

CONCEPT AND STRATEGY OF DEVELOPMENT OF ROAD INFRASTRUCTURE IN MUREȘ COUNTY TO REDUCE TERRITORIAL DISPARITIES AT MESOSCALE AND MICROSCALE

Part II. Practical Proposals

Vasile ZOTIC, Viorel PUIU, Diana-Elena ALEXANDRU, Ciprian MOLDOVAN

„Babeș-Bolyai” University, Cluj-Napoca
Faculty of Geography

Abstract: *Concept and strategy of development of road infrastructure in Mureș County to reduce territorial disparities at mesoscale and microscale.* Road infrastructure is part of transport and communication territorial infrastructure, which has greatest impact on the development because of its special qualities, namely: accessibility, low cost for implementation and maintenance, complementariness, and typological variety. These features have imposed road transport infrastructure as the most favourable for supporting the development in intercontinental territories, with a various and unstable terrain, both at mesoscale and microscale. The strategy of development of Mureș County evaluated road infrastructure as the basic infrastructure in the development process. Starting from the analysis of current situation, along with all dysfunctions evaluated at a county level, this paper aims to develop a new concept of development of road infrastructure, theoretically based on the European and national framework regarding territorial development. The major objective of this concept is represented by the decrease of territorial disparities at both mesoscale and microscale within the county.

Keywords: *concept of development, strategy of development, road infrastructure, regional disparities, scalar level*

1. PUBLIC ROAD NETWORK IN MUREȘ COUNTY. CURRENT SITUATION AND DYSFUNCTIONS

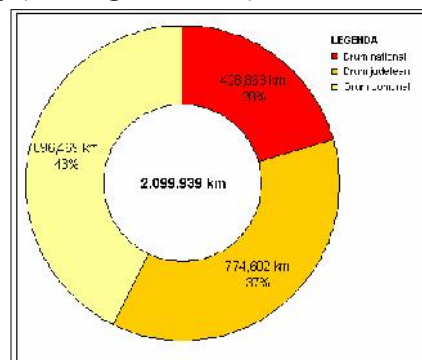
Roads represent an essential element of national economic potential of a country, most of the raw materials, freight, and labour force being transported on them, both at a national and international level. The trend of the increasing volume of goods transported by road is widespread in all countries. Sustaining this growth requires a more efficient road infrastructure, adapted to new vectors of traffic.

The classification of public roads of Mureș County (except for the streets) was established by the Presidential Decree no. 180/1984 based on the Law of Roads no. 13/1974, supplemented with GR nr. 649/1995 and amended by Ordinance 43 of August 28, 1997 with a view to the road regime.

Public roads network of Mureș County – except for the town streets - includes 2099.9 km, distributed as it follows:

Table 1. Fig. 1. The length of public roads in Mureș County (on categories of use).

Nr. crt.	Category of road	The total length (km)	Ratio of the total length (%)
1	National roads	428,868	20,42
2	County roads	774,602	36,89
3	Communal roads	896,469	42,69
4	Total length of public roads in MUREȘ County	2.099,939	100,00



As compared to 1998, the length of all categories of public roads in Mureș County increased, in accordance with the re-classification and introduction into the public circulation of new sectors of unclassified roads. This fact was positively reflected by the fortification of the communication potential in the county as a whole and also by the increasing number of settlements and their territories that became more accessible (table 2).

The greatest increase in length is observed in the case of local roads (153 km), which represents an increase of 17.08% as compared to the data registered in 1998. Nevertheless, presently, a number of 50 localities in the county have access to a classified road included in the network of public roads. This aspect stands for one of the main dysfunctions of the county road network.

Table 2. The evolution of the length of public roads, in Mureş County, from 1998 to 2008.

Nr. crt.	Type of road	1998		2008		Difference of length (km)	Ratio of the difference of length (%)
		The total length (km)	Ratio of the total length (%)	The total length (km)	Ratio of the total length (%)		
1	National roads	358	19,39	428	20,42	70	16,36
2	County roads	745	40,36	774	36,89	29	3,75
3	Communal roads	743	40,25	896	42,69	153	17,08
4	Total length of public roads in MUREŞ County	1846	100,00	2099	100,00	252	12,00

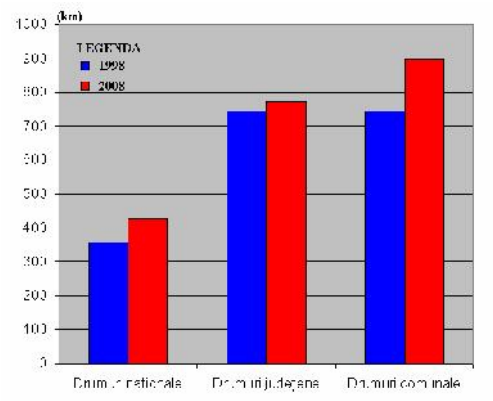


Fig. 2. The evolution of the length of public roads, in Mureş County, from 1998 to 2008

The national roads are administered by by Mureş Regional Directorate of Roads and Bridges, as the representative of the Ministry of Transport, while county roads are administered by the Mureş County Council as the representative of the Régie Autonome of Mureş County Roads, and since January 1st, 1998, local roads have entirely been under the administration of local councils.

In the following, we will refer only to the road network, except for the streets located in municipalities.

The situation of roads, by structure and technical conditions, on December, 31, 2007, revealed the following aspects (Table 3). After analyzing the types of structures of public roads in Mureş County we can highlight the following aspects:

- a clear distinction between type of the road material and type of road;
- more sectors or even the entire county road made of stone material;
- some sectors of county roads still covered with earth (earth roads);
- the low level of covering communal roads with asphalt;
- most of the communal roads are either earth roads covered with stone or earth roads.

The clear distinction between the type of material used in making the roads and type of road. This conception of equipping the public road is too old and carries the reminiscences of the former communist regime, fact that is decisively reflected in revealing the county potential of communications.

The relatively good maintenance of the public high class roads (European roads, the main national and secondary roads, and partially the county roads) and their cover with sustainable materials, as well as leaving the low class roads in total decay brings serious prejudice to the safety, comfort and freedom of movement.

