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## Road and Rail Infrastructure II

Stjepan Lakušić – EDITOR



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University of Zagreb  
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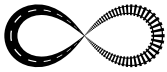
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## A TENTATIVE TOLL MOTORWAY SOLUTION ON DURRES–TIRANA–ELBASAN ROAD CORRIDOR

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### Abstract

Albania is facing a challenging task regarding the further development of its transport infrastructure. With the accession to the European Union in mind, the Government of Albania has committed itself to providing some roadway links identified as being integral parts of the planned Pan European Corridors. Being crucial for the economic development of the wider Balkans area, the part that directly relates to Albanian interests is the 8th Pan European, also known as the East–West (Durres–Skopje–Sofia–Varna), Corridor.

At this time, both the East–West and North–South corridors in Albania are almost finished, but some sections of the national road network still require rehabilitation before the two strategic routes can be considered complete. Actually, the central part of the countries road network, especially the road section from Durres to Tirana and Elbasan, is of importance and interest. In the last 14 years, the road section from Durres to Tirana has been built as a 4–lane dual facility. The section Tirana–Elbasan was built in the 30s of the last century, and it's actually a 6–7m wide, paved, mountainous single carriageway.

Durres–Tirana–Elbasan corridor considers the concession project from the private sector. The roads in Albania are located in the economically most developed region. In this region, more than two thirds of the country's population lives, and more than 75 percent of the economy is concentrated there. Two primary corridors, North–South and West–East, intersect here. This region registers most of the transport vehicles. The traffic flow, in some sections of Tirana–Durres, records more than 35 000 AADT. If we take into consideration the very limited possibilities of other means of transport, the resolution of the road infrastructure under study in this central part of the Country is a challenge for Albania.

*Keywords: road network rehabilitation, traffic studies, financial analysis*

### 1 Project description

The actual transport infrastructure in Albania; roads, ports and airport don't have the adequate capacity for answering the increasing requests of the economy and the necessity for people transport. The road network in Albania includes about 18.210 km of roads, out of which 3.500 km are national roads. Only some 6.500 km is asphalted. Origin/destinations for most of the vehicles in circulation are in the Tirana/Durres/Rrogozhine/Elbasan area.

In order to improve the national road network, road axis North–South and West–East was financed and constructed. North–South road axis bonds Kakavia (Greece) with HaniHotit (Montenegro) across coastal Albania and Durres port. West–East axis bonds Durres port with QafeThana (border with Macedonia) and Kapshtice (border with Greece). Albanian population is situated mainly in the coastal area, directed towards west Europe and from west Europe towards Durres port. Works done on the national road system on both axes are new or rehabilitated.

The 8<sup>th</sup> European Corridor connects Bari and Brindizi (Italy) ports via Durres and Vlora (Albania) with Skopje (Macedonia), Burgas and Varna (Bulgaria), both ports on the Black Sea. It is known as one of the more interesting corridors of Europe (second Pan-European Conference held in Crete, January 1994).

Durres–Tirana–Elbasan corridor is part of the 8<sup>th</sup> Trans European Corridor and represents the project–interest area that needs to be considered as a concession case project. The three cities are actually linked with different alternative roads, including newly constructed highways and old national system of roads. This situation offers the possibility, for road users, to use the existing old network as a traveling alternative.

## 2 Project aim

Durres–Tirana–Elbasan road is located in the economically most developed part of Albania. In this region, more than two thirds of the country's population lives and more than 75 percent of the economy is concentrated.

From the transport viewpoint, the three main cities of the Central region, Tirana, Durres and Elbasan, are located there. Also, two primary corridors, North–South (HaniHotit–Kakavie) and West–East (8th Pan European Corridor) intersect there. This region registers about 75 percent of the transport vehicles and this is the ratio of the economic activity of the Country as well. The traffic flow in some sections of Tirana–Durres highway, records more than 35 000 AADT.

Traffic studies (Albania National Transport Master Plan by Luis Berger) advise urgent solutions for the transport infrastructure, otherwise major problems will occur in the short to medium term future.

Even with all the efforts and investments, the government of Albania cannot change the situation of the existing infrastructure to adjust the road network in accordance with today's motorway standard's and traffic demands. For example, Tirana–Durres highway, an almost new construction, faces problems on both guidelines: traffic and infrastructure itself. In the Tirana–Vora part the actual traffic flow is more than 35 000 AADT and in the next section, Vore–Durres part, the flow is about 26 000 AADT.

