlet and outlet of pipe culverts are formed with prefabricated or monolithic headwalls and wingwalls, which may be parallel, flared or semi-flared. On the outer side of the culvert body, the wingwalls and headwalls are provided with waterproofing before backfilling. The embankment cones at the inlet and outlet of the culvert are lined with riprap at a height determined by the project, but not less than 60 cm. Particularly important is the regular cleaning and flushing of pipe culverts throughout the operational period. The main advantage of pipe culverts is that the pipes can be manufactured mechanically under factory conditions and transported and installed at the construction site. They have a simplified design and are installed quickly. This culvert system can be applied both under embankment and at grade, with different skew and gradient of the watercourse. In this culvert system, the application of a group of pipes (battery) of up to 3 units is permitted, as proven by hydraulic calculations.*

In the road section passing over the culvert, numerous longitudinal and mesh-like cracks are observed, running along the edge of the carriageway. This is a sign of loss of bearing capacity of the subgrade and infiltration of surface waters. There are deformations and local settlements along the edge of the pavement, which compromises the stability of the structure.

The restraint system is in an unstable condition, with its posts partially exposed and without firm soil support. At the base, erosional cavities and undermining are observed, as a result of which the effective working length of the system is reduced and it would not be able to retain a vehicle upon impact.





*Figure 22 – Condition of the surface above the culvert.*



*Figure 23 – Condition of the culvert at the road maintenance base, view from the north side.*



*Figure 24 – Condition of the culvert – view from the south side of the road (direction of travel from town Byala Slatina to town Knezha).*



*Figure 25 – Condition of the culvert – view from the north side of the road (direction of travel from town Knezha to town Byala Slatina).*



*Figure 26 – Condition of the road maintenance base above the culvert (the northern from the south side).*



The concrete headwalls of the culvert exhibit deep cavities, cracks and voids beneath the foundation, evidencing an active erosion process. In the lower part, openings are observed through which water has begun to undermine the headwalls and the foundation of the structure. From the upper side, detachment and destruction of the



asphalt layer is visible, indicating absence or deterioration of the waterproofing layer between the pavement and the structure.

The inlet and outlet of the culvert are densely overgrown with vegetation and filled with sediment and debris, which severely limits the conveyance capacity of the structure. During heavy rainfall, this creates a precondition for surface overflow and undermining of the headwalls. Stone or concrete lining reinforcement is missing, which further accelerates the erosion processes.

The condition of the structure gives rise to high structural and hydraulic risk, as there is a real probability of local collapse of the headwalls and failure of the road pavement. During heavy rainfall, blockage of the water opening and overflow are possible, which will lead to compromise of the road body. The operational risk is medium to high, especially during passage of heavy goods vehicles.

Immediate cleaning of vegetation and debris in the culvert zone, restoration of its conveyance capacity and structural inspection by a structural engineer are necessary in order to determine the degree of undermining and the required strengthening measures. Injection and concreting of the cavities, restoration of the pavement with laying of a new wearing course and waterproofing, as well as replacement or strengthening of the restraint system are recommended. It is necessary to construct erosion protection at the inlet and outlet of the culvert and to place temporary warning signs until the risk is eliminated.

The culvert structure is in a pre-emergency condition. The erosion processes, cracks in the pavement, undermining of the headwalls and blockage of the water opening represent a serious risk to the operational suitability of the road and traffic safety. Urgent engineering-restoration actions must be undertaken in order to prevent local collapse and ensure long-term stability of the structure.

- **Roadside configuration (shoulders, edge of pavement, cutting and embankments)**

- *Road shoulders*

The road shoulders in the studied section are grassy, formed relatively uniformly in width, but do not differ distinctly from the edge of the road pavement. In some zones, the shoulders are visibly higher than the level of the traffic lane. This creates unfavorable conditions for rapid runoff of surface waters during rainfall – water is retained on the shoulder and part of it is directed back towards the asphalt pavement.

During the performed inspection, it was established that periodic attempts have been made in recent years to clear vegetation on the shoulder, but due to the systematic lack of maintenance, the grass and shrub layer is again dense and thick. In places, individual shrubs encroach into the road clearance gauge and limit visibility, especially in the curve. Where shoulders are at an elevated level above the road pavement and vegetation is not regularly cut, conditions are created for water accumulation and local erosion processes.

Shoulders must perform three main functions: zone for emergency stopping in extraordinary situations, drainage and reinforcement of the pavement edge. In the considered section, these functions are partially compromised. The high and grass-covered shoulders do not allow safe short-term stopping of a vehicle, as they are soft and unsecured, while the presence of dense vegetation hampers maneuvering. Furthermore, the locations where the shoulder is higher than the pavement additionally impede water drainage and increase the risk of aquaplaning.



Figure 27 – Condition of the shoulder – right traffic lane in the direction of travel (town Byala Slatina → town Knezha).



Figure 28 – Condition of the shoulder – left traffic lane in the direction of travel (town Knezha ← town Byala Slatina).



Figure 29 – Example of vegetation clearing behind the road maintenance base – right traffic lane in the direction of travel (town Byala Slatina → town Knezha).



Figure 30 – Example of vegetation clearing behind the road maintenance base – left traffic lane in the direction of travel (town Knezha ← town Byala Slatina).

In the sections where road restraint systems are present, clearing is done only up to the beginning of the restraint system, while behind and beneath it no effort whatsoever has been made to remove shrubs and grass. This creates a number of problems, one of which has already been mentioned with regard to drainage of water from the traffic lane. The tall grass and shrubs also obscure the restraint system and contribute to the destruction of its structural integrity. The tall grasses and shrubs also obscure the retroreflective elements C14.1. In some places, the C14.1 elements themselves are completely missing.

In the two examples above, the images very clearly show that the shoulder level is above the level of the road pavement. During rain, the water will not drain towards the earth

ditches, but will flow back towards the traffic lane, which constitutes a condition for the occurrence of aquaplaning.

- *Edge of the road pavement*

The edge of the pavement in the considered section is not in good operational condition. In places, longitudinal cracks and local spalling were identified. The shoulder is narrow, unreinforced and with active overgrowth; penetration of fine particles and water at the pavement–shoulder contact is visible, which accelerates undermining of the edge and development of cracks. In some of the zones alongside the lane, the edge is visually “lost”, and a distinct edge line is also missing (missing marking), which at dusk, in rain or when dazzled by oncoming lights increases the probability that the driver will lose orientation and leave the traffic lane in which they are traveling.

In the curve, in some places the restraint system located in the left lane in the direction of town Byala Slatina is positioned too close to the edge and practically leaves no working zone for trajectory recovery (“shy distance”). The glossy traces in the zone of tangential wear in some of the curves are a sign of smoothing/bleeding and reduced microtexture – precisely where the transverse forces are greatest. The combination of narrow shoulder, poorly positioned restraint system and weakened texture creates an unfavorable scenario: upon a minor error, the driver first “catches” the edge, loses stability and ends up in the barrier.



*Figure 31 – Road restraint system in the curve in the direction from town Knezha to town Byala Slatina, where it is clearly visible that vegetation has not been cleared beyond the edge of the pavement.*

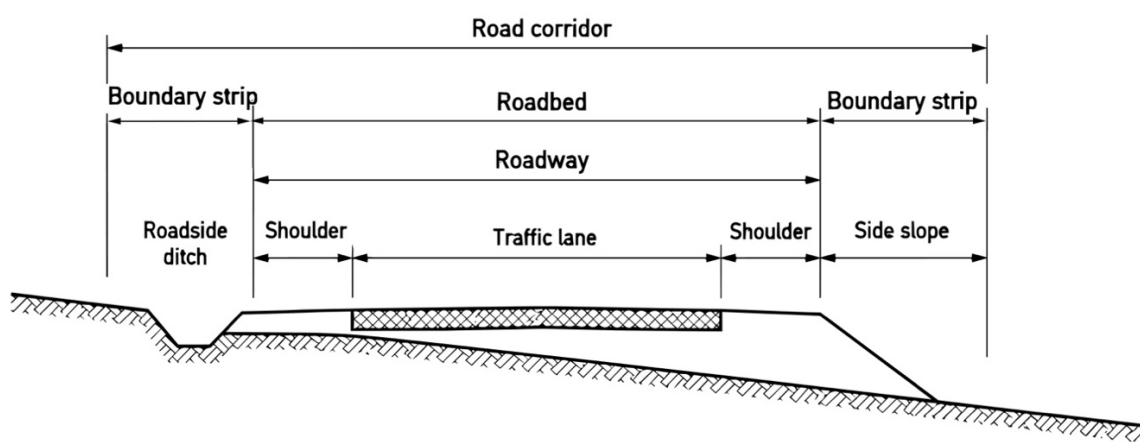


*Figure 32 – Condition of the edge of the pavement, footage captured by the remote sensing method.  
The survey was performed by the EUCTP team in April 2025.*

A substantial violation of Article 136, paragraphs 1 and 2 of the “Technical Rules and Requirements for Road Maintenance by the Road Infrastructure Agency” has been



committed. In this document, it is expressly stated that: “(1) The current maintenance of shoulders consists in their systematic cleaning, mowing, leveling, profiling and shaping, in order to ensure the necessary even surface and slope for unimpeded drainage of surface waters from the road pavement into the ditches or outside the road scope. (2) Particular attention must be paid to the timely restoration of settled areas of the shoulder around the edge of the pavement. The formed thresholds at these locations represent a serious danger to traffic and must be regularly removed through systematic filling and compaction. The deformed and rutted areas on the shoulders are most often remedied by profiling, mainly with a motor grader. After profiling, the surface of the repaired sections must be compacted with rollers or with vibratory plates.”



**Fig. 1.1.1**

*Figure 33 – The elements of the cross-section of a road that is not a motorway are shown in Fig. 1.1.1. in accordance with Article 7.*

From the attached photos, as well as during the performed on-site inspection, it was established that the vegetation is not maintained and the restraint strip before the road ditch is overtaken by tall and low vegetation. In places, this problem reaches the shoulder and the edge of the pavement. Maintenance in the studied section has not been performed in accordance with the defined internal rules and norms of the Road Infrastructure Agency. Vegetation clearing must be carried out throughout the entire road scope: “The road scope is the area on which the earth platform and the restraint strips on both its sides are located, together with the airspace above it at a height determined by the road design norms.”



*Figure 34 – Condition of the shoulder – right traffic lane in the direction of travel (town Byala Slatina → town Knezha).*



*Figure 35 – Condition of the shoulder – right traffic lane in the direction of travel (town Byala Slatina → town Knezha).*



*Figure 36 – Condition of the shoulder – right traffic lane in the direction of travel (town Knezha → town Byala Slatina).*



*Figure 37 – Condition of the shoulder – right traffic lane in the direction of travel (town Knezha → town Byala Slatina).*

The vegetation retains moisture, while roots and erosion compromise the edge, and heavy goods vehicles and peripheral movement during passing critically load this zone. The problem is further intensified where there are unregulated connections from agricultural/forest roads. Heavy agricultural machinery when entering or exiting exerts a negative influence on the edge of the pavement and further intensifies erosion, which in turn compromises the remaining part of the traffic lane.

Erosion of the edge of the pavement entails not only disruption of the integrity of the road surface; it also conceals direct risks that directly affect traffic safety on the roads. Upon disruption of the integrity of the edge of the pavement, there is an increased probability of: 1. “leaving the lane” and “catching” a tire in the edge step, 2. late perception of the end of the lane due to shadow and absence of marking, 3. as well as skidding/impact into the restraint system in the curve (direction town Byala Slatina) due to low sliding/skid resistance and zero recovery zone.

It is recommended to apply structural widening for edge reinforcement (including geogrid), milling and laying of a new wearing course with correction of cross slopes; review of the curve geometry (radius and superelevation) and use of SMA/HFST in the zones of high transverse forces.



For control and stability, it is appropriate to introduce periodic measurements of the friction coefficient and macrotexture (CEN/TS 15901), monitoring of deformations along the edge and seasonal visual inspections, especially after rainfall and winter conditions. This package of measures will reduce the probability of “run-off-road” type incidents, will improve visual guidance and skid resistance and will extend the life of the pavement along the edge.

- *Cuttings*

The slopes (cuttings and embankments) within the road scope are developed at a distance of approximately 70–100 cm from the edge of the pavement. In individual sections, especially where the restraint systems are positioned close to the edge, the slope “drops” towards a shallow ditch. This configuration practically eliminates the recovery zone for drivers and concentrates water runoff immediately adjacent to the pavement–shoulder contact zone. This leads to water seepage beneath the edge of the asphalt and accelerated micro-erosion. In some zones, the slopes are relatively steep (visually close to 1:2–1:3), with an uneven surface and local slippages. Vegetation has encroached right up to the edge of the road: low shrubs and branches protrude into the clearance gauge, and in places dry trees are encountered immediately behind the slope. This gives rise to three main problems:

- (1) undermining and destruction of the edge due to roots and retained moisture;
- (2) significant reduction of the field of visibility in straight sections and especially in the curve;
- (3) risk of fallen branches or trees onto the carriageway during strong wind.



Figure 38 – Condition of the slopes in the studied section (direction from town Byala Slatina to town Knezha).





*Figure 39 – Condition of the slopes in the studied section (direction from town Knezha to town Byala Slatina).*



*Figure 40 – Condition of the slopes, visualization from surveying performed by the EUCTP team in May 2025 using the remote sensing method.*

From the above images, as well as during the inspection performed by the ECTP team, it was established that the slopes on both sides of the road pavement are in a compromised condition and do not meet the requirements for stability and a maintained visible profile. The left slope (with respect to the direction of travel – the direction from town Knezha to town Byala Slatina) is overgrown with vegetation, including shrub species and grass formations, which in places encroach into the shoulder and narrow the useful width of the road. This creates a risk for drainage and visibility, especially during passage of heavy goods vehicles.

The right slope (direction of travel from town Byala Slatina to town Knezha) shows partially eroded sections and exposed earth surface, which is a sign of absence of grass stabilization and increased risk of washout during rainfall. Along the edge of the pavement, absence of a formed shoulder is observed, which leads to an uneven

boundary between the pavement and the earth foundation and increases the probability of side slippages and damage to the asphalt edge.

Overall, the road corridor does not maintain the necessary cross-section – the slopes do not ensure stability, drainage and visibility in the lateral zone. No traces of regular clearing or mechanical shaping are noticeable. The condition indicates a need for profiling and strengthening of the slopes, clearing of vegetation, shaping of the shoulders with a longitudinal slope towards the ditch and application of erosion protection measures.

In summary, the section shows a low level of current maintenance of the earthworks, which under adverse weather conditions leads to deterioration of drainage, compromise of the pavement and limitation of visibility for drivers.

- *Earth ditches (channels)*

The earth ditches (channels) in the considered section of road II-13 function poorly and in places do not perform their drainage function at all. Their profile is shallow and unformed, and along the entire length the cross-section is completely filled with sediment, grass vegetation and, in individual locations, with dense shrubs and young trees. In practice, the ditches have been turned into a green strip without real conveyance capacity.

It is visible that during rainfall, water is drained along the very edge of the pavement rather than into the ditches. On the asphalt pavement, traces of runoff and soiling are evident in the periphery – a classic sign of lost ditch conveyance and absence of a stable longitudinal slope. This situation creates constant moisture in the pavement–shoulder contact zone and accelerates the processes of undermining the edge of the road pavement.

The dense green mass in the studied section further “closes off” the ditches and completely eliminates the possibility of visual control over their condition. The lack of regular clearing turns the ditch from a channel for rapid drainage into a trough for water and sediment retention. This not only compromises the transverse drainage regime of the road, but also increases the risk of local flooding, water seepage beneath the asphalt and subsequent development of cracks and erosion processes. All of these “symptoms” are present in the studied section.