Unlike other EU Member States, in which even the main agricultural roads are paved, in 2008, Romania still considers that properly equipping of the lower class roads is not a priority and that the rehabilitation of rural roads can be delayed.

The public administration of Mureş County supports this idea; hence, unfortunately, even if the national roads are properly equipped, or 100% of them are in the process of modernization, only 11.76% of the rural roads are paved with a thin layer of asphalt material, the rest being earth roads covered with stones (71.15%) or earth roads (16.74%).

Table 3. The structure of public road network in Mureş County, classified by types of road materials (2007).

Nr. crt.	Type of road	Total length (m)	Length classified by types of road materials (m)					
			Concrete asphalt	(%) of the total	Cement concrete	(%) of the total	Pavements	(%) of the total
1	National roads	428868	383744	89.48	19742	4.60	0	0
2	County roads	774602	9500	1.23	1000	0.13	6649	0.86
3	Communal roads	896469	600	0.07	747	0.08	1832	0.20
4	Total length of public roads in MUREŞ County	2099939	393844	18.76	21489	1.02	8481	0.40
Nr. crt.	Type of road	Total length (m)	Length classified by types of road materials (m)					
			Roads with thin asphalt layer	(%) of the total	Stone roads	(%) of the total	Earth roads	(%) of the total
1	National roads	428868	21372	4.98	0	0	0	0
2	County roads	774602	624791	80.66	109716	14.16	22946	2.96
3	Communal roads	896469	105443	11.76	637797	71.15	150050	16.74
4	Total length of public roads in MUREŞ County	2099939	751606	35.79	747513	35.60	172996	8.24

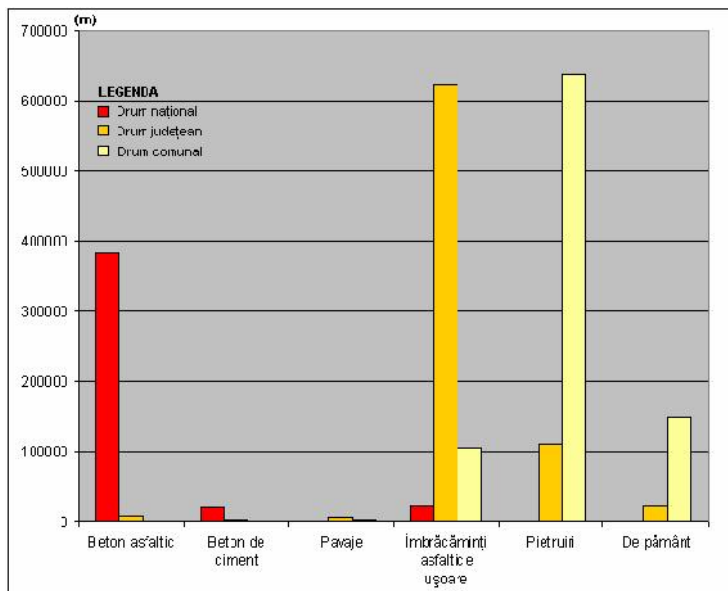


Fig. 3. The structure of public road network in Mureş County, classified by types of road materials (2007)

Equipping multiple sectors or the entire county roads with stone materials. County roads, through their main function of connecting municipalities with cities or communal centres, are considered the basic road spine of a county, by which the fluxes of circulation to intermediary and final destinations are facilitated. In this context, the state of county roads is essential for a homogeneous development of a county. It is observed that 14.16% of

the county roads of Mureş County are still made of gravel material and 2.96% of them are earth roads. Not even the condition of county roads with thin layer of asphalt is too good, many of them requiring modernization.

The presence of more sectors of county road covered with earth. The earth sectors of the county road are the most vulnerable to the action of environmental factors and they also partially fulfil the function of communication. Their technical condition is precarious and they cannot practically be used during the humid and cold periods of year. Along with rural roads, these sectors of the county roads represent a priority in the process of modernizing road infrastructure.

The low level of equipping rural roads with a thin layer of asphalt. Rural roads represent the category of public roads with the lowest degree of modernization in Mureş County, only 11.76% of them being paved with asphalt. This fact is a totally unfavourable for the development of local rural communities, the state of road representing the identity card for the development of that community.

Communal roads (rural roads) are mostly made of gravel or earth. Most of the rural roads in the county are covered with stone (71.15%) and earth (16.74%) which means that over 88% of rural roads are still in an advanced stage of physical and moral use (table 4).

Table 4. The viability state of public roads in Mureş County.

Nr. crt.	Type of road	Total length (m)	Viability state					
			Proper (m)	(%) Out of total	Medium (m)	(%) din total	Improper (m)	(%) Out of total
1	National roads	428868	428868	100.00	0	0.00	0	0.00
2	County roads	774602	390961	50.47	290665	37.52	92976	12.00
3	Communal roads	896469	349198	38.95	221409	24.70	325862	36.35
4	Total no. of public roads in MUREŞ County	2099.939	1169.027	55.67	5120.74	24.39	4188.38	19.95

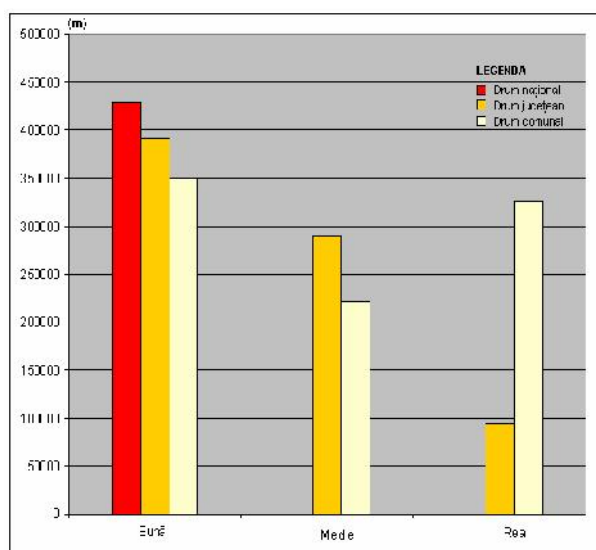


Fig. 4. The viability state of public roads in Mureş County.

This aspect is one of the main drivers and inhibitors of rural local development priorities, thus becoming a major priority for the new investments in infrastructure.