On the other hand, the Tirana–Elbasan segment is an old construction built in the 30s of the last century, when the traffic flow was not more than 200–300 AADT, with geometrical parameters of mountainous road and designated speed of 30 km/h. The aerial distance between the two cities is only 28 km, but the actual road alignment is 56 km long. The difference in length is produced because of the road elevation from 100 – 1 000 m that serves to overpass the mountains and to avoid tunnels, viaducts, and especially to avoid high construction cost. The factual travel distance is from 1.5 to 2 hours long. Road safety is very low. In addition, this road is extremely difficult and mostly, prohibited for freight transport.

This situation dictates deviation, of a considerable part of the traffic (almost 20%), from the direct route Tirana–Elbasan via mountain, to the prolonged route through Durres and Rogozhina to Elbasan and further, with more than 50–60 kilometres of extension and respective travel time.

Urgent traffic problems of this region, particularly for the Tirana–Durres section, will partially be solved by the new planned Thumane–Rrogozhine Toll Motorway, which intersects the Durres–Tirana highway in Ura Limuthit. Still, similar problems remain crucial for the other sections of the road network. The answer for the burning question is the converging of the existing 'four lane facility highway 2x2 lanes', into a full motorway, 3x3 lanes including all other motorway parameters (velocity, safety, fencing etc). There are some obstacles for accomplishing this task. The main obstacles are: Vora transient, the complicated interchange of Limuthi (planned interchange between Thumana–Rrogozhina Toll Motorway, part of the North–South corridor and Durres–Tirana motorway) and the Tirana By–pass. With these implications, the intervention with a Toll motorway project doesn't have a chance in protecting this corridor. Although, this solution could protect the road and not leave it to degenerate into a simple urban road. A later intervention will more

difficult and will have extreme high costs for the Country economy. This fact must be known to the Government of Albania.

The new idea for Durres–Tirana–Elbasan Toll motorway will also generate:

- An appropriate alternative for the 8th Corridor.
- Traffic transfer from the Elbasan, Macedonia end further, from Durres–Rrogzhine–Elbasan to Durres–Tirana–Elbasan.
- A rational solution for the transport system in two cities, Tirana and Elbasan.

The deviation of the major part of the traffic, from the existing roads, to this new alternative will contribute to smoothing the traffic and transport problems and improve the travel and transportation conditions. On the other hand, the short distances will influence the deviation of all the freight and partially of the light traffic to generate the supplementary traffic in the proposed alternatives. This will create opportunities for the Concession or PPP (Private Public Partnership) investments, where the private capital is very active. This perception, which must integrate both sections, is very dependent on this study case.

The terrain between three cities/centres varies from flat (Durres, Tirana) to hilly (partially Tirana) and mountainous (Tirana–Elbasan). Between three centres there is an existing road infrastructure (Durres–Tirana highway) or it is in the process of planning (ring of Tirana). In these specific conditions and circumstances, one of the main objectives of this study is finding new shorter and appropriate routes which would have minimum environment impact.,

### 3 Alternatives Description

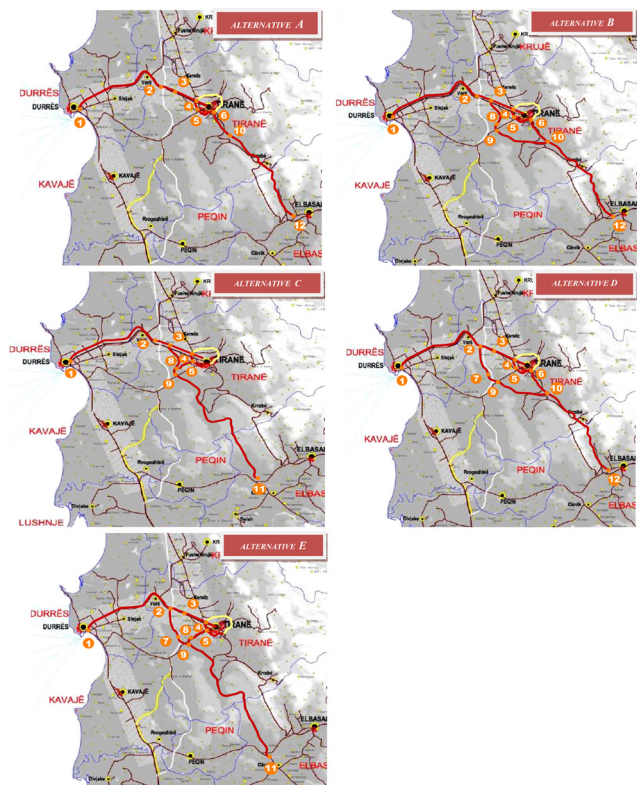


Figure 1 Alternative 'A', 'B', 'C', 'D' and 'E'

