Relief suitability for Ploiești – Pașcani fast road construction

Robert Dobre

Geomorphology – Pedology – Geomatics Department
Faculty of Geography, University of Bucharest
Bucharest, Romania

Abstract— Ploiești – Pașcani fast road one of the most important infrastructure project in Romania. Based on the economic and environmental indicators generated by the National Transport Model used in the General Master Plan for Transport (MPGT) in Romania, resulted that the project is a priority transportation of our country. The estimated length is 327.5 km and total value for the full implementation of the project is 1304.41 mil. euro without VAT. The implementation period will be five years (two years to achieve technical and economic documents, feasibility study and technical project and four years for work execution).

Keywords— *fast road; technical solution; geomorphology; geomorphotechnique analysis*

I. INTRODUCTION

Currently, the Ploiești, Buzău, Focșani, Bacău and Pașcani municipalities are connected by the DN2 national road and DJ208 county road, whose capacity is exceeded on several sectors where traffic speed is limited either by the conditions of relief.

II. LOCATION OF THE ACTION

Ploiești – Pașcani fast road is located approximately in the east of the country. The analysis was focused on the first critical sector, one of Ploiesti and Buzau, 65 km length. A detailed (geomorphological and geomorphotechnique) analysis is absolutely necessary because of the geological context and because of geomorphological peculiarities [1].

III. SCOPE AND OBJECTIVES

We were used detailed analysis made in the field in conjunction with GIS techniques analysis, in order to establish the required types of construction solutions needed in order to build the project (road junctions, bridges, culverts, road crossing, railroad overpass, railroad overpass, intersections overhead electrical lines, deposit demolition) (Fig. 1, Tab. 1).

From the field and laboratory analysis, we identified several critical areas between Ploiesti and Buzau in terms of geomorphology, which can be overcome through arrangements for the protection and defense. These critical areas should be identified and reported from initial feasibility study and technical project in order to

establishment of adequate alternative and the measures necessary for subsequent operation [1].

TABLE I. STRUCTURES IDENTIFICATION

Length (km)	75.80
Number of road junctions	6
Number of bridges	6
Total length bridges	n/a
Number of culverts	33
Total length culverts	n/a
Road crossing	12
Railroad overpass	4
Intersections overhead electrical lines	18
Deposit demolition	1
Administrative units	Dumbrava, Albești - Paleologu, Tomșani, Colceag, Baba Ana, Mizil, Sahateni, Breaza, Pietroasele, Ulmeni, Merei, Stâlpu, Buzău, Vadu Pasii, Poșta Călnău

Fig. 1. The identification of the main general geomorphological processes that affect the TEN-T Core and Comprehensive network

The geomorphotechnique analysis aims to harmonize the relation between the geomorphological processes, the construction solutions and the transport infrastructure [2].

The geomorphological approach involves several stages:

- identifying areas along the existing or planned transport networks, which are affected or can be affected by the geomorphological processes;
- establishing the intensity and the maximum manifestation of the geomorphological processes;

- determining the necessary protection work types in order to protect the transportation infrastructure;

- determining the manifestation area dimension and the solution adopted in correlation with the geomorphological processes intensity.

IV. THE RESULTS

In this analysis we obtained the best location of the parameters such as: road junctions, bridges, culverts, road crossing, railroad overpass, railroad overpass, and intersections with areal electrical lines, deposit demolition, for the fast road Ploiești - Buzău. We consider that is necessary to use the same approach for the next sectors: Buzău – Focșani, Focșani – Bacău and Bacău Pașcani, for better and faster project implementation.

Generally a straight path is chosen only when using some smart solutions. In many cases we are used large curves succession for using the advantage that the relief provides. These dimensions determine a maximum design speed of 140 km/h.

From the of 65 km length of Ploiești – Buzău sector, we determined the lengths of the structures presented in Table II.