With a view to the sustainability of public roads in Mureş County, we may notice that, if the proportion of modernized national roads is of 100%, in the case of county roads is of only 50.47% and of about 38.95% in the case of rural roads. More significant for this is to reveal the proportion of roads with an improper state. Thus, 12% of the county roads are in an advanced state of degradation, while this value

increases to 36.35% in the case of rural roads. These sectors of roads, characterized by a low state of viability, mostly coincide with gravel and earth roads (fig. 4).

Nr. crt.	Județul	Densitatea (km/100 km ²)
1	Alba	42,3
2	Braşov	28,0
3	Covasna	22,6
4	Harghita	24,8
5	Mureş	29,6
6	Sibiu	29,4
7	Regiunea de Dezvoltare Centru	29,9
8	ROMÂNIA	33,5

Table 5. The density of public roads (km/100 km²) in the Centre Region of Development

Public roads include 253 bridges with a length of 6100m, out of which 143 bridges are located on national roads and 110 bridges on rural roads.

The density of public roads in the county is of 31.26 km/100 km², under the national average, which is of 33.5 km/100 km², yet with a higher value as compared to that registered by the Centre Region of Development (29.9 km/100 km²) (table 5).

Regarding the current state of roads in Mureş County, we have to mention the following:

The road network of Mureş County includes a number of risk sectors for the circulation, such as:

- road sectors at risk of flooding;
- road sectors at risk of snowing;
- road sectors frequently foggy;
- road sectors with dangerous curves and slopes;

Two of the most frequent dangerous slopes we can find on the sector of the national road (DN 16) between Târgu Mureş and Sighişoara, as well as on the national road (DN 15) located in Luduş area.

We find the road signs satisfying on the entire network of county roads, and rather insufficient on the rural roads. If marks are executed at least once a year on the national roads, in case of county and rural roads with permanent pavement, marks have not been made with the same regularity, while there are still some sectors of county and rural roads on which these marks have not ever been made. Nevertheless so important for the safety of movement at night and in the presence of fog, since 1996 the administrations have started works for marking the roads, even including local roads, both county and rural.

From the perspective of vertical signs placed on the national roads, they are fully reflective, while the county and rural roads have been equipped with such signs only on several major routes, in the latest few years.

Causes of the current technical state of public roads in Mureş County:

- not considering investments in infrastructure as a priority, even if it represents a key factor for the county development;
- the discordance between the increase values of traffic and the budget allocated for road maintenance;
- the incomplete legislation and lack of a national strategy in this respect before 1995, and hardly carried out later;
- the lack of roads maintenance during 1980-1990, and their failure in the period 1990-2000, especially regarding local roads, both county and rural;
- some natural calamities that have adversely affected the current maintenance programs for the network of roads and bridges;
- the lack of specific high technology for carrying out the works before 2000, and their failure after 2000;
- the lack of specific materials for the execution of works before 1990 (bitumen, cement, mineral aggregates, fuel);
- the lack of qualified personnel for road works, especially after 1990, particularly workers and foremen;
- the poor quality of basic materials, particularly bitumen;
- the non-funding works for the rehabilitation and modernization of county and rural roads, in particular, fact that materialized only through the enforcement of maintenance works;
- the lack of ring roads in cities and the concentration of transit traffic in them;
- the lack of escape routes (faster routes) for transiting the county.

2. OTHER TYPES OF ROAD. CURRENT SITUATION AND DYSFUNCTIONS

“Other roads” refers to the category of roads that includes roads, which, according to the law are not public, and that provide access to forest, agricultural areas and others. This category is particularly important in developing the overall road network, since they may either constitute sectors or real links between human settlements and areas (points) of interest, or can provide variants of access, and relationships between them.

2.1. Forest roads

2.1. Forest roads (FR) are roads constructed in purposes of forest management and for the transportation of timber, they providing the connection between forests and public road network. FR represent means of technological transport, of private utility, frequently used for: management of forests, hunting and fishing activities, interventions in case of damage, calamities or disasters; they are closed to the public circulation, except for uses like sports, recreation and tourism, which may be practiced only by the consent of the owner.

These roads are state property and they are included in the economic forest units.

According to The Forest Code, FR are intended to serve the activity of forest transport and they are closed for public circulation. In addition to forest transport, the access on these roads is allowed only for the vehicles belonging to the Ministry of National Defence.

Notwithstanding the general rule, the economic forest units may allow transportation on some FR for different organizations, at their request, and by signing an agreement. They may also allow the movement of private vehicles for tourist purposes, as well as for access routes to localities located on forest roads.

In terms of how to use, forest roads are classified into:

- roads serving exclusively the interests of forest economy;
- roads that mainly serve forest transport and those on which transport is authorized, by agreement, for some shipments of industrial interest of other economic sectors;
- roads used for forest transport on which, in addition to shipments of industrial interest, is allowed the movement of in the purpose of tourism or for accessing some neighbouring localities.

It is prohibited to execute the transport on forest roads, except for the contracts (by signing an agreement).

Currently, in the county, there are 1140.4 kilometres of forest roads, out of which, most of them are consolidated, paved with stone or macadam.

Forest roads are currently used for other purposes also, mainly in animal farming (as access routes to mountain pastures and hayfields), for recreation activities (tourism), and less as access roads to the villages in the area, and the least in the mining activities.

Problems and dysfunctions:

- the deplorable state of many forest roads (a single institution cannot ensure their proper maintenance due to the total length of roads);
- accelerating the morpho-dynamic processes, mainly linear erosion, due to the unsuitable exploitation of forest roads;
- the disruption of general ecological balance in the area. These roads have allowed the deep penetration of human activities to areas recently "wild", not always civilized activities, such as: illegal forestry, tourism invasion, building vacation residences, over-pasturing, even in the recently cleared areas, therefore not allowing the regeneration of forests.

2.2. Agricultural roads

Agricultural roads represent a supplement for the existing county and rural roads, they ensuring the movement of people, cars and cargo transport from and to the field, as well as the access to every wedge sole and aggregates of machines and tractors.

