2018

REPORT

TECHNICAL REPORT - CONSTRUCTION OF THE ROAD SECTION "THUMANE - VORE - KASHAR"

1. INTRODUCTION

1.1 General Project Presentation

In this document is described the construction of a road, which starts in Thumane and continues to the intersection with the Tirana - Durres road with a new crossing.

Currently, the movement along the North-York Corridor is difficult to perform in the Thumane - Vore segment. Recently there has been an intervention in this corridor, extending the road at a length of about 15 km. The extended road ends 10 km north of Fushe-Kruja, a town that lies in the eastern part of the valley. The valley is wide and narrows about 500m wide in the vicinity of Fushe Kruja

The Thumane-F.Kruje-Vore area is located in a geographical region that serves as a link between north-east and north-west with the rest of Albania. Communication with Kosovo through the north - east corridor and the connection to the north - south corridor in the prospects of trade and tourism with Montenegro and Croatia transform this area into a communication artery that offers clear economic and historical, cultural and ethno - cultural perspectives in terms of tourism. Geographically, the study area is bordered to the north by the village of Thumane, on the eastern side of the city of Fushe-Kruja and the suburbs, south-east of the city of Tirana, south-west from the city of Vores and west of the commune villages Preze.

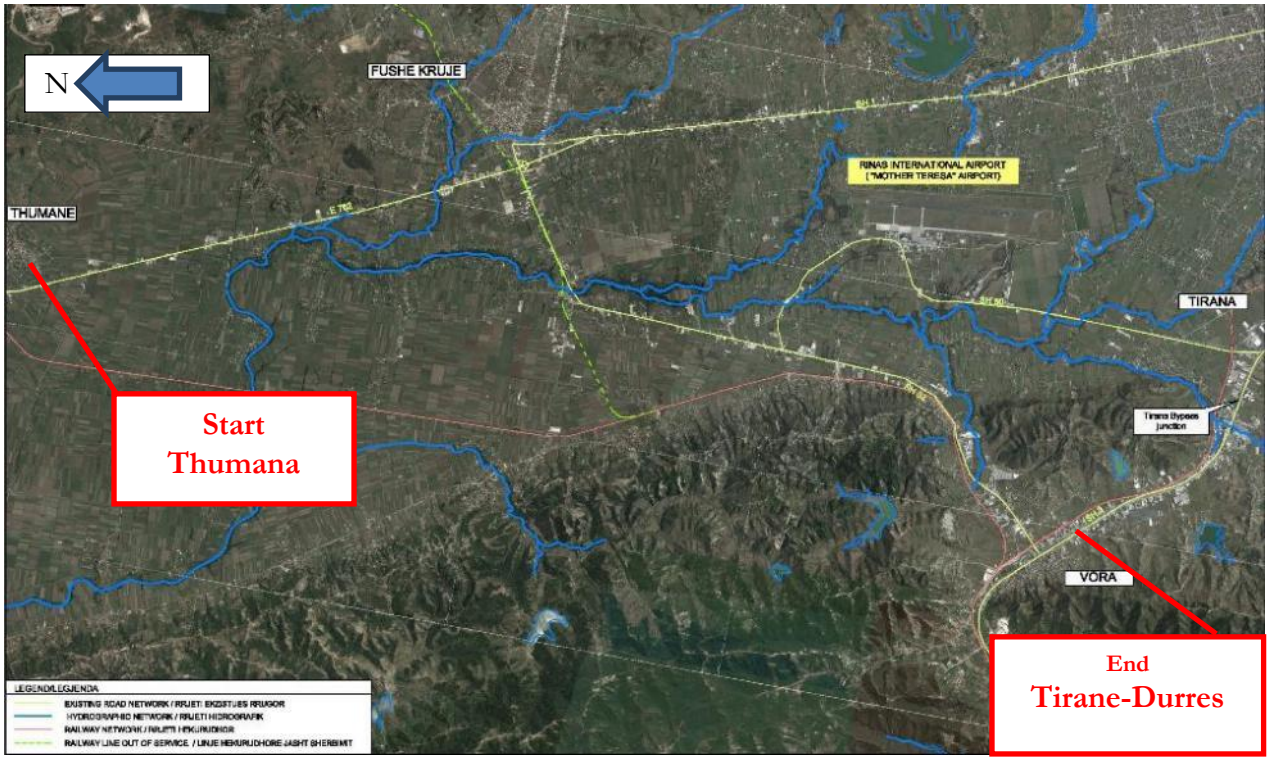
The road starts from Thumana, 150m in the interior of the 4-lane roadroad linking Milot with Thumanen towards Fushe-Kruja. The road continues with a right turn and continues right up to Fushe-Kruja. Then with a double turn towards the Rinas Airport. The road continues to the right hand side of the road of Rinas, until its connection with the Tirane-Durres Road in Kashar

The road from Thumana to Fushe - Kruja was rehabilitated in 2000-2002.

The segment from Fushe-Kruja in Vore crossroads was rehabilitated in 2004-2007.

The road crossing the Rinas airport has been rehabilitated by NATO forces during the Kosovo war.

The road from "Mother Theresa" airport to the Kashar intersection was rehabilitated by the German operator of the TIA-Hochtief airport in 2005.



The new roadroad will be in the urban and semi-urban areas of Thuman, Fushe Krujë, Rinas and Vores, and will connect two important points:

- 4-lane segment in Thumane in the north (Start of the project)
- Road Tirane-Durres south (end of project)

A direct footprint, with the appropriate geometric standards, is supposed to improve the movement of traffic across the region affected by this construction, in particular the traffic flow along the North - South corridor. It will also have a completely positive impact on the entire transport network.

The main objectives of the project are:

1. Ensure a proper connection between the north of Albania and Kosovo with the Port of Durres (this is the European path E762).
2. Also securing the connection of the capital to the International Airport of Rinas.

2. PROJECT

2.1 Goals / Objectives

The aim of this project is to improve the traffic situation and road infrastructure. The existing road passes from Thumana along the valley end, continues to Fushe-Kruje, and then moves towards the southern part of Vores. Before reaching the city of Vores, there is a turnaround connecting the existing road with Rinas and beyond with the Tirana-Durres road. About 40 km of the existing road from Thumana towards Tirana-Durres road go to an urbanized area. This road is 2 lanes (one for each direction), ranging from 7 to 10 m and its fair condition.

The new roadroad will be in the urban and semi-urban areas of Thuman, Fushe Krujë, Rinas and Vores, and will connect two important points:

- 4-lane segment in Thumane in the north (Start of the project)
- Road Tirane-Durres south (end of project)

A direct footprint, with the appropriate geometric standards, is supposed to improve the movement of traffic across the region affected by this construction, in particular the traffic flow along the North - South corridor. It will also have a completely positive impact on the entire transport network.

The main objectives of the project are:

1. Establish a proper connection between the north of Albania and Kosovo with the Port of Durres (European Path E762).
2. Facilitating traffic in the Fushe Kruje-Tirana segment which is also a residential area, which is often caused by accidents.
3. Also establish the connection of the capital to the International Airport of Rinas.
4. Implementation of international standards in the implementation of this project.

2.2 Scope of the project

The work that will be carried out for the realization of the road, according to the planning, extends in 3 stages.

Stage 1

In this phase, a detailed study and implementation project will be carried out in order to improve all road markings or other elements. At the same time, the expropriation of properties and objects affected by the project will be carried out.

Stage 2

This stage includes the construction phase of the road. It starts with the mobilization of yards, personnel, and machinery. It is necessary to specify the supply points for inert, concrete, asphalt, etc. It is necessary to specify the landfills for the soils, waste, etc. Then there is a deviation of traffic where it is needed and the implementation of the works begins. This phase closes with the completion of the works.

Stage 3

This stage includes maintenance of the road, which includes as main elements the cleaning of canals and drainage works. Possible repair of asphalt, protective barriers, signaling, etc.

2.3 Priorities, Assumptions and Limitations

Priorities

The proposal for the construction of the Thumane-Vore-Kashar road segment is part of the Government's plan for infrastructure development through the One Billion Euro program. This is to be achieved by including private equity investment. Priority for the realization of this project is the involvement of banks and the government guarantee.

With the approval of the project, priority is given to the realization of expropriations before the works are started so that there are no works prohibitions.

Assumptions:

It is assumed that the expropriation of the affected property will be carried out by the Government, prior to the commencement of the works.
It is assumed that banks will be involved in the investment of this project and with a low interest rate.
It is assumed that the Government will provide a guarantor for receiving loans from banks.

2.4 Strategic and Operational Benefits of the Project

The road starts from Thumana, 150 m insidethe 4-lane roadroad connecting Milot with Thumana towards Fushe-Kruja. The road continues with a right turn and continues right up to Fushe-Kruja. Then with a double turn towards the Rinas Airport. The road continues to the right hand side of the road of Rinas, until its connection with the Tirane-Durres Road in Kashar.

The road from Thumana to Fushe - Kruja was rehabilitated in 2000-2002. The road from the Fushe - Kruja crossroad to the city of Vores was rehabilitated in 2004-2006. The road that passes near the Rinas Airport has been rehabilitated during the Kosovo war by NATO forces. The road from "Mother Theresa" airport to the Kashar intersection was rehabilitated by the German airport operator in 2005.

It is already known that this area has problems with traffic in SH1, especially during weekdays, forcing drivers to choose a longer road in SH52 and SH60. The traffic generated in this segment has caused quite a lot of problems, accidents and pollution in the area.

The Thumane - Vore - Kashar roadroad, as presented in this study, represents a new road section from Thumane and continuing to the Tirane - Durres road. The roadroad should provide the possibility of establishing a high capacity connection - high speed for north-south transit, integrating the retraining of the Thumane - Fushe-Kruje section and the European corridor with the Milot-Morine superstructure. The new roadroad will cross the urban areas of Thuman, Fushe - Kruja, Rinas and Vores and will connect two important points: the 4 - lane Milot - Thumanes lane in the north and the Tirana - Durres road in the south.

The Albanian Government has paid close attention to the connecting roads in the north and northeast with Montenegro and Kosovo and that in the south with Greece. In this segment, daily traffic also includes traffic to the airport "Mother Theresa". The realization of this road has an important strategic dimension as part of the green corridor of the Durres - Morine road and the North - South Corridor connecting the Pan - European Corridor VIII, part of the SEETO comprehensive network, as well as the National Transport Plan proposed by Government of Albania.

2.5 Technical Analysis (Technical Project / Technical Solution / Technical Feasibility

Expropriations Analysis

The analysis is carried out in order to investigate existing and future needs in the study area, covering the following topics

Geographical strech of the project and land use

The trail starts from Thumana, where it connects to the 4-way road section of the North-South and Durres-Morine corridor, and the purpose is to connect the road between Tirana and Durres, passing mainly on agricultural land, in the west of the existing road linking Thuman with Fushe Kruja, without touching it.

After a crossroads at the east of Gjole Bridge, it is diverted to the "Mother Theresa" airport, coming almost parallel to the east side of the existing road connecting Voren with Fushe Krujë, always without touching it, and after another crossroads near the airport "Mother Theresa" is connected with the road Tirana-Durres, about 1 km west of Kashar crossing.

The municipalities affected by the Project are: Tirana, Vora, Kruja.

The route trace passes mainly through agricultural land, except in certain parts where small urban areas are affected.

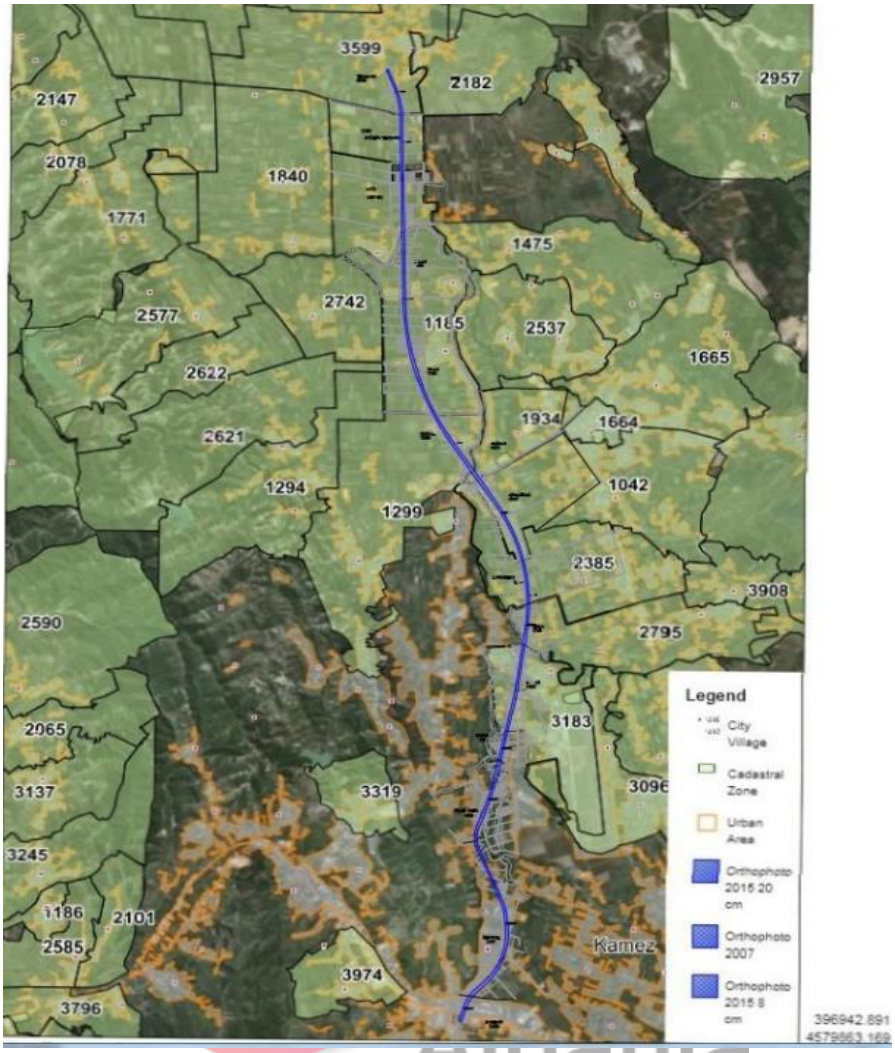
Types of Land Use

The value of land for expropriation is determined (in ALL / m2) by a Decision of the Council of Ministers, which approves the reference values by zones and categories in accordance with Law no. 9235, dated 29.07.2004 "On the Restitution and Compensation of Property" and DCM no. 658, dated 26.09.2012, "On the Approval of the Methodology for Valuation of Immovable Property in the Republic of Albania". Currently, the values are defined by DCM no. 89, date 03.02.2016 "On the definition of the land value mapping in Albania".