To restore the normal function of the earth ditches, complete clearing of vegetation, excavation of accumulated sediment and shaping of a stable longitudinal and transverse profile are necessary, which will ensure reliable drainage of rainwater away from the edge of the traffic lane.





*Figure 41 – General view of the traffic lane in the direction from town Byala Slatina to town Knezha.*



*Figure 42 – General view of the traffic lane in the direction from town Byala Slatina to town Knezha.*



*Figure 43 – General view of the traffic lane in the direction from town Knezha to town Byala Slatina.*



*Figure 44 – General view of the traffic lane in the direction from town Knezha to town Byala Slatina.*

## **2. Lighting, road signs, road markings**

- *Road signs*

Upon a request sent by the ECTP to the Regional Road Administration – Vratsa for provision of the Project for Permanent Traffic Organization and Safety, we received project No. (12/2007, sheet 05-005-0). Subsequently, the RIA clarified that an additional project for PPBD for the UKPTP had been prepared, No. 06/2025, drawing No. 01-0. Between the two projects, there is a difference in the kilometer position. In the UKPTP project, the existing permanent traffic organization is not marked. In this manner, it is not clear which signs from the first project are retained and which are removed. In the explanatory note, an explanation is also missing. In this manner, significant contradictions have been formed. The PPBD for the UKPTP itself has omissions mainly in the part concerning regulated connections at dirt roads (agricultural/ forest/ farming roads), because nowhere in the project is the installation of warning road signs from group “A” provided.

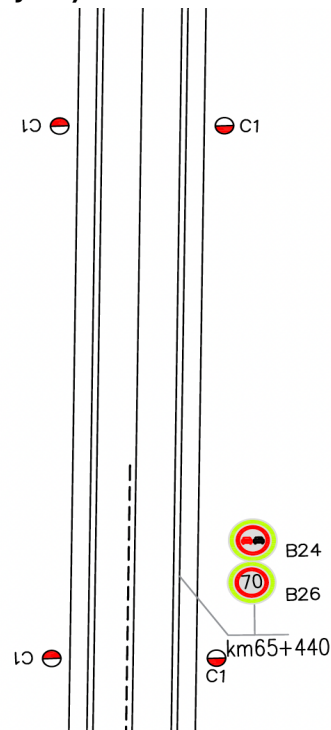


The measurements and studies performed are: visual inspection only.

The data and results from the performed inspection are described in the following table:

**Direction of travel from town Byala Slatina → towards town Knezha**

**1. Road sign B24+B26 (70 km/h) at km 65+440 (new project)**



Road signs B24+B26 (70 km/h) at km 65+440 (new project) have different retroreflectivity classes. In Appendix No. 11 to Art. 6, para. 11, item 1 and Art. 10, para. 2 of Ordinance No. RD-02-21-1-PZ, the minimum classes for the coefficient of retroreflection are defined. With regard to road signs installed on the right side of a 2nd class road from road marking materials, the requirement is that they cover at least RA2. The class of the retroreflective surface of sign B24 corresponds to class RA2, while that of sign B26 (70 km/h) complies with R3A and R3B. The different classes of the retroreflective surface lead to drivers perceiving the sign with the lower class significantly later than the one with the higher class. This results in slower perception of the sign's instructions and delayed reaction or incomplete assessment of road conditions by road users.

From a regulatory standpoint, there is a deficiency with regard to the requirements for what retroreflectivity class the face of the sign in the UKPTP must comply with. In Art. 11, para. 2 of Ordinance No. RD-02-21-1-PZ, a reference is made to Appendix No. 13, in which only the coordinates of the points of the boundary lines of the color zone according to CIE for yellow-green fluorescent color are described, without any clarification being made regarding the requirement for the retroreflection class.

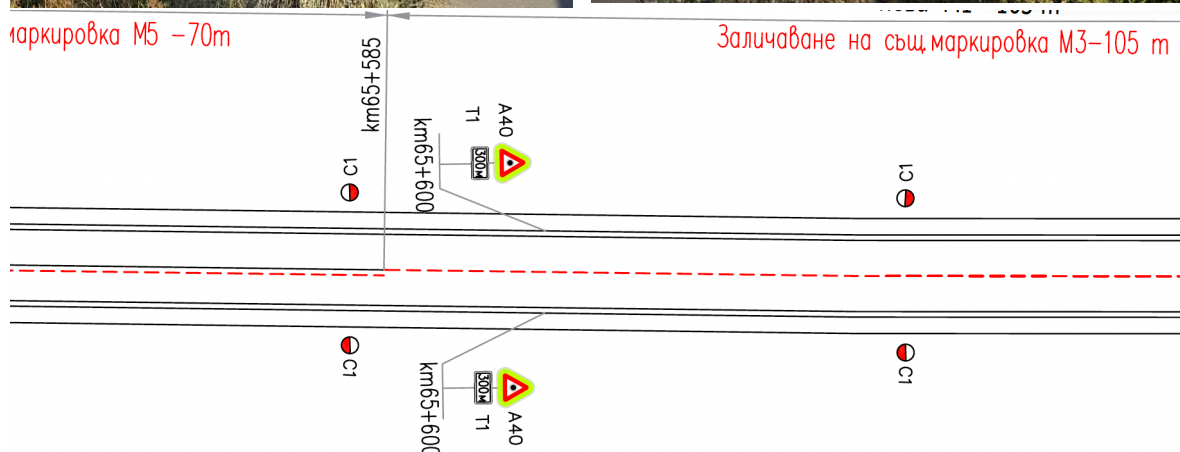
**2. Road sign – A40+T1 (300 m) at km 65+600**



маркировка М5 –70m



Заличаване на същ. маркировка М3–105 m



Road signs A40+T1 (300 m) are located at km 65+600 according to the new PPBD project for the UKPTP. Sign A40 – “Caution! Section with concentration of road traffic accidents”, which is located 300 m before the UKPTP (right side), is damaged and deformed. The retroreflectivity class of the surface of sign A40 complies with R3A and R3B, while plate T1 (right side) meets the requirements of RA2. Here again, an imbalance is created with regard to visibility of the road signs at night and under poor weather conditions. At one and the same location, road signs with the same retroreflectivity class must be installed, in order to guarantee that road users will be able to see and recognize in time the instructions of all road signs within the road scope.

Sign A40 and T1 300 m (right side) meet the visibility characteristics for retroreflectivity class R3A and R3B of the face surface. The road sign and the supplementary plate



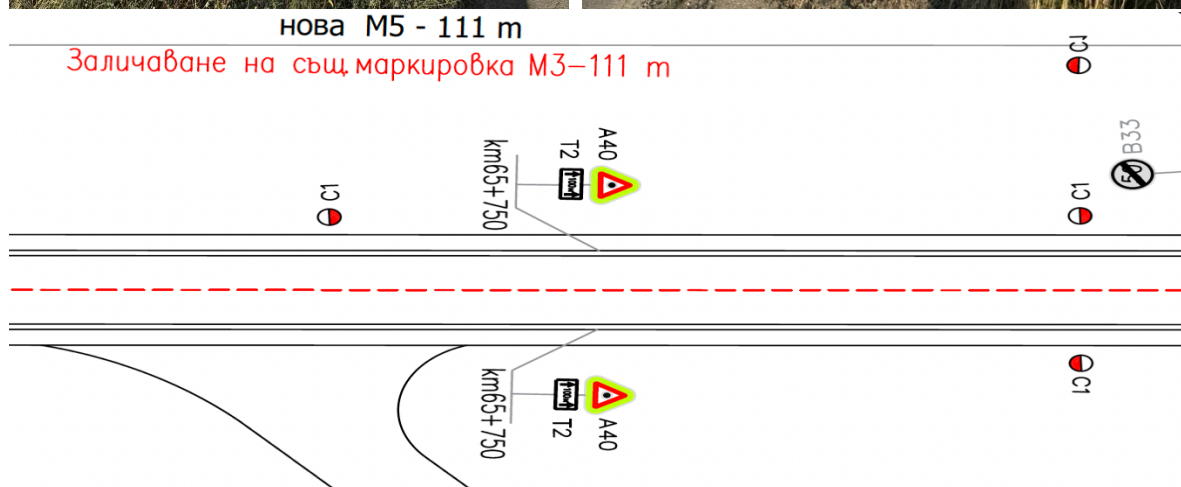
comply with the normatively defined rules described in Appendix No. 11 to Art. 6, para. 11, item 1 and Art. 10, para. 2 of Ordinance No. RD-02-21-1-PZ.

### 3. Sign A40+T2 (100 m) at km 65+750



нова M5 - 111 m

Заличаване на същ маркировка M3-111 m



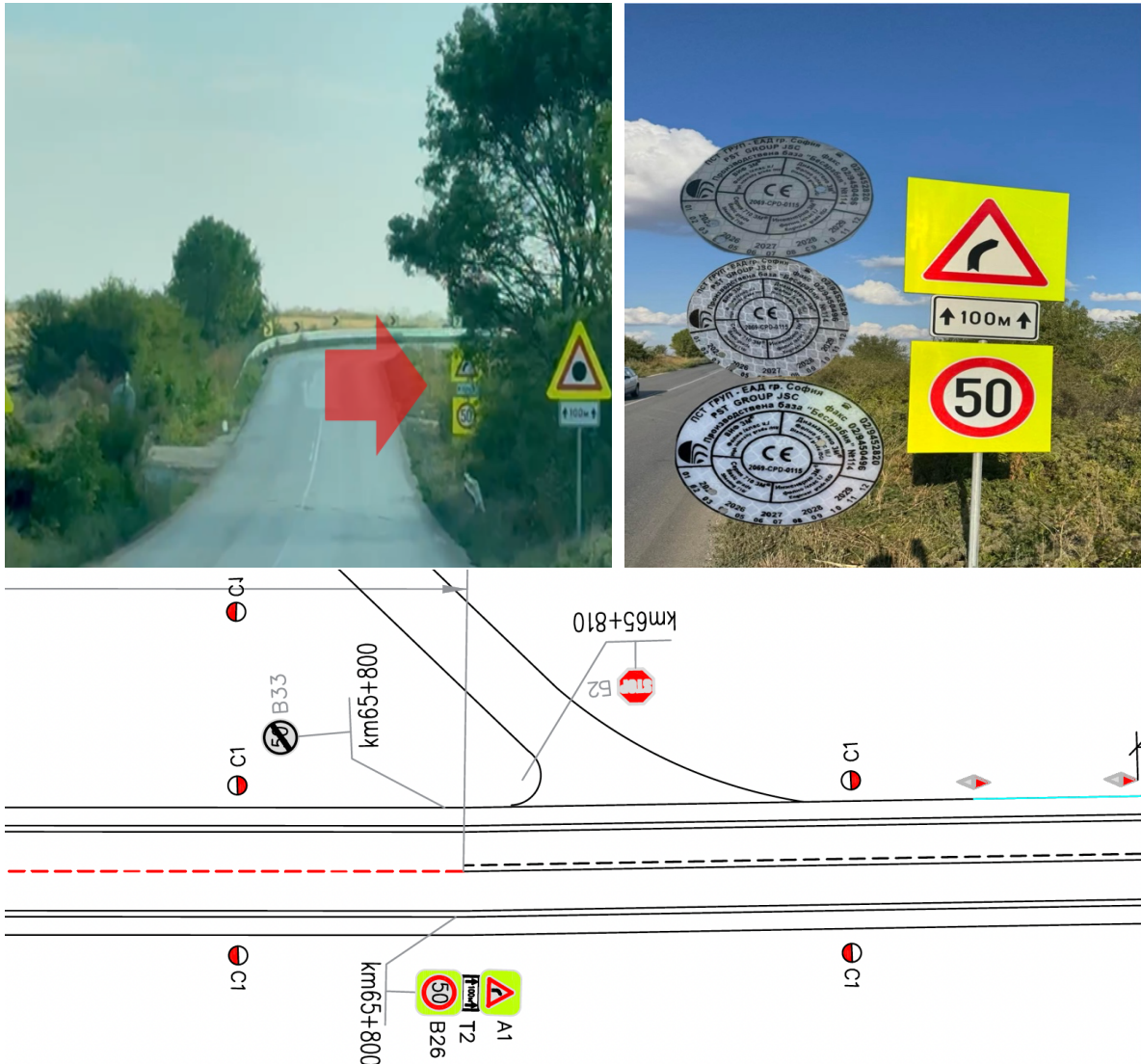
Road signs A40+T2 (100 m) are located at km 65+750 according to the new PPBD project for the UKPTP. The retroreflectivity class of the surface of sign A40 – “Caution! Section with concentration of road traffic accidents” meets the requirements of R3A and R3B, while plate T2 (right side) meets the requirements of RA2. Here again, an imbalance is created with regard to visibility of the road signs at night and under poor weather conditions. At one and the same location, road signs with the same retroreflectivity class must be installed, in order to guarantee that road users will be able to see and recognize in time the instructions of all road signs within the road scope.

Sign A40 and T2 100 m (right side) meet the visibility characteristics for retroreflectivity class R3A and R3B of the face surface. The road sign and the supplementary plate



comply with the normatively defined rules described in Appendix No. 11 to Art. 6, para. 11, item 1 and Art. 10, para. 2 of Ordinance No. RD-02-21-1-PZ.

#### 4. Road signs A1+T2+B26 (50 km/h) at km 65+800



Road signs A1+T2 (100 m) + B26 (50 km/h) are located at km 65+800 according to the new PPBD project for the UKPTP. The retroreflection of the face surface of the two road signs installed on a supplementary yellow-green fluorescent background complies with class R3A and R3B. The supplementary plate T2 is not installed on a supplementary background and in this manner is visually lost. This is further intensified by the circumstance that the retroreflection characteristics of the face surface of T2 comply with RA2.

In the group of signs A1+T2 (100 m) + B26 (50 km/h), where supplementary plate T2 indicates that the length to the end of the dangerous curve is 100 m. This means that it begins after the road signs and ends at km 65+900. Upon examination of the project, it was established that the dangerous curve on the right begins at km 65+900 and ends at km 66+000. The designer likely made an error by placing T2 instead of T1 (distance to), in which manner the indication of the supplementary plate would have been valid and correct, because the dangerous curve on the right begins exactly 100 m after sign A1+T2 (100 m) + B26 (50 km/h).

In this group of signs, the requirement of Art. 12, para. 1, items 1 and 2 of Ordinance No. RD-02-21-1-PZ is violated, where it is stated that: “Road signs, road sign supports and other signaling means are installed on the right side of the traffic lane, with their face surface against the direction of travel, so that they are not obscured by other road signs, obstacles, structures or appurtenances within the road scope at a location that ensures: 1. their timely recognition and perception by road users during the day and at night; 2. unimpeded movement of road vehicles and pedestrians.”