In the context of sustainable development, agricultural roads must meet the following requirements:

- the agricultural road network, along with the county and rural roads shall provide connections between the village and the production centres and field camps;
- they shall ensure the movement of trucks, aggregates of cars and tractors from a parcel to another;
- the location of road should be in accordance with the borders of the parcel that is worked on, with the forest protection belt, with the field camps, and also with the drainage or irrigation networks;
- the road route shall comply with the technical requirements, in terms of width and longitudinal slope;
- the project should formulate the provisions regarding the minimal investment costs. There should be used the suitable existing roads, along with their bridges and other existing facilities.

According to their significance and purpose, agricultural roads are classified into:

- *main agricultural roads (main ways)* – they serve the entire sets of plots and all categories of use; they connect settlements and groups of crop lots, because, in some cases, they overlap the rural or county roads; it is recommended to be profiled and reinforced to

widths of 6-8 m; they are projected in a straight line, so as to serve all soles in crop lots of 300-500 hectares;

- *secondary agricultural roads* – they are used to transport cargos on the long edge of the parcels of work; they make the connection with the main roads. They are also called supply roads when they serve the aggregates of cars and fuel tractors, water, seeds, as well as the making turn of empty the aggregates when executing field work. They are designed to have widths of 4-5 m; the location is on a side of plot, which is closer to the centre of the village, and the field camp shall be located where it is more convenient to organize the supply for the aggregates of machines.

As compared to the protection forest belts, roads are located on the side that dries more quickly in spring after snow melt (on the South, South-West, or South-East side). When the belt has a North-South direction, the road shall be located in front of the wind, mainly on the edge of forest belt, where less snow will be stocked. In the case of fields on slopes, the road is set above the forest belt so that the water from the snow melting shall not leak on the road.

In the case of fields on slopes, the main agricultural roads that gather the secondary roads shall be designed as winding roads with a maximum slope of 8-10 %. The secondary roads on slopes shall be projected on the long sides of the working plots on the direction of contour lines.

In all cases, there should be found all kinds of solutions so as to occupy a minimum size of arable land. In Romania, by the application of Law no. 18/1991, the old agriculture establishments and their agricultural property of about 6.8 million ha were divided into plots of 1 ha. Therefore, this led to a decrease of 900-1200 m²/ha in case of the cultivated area, agricultural roads occupying about 8% of the agricultural property, as compared to 1,5-2,8% in the lowland areas and to 1,9-3% in the hilly areas (in accordance with the standard).

3. STAGES OF DEVELOPMENT OF ROAD TRANSPORT INFRASTRUCTURE

Having in view those mentioned above, the proposals for the development of road transport infrastructure in Mureş County were divided into three phases:

Phase Ia. Priority, until 2012 - a specific most urgent sub-stage of interventions (**red lights**) is mentioned for the following period (2009-2010).

Phase Ib. Urgent interventions (period 2010-2011 - **yellow lights**).

Phase II. Intermediate (period 2012-2015 - **green lights**).

Phase III. For perspective (period 2016 – 2020).

3.1. Measures, programmes

1. Establishing a strategy (vision) for the long-term development of transport and communications infrastructure (the period estimated - 2050)

Project description. Establishing such a long-term strategy is both a necessity and a priority for the coherent development of infrastructure within the county and has to remain stable and become the basic framework for any review of the County Spatial Plan (PATJ) or of various plans of spatial planning, transport infrastructure as well as spatial (metropolitan), county and regional development. This measure will stop the incoherent and inconsistent development of infrastructure, which has resulted from the frequent changes of political regimes. Once this strategy is adopted and respected by the county administration, by implementing the measures in accordance with the phases outlined, it should be in compliance with the European technical and functional standards of infrastructure.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure.

Period of execution: 2010

2. Starting the elaboration of the pre-feasibility, feasibility and technical studies for the major infrastructure projects within the county for setting the utility of land, required by the project description.

Project description. Given the long period necessary for the elaboration of the pre-feasibility, feasibility and technical studies, in case of the major infrastructure projects, their initiation has to be

achieved in time. It will be established the exact route and the size of land allocated for the execution of construction works.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure.

Period of execution: 2011

3. Finalizing the technical studies for the ring roads in Tg. Mureş - the Southern alternative, Reghin, and Sighişoara, so as to start working on the land issue, archaeological works and starting the execution works.

Project description. The finalization of these technical studies for the ring roads represents an absolute priority for the beginning of execution works. Ring roads will determine a decrease in the urban traffic congestion and they will eliminate the traffic transit.

Actors involved/responsible. The County Council, the Local Councils, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure.

Period of execution: 2010

4. Classification of local earth roads into village roads to shorten the distances of access to the communal centre.

Project description. The project aims to classify some of the local earth and agricultural roads into village roads in order to shorten the distance of access for a number of villages to the communal centre. Currently, the access from some villages to the communal centre is made on alternative routes of 30-40 km distance, fact that is completely different from the situation in which people have to transit distances of 3-4 km. This condition severely restricts people's access to a range of important public services such as: administrative, educational, health. Therefore, we propose the following classification of local earth roads into village access roads: the extension of DC 51 to villages of Boiu and Jacu, Albeşti commune; the extension of DC 77 to Subpădure and Cuştelnic villages; Mica commune: a connection road from the communal centre to Somoştelnic village and its extension towards DC 73. The proposals are graphically represented in the maps.

Actors involved/responsible. The County Council, the Directorate for Projects, Technical Development and Investment Programmes of the County Council, the Local Councils

Period of execution: 2010

5. Programme of transforming the proposed roads into public and communal roads to connect all villages.

Project description. The programme stipulates the classification of the proposed roads into public communal roads to connect all settlements in the county, which currently have no road connections, to the public access roads, and their modernization (table 5). The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Directorate for Projects, Technical Development and Investment Programmes of the County Council, the Local Councils

Period of execution: 2010

Table 5. Proposals for the classification of village roads into communal roads in Mureş County.