### 3.1 Alternative 'A'

It is a 70 466 ml long route from Durres to Tirana to Elbasan, shown in Figure 1. The proposed alternative route suggests passing from Durres to Tirana through the existing 4-lane highway. The difference between the existing 4-lane highway and a full 6-lane motorway (toll or not) is in parameters:

- The width, from 2x2x3.50 and 0.8 median part and simple side shoulders 1.5m up to 2.0m, must change in a full motorway: 3x3x3.75m + 2.50m median part + 2x2.50m emergency lanes + 2x1.5m simple shoulders, all together 33.0m wide. . Changing from 2x2 lanes highway to 3x3 lanes motorway would hold up the very high traffic flow and change from 'four lane facility' in a full Motorway.
- Uncontrolled entrances and exits in the existing 4-lane highway. There are more than 10–12 uncontrolled entrances. Transforming the existing 4-lane highway into a motorway suggests closing of the entrance–exit roads and traffic control, which would organize traffic only on the referred points (toll or not toll).
- No toll alternative. A toll motorway doesn't suggest a toll alternative. But from Durres to Tirana, such an alternative already exists.

**Table 1** Table 1  
'A' – travel distance 70 466 ml, construction length 64 043 ml

No	Parts of the Alternative	To be financed	Rate	Amount
1	Durres–Tirana (1-2-3-4), L=32 549 ml	all	EUR	146,900,660.00
2	Tirana Ring (4-5-6), L=6 423 ml	not at all	EUR	0.00
3	Tirana–Elbasan (6-10-12), L=31 494	all	EUR	367,817,252.00
Total in EUR				514,717,912.00

### 3.2 Alternative 'B'

Travel distance is 72 845 ml long and is almost the same as, the alternative 'A'. The difference is that Alternative 'B' has a supplementary By-pass nearby Tirana.

**Table 2** Table 2  
'B' – travel distance 72 845 ml, construction length 84 886 ml

No	Parts of the Alternative	To be financed	Rate	Amount
1	Durres–Tirana (1-2-3-4) L=32 549 ml	all	EUR	146,900,660.00
2	Tirana By-Pass (3-8-9, 9-10) L=20 843 ml	all	EUR	159,266,443.00
3	Tirana–Elbasan (6-10-12) L=31 494 m	all	EUR	367,817,252.00
Total in EUR				673,984,355.00

### 3.3 Alternative 'C'

This alternative is in regard to the road from Durres (1) to Tirana entrance (4) and is similar to Alternative 'A'. The part from Kashar (3) to Arbana (9) is similar to Alternative 'B'. After this point, the Motorway continues according to a new direction alignment Baldushk–Plangarica–Paper (11), through Baldushk valley and Sollaku River. From km21+400 till 23+150 a 1 750 long tunnel is indispensable. In this paper (11) a new candidate route joins 8<sup>th</sup> Corridor. This candidate route suggests including the rehabilitation of the part from Tirana Ring (5) up to



Vaqar (8) segment in the investment. A full upgrade and partial widening is also necessary for the road segment from the Tirana Ring exit (5) up to point (8). This is not included in this estimation of the respective alternative because it is included in the already planned 'Thumana–Rrogozhina' Toll Motorway.

**Table 3 Table 3**

'C' – travel distance 85 319 ml, construction length 78 675 ml

No	Parts of the Alternative	To be financed	Rate	Amount
1	Durres–Tirana (1-2-3-4) L=32 549 ml	all	EUR	146,900,660.00
2	Tirana By–Pass (3-8-9) L=8 846 ml	all	EUR	60,444,437.00
3	Tirana–Elbasan (9-11) L=37 290 ml	all	EUR	309,548,613.00
Total in EUR				516,893,710.00

### 3.4 Alternative 'D'

This candidate route is more similar to Alternative 'B', with the difference of the By–pass: instead of Kashari (3), Vaqar (8), Arbana (9), the By–pass deviates from Limuthi (2), Ura Beshirit (7) to Arbana (9). The part from Limuthi (2) to Ura Beshirit (7) is a part of Thumane–Rrogozhine (Toll Motorway under the process of implementation). From the Arbana (9) point, the alignment extends into the Erzen valley, nearby villages of Arbana, Mullet, Petrela up to Fikas and Ura Peshkatarit(10), where Alternative 'A' joints further to Elbasan (12). For this alternative the construction length is also longer than the travel distance.