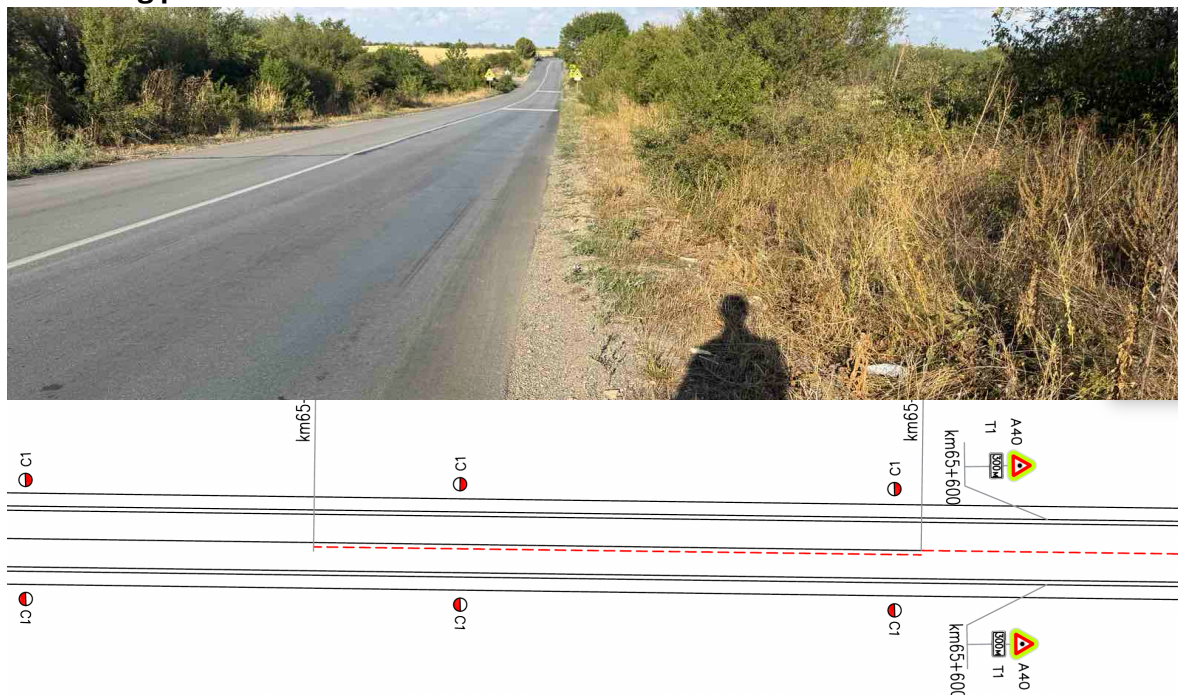
The requirement of Art. 17, para. 2, item 2 of Ordinance No. RD-02-21-1-PZ is also violated, where it is stated that: “The minimum visibility distance of the road sign (in m) depending on the maximum permissible speed of travel  $V_{perm}$  (in km/h) is as follows: for  $V$  up to 50 km/h – 100 m.” In the UKPTP, the visibility conditions towards the road signs should be guaranteed and at a minimum should cover the minimum required normative visibility distances.

Road signs A1+T2 (100 m) + B26 (50 km/h) are located immediately before an intersection on the left (in the direction of travel from town Byala Slatina to town Knezha) with a regulated agricultural/forest road. In accordance with the requirements of Art. 68, para. 3 of the Traffic Act, which states that: “A prohibition introduced with road signs B20, B24, B25, B26, B27, B28 and B30 is in effect until the next intersection with a republican or municipal road, or street.” In principle, although the dirt road, even if regulated, does not fall exactly within this hypothesis, it cannot be clear to motor vehicle drivers during travel that this is a dirt road that does not fully fall within the hypothesis of the Traffic Act. The crossing of the dirt road with the republican road is an intersection that falls under the cases of Art. 117, para. 2, item 1 of Ordinance No. RD-02-20-2 of 28 August 2018 on road design. The intersection is of Type I – on a two-lane road without left-turn lanes from the main direction and without islands on the secondary direction. In accordance with Art. 109, para. 11 of Ordinance No. RD-02-20-2-PP: “Agricultural roads without pavement are joined to roads as intersections of Type I a or I b in accordance with Art. 117, para. 2, item 1. At a distance of 20 m from the joining, they are provided with permanent pavement.” In this case, since this is an intersection, the group of signs A1+T2 (100 m) + B26 (50 km/h) should have been placed after the end of the intersection or at km 65+830. Currently, the 50 km/h limit is in effect in practice until km 65+810.

Before the intersection on the south side in the direction of travel from town Byala Slatina to town Knezha, road sign A28 “Intersection with a road without priority from the left” is missing, while on the north side in the direction of travel from town Knezha to town Byala Slatina, road sign A27 “Intersection with a road without priority from the right” is missing. The absence of warning road signs indicating an intersection from the left or from the right in a section of road representing a combination of a horizontal and vertical curve, when an established UKPTP is also involved, is a deficiency of particularly great significance and a substantial omission in the traffic organization project.



## 5. Guiding posts C1

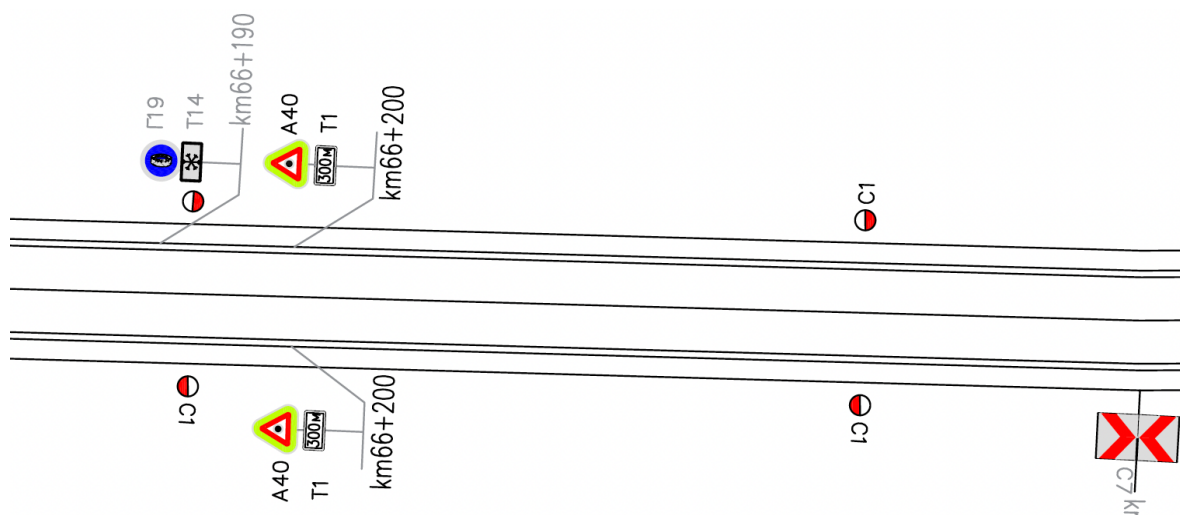


The project provides for the installation of guiding posts C1. During the inspection, not a single guiding post was identified. Even after the implementation of safety measures for the section, although they are provided for in the PPBD for the UKTP (new project), such posts were not installed. Their absence represents a serious deficiency, especially considering that there is no marking for the edge line of the road. In this manner, it becomes difficult for drivers to orient themselves regarding the boundaries of the traffic lane and the carriageway at night and under poor weather conditions.

**Direction of travel from town Knezha towards ← town Byala Slatina**

## 6. Road signs A40+T1 (300 m) at km 66+200





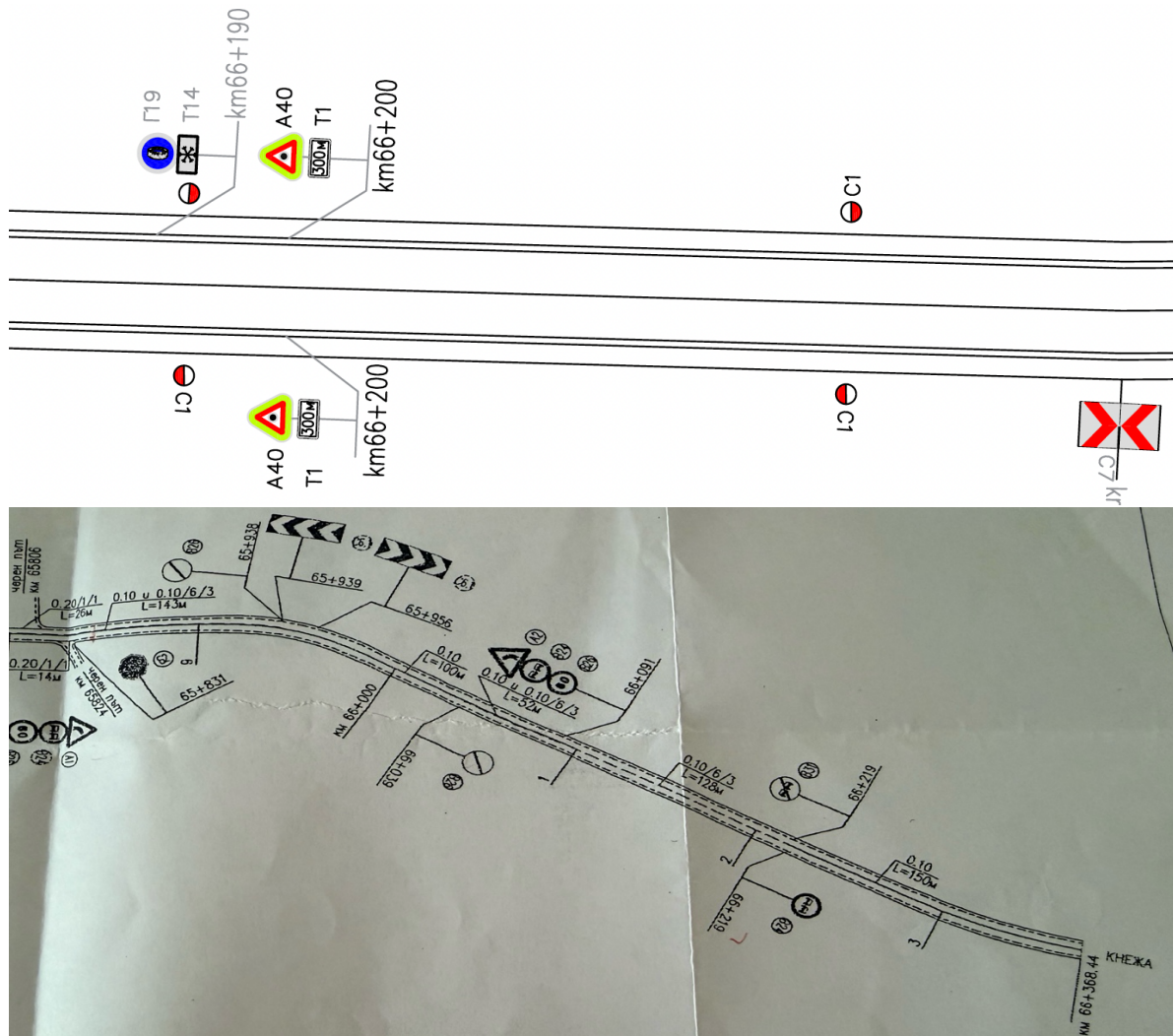
Road signs A40+T1 (300 m) are located at km 66+190 on the north side of the traffic lane according to the new PPBD project for the UKPTP. Sign A40 – “Caution! Section with concentration of road traffic accidents” has a retroreflectivity class of the surface corresponding to R3A and R3B, while plate T1 (right side) meets the requirements of RA2. Here again, an imbalance is created with regard to visibility of the road signs at night and under poor weather conditions. At one and the same location, road signs with the same retroreflectivity class must be installed, in order to guarantee that road users will be able to see and recognize in time the instructions of all road signs within the road scope.

Sign A40 and T1 300 m (right side) meet the visibility characteristics for retroreflectivity class R3A and R3B of the face surface. The road sign and the supplementary plate comply with the normatively defined rules described in Appendix No. 11 to Art. 6, para. 11, item 1 and Art. 10, para. 2 of Ordinance No. RD-02-21-1-PZ.

#### 7. Road sign G19+T14 at km 66+190 (new project)







Road sign G19 cannot be used in combination with supplementary plate T14, in accordance with the current requirements of Ordinance No. RD-02-21-1-PZ. Sign G19 is used in accordance with the conditions and under the procedure of Art. 103 of Ordinance No. RD-02-21-1-PZ. In Art. 190 of Ordinance No. RD-02-21-1-PZ, it is determined when, where and in combination with which other road signs supplementary plate T14 “In snow and winter conditions” may be used.

The sign and the supplementary plate are not part of the old project for permanent traffic organization. There is also a discrepancy in the kilometer position between the new and the old PPBD project. G19 was likely installed due to the characteristic snowdrifts in the area. In the new project, it is not clear whether this sign is new and is part of the risk management measures in the zone with concentration of road accidents, or is an existing sign installed on an unclear basis. The information available on the back of the road sign is that it was installed in 2023, and therefore cannot be part of the new traffic organization. The sign does not appear in the old project either, which means it was installed without the mandatory conditions described in Art. 3, para. 2, item 2 of Ordinance No. RD-02-21-1-PZ being present, where it is normatively determined that: “Road signs and other means of road signaling are installed within the road scope in compliance with the requirements of

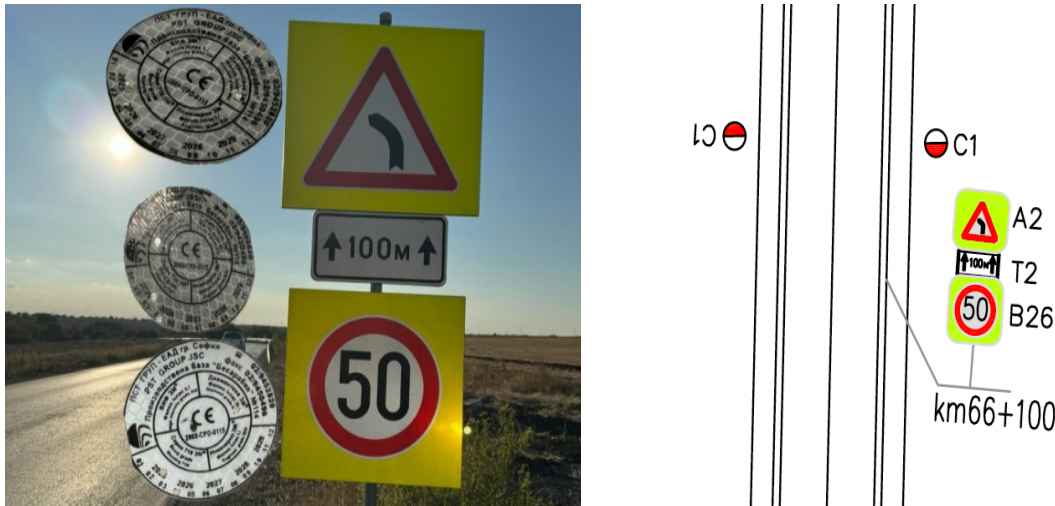


this ordinance, as follows: 2. outside the boundaries of built-up areas – in accordance with the project for traffic organization on the road.”

In addition, even if the provisions of the Road Signs Ordinance were to be disregarded, at least the principle should be observed that road signs which are valid only under certain weather conditions should be covered or removed when the need for their use ceases.

The road sign and the supplementary plate are installed on the right side and have a retroreflection class of the retroreflective surface of RA2.