For this phase, the method of assessment used is based on Guideline No. 3 dated 28.12.2016 "On approval of the average cost of construction by the National Housing Authority for 2016".

Map of Values

The trail covers 15 cadastral zones, which belong to the territory of the municipalities of Tirana, Vore and Kruje, for which we have presented a schematic overview of the cadastral zoning and the relevant values map.



Schematic representation of the layout of the project of the affected cadastrial areas

Technical Project Description

The proposed project trail starts in the south of Thuman (the endpoint of the 2 carriageway sections of the Tirana-Shkoder superstrada), and continues according to a completely new plan.

Advantages

- The solution of a completely new track allows the design of a new infrastructure in accordance with the standards / regulations for roadroads without substantial constraints along the route, as well as a good connection with the Tirana Bypass perspective project.
- No restrictions on the existing road network;
- No problem with expropriations compared to the existing case (along the entire existing route there are many direct private access and access to commercial areas that have high social costs and impacts).
- No rehabilitation of the existing main structures or their reconstruction simultaneously with the functioning of the existing road

The roadroads includes the following parts:

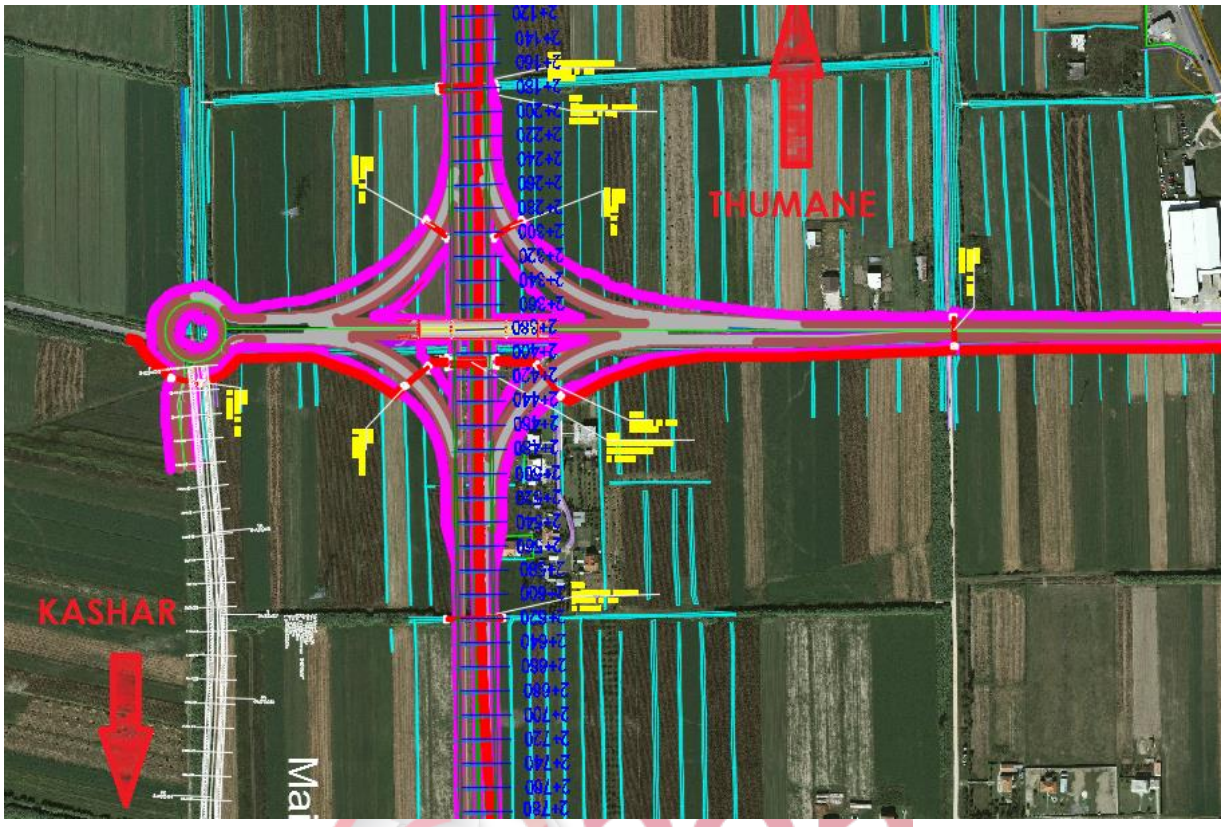
1. Interchanges
2. Access Roads and Secondary Roads
3. Bridges
4. Overpasses
5. Main Underpasses
6. Secondary Road Underpasses
7. Culverts
8. Acoustic Barriers
9. Safety Barriers
10. Passing Bays
11. Reinforced Earth
12. Lighting

a- <u>Proposed Interchanges</u>

Along the proposed Roadroad it may be possible to construct these Interchanges:

Intersection_01 – Thumane
Intersection_02 – Fushe Kruje
Intersection_03 – Aeroporti i Rinasit
Intersection_04 – Tirane Durres

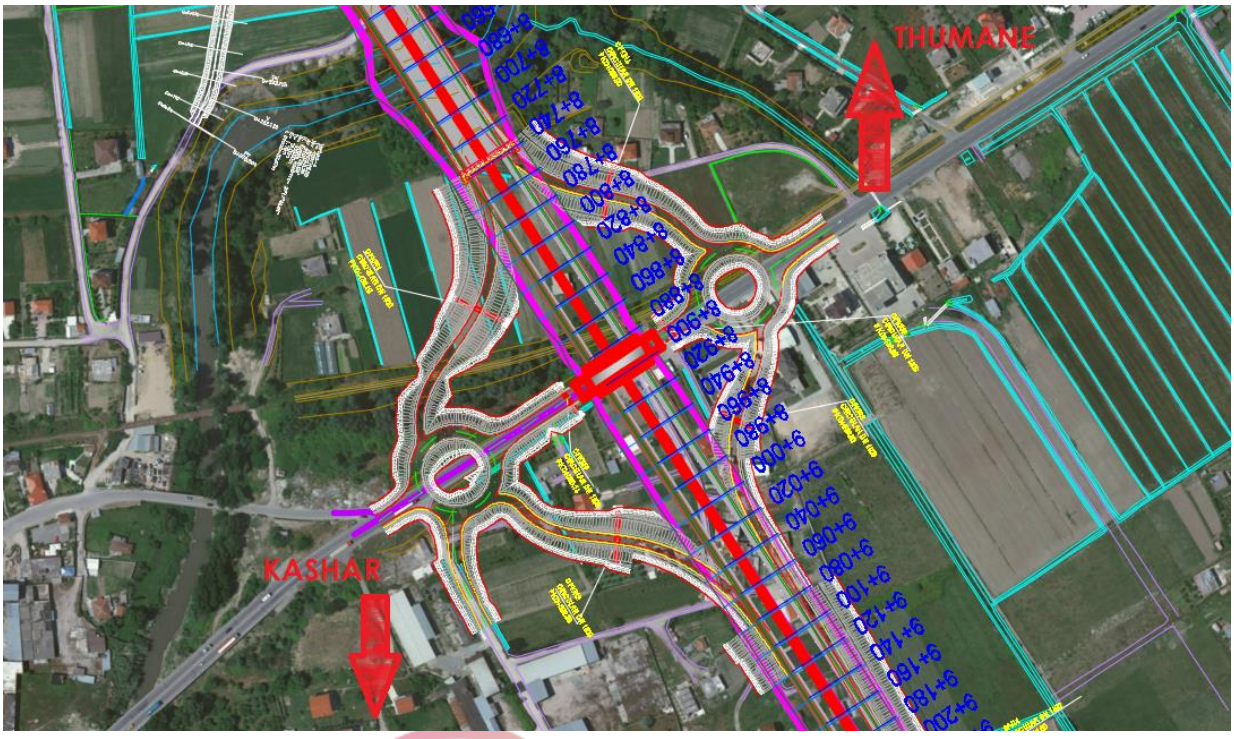
Intersection No.1



Key features of the Thuman crossroads:

The altercation is of two type with distant rotations respectively 230 m in the western direction and 700 m in the eastern direction of the roadroad. The connection to the northern part of the roadroad is realized through the eastern rotation in the direction of the roundabout and around the western turn for the return (from the north to Thuman). The connection to the southern part of the roadroad is realized through the western rotation for the roundabout and about the eastern rotation for the return (from the south to Thumana).

Intersection Nr.2



Main Characteristics of Intersection Fushe Kruja:

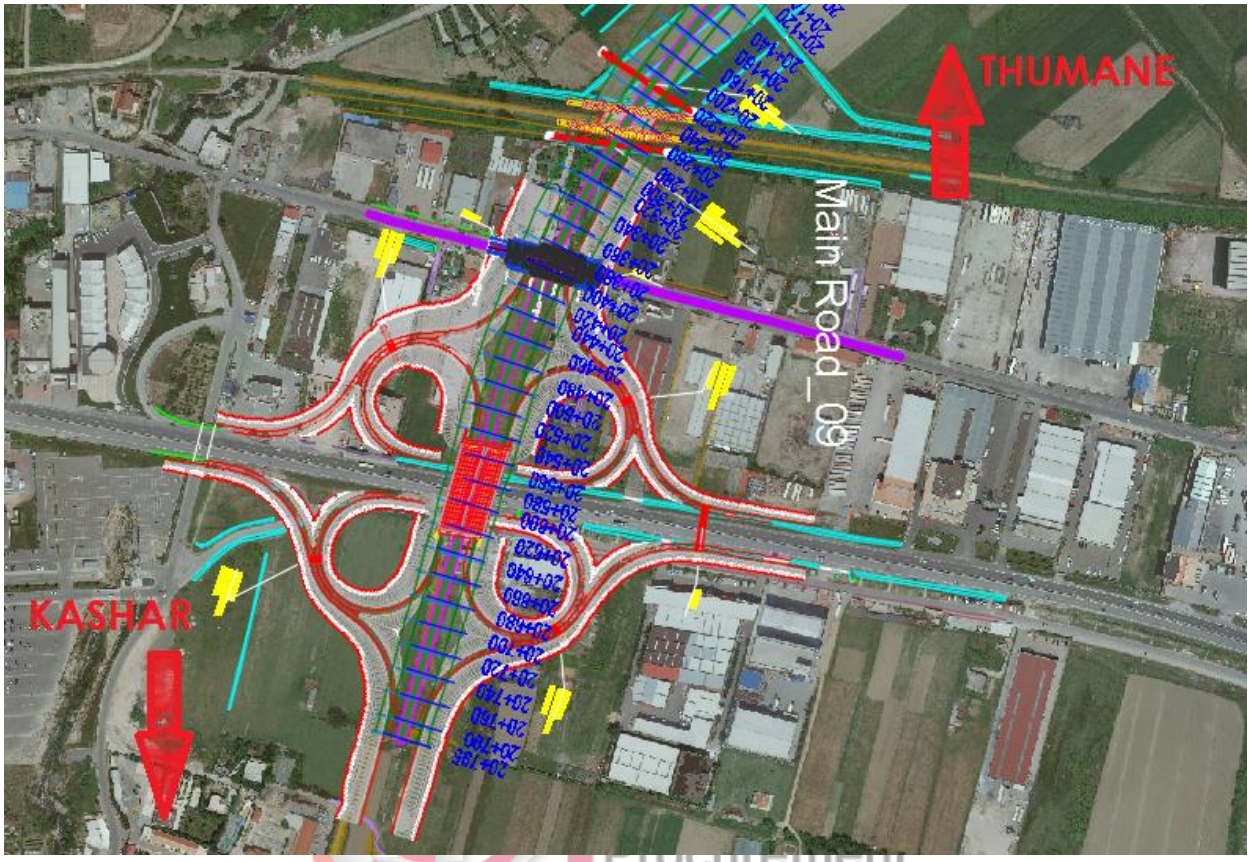
The interchange is of two types with roundabouts near underpass with a distance of 85 m in the west direction and 85 m in the east of the road. The connection to the northern part of the road is realized through the eastern roundabout in the direction of the roundabout and about the western turn to return (from the north to Fushe Kruje). The connection to the southern part of the road is realized through the western roundabout for the roundabout and about the eastern rotation for the return (from the south to Fushe Kruje).

Intersection No.3

Main Characteristics of Intersection Airoport of Rinasit and Dogana:

The layout adopted is a trumpet scheme layout as the most used scheme in case of 3 legs interchange. Connecting North side with: New RA on Sh60. Roundabout axis diameters: 50 m. Minimum radius on ramps: 50 m. Maximum vertical grade on ramps: 6%. The above mentioned specification has e refereeing value.

Intersection No.4



Main Characteristics of Intersection te Aeroportit te Rinasit and Dogana:

The alteration is of the type of full text that connects the road for construction with the Tirana Durres road. The connection to the northern part of the road from Tirana is realized through the north-eastern ramparts in the direction of the departure for Thumane and the south-west ramp for return to Tirana. The connection to the northern part of the road departing from Durres is made with the south-east ramp in the direction of the departure for Thumane and the north-west ramparts for the return to Durres. The connection to the southern part of the road (Kashar) from Tirana is realized through the north-west ramparts for going to Kashar and south-east for returning to Tirana. The connection to the southern part of the road (Kashar) from Durres takes place through the south-west ramparts for going to Kashar and north east ramparts for the return of Durres. The above mentioned specification has e refereeing value.

