



**USAID** | **KOSOVO**  
NGA POPULLI AMERIKAN  
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# USAID KOSOVO PRIVATE ENTERPRISE PROGRAM (KPEP)

## DETERMINE NEEDS AND PREPARE PLAN TO IMPROVE ROAD DESIGN

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### **DISCLAIMER**

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# Determine Needs and Prepare Plan to Improve Road Design

KPEP's objective for this sector is to improve road construction design, procurement, and building capacities resulting in higher quality roads in Kosovo.

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Kosovo Private Enterprise Program (Determine Needs and Prepare Plan to Improve Road Design).  
Contract No. EEM-I-07-00007-00, TO #2

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# 1. PURPOSE OF ASSIGNMENT

The main purpose of this assignment was to develop a framework for designing, implementing, operating, and sustaining a training program for education of professional road design engineers in Kosovo and to identify the weaknesses and possible improvements of the existing procedures regarding the planning, designing, construction and maintenance of the public road infrastructure in the Republic of Kosovo.

## 2. BACKGROUND

Presently, a critical need exists in Kosovo for licensed road design engineers and site inspectors. Construction firms want to participate in an expanding, well-regulated and professionally managed road building industry; but they are hindered by unprofessional designs, irregular procurement procedures, and inadequate inspection procedures and inspectors. This is because Kosovo universities do not have road design faculties and the government road directorate has inadequate building code capabilities. There are cases where roads designed by international firms have gone un-built for lack of Kosovo ability to assess compliance of international standards. Considering these issues, a road design training expert was required to ascertain training needs and to develop a training strategy and program to meet Kosovo's road design and challenges.

### 3. EXECUTIVE SUMMARY

The massive rise in road and infrastructure funding in the Republic of Kosovo and corresponding increase in designed and actually constructed roads and motorways, presents a problem of inefficient procedures and lack of standards and specifications.

There have to be specific goals set on how to deal with these deficiencies. A proper legislation exists, but lacking appropriate by-laws, specifications and standards.

With regards to these goals my first observation is that RCAF, and in particular Mr. Eljesi Surdulli, its Executive Director, and the RCAF Board of Directors have the professional capacity and motivation to see this to completion. KPEP and its representative Mr. Valdet Osmani is also a valuable ally in this cause, providing expert assistance and guidance.

Some deficiencies exist on the governmental (ministry) level, where lack of coordination between all levels of ruling was noticed. It was really apparent on levels three and four, which are uncoordinated and not aware how their decisions influence the planning, designing, construction and maintenance processes.

Some issues with project design documentation and project supervision were also detected.

Most of these deficiencies derive from inadequate professional education and lack of experience in the field of road infrastructure. Most engineers working on road infrastructure projects in the Republic of Kosovo come from other engineering branches, such as structures and hydraulics. So it is vital that proper educational programs on university level are established for future engineers and some additional courses are held to upgrade existing engineers knowledge about traffic flow and technical elements for public roads.

As far as regulations and professional examination of road engineers goes, a professional chamber of engineers needs to be established and it should include all different profiles of engineers and architects.

An important step in gaining some experience and insight on proper procedures and workflow is to start a pilot project. Combining that with a trip of an official Kosovo delegation to Slovenia, means that the representatives of the designers, government officials and construction companies can learn from the experience their Slovenian colleagues had, when they were in a similar situation about 25 years ago, when they separated from Yugoslavia and needed to adapt the legislation to current situation.

After I held several meetings on official and unofficial government level, I noticed that the MTPT and RCAF officials are aware of deficiencies that exist in their procedures regarding road planning, design, construction and maintenance. From our meetings, I could realize that they are eager to improve these procedures and the road design process in general. The current design process is not in sync with the legislation, basically because there are by-laws missing, or those are not precisely specified. There are several stages missing in the design process, such as:

- Traffic study
- Geodesy (cross section recordings)
- Geomechanics (a detailed program and preliminary research)
- Communal infrastructure (newly build, or reconstructions)
- Separate designs for different roads (main road, local road, etc.)
- Water stream regulations v hydraulic calculations

- Pavement structure design
- Waste water protection design
- Noise protection design
- Landscape design
- Actual construction plan with transport routes layout and material deposits
- Traffic regime during construction
- Cadastral study
- Laying out design
- Coordination and project management
- Consultation and revision

All of the above tasks should be included in the design process.

All of the stages listed above (traffic study, geodesy, etc.) should be included in the design process. For each one, a paper (design or study) should be included in the overall project design for the road. At present, Kosovo road design projects are missing one or more of these stages. Because they are not defined in any by-law or specification, the designers avoid them, resulting in poor quality road design projects. It is mandatory that these stages are precisely defined for each phase of the design process (such as preliminary design, main design, detailed design, etc.) in a by-law or technical specification.

These stages (or tasks) vary from design phase to design phase, meaning one of them is needed for Preliminary design, the other for detailed design, etc.

Linking these tasks to the design phases goes beyond this report.

## 4. FIELD ACTIVITIES TO ACHIEVE PURPOSES

In order to achieve the purpose of improving the road design process in the Republic of Kosovo, several activities should be carried out. These activities are organized in 4 phases.