#### 8. Road sign A2+T2 (100 m)+B26 (50 km/h) at km 66+100 (new project)

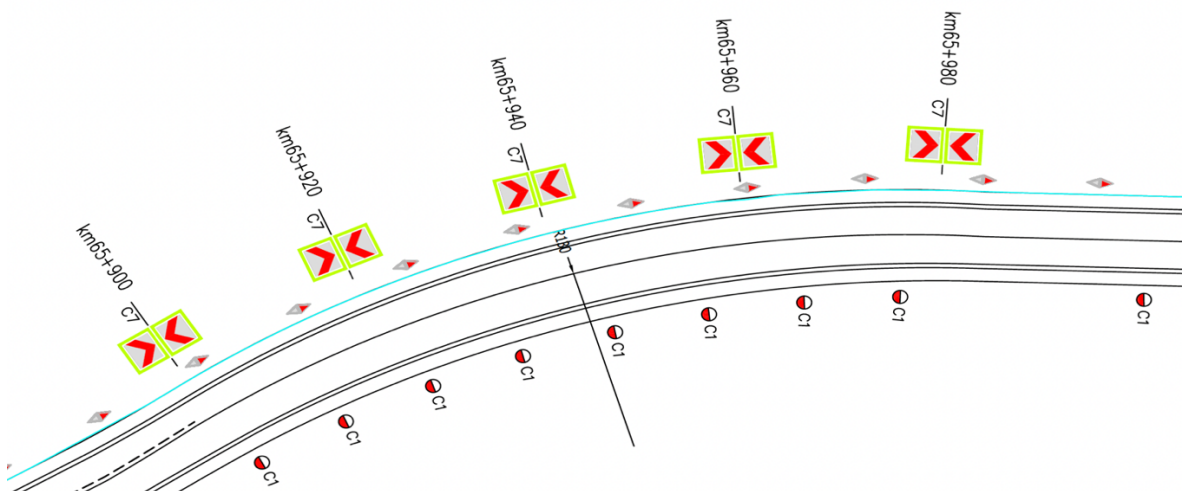


Road signs A2+T2 (100 m) + B26 (50 km/h) are located at km 66+100 according to the new PPBD project for the UKPTP. The retroreflection of the face surface of the two road signs installed on a supplementary yellow-green fluorescent background complies with class R3A and R3B. The supplementary plate T2 is not installed on a supplementary background and in this manner is visually lost. This is further intensified by the circumstance that the retroreflection characteristics of the face surface of T2 comply with RA2.

The supplementary plate in this group of road signs indicates that the length of the section or the length of the dangerous curve is 100 m after the road sign, which means that this danger ends at km 66+000. In reality, however, the distance between km 66+100 and km 66+000 is a straight. The curve begins at km 66+000 and ends at km 65+900. Here the designer has again made a substantial error by placing T2 instead of T1 (100 m).

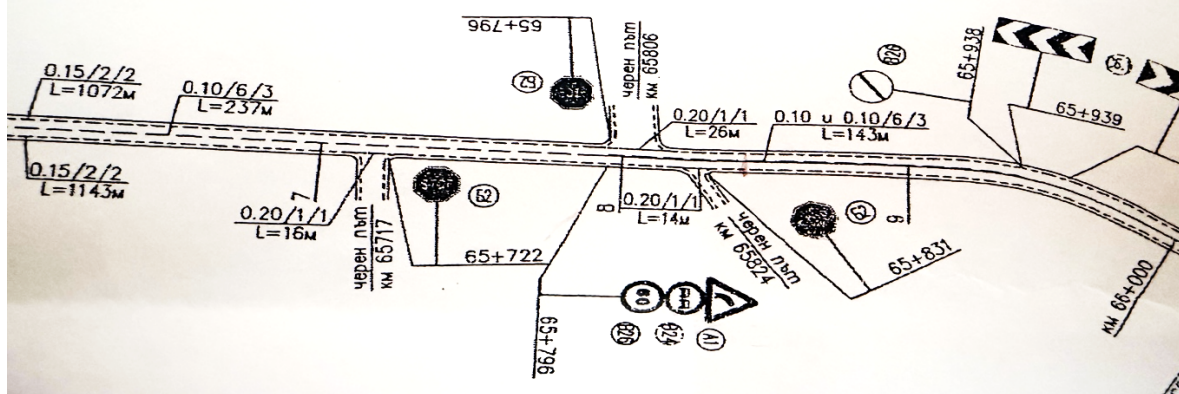
#### 9. Plates with guiding arrows C7 (5 pcs.) at km 65+980 (960, 940, 920, 900)



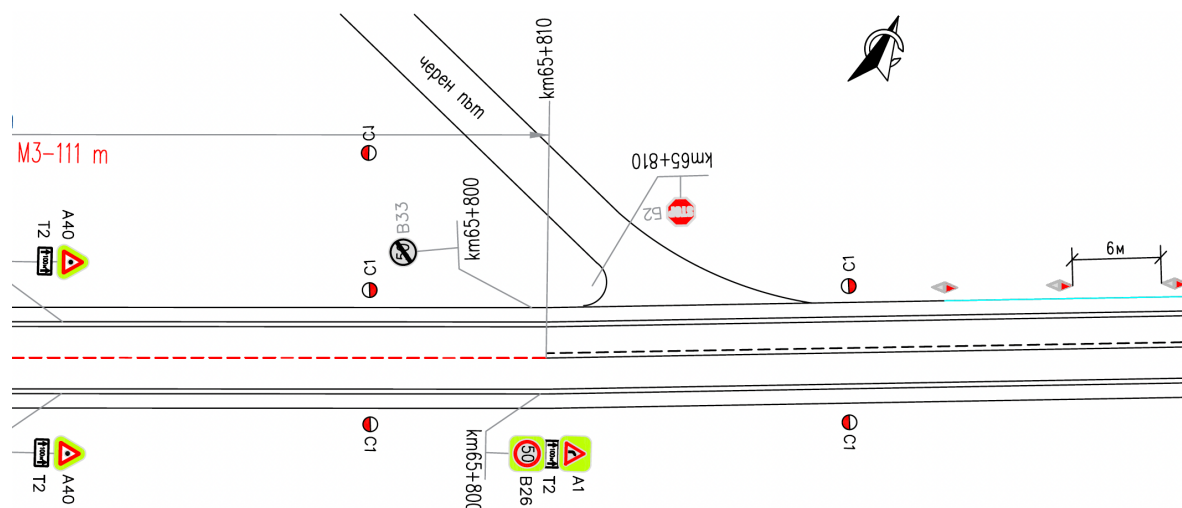


The retroreflective characteristics of the face side of the plates with guiding arrows C7 at km 65+980 (960, 940, 920, 900) – new project, comply with retroreflectivity class R3A and R3B.

#### 10. Road sign B2 at km 65+810







Road sign B2 is located at km 65+796 according to the old project and at km 65+810 according to the new project. The difference is 14 m between the two projects. It is necessary to clarify what this discrepancy is due to.

The retroreflective characteristics of sign B2 comply with RA2, which meets the requirements of Ordinance No. RD-02-21-1-PZ.

Before the intersection on the south side in the direction of travel from town Byala Slatina to town Knezha, road sign A28 “Intersection with a road without priority from the left” is missing, while on the north side in the direction of travel from town Knezha to town Byala Slatina, road sign A27 “Intersection with a road without priority from the right” is missing. The absence of warning road signs indicating an intersection from the left or from the right in a section of road representing a combination of a horizontal and vertical curve, especially when an established UKPTP is also involved, is a deficiency of particularly great significance and a substantial omission in the traffic organization project.

Sign B2 is located within the UKPTP and therefore requires an additional contour with a yellow-green fluorescent retroreflective background, as is the case with the other road signs in the considered road section (Art. 11, para. 2 of Ordinance No. RD-02-21-1-PZ).

Upon careful examination of the PPBD for the UKPTP (new project), it is established that at km 65+600, road signs A40+T1 (300 m) indicate that the distance to the UKPTP from the location of the road sign and supplementary plate is 300 m. This means that the UKPTP begins at km 65+900, which according to the project falls at the beginning of a right curve representing a combination of a horizontal and vertical curve.

The second road sign warning of the danger is located at km 65+750 and represents a combination of A40+T2 (100 m). This means that the length to the end of the UKPTP is 100 m, or the section ends at km 65+850 – 50 meters before the indication of sign A40+T1 (300 m) located at km 65+600. At the same time, however, at km 65+800 there are installed signs A1+T2 (100 m)+B26 (50 km/h), from which it is clear that the speed must be reduced to 50 km/h due to an upcoming dangerous curve on the right, which begins at km 65+900. If we exclude the error made by the designers in this group of signs (A1+T2 (100 m)+B26 (50 km/h) at km 65+800), namely that they replaced T1 with T2 in the project,

it turns out that according to the indications, the section with concentration ends at km 65+900, where in reality it begins. With the introduced traffic organization, instead of introducing more clarity regarding the specific dangers and the correct behavior of drivers, the signs are placed in such a way that they mislead road users.

In the opposite direction, signs A40+T1 (300 m) are defined in the PPBD for the UKPTP at km 66+200. This means that the UKPTP begins at km 65+900, where in reality it ends, because that is where the end of the curve is located in the direction of travel from town Knezha to town Byala Slatina. The next group of road signs A40+T2 (100 m) is located at km 66+150. They indicate to drivers that the length to the end of the section is 100 m after the road sign and supplementary plate, which means that the UKPTP ends at km 66+050. In this direction, the dangerous curve begins at km 65+980, which is 70 m before the location indicated by signs A40+T2 (100 m) placed at km 66+150. The discrepancy becomes complete when considering that according to signs A40+T1 (300 m) located at 66+200, the danger begins only at km 65+900, while according to the group A40+T2 (100 m) located at km 66+150, the danger is from there to km 66+050, or the UKPTP according to one sign ends 150 m after the place where it ends according to the other group of signs.

For sign A2+T2 (100 m) + B26 (50 km/h) at km 66+100, a substantial error has also been made. According to the indications, the dangerous right turn ends at km 66+000, where in reality the curve begins. If drivers follow the indications of the road signs and supplementary plate, they will see that 100 m of straight road lies ahead and only after that does the right curve begin.

It should be emphasized that the requirements of Art. 180 and Art. 181 of Ordinance No. RD-02-21-1-PZ expressly determine that:

Art. 180. "Supplementary plate T1 "Distance to" indicates the distance from the road sign under which it is placed to the place from which the prohibition, obligation, special prescription introduced by the road sign begins to take effect, or the distance to the signalled object."

Art. 181. "Supplementary plate T2 "Length of" indicates the length of the zone of effect of the introduced prohibition, obligation or special prescription."

It is entirely inadmissible for the indications of road signs to be inaccurate, false or to mislead road users. The errors made in the PPBD for the UKPTP are inadmissible, and it is concerning that no one in the long chain of approvals was able to see these inaccuracies and discrepancies. In practice, the new traffic organization misleads drivers. The most concerning problem here is that the designer confused the meaning of the supplementary plates and swapped plate T1 with plate T2 in two of the sign groups.

There are substantial discrepancies between the project for permanent traffic organization and the new project for PPBD for the UKPTP. In the new project, along with the other errors made by the designer, it is established that nowhere is it reflected which signs are removed and which road signs from the old project remain. There are signs that do not appear in the old project, but are left as part of the new one. The designer has not coped with the task of providing measures to overcome the problems in a section with



concentration of road traffic accidents. On the contrary, through the road signs they have given contradictory indications and have completely erased the existing traffic organization without this being necessary and without clear indications being given as to which signs are erased and which remain.

- **Road markings**

The types of road marking, the conditions, the procedure and the rules for its use are defined in Ordinance No. 2 of 2001 on road signaling with road markings (N2). Road marking consists of longitudinal markings, arrows, transverse markings, text and symbols on the road pavement and road structures, and is implemented by laying road marking materials such as paint, thermoplastic materials, cold-hardening materials, pre-manufactured strips and symbols, road studs and other materials. In accordance with the ordinance, road marking is used for creating traffic organization on the roads, by dividing the carriageway into traffic lanes, marking road structures, informing road users, including about the direction of the road, the possibility of choosing directions, the names of built-up areas and objects and the directions to them, as well as for giving other necessary instructions. Road marking is applied outside the boundaries of built-up areas, in accordance with the traffic organization project. The permanent road marking for permanent traffic organization is white in color.

In the studied section of road II-13, there are two projects for permanent traffic organization. In the so-called “old project”, it is determined that the edge line of the road (boundary of the carriageway) shall be executed as a single broken line M3 along the entire studied section from km 66+368.44 to 65+317.76 (kilometer position according to the old project). In the new project, it is provided that the edge line of the road shall be a single continuous line M1. In the PPBD for the UKPTP, however, this change is not reflected either in the explanatory note or in the drawing attached to it. On-site inspection established that the road marking at the edge line, where it exists at all, corresponds to a single broken marking M3.

The road marking was surveyed by the remote sensing method by the EUCTP team in May during the surveying of 36 UKPTPs. Subsequently, it was measured in September with a retroreflectometer in individual zones. In addition to the discrepancies that exist between the two projects, it was established that the road marking in the UKPTP does not meet the minimum normative requirements for retroreflection at night. In many places, the marking does not even meet the requirements for daytime visibility. In established sections with concentration of road accidents, it is inadmissible for the road marking not to be restored.

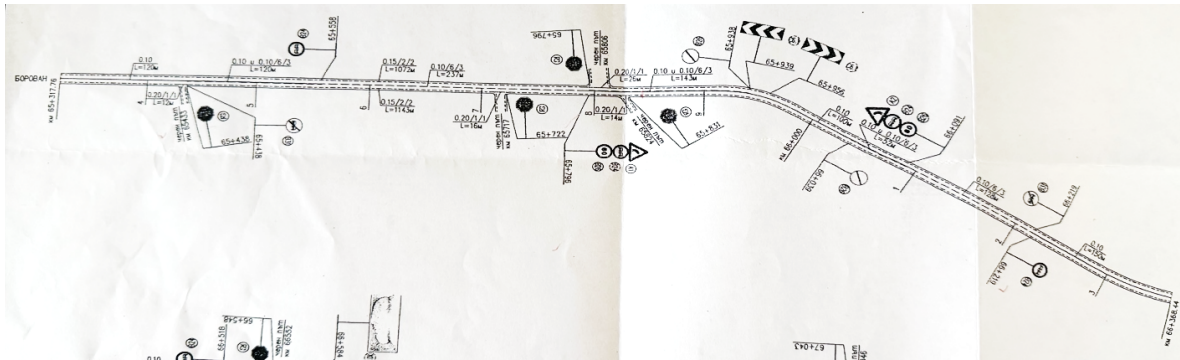


Figure 45 – PPBD – old project between km 65+317.76 and km 66+368.44.

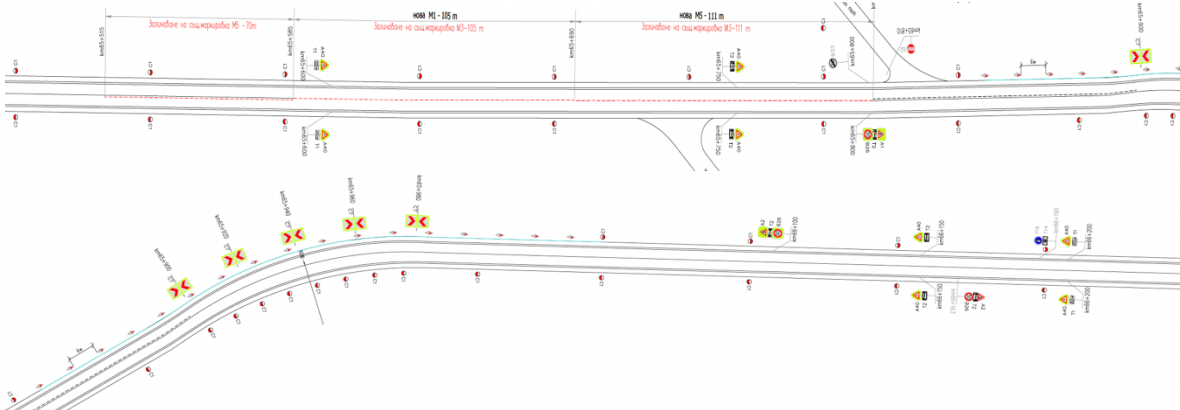


Figure 46 – PPBD for the UKTP – new project between km 65+515 and km 66+200.

Marking M3, which should outline the boundary of the carriageway, is missing along the entire length of the section, on both the left and the right side. This is a serious omission from the standpoint of road safety, as at dusk, in rain or when dazzled by oncoming lights, drivers lose visual orientation regarding the road clearance gauge and the location of the edge of the carriageway.