Data for Geology and Hydrologeology of the area

In this paragraph are given a general description of datas for Geology,Geotechnic,Hydrogeology for this project. Subarea Thumane-F. Kruje-Vore located in the western direction of Dinarido-Albaniko-Helenik (D-A-H), which create an areafor all Tetisi Sector where orogenesis continue also till today and has all the geodynamic characteristics of an orogenic arc in developement.. The area in this study is located Western paramountain Depressionas below:

- In the Northeastern area is bordered by Dalmato-Istriane (Montnegro) area. Kufizohet ne Veri-Lindje me Zonen Dalmato-Istriane (Mali i Zi) and Kruje in Albania following with Gavrovo- Tripolica (Greece))
- In the Southwestern is bordered with Paksos area of the Ionian Sea.

a- Geology

From geological point of view, subarea Thumane-Fushe Kruje-Vore-Tirane as part of Western Depression is located in the following directions as below::

a- In the East is sorrounded by Anticlinal Breast Kakariq-Dajt-Letan.
b- In the South is sorrounded by Anticlinal Breast Fushe Kruje - Tirane.
c- In the Southwestern and western, the subarea is sorrounded by anticlinal verse of Ishmi.

Area Thumane-Fushe Kruje-Vore-Tirane is a subarea central massive depressed between Adriatic and Ionian Sea. The area which is in study is part of Molassic depositions of Western Depression.

b- Stratigraphy

Depositions that lies in area Thumane-Fushe Kruje-Vore-Tirane are as below:

1 . Stratigraphy e of Molasses in the western depression.
2 . Mesiniani (N31-m)
3 . Plioceni (N12-p)
4 . Stratigraphy of quartenary deposits

c- Analysis of Underground water

Based on the study which are held in this area, into existing structure or during construction has resulted in the different level of underground water in the winter and sommer.

Winter season

In the area that border Thumane-Fushe Mamurras-Fushe Milot the underground water level is at depth 0.6 to 1.1m. .

Summer Season

Summer season in Albania accompanied by limited rainfall. For this reason underground water level is lower in this season. Compared to the Winter season the underground water levels differences ranges 0.8 to 2m.

Nga analizat paraprake te kryera rezulton se ujerat jane neutrale, jo agresive ndaj hekurit dhe betonit.

d- Erosion

Erosion caused by the river is very common in this area. Floods have occurred almost each year for example the case in year 1960 where the rivers came out from the bed.
In order to prevent and minimize erosion effect are planned to be built in both sides of the road drainage channels.

e- Geological Risk of the Region

Geologicals risks are classified as: natural origin and tecnogene. (antropogen).
Geological natural risks are Siesmic, Sliding, floods, erosion etc.
Geological antropogen risks are related to human activity.

f- <u>Conclusions and Recomandations</u>

Axe route Thumane – FusheKruje – Vore - Kashar is not in good condition from geologo-engineering point of view. The road axe located in the the filed relief and has several rivers crossing the road.

The road route passes over deposits consisting of a mixture of clays, dirt and dust, with a bad assortment. The route of Thumane - FusheKruje - Vore - Kashar road, from the point of view of geological-lithological construction is not very uniform in its extension. In this roadway there are usually generally weak mechanical and physical deposits.

Another phenomenon is the consolidation of the clay ground beneath the road floor. In order to eliminate the phenomenon of large settlents of the basement in the effect of the filling weight in the vicinity of the high works, engineering measures should be taken such as the use of consolidating piles or geosynthetic materials for the uniform distribution of loads on the ground .

Hydrogeological Conditions

1- Existing hydro-meteorological information analysis

Climate Conditions

The study area is located within the mediterranean sub-zone of the central plan.

The annual rainfall varies at range between 950-1200 mm. Sustainable snow cover is almost never observed. The absolute minimum temperature fluctuates between -3 and -5 ºC. The number of driving days can reach 12-15 per year. The maximum wind speeds in this area during warm seasons show values of 10-15 m / s, while during cold sands are approximately 25 to 30 m / s.

Duration of days with good wheather

In the evaluation of the existing data it results that the duration of the lighting reaches the maximum in July. In total, this value is around 2613 hours throughout the year.

Air temperature

The maximum mean values were reached in July (23.4 ºC), while the minimum values in January (6.5 ºC). The average value for the whole year is 14.9 ºC.

Rainfall

The maximum mean values are observed in the winter and the minimum months in July. The average value for the whole year is 1299 mm. The number of days with precipitation amounts more than 0.1 mm varies between 85 and 100 days

Air humidity

The average moisture content was observed in the winter season (79-80%) and the minimum heat value (63-67%).

Fog

In the project area, the average number of fog days is 7 to 8 days / year, maximum in September and March.

Design Criteria

a- Roads Classification

The road design standard, used as a reference for all issues related to geometric parameters and designation of the proposed route of the new road, is the New Road Design Manual in Albania, dated 30.07.2015. According to our experience, using the aforementioned regulation, the upcoming road will meet the highest standards in terms of:

- Security;
- Capacity;
- Behavior of Road Users;
- Speed of Design.

As far as the main function of this road is concerned, it belongs to Category A - Road.

Category A consists of two independent carriageways separated by an impassable security barrier, each with at least two lanes, a paved banister on the left and an emergency lane on the right, no level crossings, and strict access control.
The road will be surrounded (with guardrail) and equipped with emergency systems along its entire length. In the road will be allowed entry of only certain categories of motorized traffic, placing the relevant signal at its beginnings and ends. Prohibition and service areas are provided, providing access through acceleration and slowdown lanes.
The category of vehicles that will be allowed to use the new route are:

- Vehicles
- buses;
- trucks;
- Articulated tools.

b- Criteria for horizontal alignement

The speeds planned for this road category will range from 90 to 120 km / h (the speed limit in the table will be 110 Km / h).

The horizontal alignment of the road will provide a safe and continuous use, with a uniform (constant) speed at the significant length of the road. A maximum length will be provided of straights parts, not greater than 22 times the upper limit of the design speed Vdmax [km / h].

Regardign the curves, the minimum radius [m] will depend on the design speed and the slope. In this case, when the design speed is 90 Km / h and the 7% ceoss section-slope, the minimum radius will be 340 m.

Straight alignment
All geometrical elements of the horizontal alignment are in accordance with the Albanian Code.

However, long distances at with the same slope may have some disadvantages. Especially they can:

- Motivate the driver faster
- Increase the risk of blindness by the opposite side at night
- To cause fatigue in most road drivers

Circular Curves

For circular curves the radius should be selected as large as possible based on topography, in order to achieve: viewing distance for sufficient overtaking, maintaining uniform insurance in the direction.

Between two circular turns on the same or opposite side, the radius of these turns should be the result of a balanced traffic safety report.

For design speed 140km / hr is not defined in this table the minimum radius but is determined by means of the minimum radius formula for this design speed is 1100m.

Horizontal Turns (Spiral Length)

A gradual transition from the sideways segment to the circular plane has been ensured, thus providing a uniform speed change as well as a centrifugal acceleration that complies with vehicle motion dynamics. The use of a distance for the transition of a longitudinal slope allowed for the platform's extremity line makes possible an optically accurate planimetry. Use of variable-range curves is required for all categories of roads. For the horizontal alignment of the outer parts and the circular arcs of the road axis, a clod is used which is the one that changes the inflection from the straight line to the circular arc.

Viewpoint distance

To ensure a traffic safety and proper service level, a minimum viewing distance is required. The viewing distance is the length of the road that is possible to be viewed by the driver.

The viewing distance requested for a stop

The viewing distance required for stop is the distance that a driver who travels with the speed of the design is needed to stop his vehicle before it hits an unexpected obstacle. It consists of the distance traveled by a vehicle during the reaction of the driver and the distances for self-restraint.

c- Criteria for vertical alignment

The vertical alignment is an orientation line by which the thickness of the layers and other elements of the road is determined. It is mainly dictated by topography, road type, plan, and heavy vehicle performance, cost of expropriation, security, viewing distances, construction costs, cultural development, drainage, and pleasant appearance.

All longitudinal profile components will be in accordance with the requirements for the distance of apparently according to the projected road speed grading.

	5

Vertically designed curbs should provide the necessary viewing distance, safety, comfort in the direction of the vehicle, good drainage, and nice views. In the longitudinal path of the road, as a means of reconciliation, parabolic curves are used, but it is entirely acceptable for simple circular arc radii with a radius of more than 1500m, so that the theoretical parabola with a circular arc is approached in this manner.

Superelevation of the road

The Superelevation of the road is 7%, in the curve. In the part of curvature of variable radius the Superelevation is gradual and is throughout its length. The minimum spacing and the standard

of the right sections for the removal of water for all road categories is c = 2.5%. The drainage elements are normally outside the carriageway. On both sides of the road segment is expected to be constructed two side channels for drainage and removal of water in main and secondary roads.

The viewing distance for stop

The controls for the viewing distance in the project are made for a viewing distance for stop L = 200ml, this distance has dictated and expanded to some curves to increase the visibility of the road. All the curves we are interrupting to realize the extensions for the visibility of the road are mentioned above.

Passing bay in road side

A passing bay location on the road is the road surface besides the carriageway assigned for the usual and unusual parking of vehicles.

They must be set at such intervals in order to ensure safe traffic flow to approximately 1 km from each side. These roadside locations can also be used on auto routes provided their dimensions are not lower than the norms.

d- Intersections

The intersections in one level consist of separate components (travel lanes, entry and exit zones, ramps, etc.) that follow each other in space and require specific behavior from the driver. The structural design uniformity criteria applies mainly to these components and less to the whole intersection.

Connecting nodes include the connection of two or more auto routes (crossings in the autorun) and the joining of the autorrugs with a lower tier system (entry points).

Proposed Intersection for all the road are listed below:

- **Overpass_01 Thumana Intersection**
- **Overpass _02 Fushe-Kruje Intersection**
- **Overpass _03 Rinas Airport Intersection**
- **Overpass _04 Intersection which connect with Tirane-Durres Superstrada.**

Typical Cross Section of Traffic Nodes

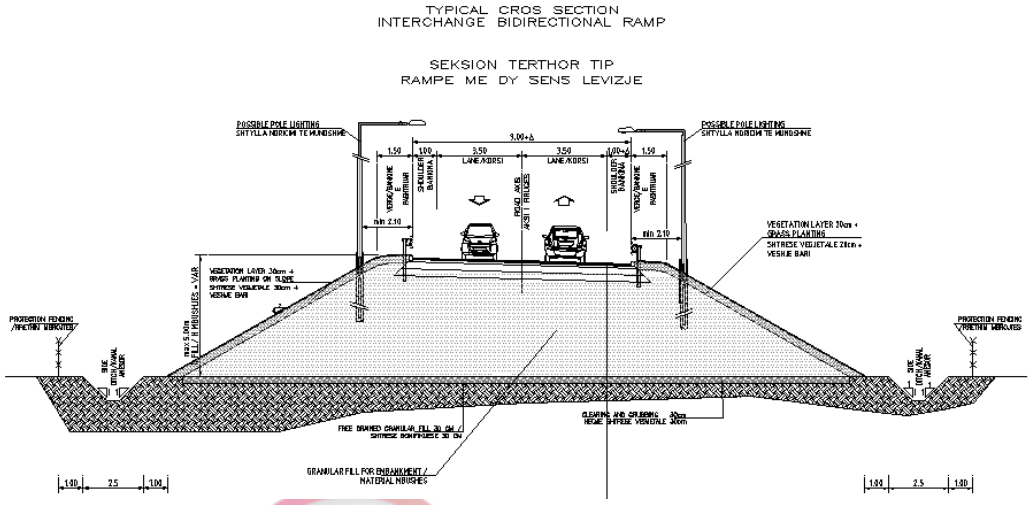
In the case of acceleration and deacceleration lane of the road, the cross-sectional section is required to be 3.75m long lane + a 2.5m paved shoulder. The typical cross section is required in the following figure:

Ramps one way direction

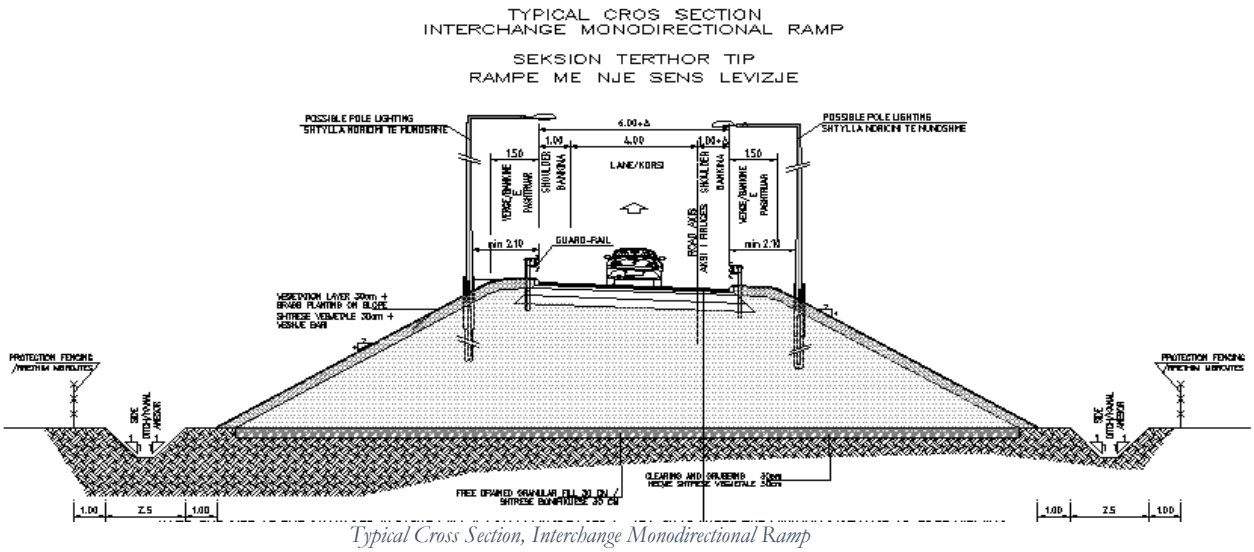
- One Lane = 4.00m,
- 2 paved shoulder = 1.00 m each,
- Unpaved shoulder = 1.50m each side
- Total paved width = at least 6.00m

Two-way moving ramps

- Two Lanes = 3.50m each,
- 2 shoulder = 1.00 m each,
- Unpaved shoulder = 1.50m on each side,
- Total paved width = at least 9.00m.
- The unpaved shoulder on the right side will increase locally to guarantee the minimum distance of free visibility.