### ***Phase 1: Basic review of existing legislation, standards and technical specifications***

This phase is very important, since the missing by-laws, standards and technical specifications should be compatible with the existing legislation (both Kosovo and EU). Where needed and possible, the existing legislation should be adapted to EU legislation. The review of the existing legislation should be carried out by the consultant who will later on be responsible for drafting the missing directives, standards, etc. The Kosovo government should work closely with the consultant, to ensure that the new documentation is best suited for the local environment.

The timeline and the costs were evaluated on basis of similar projects in the region.

<b>Approximate duration:</b>	<b>6 months</b>
<b>Approximate costs:</b>	<b>€750.000,00</b>

After the analysis of the existing legislation is finished a proposal of improvement and completion will be made for laws, by-laws, standards, technical specs, etc.

Based on the results of this analysis, the consultant will either draft the missing documents within this timeline and costs, or make a new proposal depending on the current state of the documentation.

### ***Phase 2: Preparation of basic education program***

In this phase, both formal (University) and professional (Chamber of Engineers) educational programs should be prepared.

University program should involve subjects and lectures to ensure proper education and formal certification (B.Sc. of civil engineering, specialized in road design) for future Road design engineers. A specialization program should be prepared that includes at least the subjects (lectures) listed on page 9 of this report.

This part should be carried out by the University staff, government (Ministry for education), Chamber of engineers and foreign consultants (for example visiting professors from EU).

The formal education program could be carried out by private universities, if the proper legal conditions are met (possibility of private Universities in Kosovo).

Professional educational and certification program should provide proper control and regulation of who is able to provide responsible road design, review, supervision and construction services.

This part should be carried out by the government (MTPT, RCAF, etc.), Chamber of Engineers and foreign consultants (for example engineers from Slovenian Chamber of Engineers).

**Approximate duration:** 9 months  
**Approximate costs:** €1.450.000,00

<b>Private sector</b>	<b>Public sector</b>
constructors designers	government local government
-traffic engineering	-traffic engineering and planning
-spatial planning	-economic traffic assessment
-environmental protection	-spatial planning and development
-cultural heritage protection	-environmental protection
-basics of road design	-cultural heritage protection
-basics of geodesy (surveying)	-preliminary phases of design documentation
-basics of geo-mechanics	-basics of road design
-bill of quantities and designer's cost estimation	-preparation of SOW
-basics of structure design	-tendering
	-bill of quantities and designer's cost estimation

### **Phase 3: Execution of the Pilot project**

Because the road design as an engineering science is largely based on experience and practical knowledge, and because Kosovo needs capable road engineers now, not in 4 to 10 years after proper university programs are established and after first generations of students graduate (and even they need multiple years of practice before they will be able to work independently), the execution of the pilot project is essential from my point of view.

This kind of project promotes "learning by doing" approach, which provides Kosovo engineers with a high level of experience and knowledge transfer from foreign engineers/consultants that would work on this project.

This ensures that the knowledge gained from such a project is not only theoretical, but mostly practical. Engineers can start to work independently.

The timeline and the costs were evaluated on basis of elemental road design projects of that scale that can still include all of the necessary road design phases. **You must keep in mind, that the final result of this pilot project is a competent and professionally done road design for the selected road section and a whole lot of educated local engineers, government officials, etc.**

Because this is supposed to be a real road project, government funding is expected for the most part.

This phase should be carried out by Kosovo road design engineers, Slovenian engineers/consultants, government (MTPT, etc.) and USAID.

**Approximate duration:** 36 months  
**Approximate costs:** €6.450.000,00

<b>Private sector</b>	<b>Public sector</b>
constructors designers	government local government
- licensing for designers, engineers and reviewers	- licensing for supervision and reviewers
-insurance for designer's and constructor's liability	-preparation of all phases of design documentation
-timetable and plan for the execution of the project	-control and confirmation of the design documentation
-preparation of the study of variants	-issuing of the site permit
-preparation of the preliminary project design	-issuing of the building permit
-preparation of the main project design	-technical inspection
-preparation of the detailed project design	-issuing of the use permit
-preparation of the completed works	-construction supervision
-project design and maintenance instructions	-external control
-preliminary geodesy survey	-program for the financing of the pilot project
-preliminary geo-mechanic survey	
-internal control	

#### **Phase 4: Taking over the finished Pilot project – management and maintenance**

After the pilot project is finished and the road constructed, it has to be turned over to the investor (in this case government) for management and maintenance.

The timeline and the costs were evaluated on basis of elemental road design projects.

Because this is supposed to be a real road project, government funding is expected for the most part.

This phase should be carried out by Kosovo road design engineers, Slovenian engineers/consultants, government (MTPT, etc.) and USAID.

**Approximate duration: 6 months**  
**Approximate costs: €250.000,00**

<b>Private sector</b>	<b>Public sector</b>
constructors designers	government local government
- demarcation of management and maintenance	- maintenance program and plan
-maintaining	- program and plan of maintenance financing

For the KPEP activities for the upcoming year, please see ANNEX 3, where KPEP is listed among stakeholders involved in separate phases.

