

## EXPLANATORY NOTE

**SITE:** "RECONSTRUCTION OF ROAD HKV 2101 FROM KM 0 + 814.75 TO KM 0 + 914.75" IN THE LAND OF THE TOWN OF MADZHAROVO, MADZHAROVO MUNICIPALITY

**PRINCIPAL:** MADZHAROVO MUNICIPALITY

**PART:** ROADWORKS

**PHASE:** TP

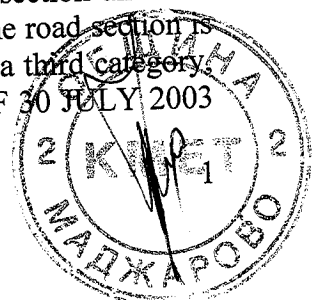
### I. Reason and purpose of the project.

This project is being prepared at the request of the Principal - Madzharovo Municipality on the basis of a signed contract for design with the Contractor - GEOLands Ltd. The project provides "Reconstruction of Road HKV 2101 from km 0 + 814.75 to km 0 + 914.75" in the land of the town of Madzharovo, Madzharovo Municipality. For the fulfillment of the task, preliminary surveys and geodetic surveys were carried out, on the basis of which the following objectives are provided:

- Comprehensive technical and economic assessment of the existing route condition.
- Improvement of the transport performance of the road.
- Ensuring the load-bearing capacity of the surface.
- Ensuring the flatness of the surface.
- Achieving technical elements meeting the standards for the respective design speed.
- Ensuring of good drainage.
- Safety in traffic organization.

Reconstruction is also provided of the drainage situated into the affected part of the road. Due to severe weather conditions, long operation and the retention of the water draining from the existing open channel, the roadway and the bank enters the main layers of the road construction and compromise the road body and the existing pipe drainage, which requires the construction of a new water drainage facility in accordance with the current maximum water quantity and the applicable regulatory base. The main objective of the present project is to provide an adequate solution that will preserve the stability of the bank and strengthen the earth's body, which in return will prevent the accidental sliding of the road section and will create a unified system for passing of the water flow without any obstacles. The road section is part of the municipal road network, according to which the construction is of a third category, in connection with art.6, para 1, letter "a", item 1 of ORDINANCE NO. 1 OF 30 JULY 2003

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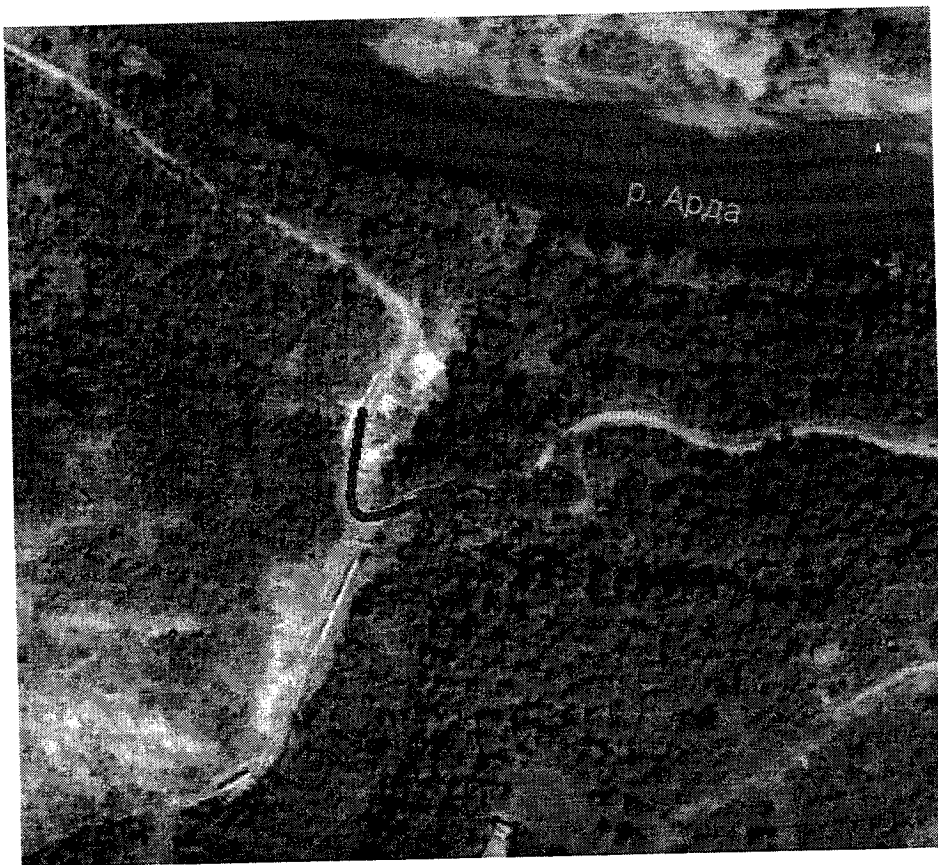


ON THE NOMENCLATURE OF THE TYPES OF BUILDING STRUCTURES and art. 137, para. 1, item 3, letter "a" and letter "g" of the Spatial Development Act (SDA).