Typical Cross Section, Interchange Bidirectional Ramp

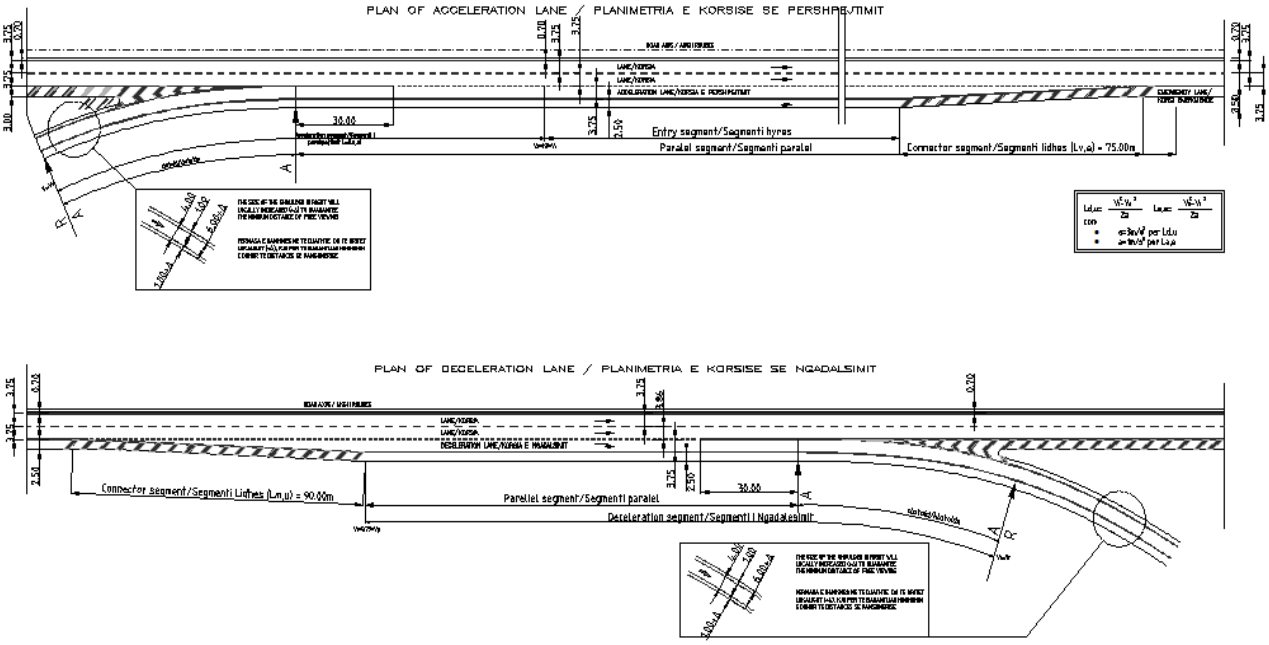


Typical Cross Section, Interchange Monodirectional Ramp

Acceleration and Deceleration lanes

According to the Albanian standard and also the best international practice, all nodes have secured lanes dedicated to entry and exit.

A typical application plan layout is presented in the following figure:



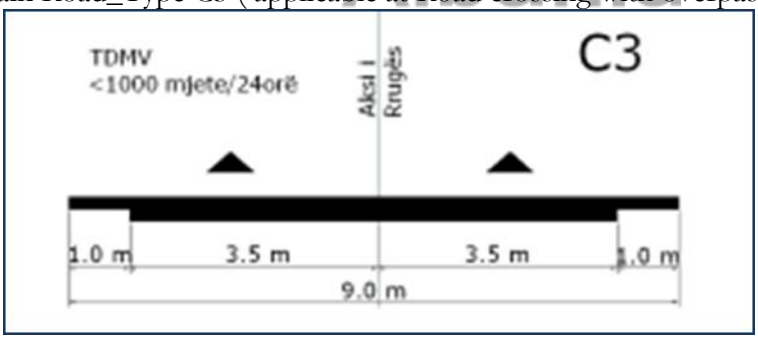
Acceleration and slowdown lanes – Typical Layout

e- Acces Roads and Rural Roads

In order to minimize the negative social impact that the new Road can bring, it is foreseen the rehabilitation of the roads and Infrastructure that crossing the road, which are divided into:

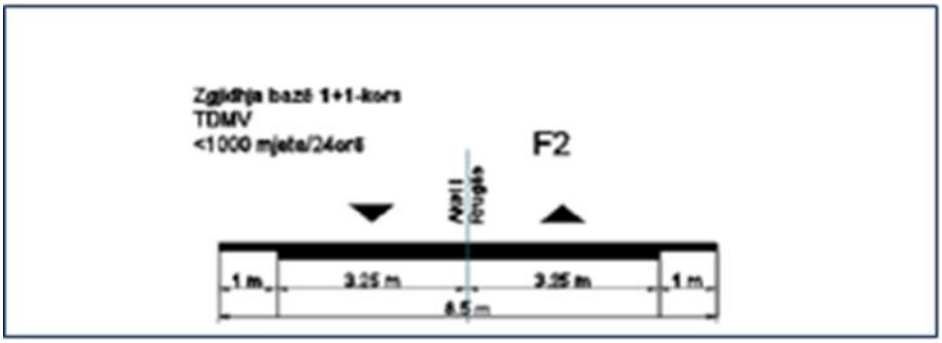
1. Main roads in which are icluded:

- Main Road_Type C3 (applicable at Road crossing with overpasses)



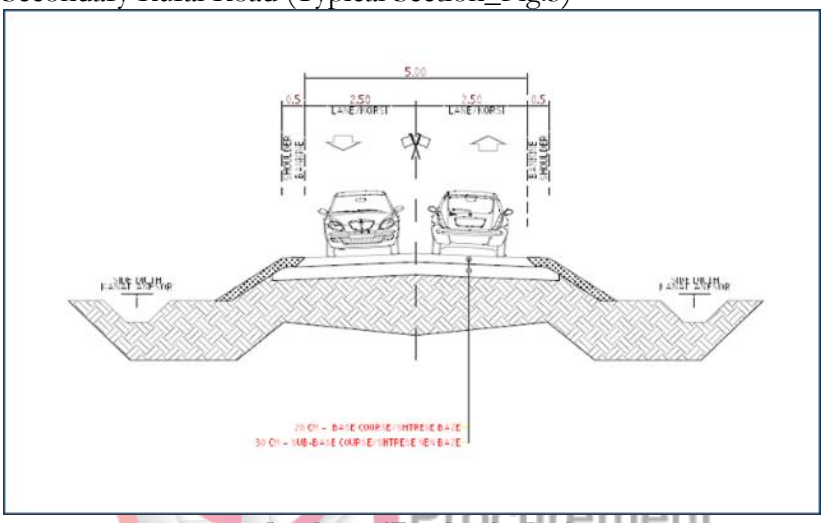
Main Road Type C3

- Secondary main road _Type F2 (applicable in the crossing of road with underpass)



Main Road, Type F2

2. Secondary Roads,in which are included:
   - Secondary Rural Road (Typical Section_Fig.3)



Cross Section of Typic Secondary Road

While the crossing of roads from one side to the other depending on the profile of the new Road is carried out with Overpasses or Underpasses. Underpasses depending on the category of roads are divided into main sub-sections with free vertical space 5m for agriculture equipment free vertical space 3.5 m for small vehicles (cars, etc.)

f- Bridges of the Project

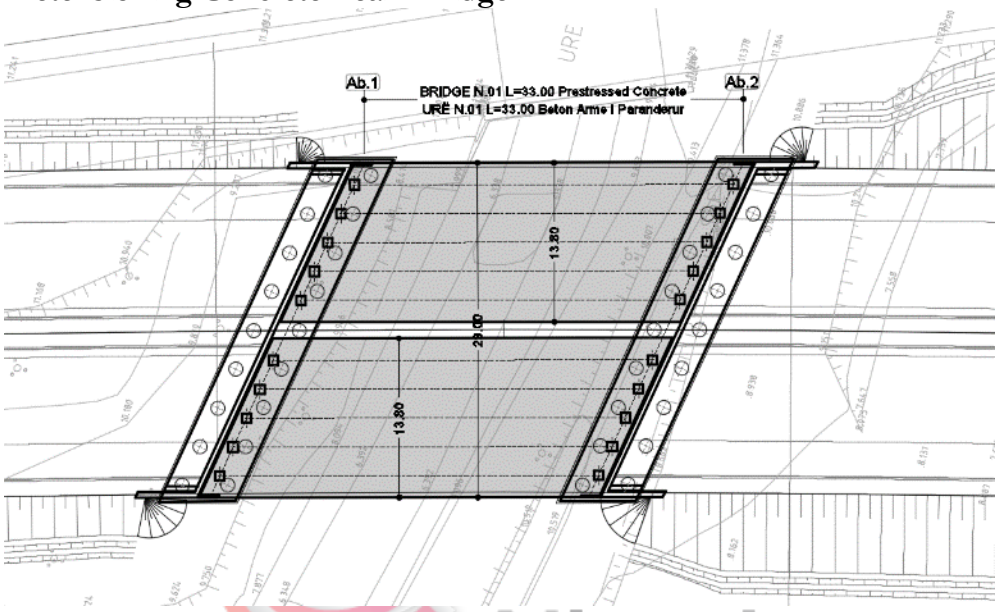
General Description.

The Thumane - Kashar road project foresees the construction of diferent bridge types:

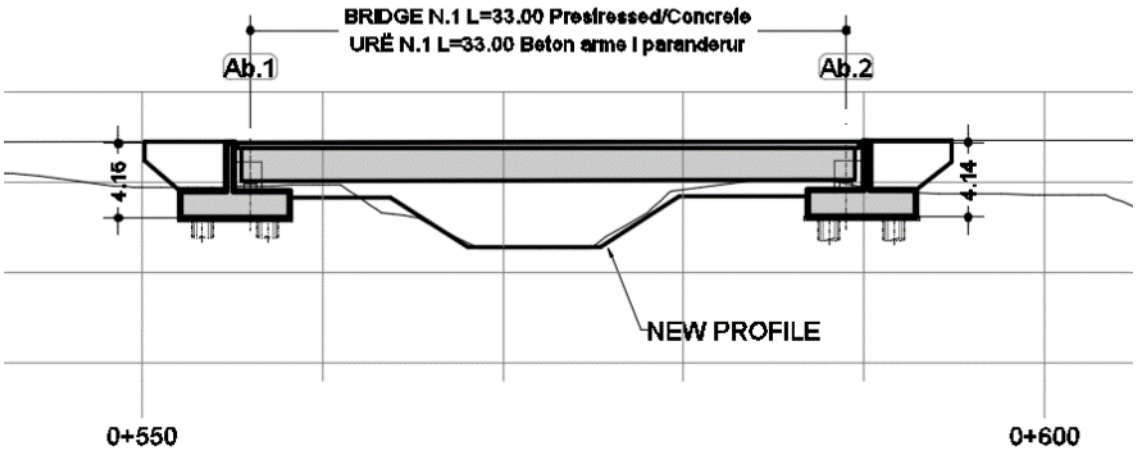
- Bridge with pretensioning concrete beam
- Ura me seksion kompozit celik / beton;
- Undepass with pretensioning concrete beam.