## ROAD DESIGN UNIVERSITY EDUCATION

To ensure properly educated and qualified road design engineers in the future, additional subjects or courses at the University should be organized and added to the existing civil engineering curriculum.

The subjects (courses) listed and described in this chapter are meant as an addition to the existing civil engineering curriculums, to educate future road design engineers.

At present, there is no proper road design study program in Kosovo. As I mention many times before in this report, road design in Kosovo is in the hands of civil engineers that come from other civil engineering branches, such as structures or hydraulics. The university does not offer any road design specialization courses or programs.

The following subjects are the minimum of what should be added to the civil engineering curriculum.

In the beginning, guest lecturers from abroad could undertake these lectures, with local lecturers assistance. Local lecturers should take over these courses (subjects) after this period is over.

Since this is an engineering education, the most important tool is experience. Therefore it is hard to devise a timetable for this kind of project.

I recommend a one year test period, where experienced and qualified lecturers from abroad (EU), should initiate this courses and assess their local colleagues who will be responsible for this program in the future.

### ***Minimum set of university courses (subjects) for road design specialists:***

- ◆ TRANSPORT INFRASTRUCTURE MANAGEMENT
- ◆ ROAD INTERSECTIONS AND ACCESS POINTS
- ◆ CONSTRUCTION AND MAINTENANCE OF THE TRAFFIC FACILITIES
- ◆ TRAFFIC AREAS IN URBAN ENVIRONMENT
- ◆ PAVEMENT STRUCTURES
- ◆ TRANSPORTATION PLANNING
- ◆ TRANSPORTATION ROUTES DESIGN
- ◆ TRAFFIC TECHNOLOGY

***Subject title: TRANSPORT INFRASTRUCTURE MANAGEMENT***

***Contents (Syllabus outline):***

- Transportation infrastructure management purpose, importance and tasks
- Transportation system management, transportation infrastructure management
- Basis of planning, construction, maintenance and other transportation infrastructure management activities
- Transportation infrastructure development strategy, national long-term development programmes, transportation infrastructure management programmes
- Transportation infrastructure management investment programmes
- Transportation infrastructure condition determination for maintenance and reconstruction
- Prioritization methods
- Transportation infrastructure maintenance planning
- Transportation infrastructure maintenance and reconstruction projects

***Objectives:***

Understanding of transport infrastructure management meaning and importance for assuring the operation and development of transport and economic system and structure. Knowledge of methods for transport infrastructure condition determination and transport infrastructure management measures or activities. Understanding of connection and independence between management, administration, planning, construction and maintenance of transportation infrastructure.

***Intended learning outcomes:***

Knowledge and Understanding:  
Students absorb in the objectives defined contents.  
Knowledge practical application on concrete examples of transport infrastructure management.

***Material conditions for subject realization***

Properly computing equipped lecture room

***Target Group:***

Students of civil engineering, specializing in road design

***Duration:***

Lectures 30 hours, Tutorial 15 hours, Individual work 75 hours

***Who can provide these training courses:***

Habilitated University Professor (at first visiting Professor, later on local Professor)

***Subject title: ROAD INTERSECTIONS AND ACCESS POINTS***

***Contents (Syllabus outline):***

- types of intersections, access points
- preliminary design of intersections, access points
- criterion for intersection design
- conditions and boundary elements for intersection design
- controlling and regulating traffic flows in the intersections
- project design of intersections and access points
- traffic signalization and traffic equipment in intersections
- landscape design of the intersections
- interchanges and access points
- crossings with other infrastructure objects

***Objectives:***

- recognition of the basic elements and principles of the intersections on road network
- acquaintance with basic elements of intersection design
- to get knowledge for understanding methods and procedures in intersection design process
- to get knowledge for cooperating in intersection project execution (design, construction)

***Intended learning outcomes:***

- to understand intersections as a basic element of the road network
- to get skills which are necessary for cooperating in intersection project execution

***Material conditions for subject realization***

Properly computing equipped lecture room

***Target Group:***

Students of civil engineering, specializing in road design

***Duration:***

Lectures 25 hours, Tutorial 10 hours, Individual work 70 hours

***Who can provide these training courses:***

Habilitated University Professor (at first visiting Professor, later on local Professor)

**Subject title: CONSTRUCTION AND MAINTENANCE OF THE TRAFFIC FACILITIES**

***Contents (Syllabus outline):***

The General Principles of Road Construction Design and technical notes. Road construction materials. Geo-mechanical basis. Traffic loadings. Experimental results and acquired experiences at design and exploitation of pavement structures TRRL (England), AASHO (ZDA). Design of flexible and concrete pavement structures. Construction of the pavement structures. Properties of the pavement surface. Technologies of the road construction works. Review of the legislation, economy and road management, assessment of the road network condition and planning and implementation of the road maintenance. Reconstruction of the roads and road structures and their maintenance.

Regular maintenance of roads and road structures. Characteristics and elements of the regular yearly road network maintenance. Damages of the asphalt roads, types of damages, reasons for the formation and repair of damages.

***Objectives:***

Basis knowledge of the of road construction, road construction materials; geotechnical and traffic viewpoint for design of flexible driving structures.

Knowledge of the investigation results and acquired experiences.