## II. Location of the site

The section of the road covered by the exploratory and design works covers the territory of a part of the road HKV 2101 from km 0 + 814.75 to km 0 + 914.75 in the direction from the town of Madzharovo towards the villages of Bryagovo and Strandzhevo, shown in the attached situation – Drawing 2.

At the site there is an open channel of concrete elements that takes away the water from the naturally formed water catchment area, at the end of the channel there is a slowing concrete threshold that has had reduced the velocity of the water before falling into the culvert of two drainage pipes  $\phi 100$  and passing of the water under HKV 2101 at km 0 + 861,36. At the time of the design, the open channel is destroyed in places, water comes out of it and enters the bank on the road. Mostly cars are driven on this road segment. The condition of the existing road surface is poor. There is a large number of cracks and decays on the edge of the surface, there is no asphalt cover in the area above the drainage. For the most part of the route, the surface is worn out.



## III. Project solution.

### 1. Situation solution.

The beginning of the project section of road HKV 2101 / NKV 2105, Madzharovo - municipality border (Madzharovo-Krumovgrad) - Bryagovets / is at km 0 + 814,75 and the end is at km 0 + 914,75. The reconstruction route is predominantly in a hilly terrain with predominant horizontal curves. The road section runs entirely in out-of-town areas.

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The total length of the area under consideration is 100 m. The radii of the curves within it meet the design speed of the road - 30 km/h, the axis being modeled by complex curves (three consecutive circular curves with alternating radii).

The road has a variable width of the asphalt surface of 3.50 to 4.00 with most of the section under consideration being with a width of 3.50 m. The width of the traffic lane will be restored to 4m. There are soft shoulders on both sides with a width of 0.5 m each, and their hardening is planned with aggregates with a selected grain size.

## 2. Longitudinal profile

The level is determined by cubic parabolas and straight sections meeting the minimum conditions for a design speed of 30 km/h. In the section the level is as close as possible to the existing asphalt surface and with providing the bank over the drainage. In the better part of the section under consideration the longitudinal profile is 7-10 cm above the existing asphalt surface - Drawing 2.

## 3. Cross sections and drainage.

A complete restoration of the road surface is planned in the area of the drainage, where the asphalt cover is missing from km 836.32 to km 879.41. The traffic load of the road is for category "light" traffic. For ground base deformation modulus of 40 MPa, the following design of the road surface was chosen:

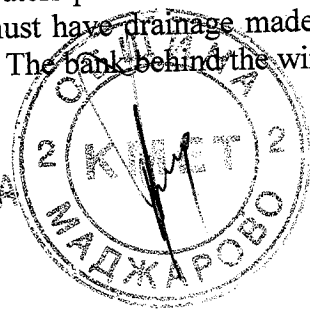
- Dense asphalt concrete type A - 4 cm
- Permeable asphalt concrete - 4 cm
- Bituminous crushed aggregates - 8 cm
- Unsorted crushed aggregates - 35 cm

In the rest of the section, milling of a small part of the existing pavement and laying of two layers - wearing layer of asphalt concrete 4 cm thick and permeable asphalt concrete (binder) 4 cm thick are performed. The detailed thicknesses of all the elements of the road structure are shown in the detailed cross sections, the sample cross sections and the details thereon.

## 4. Facilities.

The multiple compromise of the existing two-pipe drainage, the collapse of the road section and the large water quantity require the construction of a new facility. The project plans the removal of the existing drainage and the construction of a new drainage with a rectangular cross section with dimensions 150/150cm at km 0 + 861,36. The new facility will be constructed of ready-made reinforced concrete elements with a rectangular cross section with length of 1m to the total length of 7m. As planned, at the inlet and the outlet of the drainage backed concrete wings will be built and they will be clad with concrete. In this way, the drainage and the adjacent road body are protected from the high water in the gullet, which may cut the road off. At the inlet a sill is built with a board on the side of the slowing threshold in order to strengthen it and create a cascade motion of the water. Between the separate prefabricated elements of the drainage, deformation joints of 2 cm are planned. The joints are designed to be filled with elastic material. The outer walls of the drainage (bank side) must be provided with sheet or greased (bituminous). To drain the ground waters penetrated behind the wings, barbicans of  $\phi 100$  must be applied at every 2-3 m. They must have drainage made of aggregates under which a pad must be applied made of tamped clay. The bank behind the wings

ВЕРНО СОПРОВОЖДАЮЩАЯ



and around the drainage must be made of layers of coarse draining material tamped to achieve a density factor of not less than 0.98.