Scheme of the Bridge

1- Pretensioning Concrete Beam Bridge

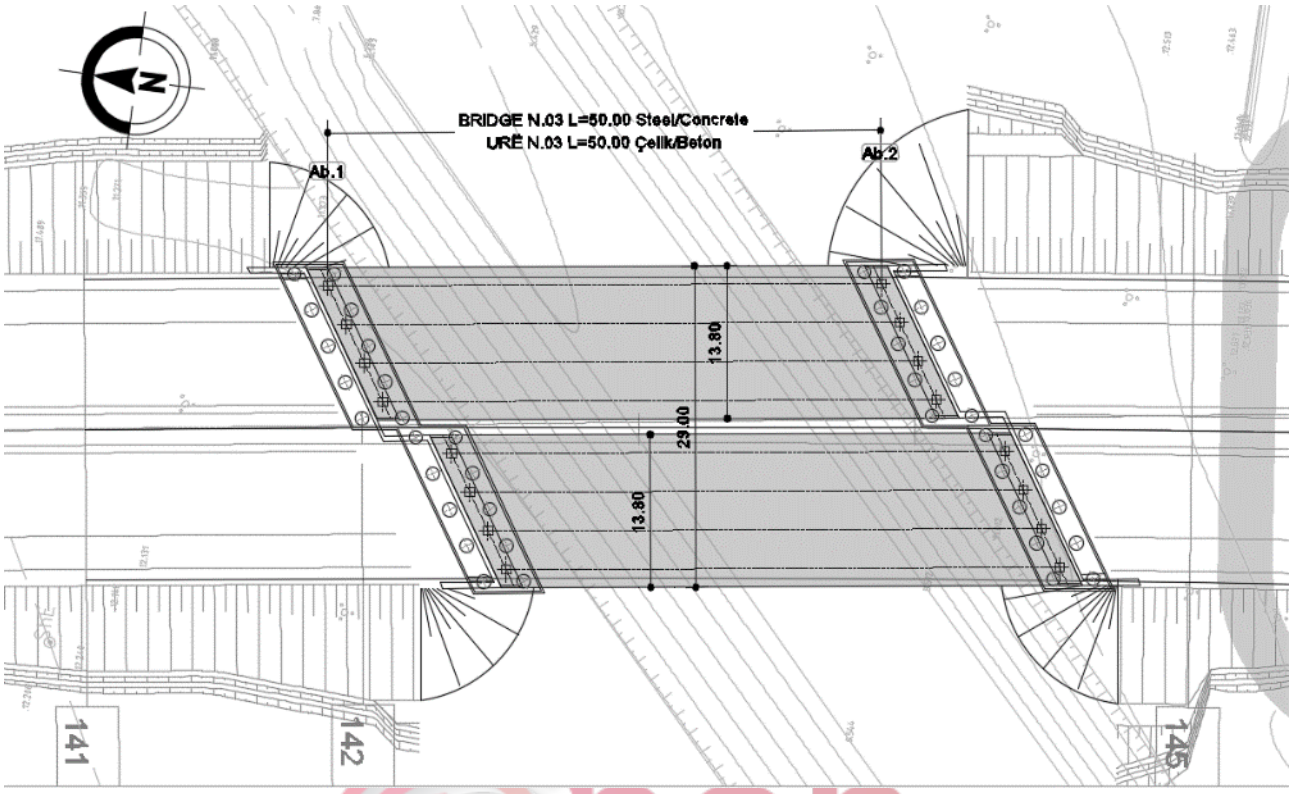


Layout of the Bridge

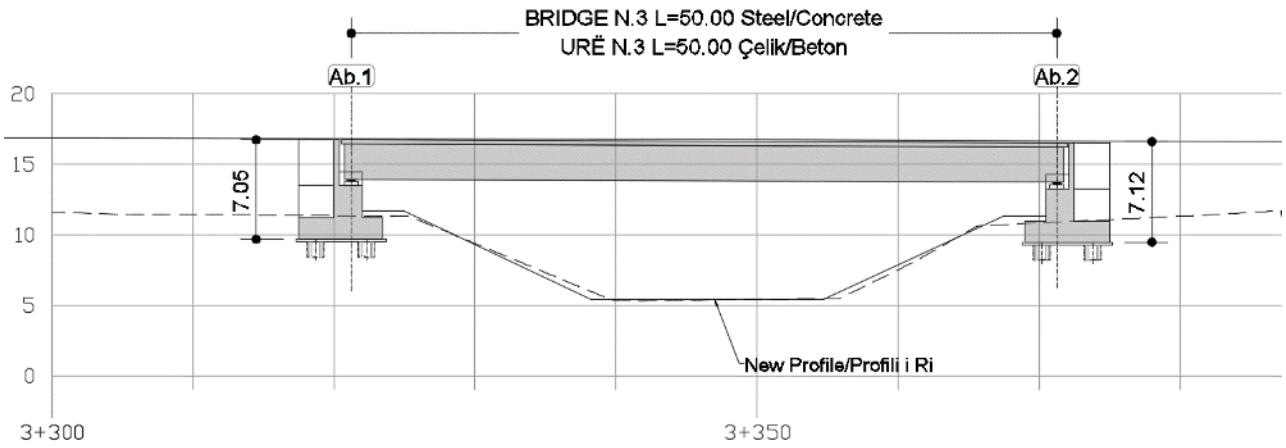


Profile of the Bridge

2- Composite Bridge (Steel and Concrete)

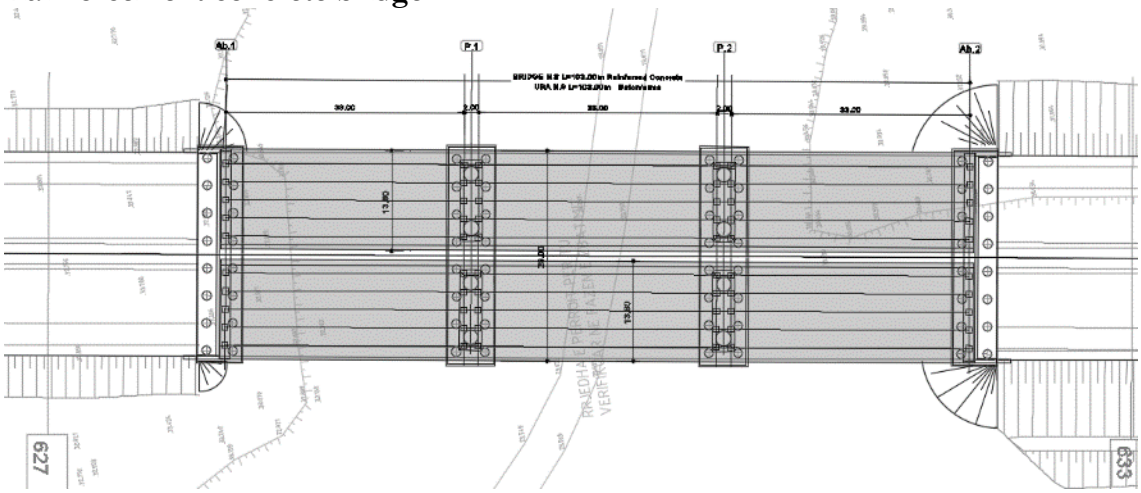


Layout of the Bridge

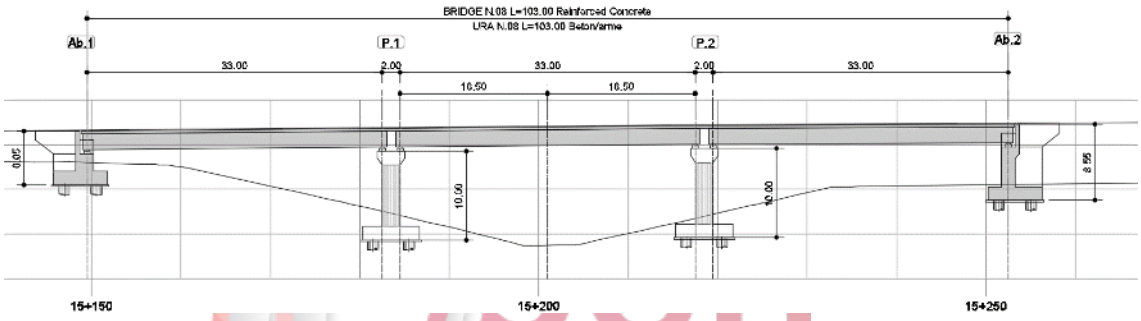


Profile of the Bridge

3- Rainforcement concrete bridge

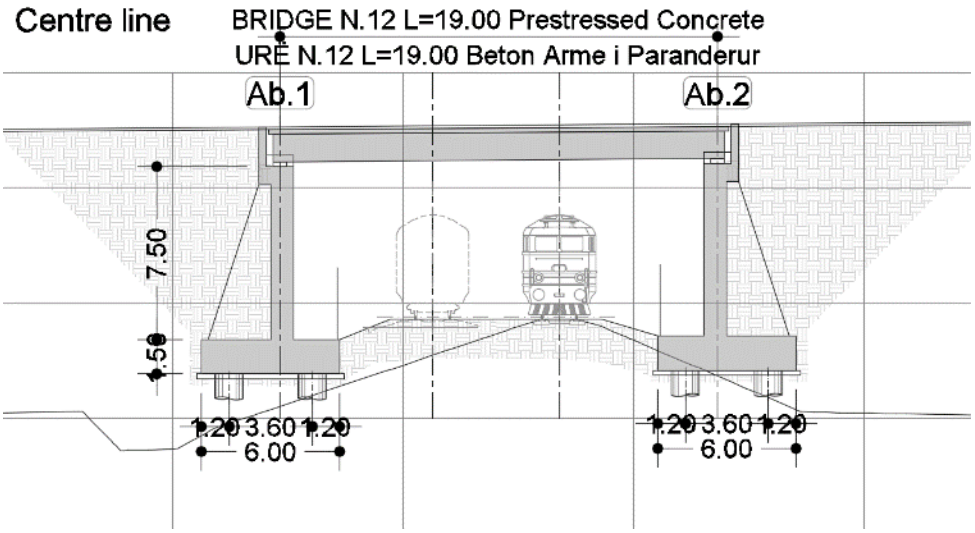


Layout of the Bridge

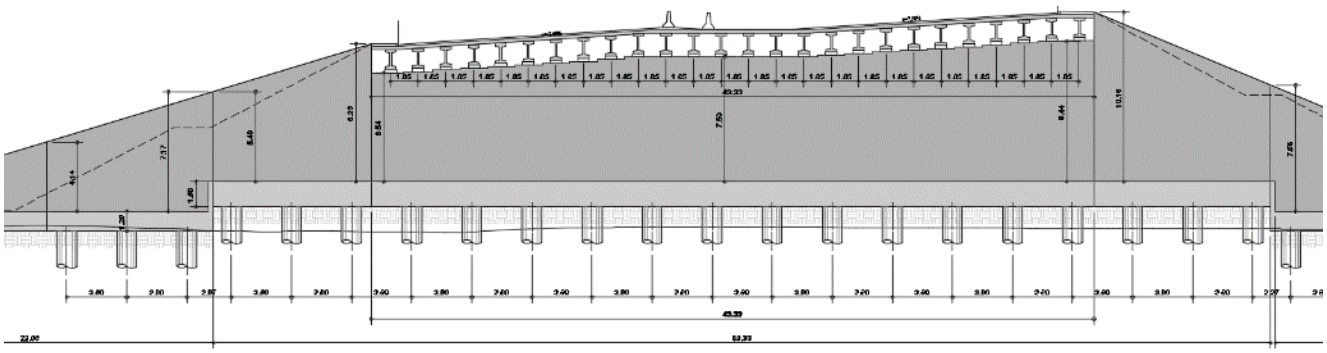


Profile of the Bridge

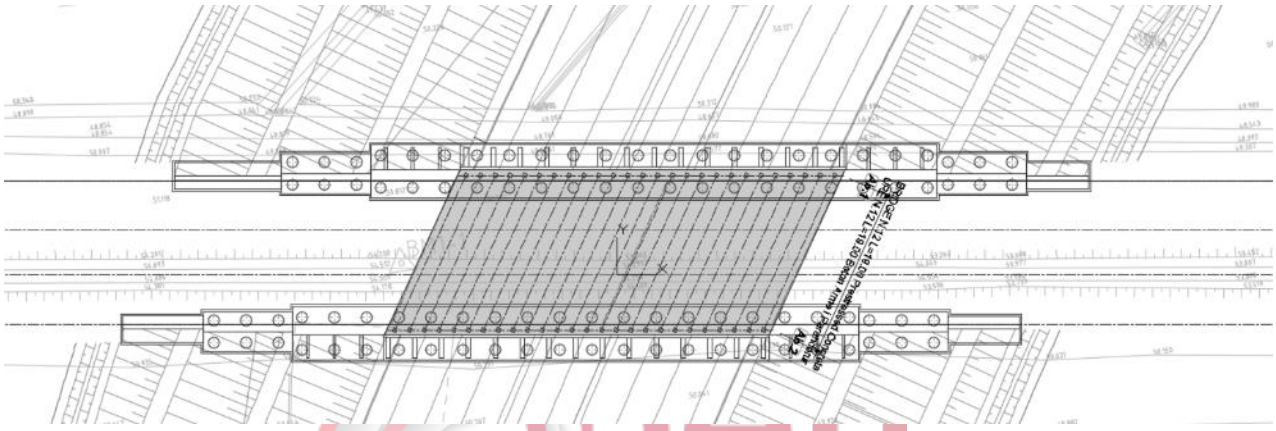
4- Underpasses with Prestressed Concrete Beam



Profile of the Bridge (Underpasses)



Typical Cross Section of the Bridge (Underpasses)



Layout of Bridge (Overpass)

g- Overpasses of Roads

The proposal for new overpassings are with composite structure (concrete and steel) . Illustrative example below:

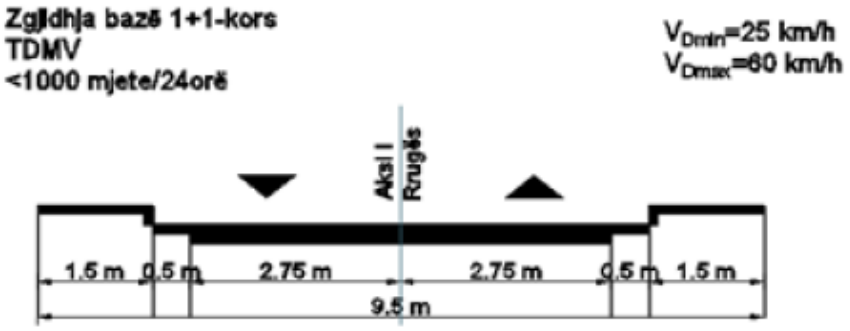
During the project, there may be four overpasses:

- Underpass_01 -Thumane;
- Underpass _02 – main Road_05;
- Undepass _03 – Main Road _06;
- Underpass _04 – Rinas Airport

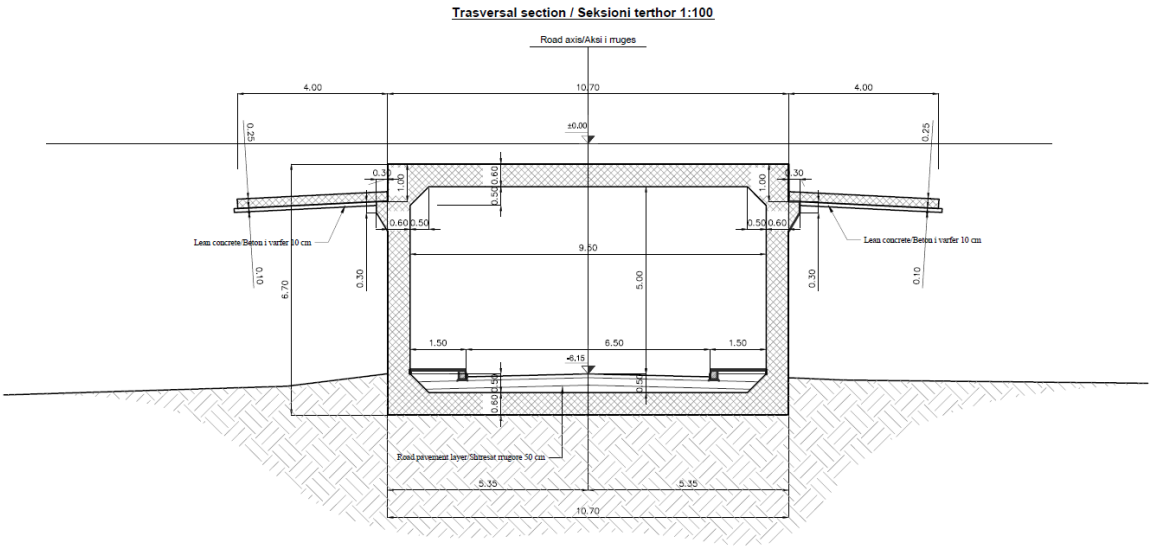
h- Underpass structures for Main roads

The construction of Thumane – Kashar road has been conceived as an artery that joins the central part of the country with the northern one. The alignment passes in hilly – field areas and in some cases near civil buildings.