TABLE II. THE PARAMETERS PROPOSED FOR PLOIEȘTI – BUZĂU SECTOR

<i>Id</i>	<i>Code emplacement</i>	<i>Characteristic</i>	<i>Validated</i>
Road junctions			
1	1	Speed road junction A3 / DX5 Dumbrava	Yes
1	11	Cricov node DX5 / DN1D	Yes
1	28	Mizil node DX5 / DJ102H	Yes
1	61	Buzau Est node DX5 / DN2	Yes
1	72	Buzau Sud node DX5 / DN2B	Yes
1	79	Buzau Vest node DX5 / DJ220	Yes
Overpass and undercrossings			
2	2	DX5 crossing over DJ101F	Yes
2	15	DX5 is crossed over by DJ102N	Yes
2	19	DX5 is crossed over by DJ101E	Yes
2	23	DX5 is crossed over by DJ102D	Yes
2	25	DX5 is crossed over by DC77	Yes
2	39	DX5 is crossed over by DJ103R	Yes
2	46	DX5 is crossed over by DJ203C	Yes
2	55	DX5 is crossed over by DJ203G	Yes
2	62	DX5 is crossed over by DN2B	Yes
2	65	DX5 is crossed over by DJ203D	Yes
2	69	DX5 is crossed over by DN2B	Yes
2	77	DX5 is crossed over by DJ203K	Yes
Railway overpass			
3	4	DX5 is crossing over the non-electrified double railway Ploiesti - Urziceni, 701 route, in operation	Yes
3	67	DX5 over crossing electrified double railway Buzau - Faurei 702, in operation	Yes
3	68	DX5 crosses over the rail joint Buzau Sud - Ram. Bobocu 702 / 500, in operation	Yes
3	78	DX5 ver crossing electrified double railway Buzau - Focsani 500, in operation	Yes
Bridges over the network basin			
4	6	Bridge over the river Vatmanu	Yes
4	10	Bridge Cricovu Sarat	Yes
4	13	bridge Valea Razboiului	Yes
4	36	Bridge over the river Naianca	Yes
4	45	Bridge over the river Sarata	Yes
4	75	Bridge over the river Buzau	Yes
Intersections with aerial electrical lines			
5	40	LEA 20 kw between Istrita de Jos and Gageni	Yes

5	64	LEA 20 kw between Buzau si Pogoanele	Yes
5	3	LEA 20 kw between Dumbrava and Ciupelnita	Yes
5	5	LEA 20 kw between Dumbrava and Trestienii de Jos	To validate in the field
5	7	LEA 110 kw between Brazi and Bucuresti Sud	Yes
5	14	LEA 20 kw between Colceag and Perepa	Yes
5	20	LEA 20 kw between Baba Ana and Fulga de Sus	Yes
5	24	LEA 20 kw between Baba Ana and Gradistea	Yes
5	26	LEA 20 kw between Baba Ana and Ciresanu	Yes
5	27	LEA 20 kw between Baba Ana and Ciresanu	To validate in the field
5	33	LEA 400 kw between Brazi and Stalpu	Yes
5	37	LEA 20 kw Sahateni - Gageni	To validate in the field
5	41	LEA 400 kw between Brazi and Stalpu	Yes
5	54	LEA 110 kw between Stalpu and Pietrosu	Yes
5	56	LEA 20 kw between Stalpu and Pietrosu	Yes
5	60	LEA 20 kw between Buzau and Spataru	Yes
5	66	AE L 110 kw	Yes
5	70	AE L 20 kw	Yes
Culverts			
6	8	Culvert over wet area, the torrent origin	Yes
6	9	Torrent culvert Valea Mare	Yes
6	12	Torrent culvert tributary Valea Razboiului vest	Yes
6	14	Torrent culvert tributary Valea Razboiului est	Yes
6	16	Culvert over Viroaga Ceptura	Yes
6	17	Culvert over Paraul Balana	Yes
6	18	Culvert over Valea Baba Sima	Yes
6	21	Culvert over irrigation channel	Yes
6	22	Culvert over Paraul Ghighiu	Yes
6	29	Culvert over irrigation channel and agricultural road	Yes
6	30	Culvert over irrigation channel and agricultural road	Yes
6	31	Culvert over irrigation channel and agricultural road	Yes
6	32	Culvert over irrigation channel and agricultural road	Yes
6	34	Culvert over irrigation channel and agricultural road	Yes
6	35	Culvert over irrigation channel and agricultural road	Yes
6	38	Culvert over irrigation channel and agricultural road	Yes
6	42	Culvert over irrigation channel and agricultural road	Yes
6	43	Culvert over irrigation channel and agricultural road	Yes
6	44	Culvert over irrigation channel and agricultural road	Yes
6	47	Culvert over irrigation channel and agricultural road	Yes
6	48	Culvert over irrigation channel and agricultural road	Yes
6	49	Culvert over irrigation channel and agricultural road	Yes
6	50	Culvert over irrigation channel and agricultural road	Yes
6	51	Culvert over agricultural road	Yes
6	52	Culvert over irrigation channel and agricultural road	Yes
6	53	Culvert over irrigation channel and agricultural road	Yes
6	57	Culvert over irrigation channel and agricultural road	Yes
6	58	Culvert over Paraul Calmatui	Yes
6	59	Culvert over Paraul Calmatui	Yes
6	63	Culvert over torrent Stramba Maneasca Est	Yes
6	73	Culvert over irrigation channel and agricultural road	Yes
6	74	Culvert over irrigation channel and agricultural road	Yes
6	76	Culvert over Buzau river arm	To validate

			in the field
		Demolition	
	71	Deposit to expropriate	Yes

V. CONCLUSIONS

The GIS provided solutions were subsequently validated based on the performed work in the field. This analysis demonstrated that this type of study is a good point for infrastructure road project starting.

We consider therefore that the geomorphotechnique analysis is an important step from the major project implementation. The geomorphotechnique map can be considered a very useful tool for both designers and engineers.

Fig. 2. The location node Dumbrava road speed (km.52 + 150/0 + 000) wide. 44 ° 50'51.61 "N, long. 26 ° 12'23.82"

REFERENCES

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