### Hydraulic sizing of the drainage at km 0 + 861,36

$h_{\text{bank}}=0,50 \text{ m}$

42 [ $\text{m}^3/\text{s.km}^2$ ]- specific runoff

$\phi$ - flow factor

F- area of the water catchment area [ $\text{km}^2$ ]

$F=0,6 \text{ km}^2$

$\phi = 0,15$  /taken from the plot for hilly terrain/

Determination of the maximum water quantity  $Q_{\text{max}}$

$Q_{\text{max}}=42 \cdot \phi \cdot F=42 \cdot 0,15 \cdot 0,6 = 3,78 \text{ m}^3/\text{s} \Rightarrow$  We accept  $Q_{\text{max}}=4 \text{ m}^3/\text{s}$

$Q_p = Q_{\text{max}} / 1,5 = 3,78 / 1,5 = 2,52 \text{ m}^3/\text{s} \Rightarrow$  We accept  $Q_p=3 \text{ m}^3/\text{s}$

$\Rightarrow$  We take a drainage with a rectangular cross section 150/150cm with  $Q_p=3 \text{ m}^3/\text{s}$

**Restraint systems** - A N2W5 type steel fence for paved roads is provided along the entire length of the project area to the right of the axis (from km 0 + 844,80 to km 0 + 894,80). The drainage will be fitted with safety rails with a height of 1.1 m.

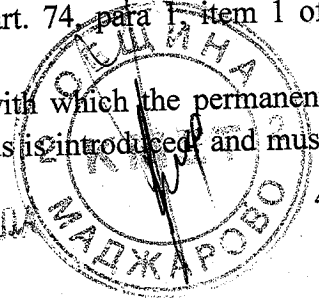
### 5. Permanent and Temporary Traffic Organization.

- ❖ **Permanent traffic organization** - The permanent traffic organization is retained, a continuous line M1 - 0.10 will be provided with a length of 100m. Road signs A1 and A2 "Dangerous curve" and speed limit of 30 km/h with road sign B26 "Driving at speed higher than the indicated is prohibited" will be placed on a single pipe posture per direction.
- ❖ **Temporary Traffic Organization** - All types of site construction work will be performed within the range of the roadway. During the construction of the drainage the traffic of the motor vehicles passing through the road section will be difficult, so it is planned to close the road above the drainage and make a temporary bypass road on the inlet side that will be built parallel to the closed section and to the same level. The temporary road will be carried out with a bed of suitable material, earth basis E = 50 MPa, the water will be drained by laying a sewer corrugated pipe PEND  $\phi 315$ , geotextile 100 kN will be laid for reinforcement of the surface.
- ❖ lower base layer of unsorted crushed aggregates 0/80 mm E = 250 MPa with a thickness of 20 cm.
- ❖ lower base layer of unsorted crushed aggregates 0/50 mm E = 250 MPa with a thickness of 20 cm.

The temporary road will be 3,5 m wide with an advantage provided to the incoming vehicles from the town of Madzharovo towards the village of Bryagovo. The signaling of the passage through the section is according to the TOTS (Temporary Organization and Traffic Safety) Scheme in drawing No. 5, according to Annex No. 71 to art. 74, para 1, item 1 of Ordinance No. 3/16.08.2010.

All signs are temporary, of a size not smaller than the signs with which the permanent organization of the traffic is set. They are mounted on portable stands and must

ВЯРНО СОПРИГНА



be removed after completion of the construction.

Traffic signs that set the permanent organization of traffic on the road that contradict to the Temporary Traffic Organization must be removed or covered with an opaque cover or black or gray film.

The work area must be surrounded by the necessary signaling, and the workers carrying out the excavation works must have bright colored clothing (vests) and reflective strips. In case of reduced visibility and night-time operation, sources delivering yellow flashing or constant light must be installed.

After the end of the working day it is necessary to take measures to secure the trenches so that no people would fall in.

The work area must be secured in accordance with the requirements of Ordinance No.3/16.08.2010 on temporary organization and traffic safety when carrying out construction and assembly works on roads and streets .

The project should be coordinated with the Traffic Police Sector at the District Police Department;

#### **IV. SAFETY DURING PERFORMANCE OF DIFFERENT TYPES OF WORK:**

- securing of the construction machinery and equipment;
- instructing all workers on occupational safety and health before commencing work;
- only qualified specialists can be working with machinery and the requirements of occupational safety must be complied with;
- before execution of the types of work in the area of the street lanes, a temporary signaling must be provided and the workers must be provided with protective and signaling clothing;
- during execution of the different types of works the relevant rules for execution and acceptance of construction and installation works must be complied with;
- compliance with the requirements of Ordinance No 2/22.03.2004 on the minimum requirements to healthy and safe labour conditions in the course of construction and installation works must be ensured.

Compiled by: .....

/ Marin Zhelev /

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