Knowledge of the system and methods of the road infrastructure maintenance, definition of technical factors, technology and organization of the road maintenance in a sense of law regulations from the field of road infrastructure maintenance activity in Republic of Kosovo.

***Intended learning outcomes:***

Knowledge and Understanding:

Students absorb in the objectives defined contents.

***Material conditions for subject realization***

Properly computing equipped lecture room

***Target Group:***

Students of civil engineering, specializing in road design

***Duration:***

Lectures 30 hours, Tutorial 30 hours, Individual work 90 hours

***Who can provide these training courses:***

Habilitated University Professor (at first visiting Professor, later on local Professor)

***Subject title: TRAFFIC AREAS IN URBAN ENVIRONMENT***

***Contents (Syllabus outline):***

- basic knowledge about traffic in the city / urban traffic from traffic infrastructure point of view
- systematic classification traffic areas in urban surroundings
- structure classification of the traffic areas in the city
- capacity and safety interdependence from intersections layout in road network
- basic characteristics different types of traffic – vehicles, cyclists, pedestrians, public transport from traffic infrastructure point of view
- parking, parking management
- traffic calming
- design of traffic areas in urban environments
- landscape planning of traffic areas in urban environments
- traffic signs and signals
- calculating traffic signals, traffic equipment of traffic signals
- basic characteristics of the lightening

***Objectives:***

- recognition the basic elements and principles of the traffic areas in urban environments
- acquaintance with basic elements for design of traffic areas in the cities
- to get knowledge for understanding methods and procedures about planning, design and construction of traffic areas in the urban environments
- to get knowledge for cooperating in project execution (design, construction) of traffic areas in the cities

***Intended learning outcomes:***

- to understand specialty of traffic areas management in urban environments
- to get skills which are necessary for cooperating in project (design, construction) of traffic areas in the urban environments

***Material conditions for subject realization***

Properly computing equipped lecture room

***Target Group:***

Students of civil engineering, specializing in road design

***Duration:***

Lectures 30 hours, Tutorial 10 hours, Individual work 120 hours

***Who can provide these training courses:***

Habilitated University Professor (at first visiting Professor, later on local Professor)

***Subject title: PAVEMENT STRUCTURES***

***Contents (Syllabus outline):***

- pavement structures design
- theoretical procedures for pavement structures design
- empirical procedures for pavement structures design
- standard procedures for pavement structures design
- dimension of pavement structures
- methods for dimensioning of pavement structures
- constructing of pavement structures
- dimensioning of pavement structures on traffic infrastructures objects

***Objectives:***

- recognition the basic elements and principles about pavement structures
- acquaintance with different procedures for pavement structures design
- to get knowledge about key parameters for pavement structures dimensioning
- to qualify students for autonomous pavement structures design

***Intended learning outcomes:***

- to understand field of pavement structures
- to understand and to command pavement structures design and dimensioning
- to understand special demands and procedures in pavement structures design, constructions and maintenance

***Material conditions for subject realization***

Properly computing equipped lecture room

***Target Group:***

Students of civil engineering, specializing in road design

***Duration:***

Lectures 25 hours, Tutorial 20 hours, Individual work 75 hours

***Who can provide these training courses:***

Habilitated University Professor (at first visiting Professor, later on local Professor)

***Subject title: TRANSPORTATION PLANNING***

***Contents (Syllabus outline):***

1. Elements of transportation planning (living functions, land use, sectoral and integral approach, transportation policy).
2. Transportation planning process (formal and informative elements and criteria, involved bodies and institutions, analysis of interests, pre-study, defining a system of planning goals, indicators and quantifying of indicators, system limits – time, space, content).
3. Development of measures. Groups of transportation planning measures: land use planning, traffic-organizational measures, logistical, technical and technological measures, regulatory and fiscal measures, pricing, behavioral (soft), infrastructural measures. Scenarios. Grouping the measures of a scenario in variants.
4. Assessment of results of planned measures. Prognosis - methods: trend, model and quasi-prognosis. Evaluation of results: multi-criteria, monetarisation and cost-benefit, weighted indicators.
5. Transportation analysis – assessment of the data: counting, road-side interview, household interview.
6. Cordon and corridor analysis, tracking methods.
7. Trip generation, production and attraction, purposes of travel. Methods of assessment (cross classification).
8. Trip distribution. Gravitational and other approaches.
9. Origin-destination matrix.
10. Assessment of modal split and load factor.
11. Route choice and network assignment methods. Wardrobe equilibrium, incremental methods.
12. Transportation statistics (terminology, sources).
13. Use of transportation planning tools (Polydrom)

***Objectives:***

- To understand the approaches and process of transportation planning.
- To understand the role of planner, authorities and involved bodies in the process.
- To understand the methods and techniques of transportation planning (assessment, travel behavior, models, evaluations etc.).

***Intended learning outcomes:***

- To understand the approaches and process of transportation planning.
- To develop a hierarchical system of planning goals with indicators.
- To understand the list of possible measures and to assess and evaluate the expected results (to develop prognosis).
- To understand the generation and distribution of travel demand and how to develop sustainable transport supply.