Nr. crt.	Name of administrative - territorial unit	Name of the public connecting road	Name of the connected village (beneficiary)	Observations
1.	Luduş Town	DN 15	Cioarga	
2.	Iernut Town	DJ 152 A	Porumbac	
3.	Sovata Town	DN 13 A	Ilieşti	
4.	Tăureni commune	DC 112	Fănaţe	Extension of road towards Triteni commune, Cluj county
			Fundătura	
5.	Cheţani commune	DC 96	Coasta Grindului	
			Giurgiş	
6.	Sânger commune	DJ 153 G – DC 117 and its	Fănaţe	Iclânzal commune
			Vălişoara	

		extension	Pripoare	
7.	Zau de Câmpie commune	DC 113	Ciretea	From the communal road
			Malea	Extension of DC 113
8.	Iclânzul commune	DC 128	Ghidășteu	
		DJ 152 A	Chisălița	
			Tăblășeni	
9.	Grebenișu de Câmpie commune	DJ 151 A	Valea Sâmpetului	
10.	Pogăceaua commune	DJ 151 A–DJ 152 B	Bologaia	
11.	Miheșu de Câmpie commune	DC 107 C	Groapa Rădaii	
12.	Râciu commune	DC 142 A	Pârâul Crucii	
13.	Crăiești commune	DJ 173	Nima Milășelului	
14.	Fărăgău commune	DN 16	Fânațe	
			Hodaia	
15.	Cosma commune	DJ 162 A	Valea Ungurului	
			Fânațele Socolului	
16.	Suplac commune	DJ 151 B	Vaidacuta	
17.	Vânători commune	DN 13	Valea Dăii	
		DN 13 C	Șoard	
18.	Sângeorgiu de Pădure commune	DJ 136	Lotu	
19.	Ghindari commune	DN 13 A	Ceie	
20.	Gurghiu commune	Extension of communal road DC 9	Orșova Pădure	
		DC 7	Păuloaia	
		DC 7	Larga	
21.	Hodac commune	DJ 153 H	Mirighioaia - Bicașu	
		DJ 153 H	Dubiștea de Pădure	
		DJ 153 H	Uricea - Arșița	
22.	Ibănești commune	DJ 153 C	Ibănești Pădure	
		DJ 153 C	Tișieu	
		DJ 153 C	Dulcea	
		DJ 153 C	Zimți	

6. Programme of the rehabilitation of current rural roads to facilitate the access to all settlements in Mureș County.

Project description. The rehabilitation of the current roads, by the execution of specific technical works represents a real necessity because of their precarious state. This fact dramatically reduces the entire potential of communication, especially in the case of earth roads. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Directorate for Projects, Technical Development and Investment Programmes of the County Council, the Local Councils

Period of execution: 2010 - 2011

7. Reclassification of the county road DJ 153 C, in the sector between Lăpușna and the border of Harghita County.

Project description. This proposal aims to re-classify the sector of the county road into forest road and, therefore, limit the public access in the adjacent mountainous area so as to maintain its preservation and biodiversity. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2010

8. Programme for the modernization of existing county roads to improve the safety and comfort of movement

Project description. The modernization of the county roads, characterized by an advanced physical and moral use (especially in the case of the stone and earth roads), represents a priority for increasing the safety and comfort of movement within the county. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2010 - 2015

9. Modernization of the national roads: Apahida –Reghin; DN 14 Teiuș – Blaj – Medias – Sighișoara.

Project description. The modernization of the two national roads is set as a priority for Mureș County, since they will support traffic outside the county, until new highways and four-lane roads are executed and start to function. They connect the North and South ends of the county and maintain traffic outside the county. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2010-2011

10. Modernization of national roads: DN 14 A Iernut - Târnăveni - Medias, DN 15 E Satu Nou - Sânpetru de Câmpie - Râciu - Tg. Mureș

Project description. The modernization of the two secondary national roads is a priority for the county development because they facilitate the North-South connections. Much more, these roads will support the future development of other categories of public roads of inferior rank (county, communal). By rehabilitation, these roads are proposed to achieve the technical class III, having a band and half on the direction of travelling. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2010-2011

11. The construction of a ring road for transferring the transit traffic in case of municipalities: Tg. Mureș - the southern alternative, Reghin and Sighișoara.

Project description. Building ring roads comes as a necessity in urban development, to relieve the internal traffic and redirect the traffic outside the urban area. Currently, all three cities have developed only intra-urban ring roads, which gradually became urban streets; hence, the transit traffic problem remained basically unsolved. Therefore, the ring roads are proposed to be constructed outside the urban areas, this way removing all transit traffic from inside (especially the heavy one). These ring roads are proposed to achieve the technical class III, and in case of connection with public roads, the road junction will be achieved through roundabouts. In sectors where topography allows, or there are ramps or slopes it is proposed to develop two-lane roads for increasing the traffic flow. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2010-2011

12. The involvement of county administration in order to support the construction of A 13 Transylvania Highway, the route between: Turda – Târgu Mureș – Sighișoara – Făgăraș.

Project description. Currently, Transylvania Highway is the main major road infrastructure in Romania, being in the phase of design and execution. Its realization is expected to end in 2013 (preliminary deadline); hence, it will create an axis of connection between the central, North-West and South areas of the country, of which Mureș county will benefit, since it axially develops within the county and it connects four cities and municipalities among which we can mention Tg. Mureș. Transylvania Highway will be the major road axis for Mureș County, as it will support and develop the other lower class road networks, as well as becoming the key factor for the future economic and urban development of the county. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2010-2013

13. The involvement of county administration, in order to support the construction of the 4 lane road, on the route: Moisei – Năsăud – Bistrița – Reghin – Târgu Mureș

Project description. The 4 lane road on the route: Moisei – Năsăud – Bistrița – Reghin – Târgu Mureș will represent the North-South road axis connecting Mureș County with its neighbouring counties (Bistrița, Maramureș). In order to properly manage the traffic flow between Târgu Mureș and Reghin municipalities, as well as to strengthen the economic relationships between them, to support the development in upper corridor of Mureș River, we propose a reclassification of the road sector with 4 lanes into an express road between Târgu Mureș and Reghin. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2012-2015

14. The involvement of county administration, in order to support the construction of the 4 lane road, on the route: Reghin – Miercurea Ciuc – Târgu Secuiesc.

Project description. This road infrastructure will strengthen the county communication potential with the neighbouring Eastern counties until the functioning of A16 Highway - Moldova. It will also support the development of settlements in the Mureș Defile; Reghin municipality will become the second most important road junction of Mureș County. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2012-2015

15. The involvement of county administration to support the construction of the 4 lane road on the route: Sibiu – Mediaș – Sighișoara – Odorheiu Secuiesc – Miercurea Ciuc.

