

## UPGRADING LOCAL ROADS IN BĂLEȘTI, VRANCEA COUNTY

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### **Abstract**

*As in Bălești, Vrancea county roads are in an advanced state of deterioration, the paper proposes a solution to modernize local roads. For the execution of the roads there is no need for demolition or variations networks because of enforcement works in such a way as to avoid disruptions in the areas specified.*

*It's about asphaltting the road structure consisting of layer support, link layer, wear strips, shoulders, ditches and culverts.*

*Road infrastructure works have a direct and indirect , positive and negative impact on the environment , take into account the protection of waters and aquatic ecosystems , the protection of the atmosphere , soil protection , environmental forestry , archaeological sites and historical and not least the human environment. By upgrading local roads ensures comfort traffic safety and promotes the development and growth of the industry of the area.*

**Key words:** *infrastructure, modernization, road.*

### **INTRODUCTION**

Road infrastructure consists of the communication routes (county roads, national roads, highways) device of road signage, road features, etc.

The importance of road transport has increased due to the formation of a true network of roads and various technical and technological innovations in the automotive industry.

Modernization of road infrastructure base increases safety, comfort and accessibility. Since ancient times, the most prosperous regions have been located either along major communication routes or at their intersection. The development potential of a region is better when the region has a developed transport infrastructure.

Undoubtedly, transport infrastructure is among the most important factors of national or regional economic competitiveness.

Symmetrically, the lack of adequate transport infrastructure can stifle development and regional economy stagnates or even records a setback.

The level of development and the condition of transport infrastructure also have a strong

influence on tourism activity.

Numerous studies have highlighted the close link between the development of transport and tourism development.

Providing access to tourist areas and creating fast connections between regional transport infrastructures on the one hand and national and European transport buses on the other hand are prerequisites for development at national and regional tourism potential.

Based on the considerations mentioned above, the development of transport infrastructure in line with growing transport needs must remain permanently priority of national and local authorities, regardless of economic or budgetary constraints.

### **MATERIALS AND METHODS**

In order to modernize the local roads in Bălești, Vrancea County, there were made arrangement works for local roads, made of road structure which is composed of layer reprofiling of ballast supporting layer of crushed rock mixture optimally link layer BADPC 20 asphalt concrete and concrete wear layer asphaltic type BAPC 16 (Hutanu, 2014).

To upgrade the roads include also the arranging

shoulders protected by a layer of concrete C25 sat on a bed of sand, arranging trenches and the culverts.

The roads have areas contaminated with clay and grass surfaces, especially shoulders. Drainage and their collection and disposal are non-existent or damaged.

To begin, studies were done on the roads longitudinal and cross sections.

The project was envisaged earthworks and foundation works of ballast, which were carried out preparatory work, picketing work, execution and quality control embankments and reception work. For the implementation of layers of crushed stone ballast were chosen natural aggregates and were determined compacting characteristics and conditions of probation sectors followed by the reception of works on preliminary and final phase.

The road traffic is characterized by layer thicknesses and the design values of the dynamic elastic modulus:

$E_b = 0,20 \times h_b 0,45 \times E_p = 0,20 \times 4000,45 \times 70 = 208 \text{ MPa}$ .

Component strains were calculated using CALDEROM 2000 software.

For the implementation of cylindering hot bituminous coverings were defined types of

mixtures, aggregates, fillers, binders and additives. Asphalt mixes were prepared and transported followed by the preparatory work, laying out, compaction, quality control materials and work reception and final phases.

For the implementation of shoulders, ditches from poured concrete monolithic and culverts for drainage preparatory works are made. Traffic calculation is established with the following relations:

$N_c = 365 \times 10^{-6} \times p_p \times c_{rt} \times \sum_{k=1}^5 [n_k 10 \times (p_{k14} + p_{k29}) / 2 \times f_{ek}] \text{ (m.o.s)}$

$N_c = 365 \times 10^{-6} \times 15 \times 0,50 \times 16 = 0,044 \text{ (m.o.s)}$

Degradation caused by freeze-thaw represents malfunctions of complex road due to the phenomenon of swelling of non-uniform due to the accumulation of the water and transform it into the lens of the ice, the earth is sensitive to freezing.

The depth of frost in the road system is considered equal to the depth of frost in the ground foundation  $Z$ , plus a bonus  $\Delta z$  and road structure are verified by freeze-thaw action :

$Z_{crt} = Z + \Delta z \text{ (cm)}$

$\Delta z = H_{SR} - H_e \text{ (cm)}$

(SR EN 1991-1-3:2005/NA:2006 TABLE NA1).