In some points, the new road interrupts the main interurban roads. In some cases is envisaged the construction of underpasses, in order to not block the vehicle circulation. In those areas where the road is not wide, it is foreseen to be constructed underpasses of closed box type and where the width exceeds 10 m, it is foreseen to built bridges.



"F2" Category according to Technical Regulation for Design and Construction of Roads



Typical Cross Section of the box underpass for main road

i- Underpasses for secondary roads

The construction of Thumane – Kashar road, except the main interurban roads interrupts also some secondary roads with smaller dimensions. These roads will be equipped with underpasses according to design standards.

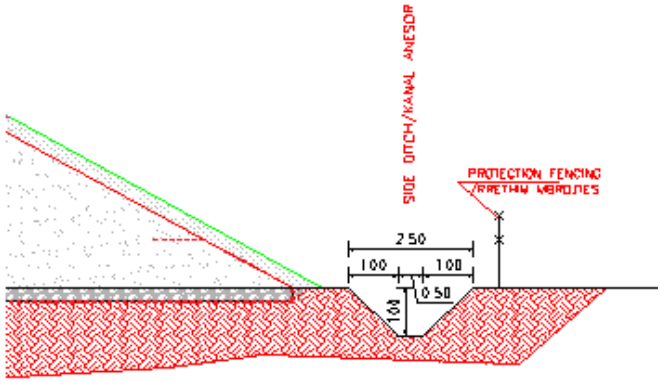
j- Water drainage system and Culverts

Water drainage system

The new channel system shall be constructed along the road, together with under passing culverts which cross the waterways from one side of the road to the other.

The open channels of the agricultural fields drainage system will be redirected to the side channels of the new roads, or will be delivered to the next side of the new roads through new culverts or the new bridges.

Below are shown the preliminary proposals for the new channels system.



Seksion Tip i Kanalit te Drenimit

The hydro structures of the project

Along the road is planned the construction of different hydraulic culverts, with the purpose of rebuilding the drainage and irrigation system affected by the construction of the new Road. They are located at the lowest point of the channels or at the discharge points drainage system. The placement of these pipes is mainly on the cross section of the road. The main function is to allow the continuity of existing drainage channels that intersect with the road axis.

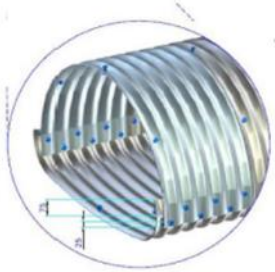
Structures of passing water under the road are:

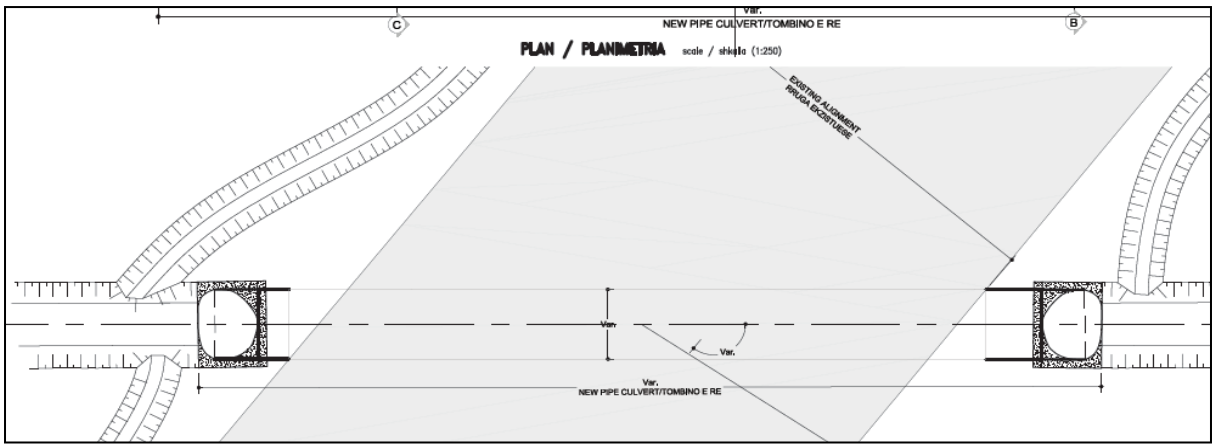
- Round corrugated metallic pipe culverts
- Arch section corrugated metallic pipe culvert
- Reinforced concrete Pipe culverts

The road from Thumana to Kashar, interrupts the water courses of the drainage channels of the agricultural area, interested by the road body. For this reason the metallic pipe culverts are foreseen to be installed in the intersecting points of the drainage channels with the road axis.

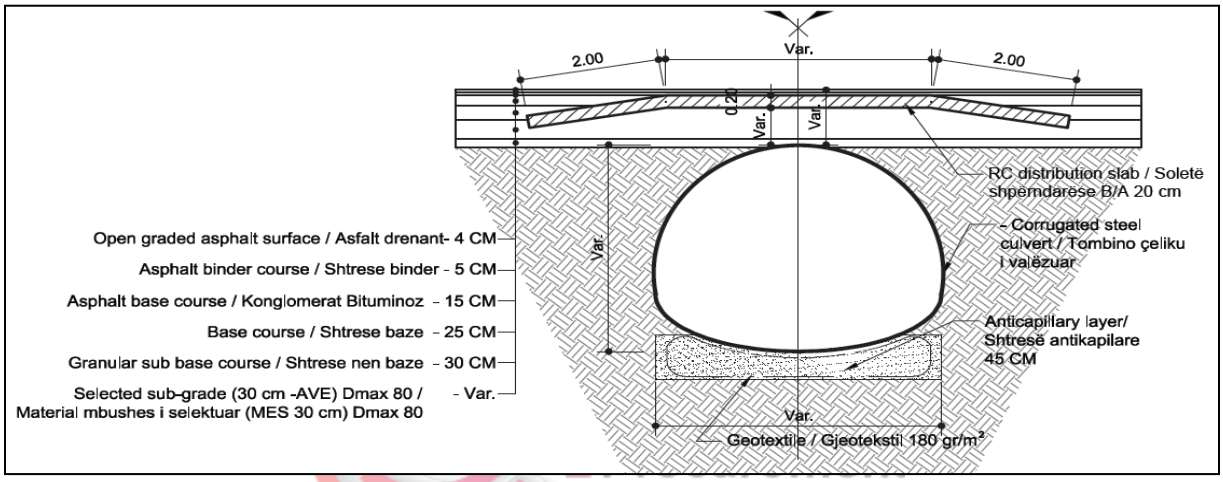
Pipe Types:

a- Round corrugated metallic pipe culverts / and Arch section corrugated metallic pipe culvert.





Plan of positioning of Round corrugated metallic pipe culverts and Arch section corrugated metallic pipe culvert



Section of positioning of Round corrugated metallic pipe culverts and Arch section corrugated metallic pipe culvert

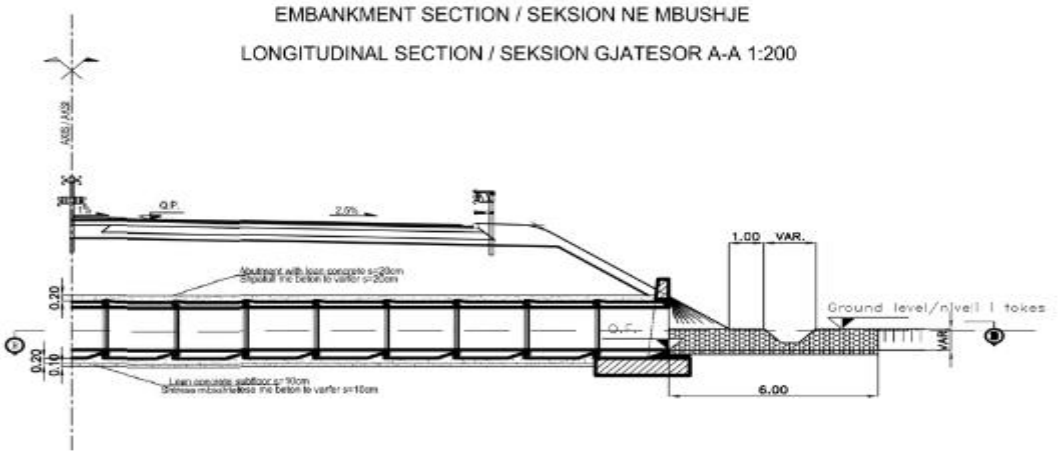
b- **Reinforced concrete Pipe culverts**

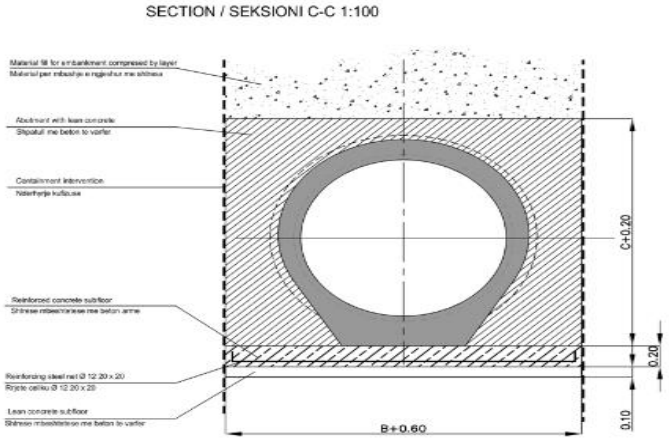
The road from Thumana to Kashar, interrupts also the water courses of the irrigation channels of the agricultural area, interested by the road body. So, the reinforced concrete culverts are foreseen to be installed in the intersecting points of the irrigation channels with the road axis.

In many places it is proposed to place double pipe culverts, due to the typology of the irrigation and drainage channels of the agricultural area (the irrigation channel of an area is positioned adjacent to the drainage channel of the neighboring area)

The dimension of this pipe are:

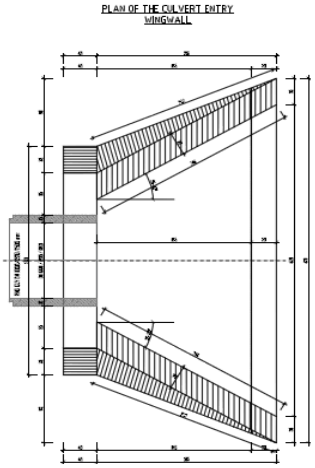
- RC pipe DN 600 mm
- RC pipe DN 1000 mm
- RC pipe DN 1500 mm