Figure 47 – Condition of the edge line marking the boundary of the carriageway (right lane, direction from town Byala Slatina to town Knezha). The photo was taken in September 2025 after the safety measures for the UKTP were implemented.



Figure 48 – Condition of the edge line marking the end of the carriageway (right lane, direction from town Knezha to town Byala Slatina). The photo was taken in September 2025 after the safety measures for the UKTP were implemented.





*Figure 49 – Overall condition of the road marking as of September 2025, after the safety measures for the UKPTP were implemented.*



*Figure 50 – Overall condition of the road marking as of September 2025, after the safety measures for the UKPTP were implemented.*



*Figure 51 – Condition of the road marking as of May 2025 before the safety measures for the UKPTP were implemented – footage captured by the remote sensing method.*



*Figure 52 – Condition of the road marking as of May 2025 before the safety measures for the UKPTP were implemented – footage captured by the remote sensing method.*

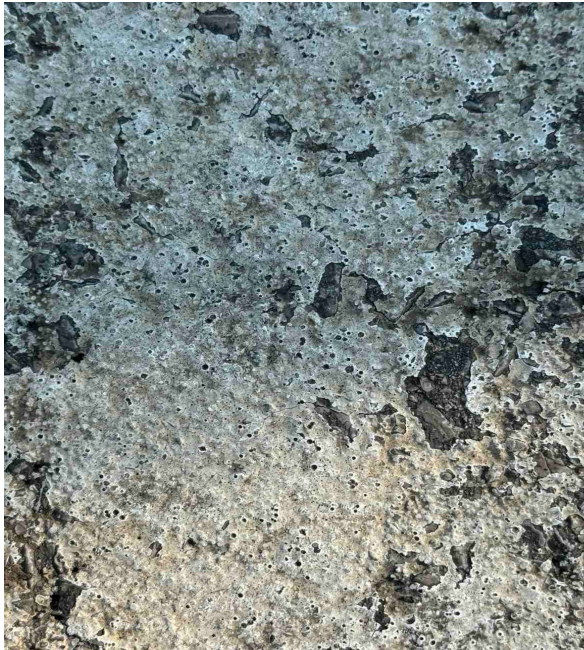
During the on-site inspection, it was established that the center line M1, M3 and M5 was laid in August 2025, but its execution does not comply with the normative requirements for busy 2nd class roads with traffic intensity exceeding 4,000 vehicles/day. Acrylic paint was used, which is not permissible for such a class of road, due to insufficient wear resistance and reduced durability under high traffic intensity.

In Art. 7, para. 4 of Ordinance No. 2, it is stated that: “The road marking on motorways, on express roads, on 1st class roads, on 2nd class roads with average annual daily traffic intensity exceeding 4,000 veh./day and on streets of I to III class, as well as the road marking on the road, when the road pavement allows its laying, shall be executed from: 1. cold spray plastics with a minimum layer thickness of 0.6 mm; 2. cold or hot laid plastic masses with a minimum layer thickness of 2 mm; 3. ready-made road markings.”



The road administrator has allowed the laying of road marking only at the center line to be contracted. Considering that at the boundary of the carriageway it not only is missing...

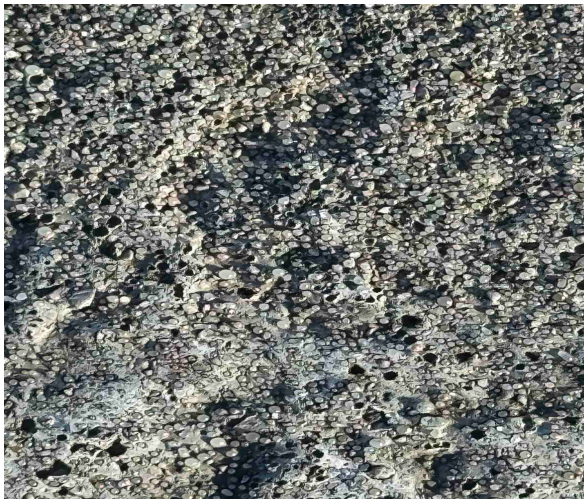
The center marking has unevenly laid glass beads – in places, lack of beads and uneven coverage is already observed. During the inspection, it was established that the beads have not sunk into the paint layer, as the layer itself is executed too thinly. This leads to reduced retroreflectivity and impaired night visibility. The color of the applied paint is visibly soiled and does not meet the requirements, which further reduces the effectiveness of the marking at dusk and in wet conditions, as well as during the day.



*Figure 53 – Condition of the road marking as of 26 May 2025.*



*Figure 54 – Condition of the road marking as of 26 May 2025.*



*Figure 55 – Condition of the road marking as of 10 August 2025.*



*Figure 56 – Condition of the road marking as of 10 August 2025.*

During the remote sensing survey, it was established that the center line is partially preserved, but strongly faded, with numerous interruptions along its length and lack of clear delineation. The marking layer has reduced retroreflection, and in places a visible

marking strip is completely missing. This indicates significant wear of the surface film and loss of microspheres (glass beads) that ensure night visibility. The same is confirmed by the close-up photos taken on 26 May 2025.

In the detailed close-up photos, a completely lost surface structure of the applied paint is observed – glass bead particles are almost entirely absent, and the binding polymer layer is porous and with compromised integrity. This is a characteristic sign of marking aging over 12–18 months without maintenance, or of poor-quality initial laying, in which sufficient quantity of beads and binding agent was not ensured.

After the laying of the new road marking layer, substantial defects continue to be observed, related to the quality of execution and the laying technology. In numerous sections, loss of glass beads is established, which is a direct indicator of improper application or non-compliance with technological requirements.

In visual inspection, it is seen that the beads have not sunk sufficiently into the paint layer, which means that the technological regime of temperature and material quantity was not observed during application. It is recommended that approximately 60–65% of the bead diameter be embedded in the paint, in order to ensure good adhesion and stability. With less embedding, the beads remain partially exposed on the surface and are easily chipped off under tire pressure, especially during movement of heavy goods vehicles.

The probable cause of this is an improper ratio between the quantity of paint and glass beads, in which the paint layer is excessively thin and its thickness does not allow sufficient embedding of the beads. As a result, surface delamination and destruction of the upper film are observed, which further accelerates the process of bead loss and reduction of retroreflection.

These defects are an indicator of non-compliance with the requirements of BDS EN 1423 (Road marking materials. Drop-on materials. Glass beads, antiskid aggregates and mixtures of the two products) and BDS EN 1436 (“Road marking materials. Road marking performance for road users and test methods” – this standard covers requirements for daytime and night visibility, color and durability). The violation of technology leads to sharp deterioration of night visibility and the reflective capability of the marking, while the actual service life of the applied layer will likely be significantly shorter than the normative (under 6 months).

Therefore, the marking does not ensure normative daytime and night visibility, nor does it meet the minimum retroreflection values set forth in Ordinance No. 2 of 2001 on road signaling with road markings and BDS EN 1436.

Furthermore, due to cracks and micro-erosion of the asphalt pavement, the adhesion of the paint to the pavement is compromised, which further shortens the service life of the marking. In places, there is partial intrusion of contaminants and dust particles into the structure, which reduces the luminance coefficient and contrast.



The road marking is in deteriorated operational condition, with a low coefficient of reflective capability and weak visibility under night and wet conditions. It does not comply with the applicable standards and must be entirely replaced by laying a new layer of thermoplastic or cold-plastic marking with embedded glass beads. Retroreflectometric measurements (RL and Qd) are recommended for confirmation of the values, but based on visual signs, the marking is below the critical threshold for safety.

Before the beginning of the section with concentration of road traffic accidents, in both directions, warning rumble strips of type M20 are laid – four zones with twelve transverse strips each. During the inspection, it was established that these rumble strips also do not comply with normative requirements. It is visible that the laying technology was not observed during execution – the material has “spilled”, uneven edges and local thickenings have formed. The thickness of the applied material varies between 6 and 12 mm, which is outside the permissible limits of  $10 \text{ mm} \pm 10\%$  according to Ordinance No. 2. This marking is not part of either the old project or the project for permanent traffic organization and safety for the UKPTP.



*Figure 57 – Transverse rumble marking – M20.*

In the section of road II-13 between km 65+440 and km 66+200, road marking measurements were carried out with a certified device ZRM 6014 (serial No. 553136014) on 12.08.2025 under dry atmospheric conditions. The measurement aims to establish the compliance of the indicators for daytime and night visibility with the requirements of the applicable normative documents – BDS EN 1436, Technical Rules No. 12/2010 and Ordinance No. 2/2018.



| Job Name:           | Default                |                |                |          |               |
|---------------------|------------------------|----------------|----------------|----------|---------------|
| Device Name:        | ZRM 6014               |                |                |          |               |
| Serial Number:      | 553136014              |                |                |          |               |
| Ref min             |                        | RL=150 - R3    | Qd=130 Q3      |          |               |
| Date                | Number of Measurements | RL (mcd/lx/m²) | Qd (mcd/lx/m²) | Location | Serial Number |
| 12/08/2025/17:36:19 | 1                      | 96             | 158            |          | 553136014     |
| 12/08/2025/17:36:48 | 1                      | 55             | 113            |          | 553136014     |
| 12/08/2025/17:37:22 | 1                      | 214            | 129            |          | 553136014     |
| 12/08/2025/17:37:58 | 1                      | 76             | 132            |          | 553136014     |
| 12/08/2025/17:38:14 | 1                      | 186            | 134            |          | 553136014     |
| 12/08/2025/17:39:03 | 1                      | 298            | 106            |          | 553136014     |
| 12/08/2025/17:39:55 | 1                      | 87             | 180            |          | 553136014     |
| 12/08/2025/17:40:26 | 1                      | 34             | 127            |          | 553136014     |
| 12/08/2025/17:40:57 | 1                      | 26             | 86             |          | 553136014     |
| 12/08/2025/17:41:18 | 1                      | 54             | 52             |          | 553136014     |
| 12/08/2025/17:42:02 | 1                      | 153            | 98             |          | 553136014     |
| 12/08/2025/17:42:33 | 1                      | 64             | 55             |          | 553136014     |
| 12/08/2025/17:43:26 | 1                      | 86             | 119            |          | 553136014     |
| 12/08/2025/17:44:08 | 1                      | 72             | 121            |          | 553136014     |
| 12/08/2025/17:44:44 | 1                      | 79             | 100            |          | 553136014     |
| 12/08/2025/17:45:12 | 1                      | 280            | 132            |          | 553136014     |
| 12/08/2025/17:45:57 | 1                      | 155            | 177            |          | 553136014     |
| 12/08/2025/17:46:22 | 1                      | 88             | 154            |          | 553136014     |
| 12/08/2025/17:47:01 | 1                      | 28             | 131            |          | 553136014     |
| 12/08/2025/17:47:33 | 1                      | 157            | 132            |          | 553136014     |
| 12/08/2025/17:52:11 | 1                      | 56             | 95             |          | 553136014     |
| 12/08/2025/17:52:51 | 1                      | 98             | 144            |          | 553136014     |
| 12/08/2025/17:53:34 | 1                      | 114            | 117            |          | 553136014     |
| 12/08/2025/17:54:18 | 1                      | 217            | 132            |          | 553136014     |
| 12/08/2025/17:54:52 | 1                      | 126            | 142            |          | 553136014     |
| 12/08/2025/17:55:26 | 1                      | 158            | 133            |          | 553136014     |
| 12/08/2025/17:56:07 | 1                      | 98             | 129            |          | 553136014     |
| 12/08/2025/17:56:43 | 1                      | 117            | 126            |          | 553136014     |
| 12/08/2025/17:57:27 | 1                      | 44             | 108            |          | 553136014     |
| 12/08/2025/17:58:11 | 1                      | 58             | 117            |          | 553136014     |
| 12/08/2025/17:58:54 | 1                      | 98             | 142            |          | 553136014     |
| 12/08/2025/17:59:26 | 1                      | 92             | 133            |          | 553136014     |
| 12/08/2025/18:00:12 | 1                      | 41             | 98             |          | 553136014     |
| 12/08/2025/18:00:59 | 1                      | 126            | 196            |          | 553136014     |
| 12/08/2025/18:01:28 | 1                      | 218            | 157            |          | 553136014     |
| 12/08/2025/18:02:01 | 1                      | 168            | 122            |          | 553136014     |
| 12/08/2025/18:02:49 | 1                      | 144            | 124            |          | 553136014     |
| 12/08/2025/18:03:17 | 1                      | 111            | 54             |          | 553136014     |
| 12/08/2025/18:03:59 | 1                      | 233            | 147            |          | 553136014     |
| 12/08/2025/18:04:53 | 1                      | 69             | 84             |          | 553136014     |
| 12/08/2025/18:05:22 | 1                      | 104            | 133            |          | 553136014     |

Figure 58 – Results from measurement with retroreflectometer.

In accordance with the normative requirements, the minimum values for road marking on the republican road network are  $RL \geq 150 \text{ mcd/lx/m}^2$  for class R3 (night visibility) and  $Qd \geq 130 \text{ mcd/lx/m}^2$  for class Q3 (daytime visibility). In the considered section, a total of 40 measurements were recorded, with the results showing an average RL value of 115  $\text{mcd/lx/m}^2$  and an average Qd value of 126  $\text{mcd/lx/m}^2$ . The minimum recorded values are respectively 26  $\text{mcd/lx/m}^2$  for RL and 52  $\text{mcd/lx/m}^2$  for Qd, while the maximum values reach 298 and 196  $\text{mcd/lx/m}^2$ .

Analysis of the data shows that only about one-third of the measured points for RL cover the minimum normative threshold. In the remaining part of the section, significant downward deviations are observed, with night visibility at individual points being critically low and not ensuring adequate orientation for drivers during the dark part of the day. For the Qd indicator (daytime visibility), a reduction is also established – in almost half of the measurements, the values are below 100  $\text{mcd/lx/m}^2$ , which means reduced contrast and visibility under daytime conditions, especially on wet pavement.

The fluctuations between individual measurements are exceptionally large – from 26 to 298  $\text{mcd/lx/m}^2$ , which is a sure sign of uneven embedding of glass beads and varying thickness of the applied paint layer. This is usually a result of deviations in the laying technology or poor-quality execution. The established values correspond to class R2Q2, which is below the minimum requirements for roads of the republican road network.

The overall condition of the road marking in this section can be defined as unsatisfactory. It does not ensure the necessary visibility at night and under reduced illumination, being in places practically invisible. Non-uniformity along the length of the alignment is established, which leads to visual interruption and disorientation of drivers. The marking does not meet the minimum operational requirements for class R3Q3 and must be deemed unfit for operation.