Project description. This road infrastructure will provide the connection the Southern part of the county to the neighbouring counties (Sibiu, Brașov, Covasna) and it will also represent the basic road infrastructure for the development of the secondary one. Sighișoara Municipality will become a second road hub of Mureș County, fact that will sustain its socio-economic development but also the management of tourist potential. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2012-2015

16. Modernization of three roads of inter-county (regional) importance, with the possibility of reclassification to the rank of national roads: DJ 153 Reghin – Sovata; DJ 151 Luduș – Sărmașu – Lechința; DJ 106 Sighișoara – Apold – Sibiu.

Project description. The modernization of the three county roads and including them into the category of technical class III, of inter-county and regional importance, with the possibility of reclassification into the category of the national secondary roads, are designed to increase the polarization level of the territory and support the inter-county traffic, by establishing high rank county road infrastructure. The modernization of DJ 153 Reghin - Sovata will provide Reghin direct connection to the A16 highway Moldova and will facilitate the traffic coming from Maramureș and Bistrița-Năsăud on the 4 lanes road: Moisei – Năsăud – Bistrița – Reghin. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2012-2015

17. Establishing new classified roads in the metropolitan area of Tg. Mureş to polynuclear development.

Project description. This proposal aims to develop new routes for the classified roads located within the metropolitan area, in order to connect new economic establishments for the exploitation of local resources, so as to ensure a polynuclear development. Supporting the polynuclear development in the metropolitan area represents the most viable alternative to turn it into a functional structure. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Agency for Regional Development, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2012-2015

18. Establishing classified roads to support the micro-regional development.

Project description. In the micro-regions of development, bordered within Mureş County (others than the associated micro-regions), it is necessary to plan the rehabilitation or the re-classification of public roads, so as to support the micro-regional development. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2012-2015

19. Establishing and extending public roads for setting-up inter-county direct connections for the micro-regional cooperation.

Project description. This proposal lays down the provisions for the extension or improvement of sectors of public rural roads, so as to achieve the micro-regional collaboration. By creating a local direct connection to support the local micro-regional cooperation, it can lead to the diversification of local relationships between them and also to provide a more facile access outside county limits. Therefore, we propose works on the following sectors of the road: Vişinelu (Sărmaşu commune) – limit of Cluj County; Băiţa (Lunca commune) – limit of Bistriţa County; Deleni (Băgaciu commune) - limit of Sibiu County; Idiciu (Bahnea commune) – limit of Sibiu County; Gâmbuţ (Bichiş commune) – limit of Alba County; Solocma (Ghindari commune) – limit of Harghita County. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2012-2015

20. Establishing earth local roads for accessing the isolated areas.

Project description. This proposal stipulates the modernization of earth local roads, firstly by paving them with stones, subsequently being proposed for re-classification into communal roads, so as to provide access to remote areas, which could be included into the economic cycle by setting-up several agricultural farms. This measure is mainly necessary in the plain area of Mureş County, in which case the access to the farms is achieved through precarious agricultural roads. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Directorate for Projects, Technical Development and Investment Programmes of the County Council, the Local Councils.

Period of execution: 2012-2015

21. Establishing tourist roads with mixed-function.

Project description. This measure aims to establish several tourist roads in areas that have high tourism potential, by superposing them to some of the current classified roads or earth local roads. The sectors of roads may also have mixed-use, and they can also be used for various purposes, other than tourism. The sectors of the tourist roads proposed for this purpose are the following: Apold – Daia – Saschiz; Mihai Viteazu – Archita; Ozd – Bobohalma; Cucerdea – Giuluş – Lăscud – Somoşelnic. The proposals are graphically illustrated in the maps

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Directorate for Projects, Technical Development and Investment Programmes of the County Council, the Local Councils.

Period of execution: 2010-2011

22. The involvement of the county administration in actions for supporting the construction of the A16 Motorway, the sector of Târgu Mureş – Piatra Neamţ – Roman – Târgu Frumos – Iaşi – Sculeni

Project description. Moldova Highway will be the second major infrastructure of Mureş County and it will support the road traffic both to the East part of the country and also across borders. Its implementation is expected to be finished by 2013 and transform Mureş County in a transit hub for traffic transit on the West-East direction, and transform Târgu Mureş city in an important road junction and a socio-economic development pole. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2016-2020

23. Doubling the major roads on the opposite side of the main rivers in the county

Project description. This proposal fosters the construction of new sectors of public roads and proposes to connect the current routes to provide continuous access to villages on the opposite side of the large rivers in opposition to the current ones. It would also create several alternative access routes on the same direction and provide access to several localities situated on the opposite side of river. This measure, correlated with the construction of bridges at points of convergence of several roads, would set the connection with such settlements. This measure is proposed for the rivers of Mureş, Târnava Mare, Târnava Mică, and Niraj. The proposals are graphically illustrated in the maps.

Actors involved/responsible. The County Council, the Centre Regional Development Agency, the Ministry of Transport and Infrastructure, the Directorate for Projects, Technical Development and Investment Programmes of the County Council.

Period of execution: 2016-2020

4. CONCLUSIONS

In the context of territorial development of Mureş County, road transport infrastructure has been and it still remains the most attractive modality of transport. Because of the multiple advantages that road transport has in the process of territorial development at the mesoscale and microscale, in the near future it will continue to remain the basic infrastructure in the transport of goods and people. In this respect, this paper proposes a new plan-space configuration of Mureş road infrastructure that shall optimally respond to the new trends in spatial development. Much more, the new configuration of public road network means to reduce regional disparities at the mesoscale and microscale, which appeared and perpetuated in the county as a result of the uneven distribution of road infrastructure in the territory, and also determined by the lack of specific types of roads, with certain class and technical rank in accordance with the current and future needs. Both the text and the maps are contributing to the thorough analysis of the current situation and proposals; therefore, the new plan-space configuration of Mureş county road infrastructure can be noticed, all proposals having the deadline until the interval 2015 - 2020, supporting the spatial development process at least until 2050.