**Table 4 Table 4**

'D' – travel distance 71 693 ml, construction length 72 220 ml

No	Parts of the Alternative	To be financed	Rate	Amount
1	Durres–Tirana (1-2-3-4) L= 32 549 ml	all	EUR	146,900,660.00
2	Tirana By–Pass (2-7, 7-9, 9-10)	Partially 7-9-10 Lp=14, 977ml	EUR	110,820,483.00
3	Tirana–Elbasan (6-10-12) L=24694m	all	EUR	367,817,252.00
Total in EUR				625,538,395.00

### 3.5 Alternative 'E'

This candidate route is similar to Alternative 'C', with the difference of the By–pass: instead of Kashari (3), Vaqar (8), Arbana (9), the By–pass deviates from Limuthi (2), Ura Beshirit (7) to Arbana (9). The Limuthi (2) part up to Ura Beshirit (7) is a part of Thumane–Rrogozhine (Toll Motorway under the process of implementation). From Arbana (9), the Motorway continues according to direction alignment Baldushk–Plangarica–Paper (11), through Baldushk valley and Sollaku River. This candidate route suggests the rehabilitation of the section from Tirana Ring (5) up to Vaqar (8): full upgrading and partially widening the existing road. It is not included in the estimation of the alternative because another project; 'Thumana–Rrogozhina' has it planned already.

**Table 5 Table 5**  
'E' – travel distance 84 167 ml, construction length 74 114 ml

No	Parts of the Alternative	To be financed	Rate	Amount
1	Durres–Tirana (1-2-3-4) L=32 549 ml	all	EUR	146,900,660.00
2	Tirana By–Pass (2-7;7-9 and 9-11)	Partially:7-9; L=2, 900 ml	EUR	11,998,477.00
3	Tirana–Elbasan (8-9-11) L=38 665 ml	all	EUR	309,548,613.00
Total in EUR				625,538,395.00

## 4 Economic and traffic analysis

The full study suggests a prefeasibility study which would be done with World Bank Standard HDM IV including Environment Impact Assessment. The prefeasibility study would include:

- The proposed road corridor
- Socio–economic indicators and traffic growth
- Population
- The growth of the Vehicle Fleet in Albania
- The value of travelling time, value of time, value of traveling time
- Traffic model
- The definition of Transport Network
- Passenger Traffic
- Existing traffic in both road corridors
- 

For both segment Durres–Tirana and Tirana Elbasan, a financial analysis has been considered: traffic diversion, traffic forecast, financial analysis, investment cost, costs of maintenance, financial revenues, and sensitive analysis.

**Table 6 Table 6**  
Classification of alternatives according to travel distance and construction cost

No	Comparing Criteria	Alternative				
		1st	2nd	3rd	4th	5th
1	According travel distance	A	D	B	E	C
2	According construction cost	E	A	C	D	B
	First	5 points				
	Second	4 points				
	Third	3 points				
	Fourth	2 points				
	Fifth	1 points				
<b>Classification</b>						
No	Alternative	Points			Classification	
1	Alternative 'A'	9			1st	
2	Alternative 'B'	4			4th– 5th	
3	Alternative 'C'	4			4th–5th	
4	Alternative 'D'	6			3rd	
5	Alternative 'E'	7			2nd	

## 5 Conclusions

From the above mentioned study we reached an important conclusion to be suggested to the Albanian Government.

For Durres–Tirana segment, based on the financial analysis, the investment is financially viable for a period not less than 35 years. The Government is a very important actor which can guarantee the project scheme. The consultant recommends the involvement of Albanian Government in the expropriation process. Engineer recommends the construction of the Tirana–Vore–Durres Motorway by concession as a project financially viable.

Based on the financial parameters such as the IRR and Net Present Value, the construction of the four lane motorway Tirana–Krraba–Elbasan by concession is not financially viable. The construction of the two lane highway including the tunnel can be financially viable only in the case the Government of Albania partly subsidize the construction of the road infrastructure. Third option is the one in which the state takes the responsibility for the road segment construction instead of the concessionaire who should take the responsibility for the tunnel construction. The tunnel length is 2.5 km.