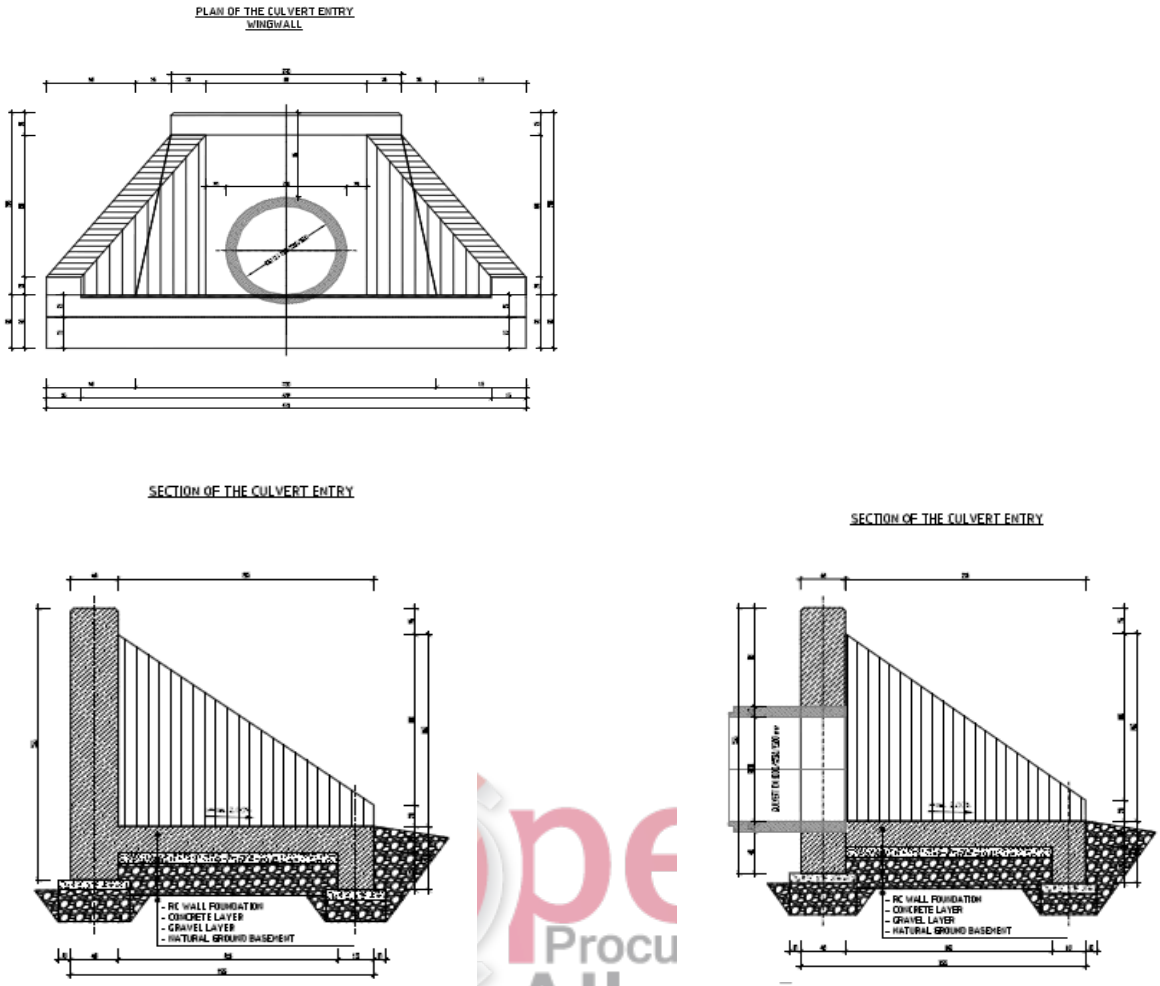




Concrete pipe culvert cross section

c- Pipe culvert wing walls and sections

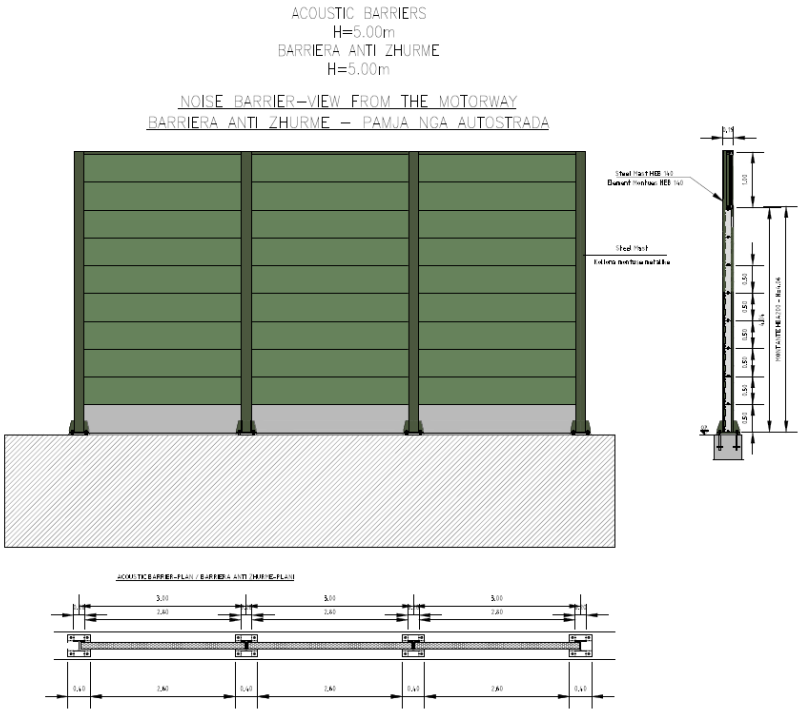




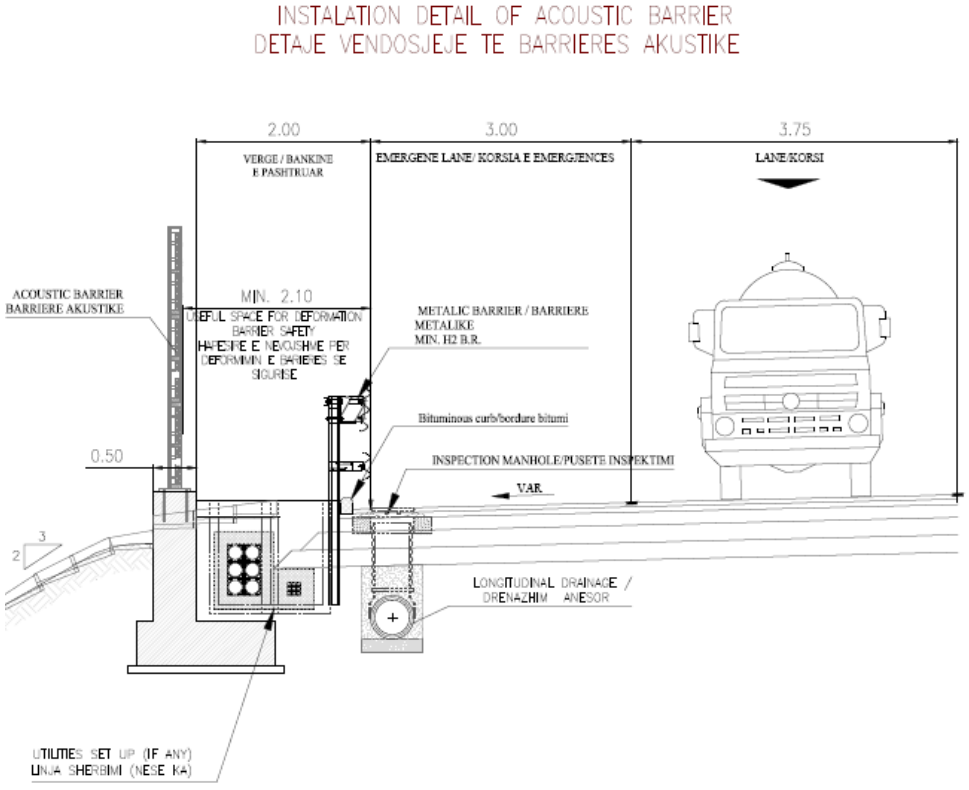
Details of Pipe culvert wing walls and sections of the entry of the pipe culvert

k- Acoustic Barriers

For the project have been foreseen acoustic. The study of the proposed locations starts form the analysis of the villages and single houses that are of interest and shall be protected from the noise originating from the vehicles' traffic.



Barriera Akustike Tip



Typical installation of Noise Barrier

l- Pavement Desiogn

The proposed pavement layers package must be calculated taking into consideration the fact that they satisfy the criteria for road saftery and the required standards.

The evaluation of the proposed pavement has been made taking into consideration the following factors:
The influx of the vehicles expected to drive, their types, and tipology, specific climactic conditions, possible materials for construction, cost balance of the object in the exploitation of circumstantial sources, actual conditions of the applied technology in country for construction and maintenance, constructive conditions of the applied layers in our country etc.

m- Safety Barriers

The safety barrier is an important element whose main function is to prevent penetration and to safely orientate a vehicle off the road side or to prevent the greater risk of falling off the road. Security barriers and other restrictive equipment are primarily designed to provide road users as well as potential roadside passers, acceptable road safety conditions, providing, within certain limits, vehicle control that can try to get out of the road.

Type of safety devices

Barrierat anesore te rruges - are used to protect traffic from roadside obstacles or hazards, such as slopes steep enough to cause rollover crashes, fixed objects like bridge piers, and bodies of water
Median barriers - are used to prevent vehicles from crossing over a median and striking an oncoming vehicle in a head-on crash.
Bridge barrier - is designed to restrain vehicles from crashing off the side of a bridge and falling onto the roadway, river or railroad below.

R**oad safety devices**
The protections will concern at least:

- The edges of all the constructions such as bridges, viaducts, bridges, overpasses and roadway retaining walls, regardless of their longitudinal extent and the height from the ground level.
- The median ;
- The road side margin in sections, where the difference between the shoulder and the ground level is ≥ 1 m. The protection is required for all slopes with slope greater than or equal to 2/3. In cases where the slope is less than 2/3, the need for protection depends on the combination of the slope and height of the slope, taking into account the situations of potential hazard to the valley (presence of buildings, roads, railways, hazardous material or similar deposits...)

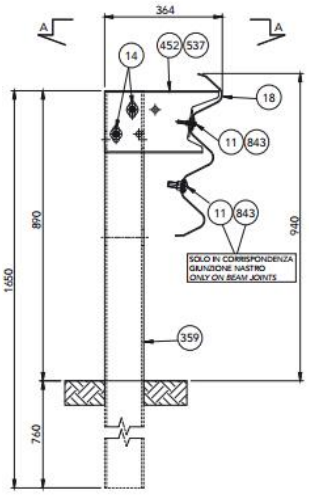
There follows a summary of the characteristics of the restraint devices to be expected for different destinations: central reservation, side edges of the structures:

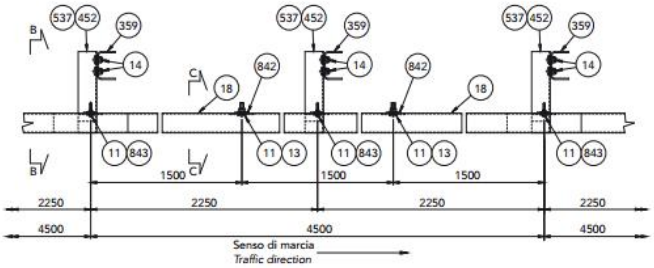
- The type of barriers to be provided for the side edge is that of a triple beam metal barriers, favouring a link between different types of barriers. The devices will have to have a severity level of class A.
- The bridge and the median barriers will be preferably characterized by the class of severity A.

With reference to the category of infrastructure in the project, the type and class of barriers prescribed for the different destinations, median, roadside and in correspondence of the structures are the following:

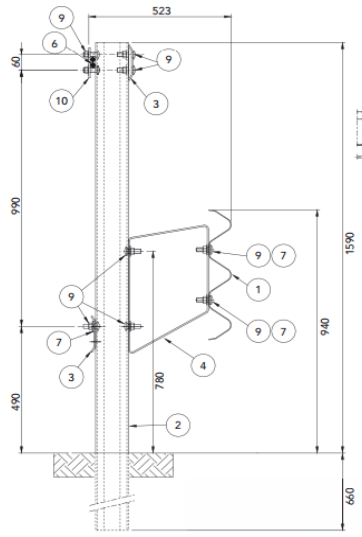
- For the median barriers to be installed in the road, a new jersey type H2 grade concrete may be used or metal guardrail of high safety levels.
- The wall barrier is placed on the side in the direction of the possible impact of the vehicle with a special order with three different slope. For the side sections of the road, H2 and H3 class H2 fixed-walled metal barrier may be installed.
- For structures such as bridges, viaducts, underpasses with span greater than 10 m: triple beam metal barriers H3-H4-class deck.
- For structures with span not exceeding 10 m: triple beam metal bridges type barriers of H2-H3 class.

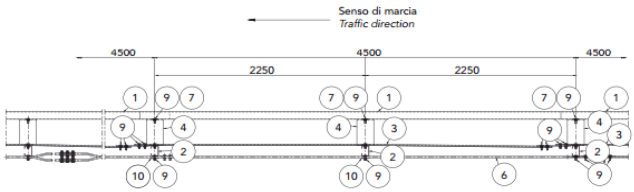
Barrier Type H2



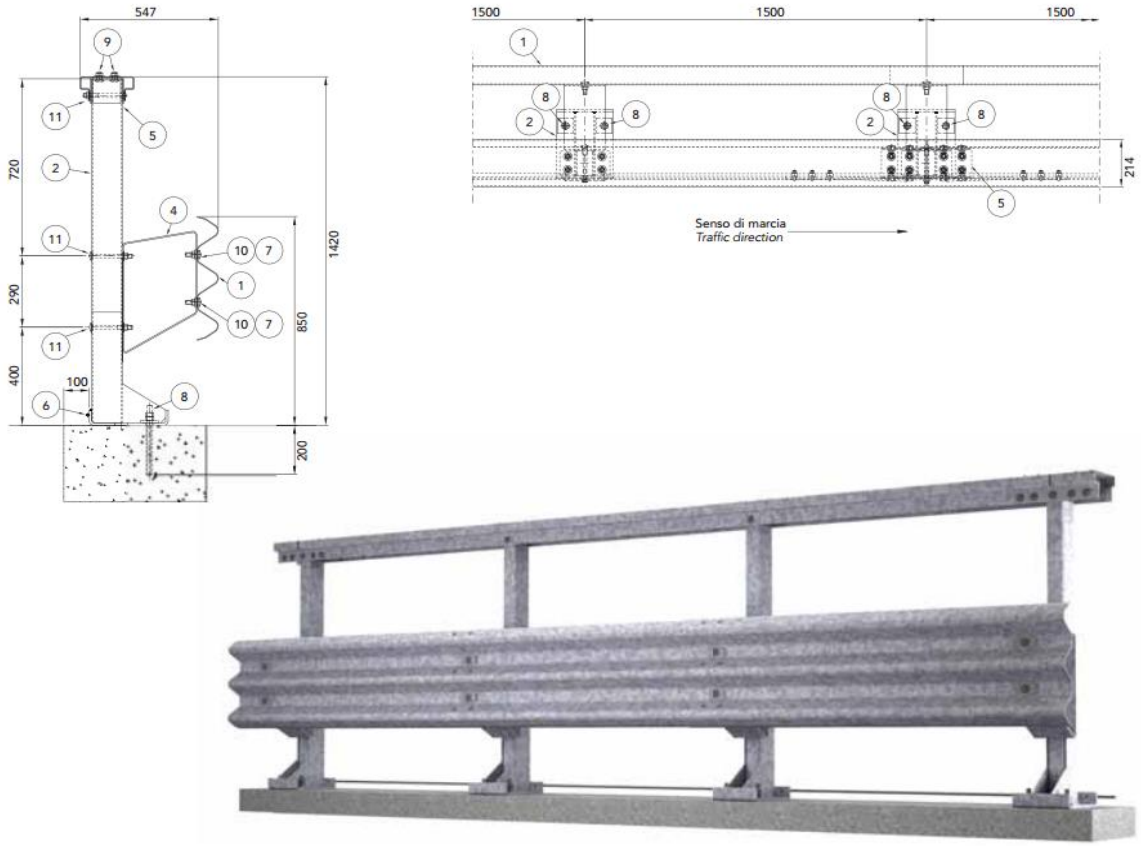


Barrier Type H3





Barrier Type H4



n- <u>Retaining Walls</u>

Along the alignment retaining walls will be provided in order to reduce the impacts in houses or electric towers relocation.