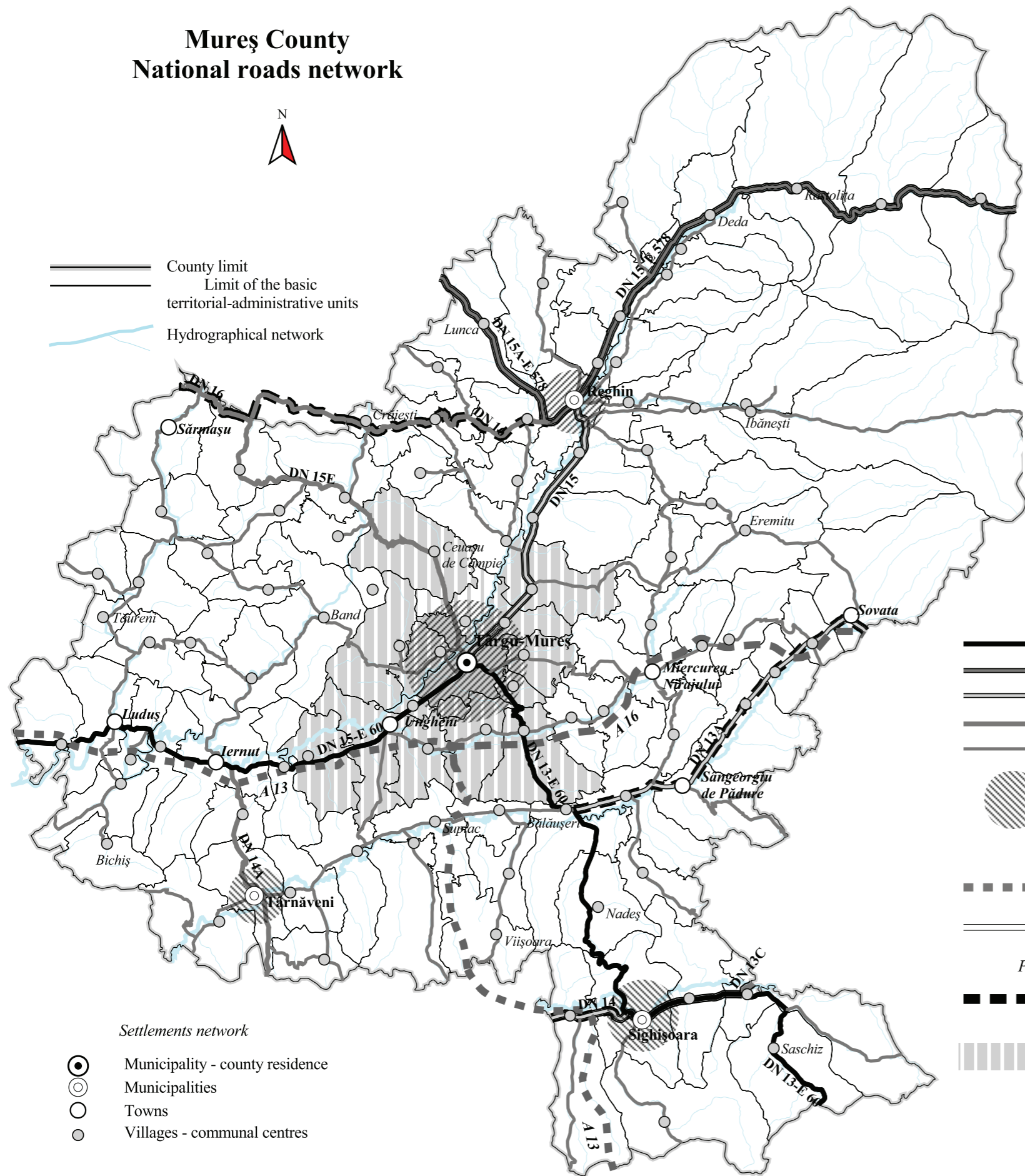
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Mureș County National roads network

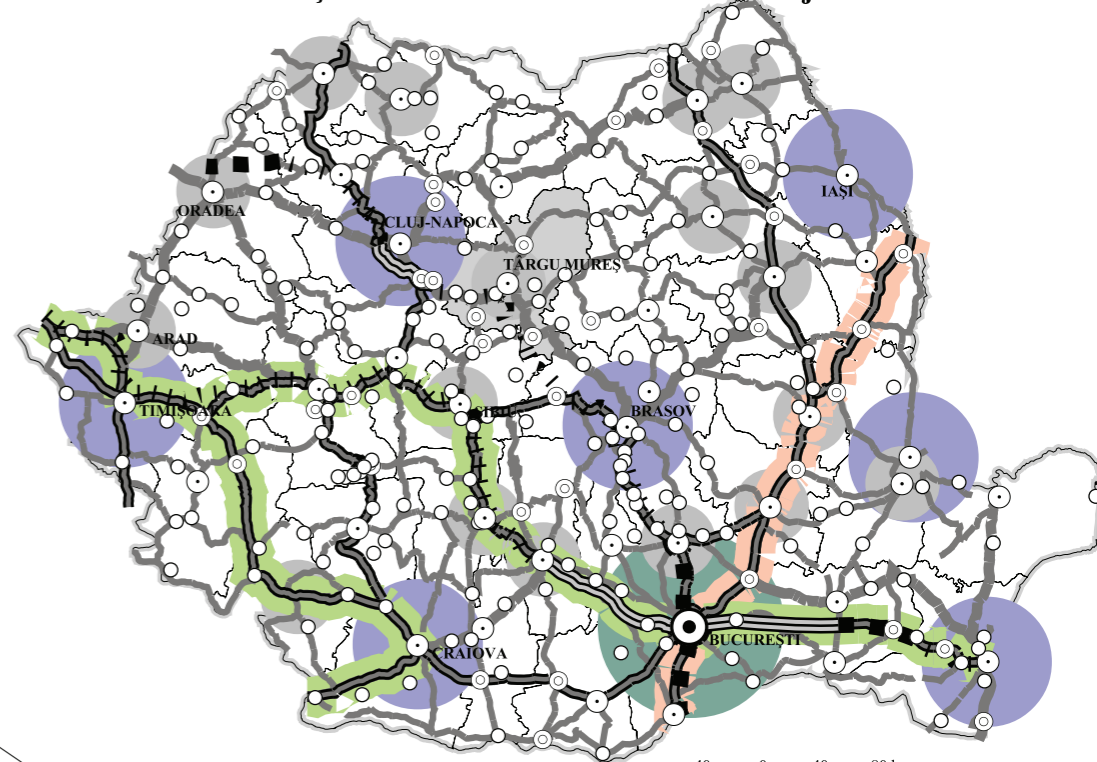


- County limit
- Limit of the basic territorial-administrative units
- Hydrographical network