***Material conditions for subject realization***

Properly computing equipped lecture room and software licenses for Transportation planning software.

***Target Group:***

Students of civil engineering, specializing in road design

***Duration:***

Lectures 34 hours, Tutorial 15 hours, Individual work 120 hours

***Who can provide these training courses:***

Habilitated University Professor (at first visiting Professor, later on local Professor)

**Subject title: TRANSPORTATION ROUTES DESIGN**

**Contents (Syllabus outline):**

- road – traffic – users – external influences
- road and the environment – influences and loadings, consideration in project
- preliminary research for road projects
- definition, dimension of normal cross section
- types of project documentation
- extent and contents of preliminary outline studies
- preliminary project evaluation, basics of influences on environment
- extent and contents of projects for constructing
- geometric elements of road axes
- drainage, objects on roads
- basics about evaluation of highway work calculation/costs, marking out elaborate, details
- basics of level intersections, interchanges
- road signalization and equipment
- road protection from influences of surroundings

**Objectives:**

- consolidation of the knowledge about driving dynamic parameters on the transportation routes
- consolidation of the knowledge about geometric elements of the road
- absorption of the knowledge about road user behavior
- recognition of the special cases about transportation routes design and solutions
- to get knowledge for understanding methods and procedure for transportation routes projects documentation and projects realization
- to qualify students for autonomous transportation routes design

**Intended learning outcomes:**

- to understand system road – traffic – users
- to understand and to command transportation routes design and transportation routes as an spatial objects,
- to understand special demands and procedure in transportation routes design

**Material conditions for subject realization**

Properly computing equipped lecture room

**Target Group:**

Students of civil engineering, specializing in road design

**Duration:**

Lectures 30 hours, Tutorial 30 hours, Individual work 90 hours

**Who can provide these training courses:**

Habilitated University Professor (at first visiting Professor, later on local Professor)

- ***Subject title: TRAFFIC TECHNOLOGY***

***Contents (Syllabus outline):***

- Dimensioning of other freeway facilities
- On and off ramps influence area
- Weaving areas
- Signalized intersection:
- Characteristics of interrupted traffic flow
- Types of signal controls
- Dimensioning of signalized intersections by HCM 2000
- Dimensioning of signalized intersections by HBS 2000
- Traffic management and control in urban area
- Signal coordination on the closed urban road network
- Signal coordination on the opened urban road network
- Advanced methods for dimensioning
- Usage the computer based tools for engineering problems on the field of traffic technique
- Computer tools for dimensioning
- Computer tools for modeling and simulation

***Objectives:***

To inform students with advanced methods for dimensioning of traffic areas outside and inside urban areas and with up-to-date, computer based methods for dimensioning the traffic areas.

***Intended learning outcomes:***

- Knowledge and understanding of procedures for dimensioning of traffic areas,
- Usage the computer based tools in the engineering problems

***Material conditions for subject realization***

Properly computing equipped lecture room

***Target Group:***

Students of civil engineering, specializing in road design

***Duration:***

Lectures 20 hours, Tutorial 25 hours, Individual work 75 hours

***Who can provide these training courses:***

Habilitated University Professor (at first visiting Professor, later on local Professor)

**Basic elements and structure of a training center with approx. costs:**

- |   |           |
|---|-----------|
| - One fully furnished classroom for 25 students   | (€12,000) |
| - Office space approximately 100 sqm - rent 50 days per year  | (€10,000) |
| - 2 workers (secretary and director/manager) full time  | (€14,000) |
| - Annual training programs and events (topics and lecturers)<br>one week per program and in total 7 weeks | (€60,000) |
| - Operation and accommodation cost for lecturers  | (€35,000) |

**Costs of the professional exam:**

- approx. 600 EUR per person, excluding education and training for the exam

**Personnel requirements for training center:**

The lecturers should be at least certified engineers with 15 years of practice on the subject they lecture or examine; preferably they should be university professors with past practice in the industry.

The examiners for the professional exam should all be certified members of the professional chamber of engineers, should be elected into the title of an examiner and should have great competence on the subject they examine.

The elected members of the examination commission should consist of:

- ◆ president
- ◆ examiners for specific task
- ◆ mentor

The mentor is a certified engineer that oversees and consults the project, a candidate for the certification is assigned to, as a part of practical exam. He (or She) overlooks the candidate's work on this project throughout the whole process and advises him on this matter.

Based on European practice, I recommend that the professional examination and licensing is carried out by the Chamber of engineers and overseen by the MESP or any other governmental body. A publically available registry of certified engineers should be put online to provide easier access to this information, which in the end, provides more control and assures professionalism in the industry. If the Chamber of engineers and the Chamber of architects are devised as separate entities, the registry should be maintained by the ministry in charge on licensing supervision, to avoid confusion.

## 5. TASK FINDINGS

Several meetings on official state level and also private sector were carried out over the period between May 10 and May 24 2009.

The conclusion is that Kosovo has proper legislation on state level that controls planning, designing, building and maintaining public road infrastructure, while is missing proper sub-laws, standards and specifications that ensure adequate law and quality compliance.