One main type of wall will be used along the road: Reinforced earth wall. Reinforced earth is soil-constructed with artificial reinforcing. The reinforcing elements used can vary but include steel and geo-synthetics. The wall face is made of precast, segmental blocks that can tolerate some differential movement. Reinforced walls utilize horizontal layers typically of geogrids. In our design there is an extensive use of this type of walls especially because they better fit with the landscape and esthetical requirements for a road in the middle of a very agricultural area.

Construction Methodology

The present Construction methodology is aimed at granting that the eligible Work's Contractor will produce the Thumane - Vore - Kashar Road works in accordance with the best engineering practice standards, controlled time and within budget limits. Appropriate evaluations must be secured regarding:

- Type and sequence of activities to perform along the entire extension of the Road;

- Spot traffic diversion management system in accordance with the necessities of the minor and mayor viability encroaching the Road alignment;
- High Voltage electric lines realignment;
- Geotechnical problems;
- Environmental issues created by the works execution;
- Site yard location, dimension and composition, including internal arrangements;
- Availability within the region of Quarries, Crusher plants, Concrete and Asphalt mix production plants, including number, location, production capacity, viability and distance from the Sites.
- Public awareness of the possible inconvenience deriving by the works execution.

All the suggested guidelines are subject to the National Standards and Codes applicable for the public works Design and execution within the Albanian territory.
The National Labor Law will apply to all the matters related with the manpower involved for the Works realization.
The proposed Works program is based on 5 working days per week and 8 working hours per day.
It is assumed that the process of properties expropriation and obstructions removal will be completed in advance of the Works starting date.
It is also assumed that the High Voltage lines realignment and metallic towers relocation will be completed in advance of the Works starting date.
It is also assumed a strict cooperation of the Local Authorities to grow up citizens understanding/acceptance of the unavoidable inconvenience during construction time and the Traffic Police assistance in easing the unavoidable constrain to the traffic.

a- Project description

a) Sh1 From Kamez to Thumane

Estimated total traffic south of Thumane: 12.500 vehicles/day approx.;
of which 87% light vehicles and 13% heavy vehicles
Estimated total traffic north of Thumane: 22.600 vehicles/day approx.;
of which 89% light vehicles and 11% heavy vehicles.

b) **Sh52 From Vore to Fushe Kruje**
Estimated total traffic: 7.600 vehicles/day approx.;
of which 80% light vehicles and 20% heavy vehicles.

c) Sh60 Fron Tirana-Durres Road to Rinas Airport
Estimated total traffic 12.100 vehicles/day approx.
of which 97% light vehicles and 3% heavy vehicles.

b- Expected main activities

The expected main activities to be performed during the A Road construction are summarized below:

01) Vehicles spot traffic diversion preparation, where and when required;
02) Clearing and grabbing of the Road structure area;
03) Laying of geo-textile and free drainage granular fill;
04) Excavation of parallel drainage side ditches;
05) Scarification and reconstruction, according to new standards, of about 400m of existing road, starting km 0+000;
06) Construction by compacted fill layers of selected material of the Road structure, with priority for sections exceeding 6m elevation over natural ground level;
07) Spot section erection of embankment protection by reinforced earth retaining structures;
08) Construction of underground utilities ducts;
09) Installation of underground longitudinal pipe lines;
10) Construction of Agriculture underpasses, relevant connected viability and traffic diversions;
11) Construction of Major Roads underpasses, including relevant traffic diversions;
12) Construction of railway underpass;
13) Construction of Arch Metallic Culverts
14) Construction of Pipe Culverts;
15) Construction of Bridges across rivers;
16) Construction of Interchanges ramps and relevant overpasses, including temporary traffic deviations;
17) Construction of pavement layers by laying and compacting selected material, including lay-by;
18) Laying and compaction of Asphalt Base Course, including lay-by;
19) Laying and compaction of Asphalt Binder Course, including lay-by;
20) Laying and compaction of Open Graded Asphalt surface, including lay-by;
21) New horizontal and vertical signalization;
22) Road dressing (Guard rails with reflectors, reflecting flexible posts, cat eyes, speed breakers, rumble strips, etc.);
23) Vegetation layer on verges and slopes;
24) Fencing and acoustic barriers;
25) Removal of temporary ramps and traffic temporary diversions (if any);
26) Removal of temporary structures, temporary dump areas and temporary signalization, inclusive of original situation reinstatement.

c- Traffic diversion during works execution – guiding criteria

Taking into consideration that the Road Thumane - Vore - Kashar, inclusive of the connection to Rinas Airport existing viability, will be a completely new construction and an existing alternative viability will be fully operational during construction time, the problem of traffic diversion will be strictly limited to specific spots only, basically represented by local main and minor viability crossing the Road structure.

The existing operational viability that will grant the flow of traffic supposed to be absorbed by the Road future completion will be:

1 – Sh60 – From Kashar existing interchange along Tirana-Durres Road to Rinas Airport;
2 – Sh52 – From Vore to Fushe Kruje;
3 – Sh01 – From Fushe Kruje to Thumane.

The new Road will drain also a substantial part of the traffic from/to Milot-Morina Road and from/to Shkoder to Thumane, inclusive of the traffic generated from/to the Borders with Montenegro, namely Hani Hotit and Muriqan.

The spots where traffic diversion will be mandatorily organized during the Road construction period are specified below.

a. IC 01 Overpass connecting the new Road with Sh1;
b. IC 02 Underpass crossing with Sh52, Vore-Fushe Kruje
c. IC 03 Overpass connecting the new Road with Sh60, Rinas Airport;
d. IC 04 Overpass interchange with Tirana-Durres Road.
e. Main Road Underpass local viability;
f. Main Road Overpass local viability;
g. Agriculture Underpasses.

For the Main Roads Underpasses the concrete structure will be executed along the existing alignment, creating appropriate parallel temporary diversion to grant un-interrupted traffic flow.

For the Agriculture Underpasses the concrete structure, of limited dimension (4.8m X 5.00 net), will be executed parallel to the existing viability, maintaining the traffic along the existing alignment.

Temporary diversions will be removed immediately upon completion of the design structure completion.

Similar criteria will apply for the IC Overpasses/Underpass and entry/exit ramps.

d- Traffic diversion management system

The guiding criteria for the traffic diversion realization will be as specified in the following::

1 – Complete avoidance of traffic in the immediate vicinity of the works under execution. This criteria with the aim of granting the Contractors, awarded the Works execution, the maximum of freedom in organizing the construction area of the Road portions involved;
2 – Granting a smooth flow of the existing crossing viability traffic, simplifying, as far as practicable, in and out of the single vehicles from the existing alignment;
3 – Granting an appropriate visibility, during and after construction, of vehicles proceeding from opposite direction;
4 – Minimize the use of flagmen and special signalization;
5 – Maximize the use of already existing alternative viability;
6 – Minimize the wear and tear of the existing alternative viability;
7 – Minimize the temporary expropriation of agricultural land for the diversion construction.Eshte arsyetuar gjithashtu se zgjidhjet perfundimtare per devijimin, perpara realizimit, do te negociohen me Autoritetet kompetente lokale, me bashkepunimin e Policise Rrugore dhe konform te gjithe rregullave dhe legjislacionit qe i perket sinjalistikes paralajmeruese.

e- High Voltage Electrical Lines

During the survey works performed along the Road proposed alignment it was noted the interference with sections of the existing HV electric line.

A realignment of the HV electric line shall be negotiated and agreed with the concerned Authority with the scope of preventing extended overlapping of the HV cables with the Road alignment, while removing the metallic towers falling within the Road.

f- Environmental issue

Several environmental problems will be created by the construction of the Road construction works.

The most remarkable, in order of impact dimension, are below listed:

- Source identification of selected material for an approximate total of 3 millions cubic meters of fill embankment;
- Construction of the site yard;
- Construction of traffic diversion routes;
- Quarries and borrow pits opening;
- Installation and running of crusher plants;
- Installation and running of concrete mix production plants;
- Installation and running of asphalt mix production plants;

Possible preventive/remedial measures:

The governing activity of the project, in terms of time consumption, will be the excavation, processing, transportation and laying of the selected material for the realization in compacted layers of the road embankment.

In consideration of the remarkable quantity of selected material necessary for the realization of the Road embankment fill and concrete structures, it will be advisable the recourse to several sources of materials with the aim of alleviating the environmental/aesthetic impact of borrowing from a single location.

As far as practicable the use of material from river bed pits might be taken into consideration as the use of sources that could be connected with the site through the use of railway lines.

This last solution with the aim of reducing the negative impact of the heavy vehicles traffic along the existing viability and the air pollution by an excess of exhaust emissions by the same.

Construction of traffic diversion routes

The traffic diversion to realize in connection with the Road construction could be classified by two categories, each-one subdivided into two sub-categories, namely:

Temporary diversions aimed at granting the execution of permanent structures:
– Un-asphalted in case of Agriculture Underpasses;
– Asphalted in case of interference with main viability routes already asphalted.

Both sub-categories of temporary diversions will be removed on completion of the permanent structures to be incorporated within the Road body.

Permanent diversions aimed at granting local viability connection upon Road completion.
– Un-asphalted in case of rural viability re-design;
– Asphalted in case of local viability re-design to grant villages interconnection or re-connecting interrupted continuity of asphalted local roads.

The final determination of the sub-categories of the permanent diversions shall be negotiated and agreed with the local Authorities competent for the area.

g- Maintenance of the road

After the completion of construction works, it is planned to be carried out the maintenance of the road for a period of 11 years. This activity is planned in accordance with the financial plan odescribed in the following chapters.

The main objectives of the Operation and Maintenance of the Road are:

- Permiresimi i kushteve dhe sigurise te Rruges ne te mire te perdoruesave.
- Increase the cost effectiveness for maintenance and further development of the road.

The performance of this process will be determined by the following factors:

- Maintenance of asphalt,
- Preservation of signs and barriers,
- Control of vegetation on the side of the road,
- Keeping water away from the road body,
- Maintenance of guardrails,

Road maintenance through the years

The maintenance work will consist of:

a) Monthly Inspect of the road (with all its elements) and report preparation.
b) Maintenance of road operating conditions:

- repair of road / asphalt cavities from erosion / waters,
- cleaning the road,

- filling cracks in the asphalt,
- cutting the vegetation along the road.

c) Maintenance, aimed at avoiding time damages:

- Like the drainage of water on the street
- repair the padding from displacements
- repair of RC structures

d) Works for maintaining the road safety standard:

- repair damaged defensive barriers
- Repair damaged road signs

Mobilization for maintenance

Road will be maintained continuously for 11 years.

1.2 Assessment of Social and Environmental Impact

In principle, the environmental impact assessment for a proposed project is the process of identifying its compatibility with the environmental legislation, the natural resources found in the project area, and how it will be affected during the project implementation phases. By identifying possible negative impacts of its implementation, at the design stage, the Environmental Impact Assessment of a Project aims at:

- Inform decision-makers about the environmental consequences of the proposed project;
- To propose the necessary technological improvements in order to mitigate or reduce its consequences and adapt to the carrying capacity of the host environment;
- Promote friendly and stable enviromental development

This EIA report for the Thumane-Vore-Kashar road segment "presents a summary of existing data and information on the environmental conditions where the project will be implemented, including physical, atmospheric conditions, water resources, biological resources, socio-cultural facilities and status socio-economic aspects of the area.

The detailed environmental impact assessment report includes:

- Legal framework
- Identification of environmental issues
- Description of methodology
- Description of the Project
- Analysis of the selected trace
- Description of the environment in the project area
- Identification of possible negative impacts on the environment
- Possible Social and Economic Impacts
- Environmental management plan and measures to prevent and mitigate the impact
- Environmental Monitoring Plan
- Conclusions

During the assessment of the environmental impact of the project presented for the construction of the new road Thumane - Kashar the following conclusion were achieved:

- This road axis will be a very important component of the national road network, which will connect not only a large region with tourist and economic potential, but also the northeastern part of the country and the region with the Western Southeastern of Albania. The project is in line with the national strategy for the development of remote areas, approved by VKM No. 773, dated 14.11.2007 " On the adoption of the strategy for regional development for the period 2008-2013", which includes the area of project and regional relevant plans.
- Talking about a completely new axis, the main negative impact on the environment arising from the implementation of the project is the change in the use of the land it is affecting. Surveys on the ground and secondary sources of information showed that the largest part of the road body develops on agricultural land. Despite the low botanical importance, the agricultural land habitat will lose the naturalness and the ability to support the respective ecosystem.
- Another important impact is the demolition of particular habitats and their fragmentation from the track. The new road axis interrupts several sites of the Ishem, Tirana and Terkuza rivers, creating a fragmentation of the alluvial and forests. In five points with aquatic bodies, where new

bridges are to be built, the vegetation that will be damaged is new and is represented by high forest. The main plant species are fully developed and comprise 50-75% of the surface.

- Due to fragmentation of the habitat, the disturbance will increase the possibility of using it and fauna in the impact zone (on both sides) will be reduced. The disturbances in the fauna will be long-term as well as anticipating accidents in certain species (reptiles, amphibians, mammals and birds). The above-recommended measures for the protection of fauna guarantee the avoidance of irreversible and long-lasting damage (especially the tombs of ecosystem communication) of the earth's fauna.
- The road body will intersect some watercourses. This will be accompanied by the possible addition of solid matter to these water bodies. These impacts are temporary and controllable due to contemporary construction technologies and mitigation measures for environmental impacts.
- With the construction of the road body is not expected to generate significant spoil material, as the new road is almost completely developed in the filling. The rest will be disposed in suitable locations and with criteria that guarantee the protection of the environment (as is also reported in this report).
- Encourage economic growth of the area as it creates the opportunity to use its resources and will open and develop the prospect of tourism development of this area. It will create good links to the region with the rest of the country and will also help improve the quality of life throughout the area.
- Construction activity should be monitored according to the program presented above and the data should be reported regularly to the Regional Environmental Directorates. They should also be accessible to the public and interest groups.
- Decision-making for the project must also be carried out within the legal environment and transparency framework that requires legislation to involve the public.