- Settlements network*
- ⊙ Municipality - county residence
 - ⊙ Municipalities
 - Towns
 - Villages - communal centres

Contextul național al infrastructurii rutiere majore



40 0 40 80 km

Legend

Road infrastructure

- European roads
- National roads
- Current highways
- Highways under construction
- Highways in design phase
- Pan-European Corridor IV
- Pan-European Corridor IX
- TEN-R Network

Settlements network

- ⊙ Metropolis - national capital city
- ⊙ Municipalities- county residences
- Other municipalities
- Towns

The functional hierarchy of settlements

- a. Romania's capital city - Metropolis of European importance
- b. Municipalities of national importance, having regional role and potential importance at the European level
- c. Municipalities of inter-county importance

Legend

Road infrastructure

- European roads - A class
- European roads - B class
- Main national roads
- Secondary national roads
- County roads

- ⊙ Lack of ring roads

Provisions of NSP (PATN)

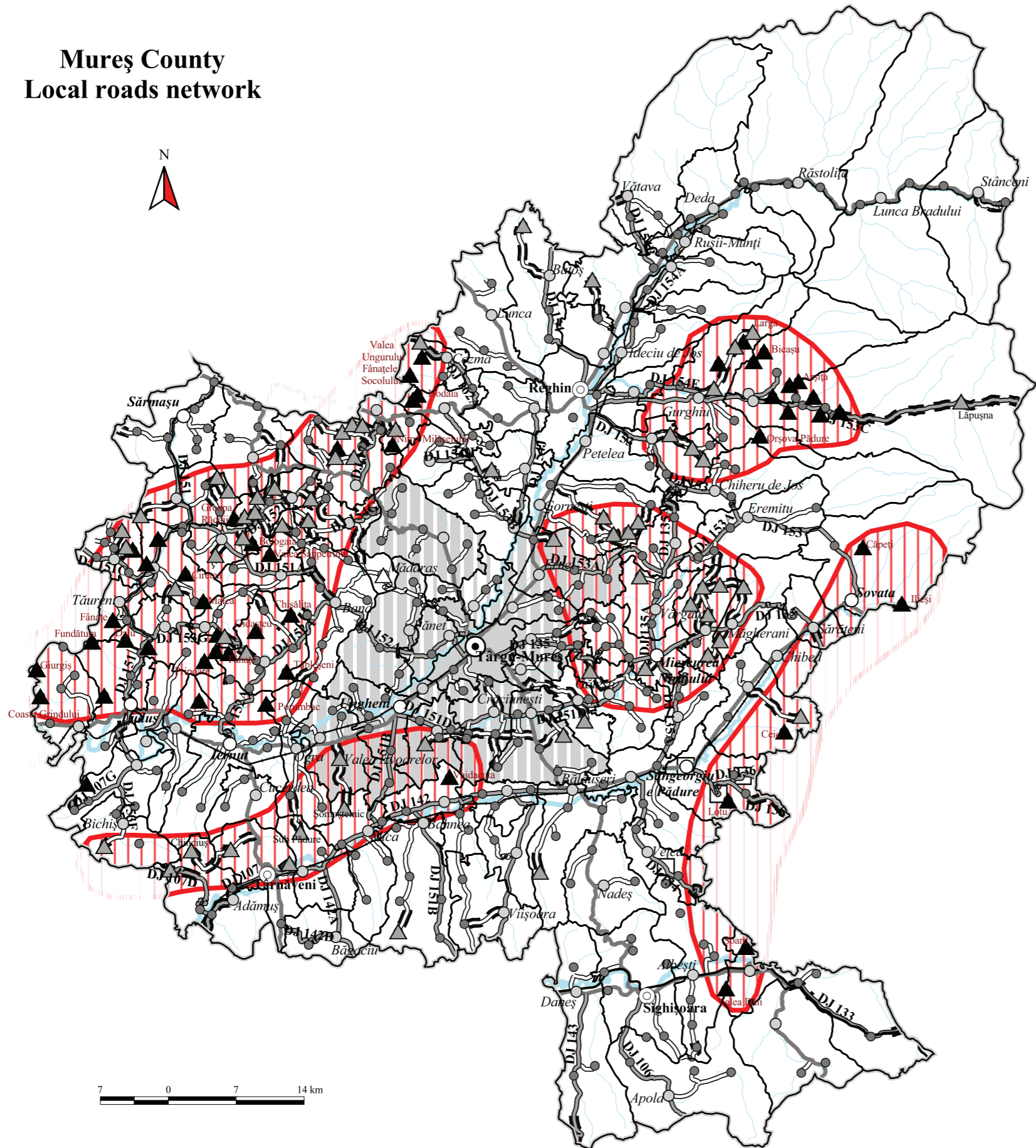
- Highway
- Express road or four lane road

Programme for modernization of road network

- Modernization of national roads-co-funded by structural funds
- Târgu Mureș metropolitan area

8 0 8 16 km

Mureș County Local roads network



Legend

- County limit
- Limit of the basic territorial-administrative units
- Railway network*
- Double track railways
- Single track railways
- Hydrographical network
- Settlements network*
- ⊙ Municipality - county residence
- Municipalities
- Towns
- Villages - communal centres
- Other villages
- Road infrastructure*
- National roads
- County roads
- Communal roads
- ■ ■ ■ ■ Sections of classified roads - in a precarious state
- Damaged bridges
- △ Localities - communal centres with no access to the county roads
- ▲ Localities - with no access to classified public roads
- ▲ Localities - with difficult access to classified public roads
- ▤ Areas with access deficiency
- ▨ Metropolitan area of Târgu Mureș

Mureş County The development of national road network