One of the most important deficiencies that exist in Kosovo today, is lack of qualified personnel, who would be competent for the entire process of planning, designing, building and maintaining public road infrastructure.

This problem derives from unsuitable or missing University of Prishtina programs that don't specifically cover road infrastructure processes.

All available personnel originates from other branches of civil and similar engineering.

Apart from their main field of expertise, such as structures, hydraulics, etc., they have also taken on the road design, planning, building and maintaining processes.

A lot of this engineers is working for several different business entities on different segments of the road infrastructure branch, what prohibits or at least complicates the quality control and regulation.

After reviewing several different examples of road project documentation, that was completed on a level of main design and was serving as a base for tender documentation for construction, I have detected some major deficiencies that affect the quality of the construction and later finished objects. These factors also affect the maintenance of the infrastructure, raising the cost and increasing the reconstruction rate. These deficiencies could be eliminated with properly educated and experienced engineers, alongside with good standards and specifications.

Some problems were detected on the governmental (ministry) level, where a lack of coordination between all levels of ruling was noticed. It was really apparent on levels three and four, which are uncoordinated and not aware how their decisions influence the planning, designing, construction and maintenance processes.

### ***Necessary actions***

- 1. GOK should review its structure and organization with regard to the planning, designing, construction and maintenance of public road infrastructure.**

#### ***Clarification:***

I have established that the basic structure is set, but is not functioning properly. Key personnel that is involved in decision making process for road infrastructure planning, design, construction and maintenance are not experienced enough, or even lack basic knowledge on these subjects. Therefore poor decisions are made. Basic regulative procedures for phases before, during and after construction should be prescribed as follows:

- Preliminary study with cost/benefit analysis to prove the need for the investment (and feasibility study)
- Preliminary design as a basis for spatial design
- Main design as a basis for construction permit
- Tender design as a basis for procurement process
- Finished work design as a basis for use permit
- Maintenance instructions

Good practice from EU countries could be transferred to the Kosovo territory, but the problem I see at the moment, is the lack of qualified personnel (in both private and public sector) that can do that. Missing this parameter, even the best practice is destined to fail.

- 2. Additional education of the existing engineers that work in the industry and development of long term training programs and curriculums at the University.**

#### ***Clarification:***

It seems that the University of Prishtina has some internal issues regarding the personnel that cover specific fields of work. The students get only basic knowledge on road design, planning, construction and maintenance. After they obtain University diploma, they need approx. 5-10 years to be able to do standalone, responsible work (this timeframe is based on EU experience and is not just Kosovo related). I estimate, that the execution of the proposed pilot project could shorten this period to 3-5 years, because it would include engineers that are already working in the industry and have some experience in road design. They will be invaluable in the future, when will have to tutor new engineers after they leave the University and start to work in the companies of these engineers.

- 3. Determination of minimum requirements or licenses, that need to be complied with, in order to get involved in the planning, designing, construction and maintenance of public road infrastructure**

See page 24 of this report.

- 4. Preparation of the pilot project**

See page 25 of this report.

## 6. CONCLUSIONS AND RECOMMENDATIONS

A proper reorganization of planning, designing, construction and maintenance of public road infrastructure segment is needed, on state level as well as in private sector.

Planning phase and all of its processes should be strictly separated from the actual design, construction and maintenance, and should be under strict governmental jurisdiction, tightly controlled and governed by state, its ministries and agencies. The rest of the process should be left to qualified and officially licensed private entities.

Good practice from EU countries could be transferred to the Kosovo territory, but the problem I see at the moment, is the qualified personnel (both private and public sector) that can do that. Missing this parameter, even the best practice is destined to fail.

The Ministries could provide an efficient reassignment of the existing personnel in order to assure the best possible results at:

- Planning of necessary steps and actions needed prior to construction – spatial documentation and permits, building permits
- Preparation of detailed scope of work for the designing process
- Preparation of detailed program for geomechanical research that is to be carried out in the field
- Establishment of the official project design review - auditing
- Competent road construction control and supervision
- Confirmation of constructed infrastructure - Technical inspection
- Use permit for constructed infrastructure
- Preparation and confirmation of road infrastructure maintenance program
- Additional training of the existing engineers that work in the industry and development of long term training programs and curriculums at the University (for University courses see page 9 of this report).

## **ADDITIONAL TRAINING FOR THE EXISTING CIVIL ENGINEERS (SPECIALIZATION FOR ROAD DESIGN):**

The following seminars are intended for the existing civil engineers that work in the industry.

Existing engineers come from different branches of civil engineering, mostly from structures and hydraulics and are missing basic knowledge of the planning, designing, construction and maintenance of the public road infrastructure.

At least two 45 hour seminars should be carried out, covering:

- Basic traffic flow
- Basic technical elements for public roads

These courses should be carried out in a properly equipped classroom or conference room (basic computing equipment) by experienced consultants or engineers with appropriate references /for example engineers from Slovenian chamber of engineers).

The basic goal of these seminars is to familiarize current road designers in Kosovo with the latest knowledge on road design and to give them some theoretical insight on things that they use in practice but are unfamiliar with the background principles.

Additional education should be organized in the future, following the wishes and demands for lectures that derive from the questionnaire included in **ANNEX 1**.