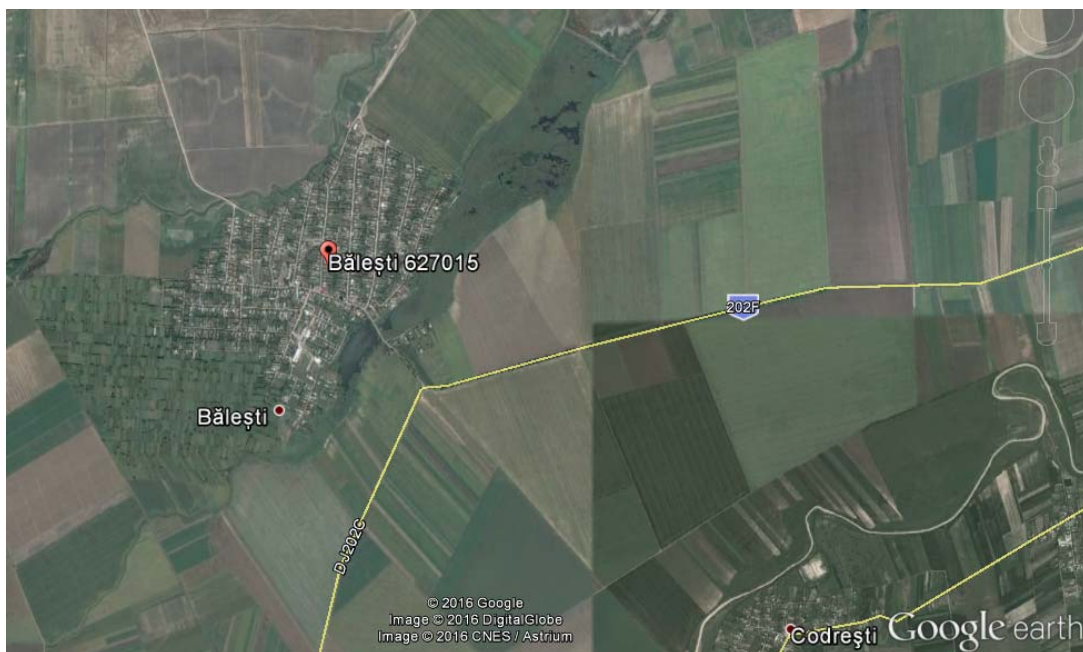


Figure 1. The local road in Bălești, Vrancea County (Google earth)

## RESULTS AND DISCUSSIONS

Traffic associated calculation results are shown in Table 1.

Road layer thickness and design values of dynamic elastic modulus and Poisson coefficient are proposed in Table 2.

Component strains obtained from the use CALDEROM 2000 software are:

$$\varepsilon_r = 12,9 \text{ microdeformations}$$

$$\varepsilon_z = 12,9 \text{ microdeformations}$$

Criterion specific tensile deformation allowable based on bituminous layers requires:

$$N_c = 0,044 \text{ m.o.s}$$

$$N_{adm} = 24,5 \times 108 \times \varepsilon_r - 3,97 = 24,5 \times 108 \times$$

$$12,9 - 3,97 = 0,096 \text{ m.o.s}$$

$$RDO = N_c / N_{adm} = 0,044 / 0,096 = 0,46 < 1,00$$

$$RDO_{adm} = 1,00$$

Criterion -specific vertical deformation at ground level foundation requires:

$$\varepsilon_{zadm} = 600 \times N_c - 0,28 = 600 \times 0,044 - 0,28 = 1439 \text{ microdeformations}$$

$$\varepsilon_z = 593 \text{ microdeformations} < \varepsilon_{zadm} = 1439 \text{ microdeformations}$$

To check the freeze-thaw resistance, the diagram of STAS 1709 / 1-90 is considered the depth of frost in the ground foundation  $Z = 90$  cm.

$$So: H_e = \sum H_i \times c_{ti} = 25 \times 0,80 + 15 \times 0,70 + 5 \times 0,60 + 4 \times 0,50 = 20 + 10,5 + 3 + 2 = 35,5 \text{ cm}$$

$$\Delta z = HSR - H_e = 49 - 44,9 = 4,1 \text{ cm}$$

$$Z_{crt} = 90 + 44,9 = 134,9 \text{ cm}$$

STAS 1709 / 2-90 degree of frost penetration of insurance in complex road:

$$K = H_e / ZCR = 44,9 / 134,9 = 0,33.$$

The degree of penetration of insurance to frost is 0.33.

Table 1. Traffic associated calculation results

Type of vehicle	nk 2010	Pk 2014	Pk 2029	(Pk2014+Pk2029)/2	Fek	Nk*(Pk2014+Pk2029)/2*Fek
2-axle trucks	30	1,20	1,84	1,52	0,1	5
Trucks 3 and 4 axles	4	1,13	1,61	1,37	0,7	4
Articulated vehicles	1	1,16	1,81	1,48	0,9	2
Buses	1	1,12	1,65	1,38	0,6	1
Tractors , special vehicles	15	1,10	1,47	1,28	0,1	2
Road trains	1	1,09	1,48	1,28	1,0	2
Total OS 155 KN						16

Table 2. Road layer thickness and design values of dynamic elastic modulus and Poisson coefficient proposed

Name the layer material	h(cm)	E (MPa)	$\mu$
Asphalt for the road surface BAPC 16	4	3600	0,35
Asphaltic mix for the bonding layer BADPC 20	5	3000	0,35
Base layer of crushed stone optimal mix	15	500	0,27
Foundation layer of ballast	25	208	0,27
Earth foundation	$\infty$	70	0,42

## CONCLUSIONS

Degradation of local roads in Bălești, Vrancea County leads to improper and unsafely conduct and lack of comfort in the built-village movement.

The solution proposed for modernization will withstand traffic forecasted for the year 2029 provide water uptake and prevents stagnation, has a road structure that guarantees deformations permissible limits for class road. By upgrading local roads is intended to ensure traffic comfort, this having a major importance for the local economy because it is a gateway to other communication channels So, the main economic activities of the

inhabitants - agriculture, livestock, logging , farming, trade and service provision - use pathways to other roads, which are in benefit with the proposed modernization.

## REFERENCES

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