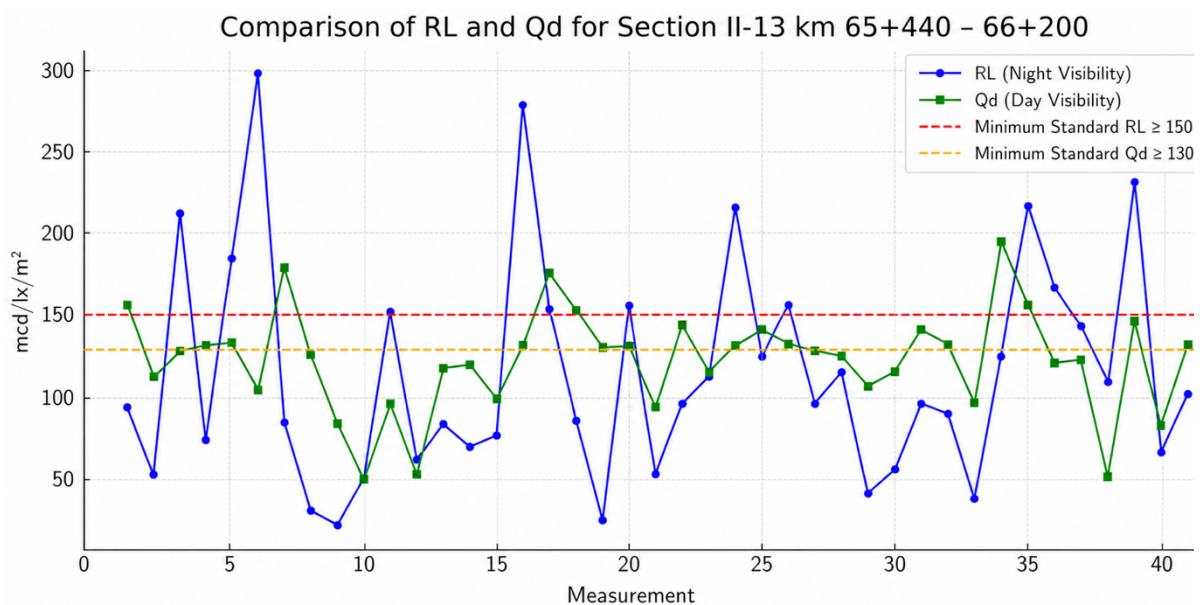


Figure 59 – Statistics from measurement with retroreflectometer..

The probable causes for this condition are related to insufficient paint layer thickness, improper distribution and embedding of glass beads (below 60%), as well as natural wear



and soiling of the surface due to traffic and atmospheric influences. The possibility of using materials of lower quality than normatively required is not excluded either.

Based on the findings made, complete restoration of the road marking with materials complying at least with class R3Q3, and where possible with class R4Q4, is recommended. Upon re-laying, uniform embedding of glass beads between 60 and 65% must be ensured, as well as a minimum layer thickness of not less than 0.6 mm for paint or 1.5 mm for cold plastic. Control measurement 7–10 days after laying is recommended, as well as subsequent monitoring during the first six months of operation. Additionally, periodic cleaning of the road marking is expedient, in order to prevent accumulation of dust and contaminants that reduce its reflective properties.

All identified defects – improperly selected type of paint, absence of edge lines, unevenly laid and partially missing beads, as well as poorly executed rumble strips – indicate a systematic omission in control during the execution of the marking and substantially reduce its effectiveness as a road safety measure. New execution with suitable highly durable materials (cold plastic coating or ready-made road markings) is necessary, in accordance with the intensive traffic and the requirements of Ordinance No. 2 on road signaling with road markings.

- **Lighting**

In the studied section, no lighting is installed. There is no practice or normative requirement for this type of roads to be illuminated. In the intersection zones, it is also not necessary; it is desirable for the horizontal and vertical markings to be brought into compliance with the normative requirements in order to improve the visual orientation of road users.

### **3. Road restraint systems**

The main purpose of the design and installation of road restraint systems is to increase traffic safety. Another substantial purpose is the prevention and exiting of motor vehicles from the carriageway, reduction of the number and severity of road traffic accidents, and securing of dangerous locations and sections.

The restraint system between km 65+840 and km 66+010 (new project) is type H2W3. At km 65+770, there is a road restraint system on both sides of the traffic lane above an existing culvert. During the performed visual inspection, it was established that the initial elements of the installed road restraint system do not meet the requirements of Ordinance No. RD-02-20-1 of 2024 on the conditions and procedure for use of road restraint systems and the requirements for them (Ordinance No. RD-02-20-1-RRS).

In accordance with “Execution of initial and final elements of road restraint systems” to Ordinance No. RD-02-20-1-RRS, point 3.1.1 “At point obstacles on two-way roads without median barrier, the beginning and end of the RRS are executed by a single terminal”. In this case, the presence of a significant number of trees alongside the RRS (safety fence) represents point obstacles. A single terminal must mandatorily be installed in accordance with the example indicated below and in accordance with Figure 32 of Ordinance No. RD-02-20-1-RRS.

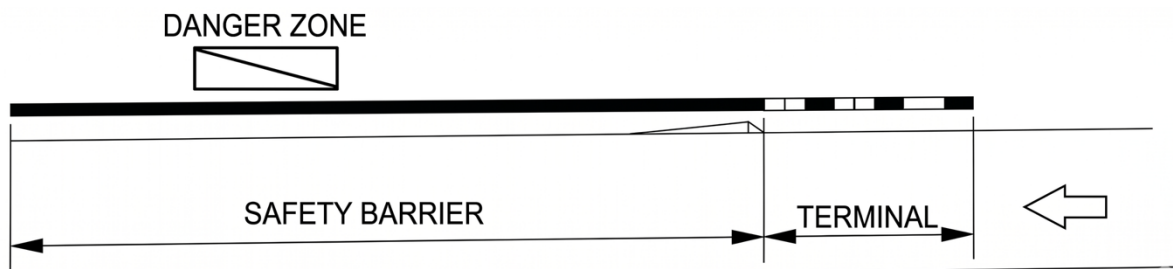


Figure 60 – Example in Figure 32 of Ordinance No. RD-02-20-1-RRS.



Figure 61 – Initial element of road restraint system at km 66+010 (direction of travel from town Knezha to town Byala Slatina) before the safety fence, which does not comply with the requirements of point 2.2 “Execution of initial and final elements of road restraint systems” to Ordinance No. RD-02-20-1-RRS. It must be replaced with a single terminal.



Figure 62 – Damaged road restraint system as a result of a road traffic accident, located on the right side of the left curve in the direction of travel from town Knezha to town Byala Slatina.

The road restraint system between km 65+840 and km 66+010 (new project) was installed as one of the safety measures for the section with concentration of road traffic accidents. During the on-site inspection, it was established that the restraint system has rather the opposite effect, and after its installation it has contributed to the occurrence of more severe injuries, as vehicles traveling in the direction of town Byala Slatina have no possibility to undertake an evasive maneuver and avoid impact. The road accidents end with the vehicle traveling in this direction being crushed against the restraint system.





Figure 63 – Photo from the installation of the road restraint system on 20.05.2025. Source: <https://api.bg/bg/novini/montirani-sa-novi-mantinel-na-put-ii-13-byala-slatina-knezha-pri-66-i-km-za-obezopasyavane-na-uchastuka-s-kontsentratsiya-na-intsidenti.html>



Figure 64 – Photo reflecting the current condition of the road restraint system on 25.05.2025 in the zone of the section with concentration of road traffic accidents.



Figure 65 – Condition of the passenger car involved in a serious road traffic accident at km 65+920, which was crushed against the road restraint system by the trailer of an oncoming heavy goods vehicle traveling in the direction from town Byala Slatina to town Knezha. The road accident ended with three injured.



Figure 66 – Condition of the road restraint system after the safety measures for the UKPTP were implemented. From the traces of numerous impacts, it is clearly evident that the cause of the road accidents is complex and the restraint system is not the best solution.





Figure 67 – In the two images above, an absolutely analogous road accident is visible, which occurred before the installation of the restraint system (28.03.2025). The heavy goods vehicle was traveling in the direction from town Byala Slatina to town Knezha, while the passenger car was traveling in the opposite direction. In this case, due to the absence of the road restraint system, the driver of the passenger car undertook an evasive maneuver and left the carriageway. As a result of the road accident that occurred, there were no injuries, only material damages.

In the project for permanent traffic organization, it is provided that C14.1 be installed at intervals of 6 m. During the inspection, it was established that they are installed at intervals of 9 m.



Figure 68 – Measuring the distance between C14.1.

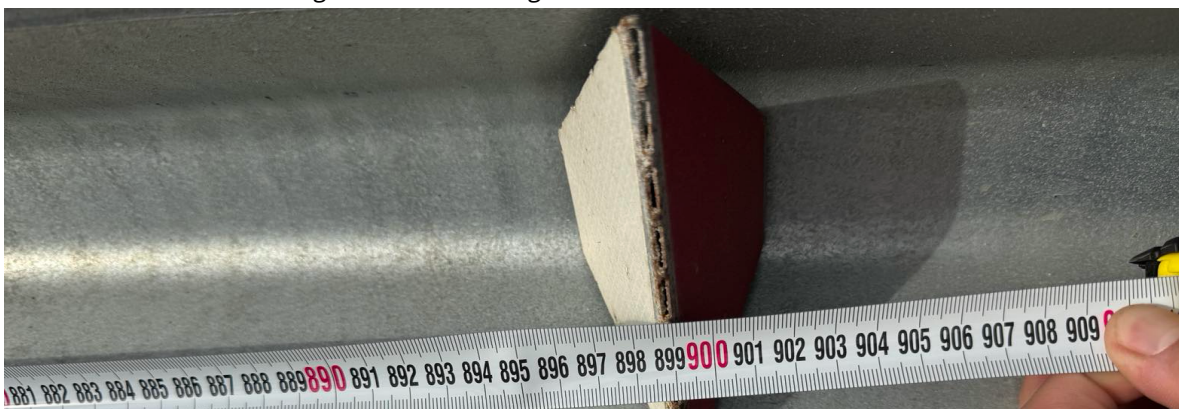


Figure 69 – Indicate the spacing between C14.1.

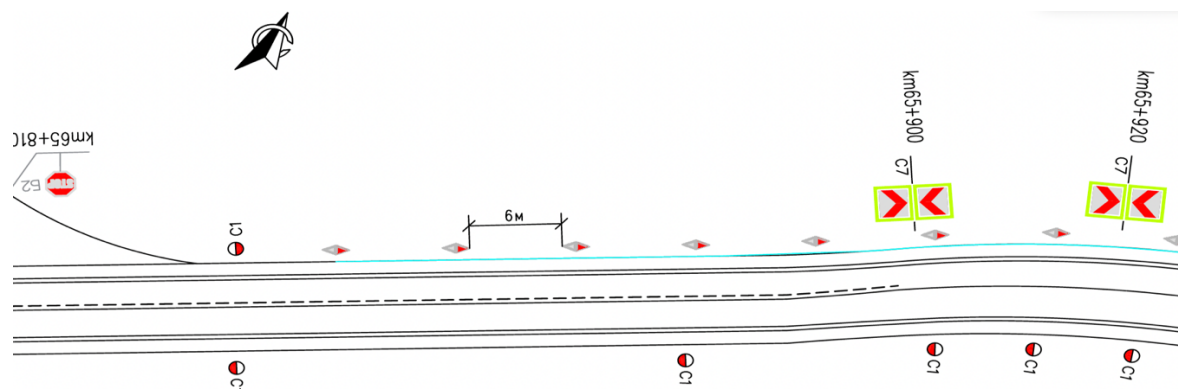


Figure 70 – Project instructions for the installation of C14.1 elements on the road restraint system according to the PPBD for the UKPTP, and measurement of how they are actually installed.

On a two-lane road with one carriageway and traffic intensity exceeding 4,000 vehicles/day, the beginning of the restraint system is highly “exposed” – the probability of someone hitting it frontally or at a small angle is comparable to that of any side impact along its length. Therefore, good practice is for the beginning to be a crashworthy terminal (energy-absorbing/redirecting element, certified to EN 1317), rather than “zeroing out” the post over ~12 m.

The terminal ensures controlled energy absorption and/or safe redirection of motor vehicles upon frontal and oblique impact. It prevents the probability of the leading posts of the restraint system penetrating the vehicle, launching upward (“ramp effect”) and overturning. Furthermore, the terminal anchors the first section of the restraint system, so that the system works as a barrier from meter No. 1. With a 12-meter zeroing-out, the first posts are below the working height of the system, which increases the risk of “vaulting” and penetration into the dangerous zone behind the fence.

The mechanism of the road traffic accidents that have occurred in this curve shows characteristic repeatability: during rainy weather and low adhesion, vehicles traveling from town Byala Slatina to town Knezha often skid and enter the opposing lane. Oncoming vehicles cannot avoid the impact and collide with the guardrail. The presence of a restraint system on the right side for the direction Knezha–Byala Slatina further limits the possibility of drivers to undertake an evasive maneuver and in this manner increases the probability of a head-on or side impact.





*Figure 71 – Condition of the road restraint system on both sides of the culvert located at km 65+770.*

The road restraint system installed above the culvert located at km 65+770 (new project) is unstable due to the erosion observed in the zone of the upper part of the culvert. It is necessary to cast curb blocks (cap) as a preventive measure against destruction and failure of the traffic lane, and subsequently to restore the road restraint system.

For this reason, it is recommended to consider how appropriate it is to have a road restraint system in the section with concentration of accidents. A similar measure would reduce the risk for skidding vehicles and limit the possibility of serious head-on collisions, while at the same time allowing drivers greater space to avoid collision.

#### **4. Condition of the asphalt pavement and other hazards (deficiencies)**

- Condition of the asphalt pavement

During the inspection, in addition to visual examination and assessment of the condition of the asphalt pavement, measurements were also carried out to check the skid resistance/skid resistance. The measurement was performed under simulated wet pavement conditions. The study was conducted with a device of brand SARSYS, model T2GO.



The pavement is in an advanced stage of functional degradation with local structural defects. Pronounced longitudinal cracks are observed (along the axis and in the edge zone – the boundary of the traffic lane), sections with ruts and lateral shoving, torn strips along the edge with settlement towards the shoulder, as well as numerous patches of different age and quality. The surface layer is polished in places (especially in the curves and in the wheel tracks – the ruts), and in individual zones there is bituminous “film”/fatting, which substantially reduces microtexture and skid resistance. In some zones, differential settlement is observed, which forms transverse “steps” and longitudinal waves.

The main causes are a combination of aging of the binder material, water infiltration through cracks and poor drainage, insufficient bearing capacity of the shoulder (leading to edge deformations), and heavy goods/agricultural traffic, which accelerates rutting and crushing of thin layers. In the curves, uneven superelevation/cross slope is probably also added, which retains water towards the inner edge and further reduces skid resistance. The shadow from vegetation retains moisture, delays drying and promotes polishing of the wearing course.



*Figure 72 – Clearly visible longitudinal crack.*



*Figure 73 – Poor-quality asphalt at one of the patches.*



*Figure 74 – General view before one of the patches, at which lateral shoving is observed.*



*Figure 75 – Zone with clearly visible lateral shoving and a formed step with a height exceeding 7 cm.*





*Figure 76 – Condition of the asphalt pavement in the curve.*



*Figure 77 – Difference in the aggregate grading between the old and the new asphalt. The old grading is Type B, while the new grading is Type A.*

Type A and Type B fractions differ in the nominal maximum size and granulometric composition of the inert materials, as well as in the corresponding bitumen content. Type A usually has a finer fraction and higher bitumen content, giving a smoother surface and lower macrotexture; Type B has a coarser fraction, more pronounced texture and better water drainage/high-speed skid resistance. This is also visible on-site: sections with “compacted fraction” Type B are rougher and more open, while patches with Type A are smoother and darker.

On one and the same road section, mixing these two recipe types leads to sharp non-homogeneity of skid resistance (macro- and microtexture), which is dangerous. During rain, a thicker water film forms on the smoother patches (Type A) and the braking distance increases; on dry conditions, the difference in texture creates a “step-like” change in friction longitudinally and transversely – when one side of the vehicle steps on a Type A patch while the other remains on Type B, asymmetry of skid resistance occurs and an undesirable turning moment arises in a curve or during braking. Additionally, the different structure and hardness cause differential deformations (ruts/waves), accelerate reflective cracking along the boundaries and worsen durability.

Precisely for these reasons, the Technical Rules and Norms of the RIA and the corresponding specifications require uniformity of the mixture type and fraction within one lane/section. “Mismatch” in the type of fractions is inadmissible – patches and local repairs must be executed with the same type of mixture and fraction as the existing layer, or complete leveling/re-covering (milling + new wearing course) must be provided, so that the resulting surface is texturally and frictionally homogeneous.