**Note:** *for University curriculum for future road design engineers, please see page 9 of this report*

## PROFESSIONAL LICENSING AND CERTIFICATION

Every engineer involved in previously described processes, should comply with minimum requirements for education and professional title.

### **Determination of minimum requirements or licenses, that need to be complied with, in order to get involved in the planning, designing, construction and maintenance of public road infrastructure**

Ministry of Environment and Spatial Planning should prescribe minimum requirements and areas of expertise those engineers responsible for individual segments of work need to comply with in order to become licensed engineers. These requirements should be enforced within the Chamber of Engineers.

The Chamber of Engineers should be a professional association of engineers that are in any way involved in construction and coordination of construction with spatial planning in the Republic of Kosovo.

It should be granted official power to independently prepare educational programs and organize and execute professional examinations and licensing.

The main purpose of the professional examination is to check, whether the candidate is qualified for the execution of engineering services, according to the field of work that is covered in this examination. He or she should be aware of the basic principles, methods and techniques that are involved in his or hers role as a responsible project manager, or a responsible project designer of individual designs, or a responsible project auditor.

Examinations are differentiated according to the powers entrusted into them after they pass the professional exam. These include:

- Responsible project design (architecture, spatial planning, construction)
- Responsible work management (managing specific tasks at construction)
- Responsible project management (project management)
- Responsible design auditing and reviewing

## PREPARATION OF THE PILOT PROJECT

The pilot project represents a “learning by doing” approach to professional education of the existing engineers that work in the industry of road design and later phases. As road design is an engineering science, the actual practical experience is invaluable. And one can only gather this experience by dealing with real life situations. Road design can not be learned only in classroom from a teacher, a great deal of knowledge is transferred from senior engineers on to the next generation. If senior engineers are missing, as this is the case in Kosovo, the younger generation need to be educated abroad (at the design companies in Slovenia for example), or the pilot project is initiated, where Slovenian engineering companies in association with local firms take over the project and work hand in hand with local staff. The knowledge is passed on and the engineers can accumulate experience and learn from the engineers with broad reference list.

Another aspect is the connection and implementation of the knowledge that these engineers with gather in seminars, with real life situations.

The pilot project should be prepared with cooperation of MTPT. The Ministry should select a section of a road (approx. 25 km long) that would include all possible road elements and structures and would demand the whole scope of engineering services. MESP should also be involved, since they are (or should be) responsible for permits (constructions permit, use permit, etc.)

The team should include experts from both, public and private sector.

### PUBLIC SECTOR:

Public sector should be represented by experts from different ministries, responsible for planning, supervision and maintenance.

The purpose for inclusion of public servants in the pilot project is to set out rules and procedures for road infrastructure planning, design, etc., mainly preparation of:

- scope of work for feasibility study
- scope of work for preliminary design and spatial documentation
- scope of work for main design and required documentation for construction permit
- scope of work for detailed design with bill of quantities for tender documentation
- scope of work for tender documentation and procurement procedure
- construction supervision and super-control with technical inspection
- use permit procedures

The exact action plan goes beyond this report, but the objective is, that the pilot project is initiated as soon as possible, due to amount of work to be done.

## PRIVATE SECTOR:

The goal is to educate at least 50 responsible engineers that will lead the way of road design in the Republic of Kosovo in the future.

Private sector should be represented by experts from different economic operators, responsible for planning, supervision and maintenance, such as:

- responsible engineer for geodesy (land surveying)
- responsible engineer for geomechanics
- responsible engineer for hydrogeology
- responsible engineer for pavement structures
- responsible engineer for road design
- responsible engineer for structure design
- responsible engineer for pipeworks
- responsible engineer for electrical powerworks
- responsible engineer for water regulations
- responsible engineer for landscape design
- responsible engineer for noise studies and protection
- responsible engineer for traffic studies
- responsible engineer for construction waste

### General action plan:

#### Overview of the phases of the pilot project:

Phase 1:	Preliminary study with cost/benefit analysis to prove the need for the investment (and feasibility study)	..... 4 %
Phase 2:	Preliminary design as a basis for spatial design	..... 40 %
Phase 3:	Main design as a basis for construction permit	..... 30 %
Phase 4:	Detailed design as a basis for construction	..... 20 %
Phase 5:	Tender design as a basis for procurement process	..... 2 %
Phase 6:	Finished work design as a basis for use permit	..... 2 %
Phase 7:	Maintenance instructions	..... 2 %

The percentage given above at every phase represents the approximated value of each phase in the overall value of the project.

It is impossible to give exact numbers at this point, since the road section for the pilot project hasn't been chosen yet. But the amount on page 7 of this report can be used as orientation, as well as the timeframe listed on the same page.

**You must still keep in mind, that the final result of this pilot project is a competent and professionally done road design for the selected road section and a whole lot of educated local engineers, government officials, etc.**

The chapters in **ANNEX 2** represent the list of necessary topics that should be addressed in the pilot project and from which the engineers would gain knowledge and experience.