In the considered zones, the opposite is the case – the newer patches are of Type A, while the surrounding section is of Type B. This leads to unpredictable behavior of motor vehicles in curves and during braking, especially on wet pavement; the marking also wears unevenly due to the different texture. The practical engineering-safety approach is: (1) prohibition of using different fractions in local repairs; (2) where mismatch already

exists – milling and uniform re-asphalting over the entire width of the lane with the same type of mixture; (3) until rehabilitation – high-friction thin-layer treatment on the smooth patches for equalization of macrotexture, plus monitoring of skid resistance (SRT/SCRIM) and correction upon deviations.

In a word: uniform fraction type is not an aesthetic but a critical safety requirement. Mixing Type A and Type B in one lane is inadmissible by the norms and creates a real risk of skidding, extended braking distance and accelerated pavement degradation.

The risk effect is twofold: (1) lower skid resistance and extended braking distance (especially during rain – the ruts accumulate water and increase the risk of aquaplaning); (2) unstable trajectory due to edge steps and unevenness, which during passing in narrow sections and near safety fences increases the risk of “leaving the carriageway” and impact into the road restraint system. The cracks accelerate structural degradation – during winter, water in them freezes and expands the damage.



*Figure 78 – Presence of mesh-like and block cracks in numerous zones.*

*Figure 79 – Presence of mesh-like and block cracks in numerous zones.*

Urgent measures (maintenance): machine cleaning and hot filling of cracks with polymer-modified bitumen; local “wedging” of the edge and restoration of the shoulder;



cutting and quality patching of torn zones; clearing of drainage and vegetation; restoration of edge and center marking with high retroreflection.

Short-term/medium-term (rehabilitation): profiling milling for removal of ruts and leveling, laying of a leveling course (AC 16/AC 22) and a new wearing course (SMA/AC 11) with required macrotexture; high-friction treatment in the dangerous curve; structural strengthening/widening of the shoulder; correction of cross slopes/superelevation in sections with water retention. In case of proven bearing capacity deficiency – local reinforcement (reinforcement/geogrid, thicker layers).

Within the scope of the study, both types of damage are observed: deformations and destructions. The entire list of damages described in Art. 60, para. 2 and para. 3 of the “Technical Rules and Requirements for Road Maintenance” is present here.

- **Analysis of skid resistance/skid resistance**

The skid resistance of the road pavement is a main indicator ensuring conditions for stable and safe movement of vehicles on the roads at the intended speeds. Skid resistance depends on many and most diverse factors related to the vehicle, the tires, the driving mode, the road alignment, the type and condition of the road pavement, the drainage, the environment, etc. Of the factors directly related to the road pavement, the roughness of the pavement and its momentary condition – dry, wet, muddy, icy, etc. – have the greatest significance for skid resistance.

The first measured section is on the west side in the direction of travel from town Byala Slatina to town Knezha. Total length of the measured section approximately 330 meters, in the zone of the UKPTP. In the measurement report, all parameters under which the measurement itself was performed are described in detail.

*The measurement was performed on 06.08.2025.*

### Measurement Report T2GO

|                                  |              |                                   |                             |
|----------------------------------|--------------|-----------------------------------|-----------------------------|
| Percentage of PASS measurements: | <b>0.33%</b> | Measurement (PASS / FAIL):        | <b>FAIL</b>                 |
| Location:                        | <b>ii13</b>  | Measurement Name:                 | <b>ptp km 65+930 -66+03</b> |
| User Name:                       | admin323     | Date:                             | 2025-08-06                  |
| ID:                              | 1            | Time:                             | 13:46:48                    |
| Measured Distance (m):           | 336.9        | Average Speed (kmph):             | 6.09                        |
| Maximum Friction:                | 0.63         | Average Air Temperature (°C):     | 35.80                       |
| Average Friction:                | 0.24         | Average Tire Temperature (°C):    | 33.21                       |
| Minimum Friction:                | -0.05        | Average Surface Temperature (°C): | 37.55                       |
| Threshold:                       | 0.5          | Average Humidity:                 | 47.58                       |
| Interval:                        | 10 cm        | Self Test date:                   | 2025-07-14_13-16-25         |
| Self Test result:                | passed       | Water                             | ON                          |
| GPS                              | ON           |                                   |                             |

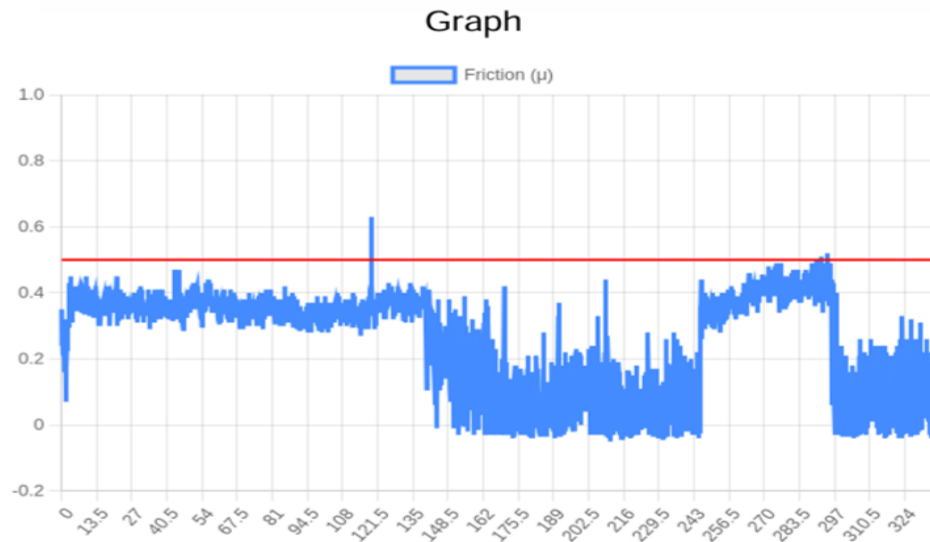


Figure 80 – Results from measurement performed with device SARSYS T2GO.

The measurement was performed on 06.08.2025 in a section with a length of approximately 330 m, at an average device speed of about 6 km/h and under wet test conditions.

Main recorded parameters:

- Average friction coefficient ( $\mu$ ): 0.24, with a required threshold  $\mu \geq 0.55$  – categorically FAIL, “PASS” percentage only 0.33%.
- Maximum value: 0.63, minimum:  $-0.05$ , which shows local sections with practically zero or negative friction.
- Temperature conditions during the test: air  $\sim 35.8$  °C, pavement  $\sim 37.5$  °C, humidity  $\sim 47$  %.

The graph clearly shows long zones with persistently low friction, with local drops to 0 – 0.1. There are “holes” along the length – sections in which the coefficient falls far below the minimum permissible values. On the graph, it can be very clearly established where the patches with new asphalt are located – there the scale shows drastic and clearly distinguishable drops (pockets), after which there is leveling where there are no patches, only old asphalt. What is alarming is that the old asphalt shows better skid resistance/skid resistance indicators than the newly laid asphalt.

These results show that the braking distance on wet pavement is extended by more than twice compared to the reference value at  $\mu = 0.55$ . During sharp maneuvers and in curves, the risk of side skidding, leaving the carriageway and impact into roadside structures increases significantly, especially during rain and night conditions. The low and uneven friction is an indicator of loss of macrotexture of the asphalt pavement and of the presence of zones with different aggregate fraction in the surface layer, which leads to formation of a water film.



The section of II-13 in the right lane in the direction Byala Slatina → Knezha has categorically insufficient skid resistance, which determines a high risk of road traffic accidents and necessitates urgent measures for improvement of friction and signaling.

During the testing conducted with the T2GO system on 06.08.2025 on a section with a length of approximately 252 m, an average friction  $\mu = 0.30$  was recorded, with an admissibility threshold of  $\mu \geq 0.55$ . The maximum measured friction value is  $\mu = 0.71$ , and the minimum –  $\mu = -0.06$ , which indicates the presence of local zones with practically zero friction. The share of measurements covering the normative threshold (“PASS”) is only 9.6%, i.e. over 90% of the section categorically does not meet the requirements for safety under wet conditions.

### Measurement Report T2GO

|                                  |          |                                   |                     |
|----------------------------------|----------|-----------------------------------|---------------------|
| Percentage of PASS measurements: | 9.6%     | Measurement (PASS / FAIL):        | FAIL                |
| Location:                        | ii13     | Measurement Name:                 | ptp km 66-03 bsl    |
| User Name:                       | admin323 | Date:                             | 2025-08-06          |
| ID:                              | 1        | Time:                             | 13:53:54            |
| Measured Distance (m):           | 252      | Average Speed (kmph):             | 6.11                |
| Maximum Friction:                | 0.71     | Average Air Temperature (°C):     | 34.31               |
| Average Friction:                | 0.3      | Average Tire Temperature (°C):    | 25.02               |
| Minimum Friction:                | -0.06    | Average Surface Temperature (°C): | 36.13               |
| Threshold:                       | 0.5      | Average Humidity:                 | 62.09               |
| Interval:                        | 10 cm    | Self Test date:                   | 2025-07-14_13-16-25 |
| Self Test result:                | passed   | Water                             | ON                  |
| GPS                              | ON       |                                   |                     |

### Graph

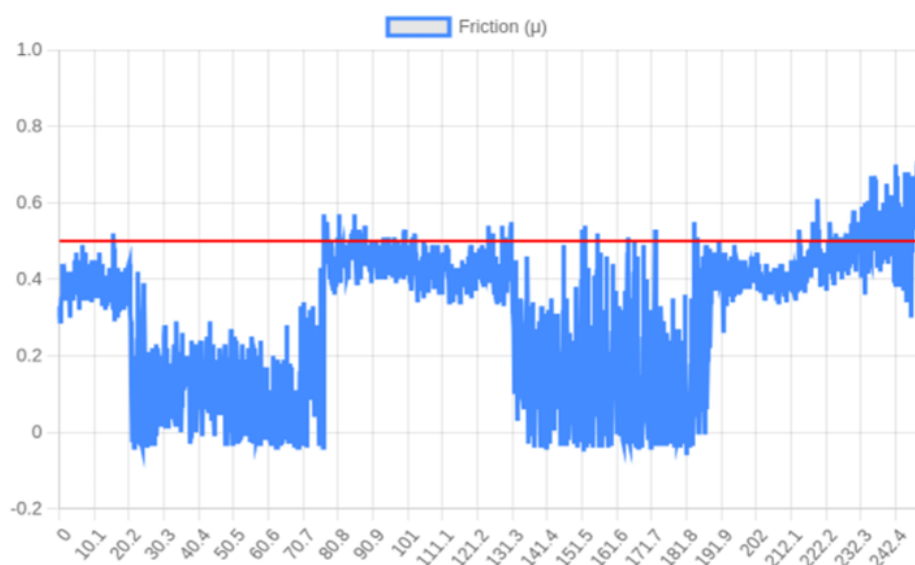


Figure 81 – Graph of the results per kilometer.

The graph from the measurement clearly outlines extensive sections with  $\mu$  values in the range of 0.20–0.30, as well as deep local drops to around 0.0, at which friction is

practically lost. Such uneven and low macrotexture leads to a sharp increase in braking distance on wet pavement – at  $\mu = 0.30$ , the braking distance is approximately 40–45% longer compared to the reference  $\mu = 0.55$ , while in zones with  $\mu \approx 0.20$ , the braking distance can become about 2.5 times longer. This creates a high risk of skidding, side impacts and leaving the carriageway, especially in curved sections and during travel in the dark part of the day or during rain.

Based on the results and in accordance with Ordinance No. RD-02-21-1/23.11.2023, the introduction of road sign A15 “Danger of skidding” along the entire length of the studied section is recommended until the problem is definitively resolved.

The necessary long-term measures include milling of the wearing course or thin-layer high-friction surface treatment (HFST) in order to restore macrotexture, homogenize the upper layer and ensure stable friction across the entire width of the carriageway. After performing these activities, repeated measurements must be made to confirm achievement of the required  $\mu \geq 0.55$  without local “holes” along the length.

- **Other identified hazards**

On-site, a tree was identified with dried branches extending over the traffic lane.



*Figure 82 – On-site, a tree was identified with dried branches extending over the traffic lane.*

Vegetation clearing must be performed as specified in the “Technical Rules and Requirements for Road Maintenance” of the Road Infrastructure Agency. In accordance with point 1.2.4 of Ordinance No. RD-02-20-19 of 12 November 2012 on maintenance and current repair of roads: “The main works for current repair of structures for drainage of surface waters and of waters flowing within the road scope, including drainage and protective ditches, drainage channels and rigoles, are: clearing from sedimentary soils, vegetation and other materials that have entered the road scope, restoration of the



transverse and longitudinal profile of the ditch by shaping its transverse section, leveling and/or deepening, restoration and/or repair of undermined sections with eroded soil, restoration and/or repair of ditch lining, restoration and/or repair of protective embankment dikes, restoration of undermined or settled elements of channel lining, restoration and/or repair of thresholds at the embankment toe, restoration of the geometric position and/or replacement of concrete curbs forming the channel inlet.” Yet in the specific studied section, none of the described works have been performed in accordance with the applicable requirements described in the legal and subordinate legislation of the Republic of Bulgaria.

#### ⇒ Concentration of road traffic accidents

Excerpt from the interactive map of the Ministry of Interior, reflecting the number of road traffic accidents that have occurred. In the section from the beginning of 2025 until 06.08.2025, 8 road traffic accidents have occurred, with 7 injured. In total for this period, there are 19 participants in the incidents. Three of the incidents are of the type “collision of motor vehicles at an angle”, one is of the type “impact into slope”, one is “impact into roadside structure”, and three are of the type “side collision between motor vehicles”.



Figure 83 – Interactive Map of Traffic Accidents, Minor Accidents.

For the period from 01.01.2024 to 31.12.2024, 2 road traffic accidents occurred. One of them with one fatality and one with only material damages.

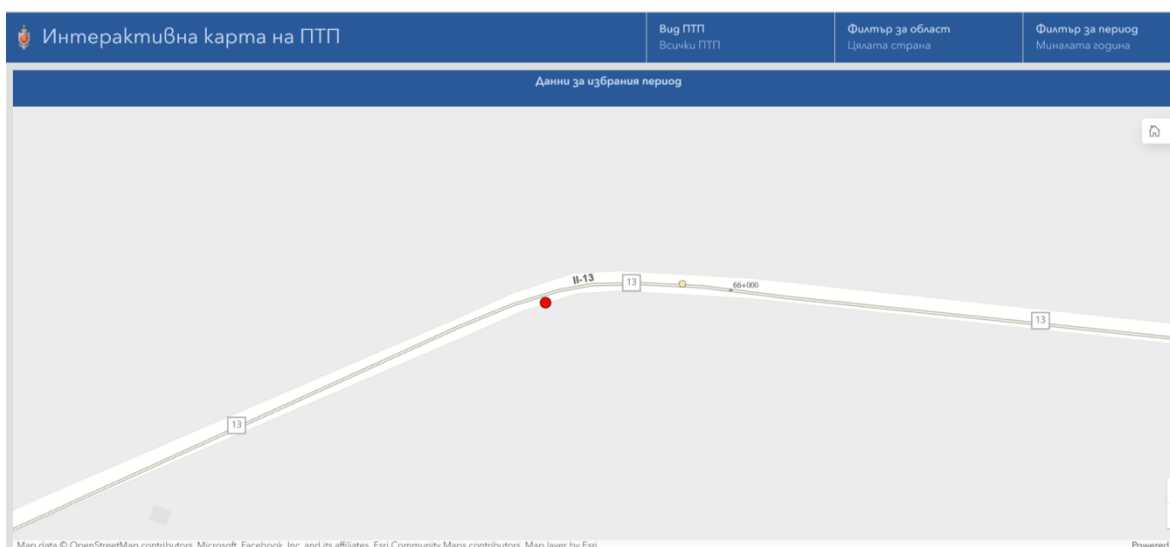


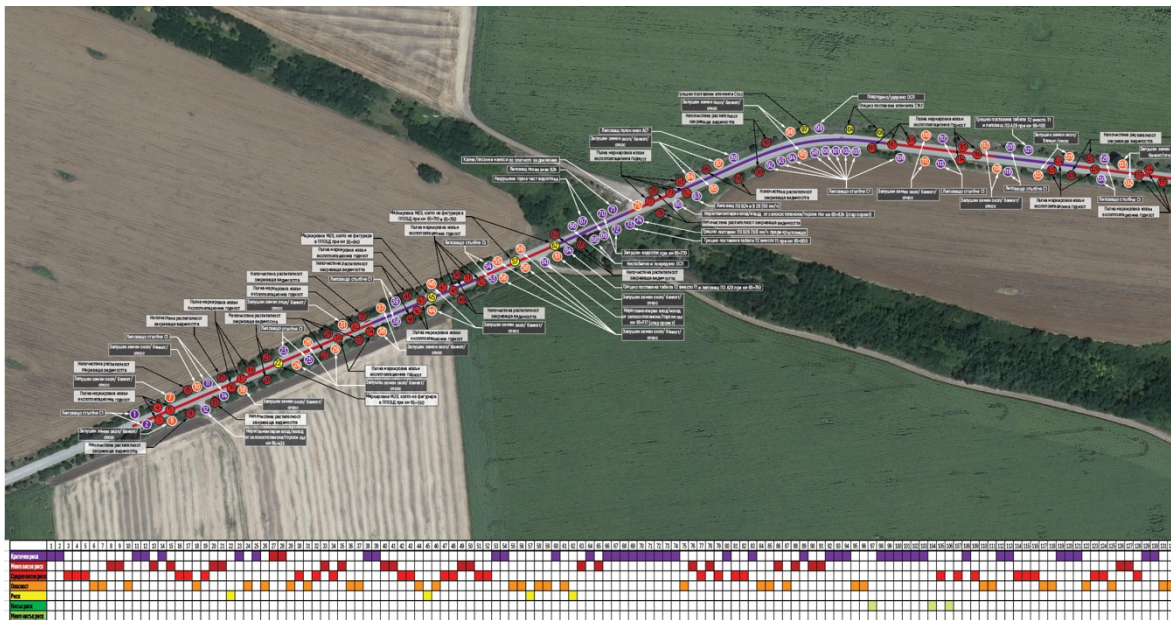
Figure 84 – Interactive Map of Traffic Accidents, Major Accidents.

This section of road II-13 has been confirmed as a “Section with concentration of road traffic accidents” due to the continuing high number of incidents that have occurred, including after the introduction of warning road signs and other safety measures. The large number of accidents shows that the actions undertaken to date are insufficient to reduce the risk. The poor operational condition of the pavement, combined with the deteriorated skid resistance of the road surface, creates conditions for side impacts and other characteristic mechanisms for the occurrence of road traffic accidents. Planning of additional and more effective engineering measures for lasting improvement of safety on this section is necessary.





Based on the conducted study, an assessment of “poor” is given for the condition of the road infrastructure. Regarding safety in the section between km 65+440 and 66+200 on road II-13, it is “very high risk”.



*Figure 85 – Risk analysis using the remote sensing method. Full version of the map in Appendix A to this document.*

**\*Full version of the map in Appendix 1 to this document.**

The risk assessment conducted for the section of road II-13 (km 65+440 – km 66+200) shows a predominantly high to very high risk, with a significant concentration of critical sections in the first 400–500 meters. The identified problems are systemic and stem both from insufficient maintenance and wear of the road pavement and marking, as well as from lack of uniformity in the restraint systems, drainage and visibility of road signs.

The risk is not isolated but complex – combining technological, structural and operational non-compliances, which significantly increase the probability of road traffic accidents occurring.

Urgent corrective measures are necessary, including replacement of road marking, restoration of restraint systems and ensuring full visibility in the section.

Transportation

- The section has a high concentration of road traffic accidents, with the combination of a horizontal right curve and a vertical sag curve limiting actual visibility below the normative values, especially under poor weather conditions and during the dark part of the day.

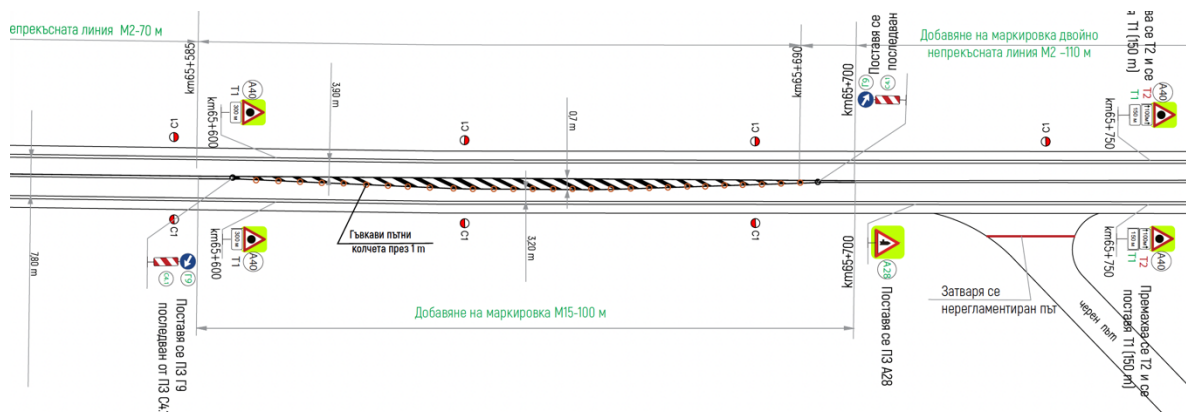
- There are unregulated connections of agricultural and dirt roads, which do not appear in the cadastral map and are not provided for in the new project documentation, while in the old one they are not properly signaled. This creates a direct precondition for serious road traffic accidents.
- Discrepancies have been identified between the old and new PPBD projects, including absence of warning road signs (A27 and A28) and non-compliance in the kilometer positions of existing signs.
- The designer did not take into account the existing situation and the old PPBD project, which has led to the installation of a contradictory and confusing traffic organization;
- A mistake has been made by the designer, which not only was not corrected along the project approval chain, but this has led to the installation of wrong signs giving misleading instructions in a section with concentration of road traffic accidents and increased risk.
- The shoulders, slopes and ditches have a disturbed profile, filled with vegetation and sediment, which leads to ineffective drainage and accelerated erosion of the edge of the pavement.
- Maintenance is missing at the culvert located within the scope of the study. The erosion processes on the surface where it is located have reached a phase at which the road restraint system has nowhere and for what to anchor stably.
- The road restraint systems (RRS) are partially compromised and overgrown, which reduces their visibility and working effectiveness.
- After the installation of the road restraint system in the section with concentration, the severity of road accidents has increased due to the limitation of the possibility for drivers to undertake an evasive maneuver when necessary.
- The road signs and markings have non-uniform retroreflectivity classes (RA2, R3A/B), which leads to uneven perception by drivers and hinders reaction during night driving.
- A lack of systematic maintenance is observed – the grassy vegetation is not mowed regularly, the ditches are not cleaned, and the marking is partially worn.

#### ■ **Recommendations:**

- Retention of the 50 km/h limit, with the addition of warning signaling before regulated intersections representing connections from agricultural/forest/dirt roads.
- Closure of all unregulated connections through physical barriers (embankments, RRS, protective fences) and updating of the PPBD in accordance with the applicable normative requirements, so that there are no contradictions between the old and new projects.
- **Correction of the errors made by the designer with regard to the road signs in the UKPTP.**
- **Performance** of geodetic surveying and correction of project discrepancies between the old and new PPBD; introduction of a unified scheme for road signs and markings complying with the applicable normative requirements.

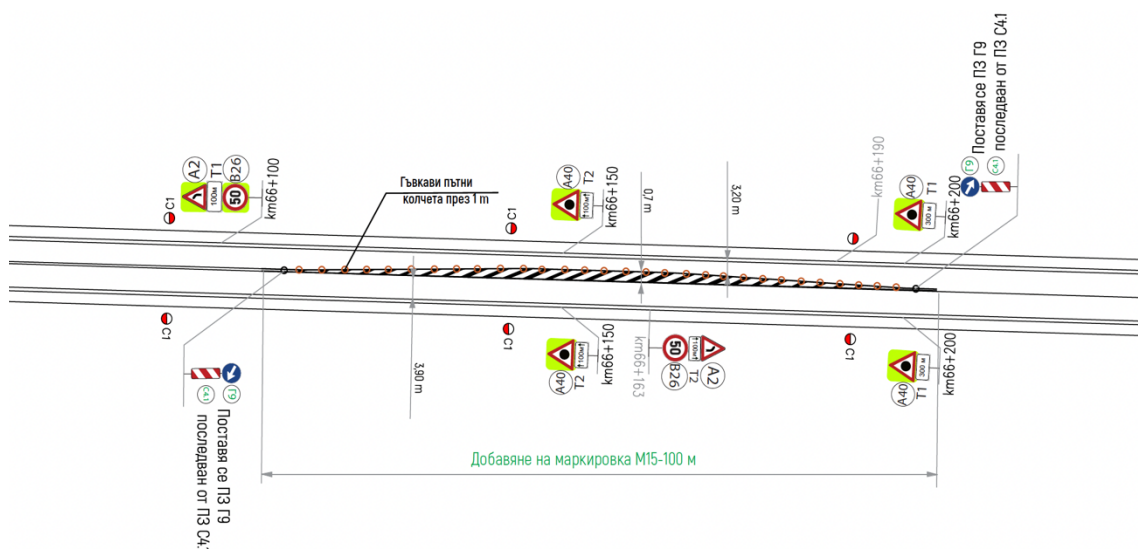
- Complete clearing and profiling of shoulders and ditches, as well as erosion strengthening of slopes with grass stabilization and geogrid.

It is recommended that between km 65+600 and km 65+690 (transition zone) a situational lane modification be introduced in the direction of town Knezha with the aim of reducing speed (\*Full version of the map in Appendix 2 to this document).



*Figure 86 – Our proposal for updating the traffic management plan, incorporating an artificial island with flexible delineators for speed reduction(direction from Byala Slatina to Knezha).*

It is recommended that between km 66+200 and km 66+100 (transition zone) a situational lane modification be introduced in the direction of town Byala Slatina with the aim of reducing speed (\*Full version of the map in Appendix 2 to this document).



*Figure 87 – Our proposal for updating the traffic management plan, incorporating an artificial island with flexible delineators for speed reduction(direction from Knezha to Byala Slatina).*

- Replacement and unification of the retroreflectivity classes of road signs (minimum R3A/B) and restoration of missing warning signs.
- **Urgent restoration of the surface of the culvert located at km 65+770 is necessary, including casting of a new concrete lining (curb block/cap) on the surface in order to stop the erosion processes, prevent failure of the road pavement and strengthen and anchor the road restraint systems stably.**



- Increasing skid resistance ( $SRT \geq 55$ ) by laying a wearing course with SMA/HFST in the zone of the curve and before the apex.
- Periodic monitoring of friction and retroreflection with devices certified to BDS EN 13036-4 and BDS EN 1436, at least twice a year.
- Development of a current maintenance plan, including regular inspections, mowing, ditch cleaning and checking of road signaling.

## ■ Conclusion

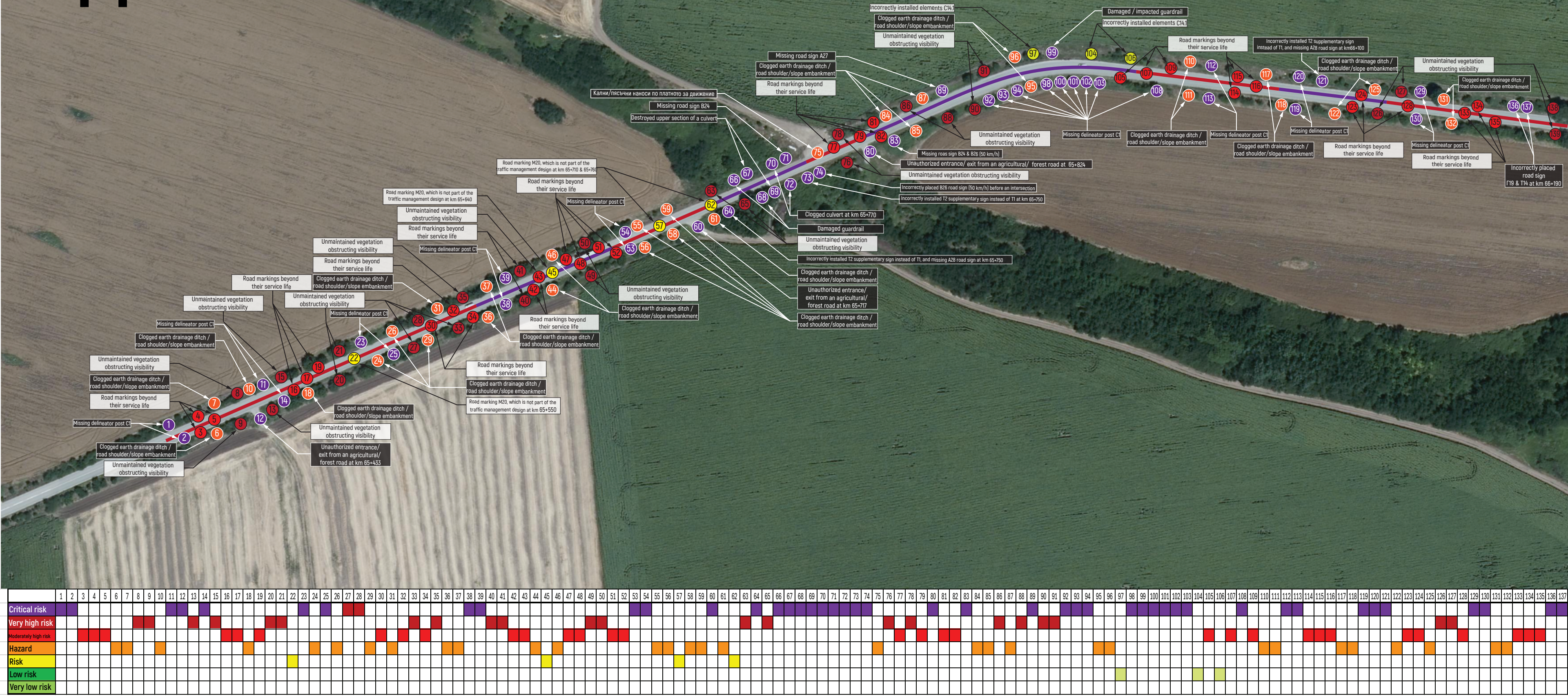
The studied section of road II-13 represents a structurally and functionally compromised zone with accumulated design, maintenance and organizational deficiencies. Despite being designated as a UKPTP, the actual level of road safety remains unsatisfactory due to geometric limitations, unregulated accesses and insufficient maintenance.

A comprehensive application of engineering, organizational and maintenance measures is necessary to ensure safe visibility, effective drainage and correct signaling. The implementation of the recommended actions will lead to reduction of the risk of road traffic accidents, extension of the service life of the pavement and achievement of compliance with the requirements of the applicable regulatory framework.

**EUCTP TEAM**  
**OCTOBER 2025.**



KKC 2005 4817295, 379419





# Appendix B

Permanent Traffic Organization  
M 1:500

LEGEND

Common symbols

B26 INSTALL A SIGN

B26 REMOVE A SIGN