## 7. ANNEXES

## Annex 1

## Training Needs Questionnaire On Road Design

This questionnaire has been designed to find out *your* preferences for the delivery of training courses. Due to the nature of the service you provide, it is important that we provide training in a way that you can access and in the format best for you. Please take a moment of your time to fill in the few questions below so that we can provide courses which are reflective of your needs and objectives.

Name of organisation:

Number of staff:

### 1. Timing of training sessions

Would you prefer courses to run for:

Half day      9:00am – 1.00pm       1.00pm – 5.00pm       6.00pm –  
9.00pm

Full day      9:00am – 5:00pm       10.00am – 6.00pm

Other (please specify):

### 2. Days to run training sessions

Which day(s) would you prefer courses to run on (please place a number next to each box to indicate your preference e.g. 1 = first choice and 7 = last choice):

Monday     Tuesday     Wednesday     Thursday

Friday

Saturday     Sunday

### 3. Releasing staff

Do you prefer to send staff on courses alone or in groups?

Alone     In Groups

How many members of staff are you able to release at one time to attend a training course?:

1-3     4-5     5-10     10+

### 4. Type of training

What method of training delivery do you prefer (please indicate preference by placing a number by each box e.g. 1 = first choice, 4 = last choice):

Qualified trainer  Internal staff trainer  E-Learning   
 Distance Learning  Other (please specify):

---

**5. Venues**

Would you prefer training courses to be run (please indicate preference by putting a number next to each box e.g. 1 = first choice, 3 = last choice):

Away from your workplace  Maximum distance you would travel:  
 In house at your workplace  At other providers care homes   
 in your locality

**6. Payments**

Do you pay your staff to attend training courses?

Yes

No

**7. Which courses you want to take**

Which training courses you will attend?

- Road Design basics .....
- Road Design crosscutting.....
- Standards on road design and construction.....
- Continual Education .....
- Use of software for road design/Highway.....
- Preparation course for professional exam.....
- Motorway design – focus on safety.....
- Roundabouts.....
- “Turbo” Roundabouts.....
- Spatial planning for road infrastructure.....
- ITS and road safety.....

**Note:**

*This questionnaire is intended for the additional education of the existing engineers (private sector) and not for the university students, therefore the courses listed on page 9 on in the report are not included.*

**8. Which courses would you suggest to expand your road design knowledge**

.....  
.....  
.....

## Annex 2.

Vol.	Part	Chapter	Kosovo pilot project – Contents –	
<b>0</b>				<b>Criteria for Public Road Classification</b>
				Introduction
				Legal basis
				Assessment of present condition
				Regulation in European Union member states
				Proposal for road classification criteria
				Application of road classification criteria
				Conclusion
<b>1</b>				<b>Designing</b>
<b>1</b>	<b>1</b>			<b>Road Designing</b>
1	1	1		Planning, design and investment documentation
			1	Introduction
			2	Road planning
			3	Investment documentation
			4	Design documents
			5	Regulation of relations among the participants in investment realization
			6	Appendices
1	1	2		Engineering-geological and geotechnical investigations and testing
			1	Introduction
			2	Approach to implementation of geotechnical investigations
			3	Course of geotechnical investigations
			4	Contents of geotechnical reports
			5	Types and descriptions of tests
			6	Appendices
1	1	3		Geometrical road elements
			1	Traffic
			1	Traffic participant-vehicle-environment system
			2	Traffic data
			3	Traffic load and permeability
			2	Basis for selection of road elements
			3	Cross section
			1	General
			2	Traffic and clearance profile
			3	Cross section elements
			4	Standard cross profiles
			4	Road elements

			1	General basis
			2	Sight distance
			3	Road axis in space
			4	Horizontal alignment elements
			5	Vertical alignment elements
			6	Conformity of road axis elements
1	1	4		Functional road elements and surfaces
			1	Level crossroads and access points
			2	Split-level intersections and access points
			3	Roundabouts
			4	Railroad crossings
			5	Passing-by and turning areas
			6	Cyclist and pedestrian surfaces
			7	Control stations
			8	Bus stations
			9	Parkings at carriageway
			10	Rest and service areas
			11	Petrol and gas stations
			12	Toll stations
			13	Road maintenance facilities
			14	Conduction of traffic along infrastructure
1	1	5		Traffic signalization and equipment
			1	Prometna signalizacija
			1	Vertical signalization
			2	Road markings
			3	Signs for marking road works, other obstacles and damages to carriageway
			4	Traffic lights and light markings
			5	Signs of variable meaning
			6	Tourist and other informative signs
			2	Traffic furniture
			1	Furniture to mark vicinity of carriageway edge, edge of extra width or emergency or crawler lane edge
			2	Furniture to control and canalize the traffic in the area of road works, other obstacles and damages to the pavement
			3	Safety barriers
			4	Protective fences
			5	Traffic mirrors
			6	Anti-glare furniture
			7	Impact energy absorbers
			8	Traffic calming devices and measures
			9	Barriers and semi barriers
			10	Road lighting
			11	Furniture to clearly indicate the motorway or expressway course in the road split area

			12	Emergency call
1	1	6		Road and environment
			1	Noise protection
			2	Water and soil protection
			3	Protection from erosion and snow avalanches
			4	Animal passages
			5	Roadside design
			6	Protection from wind and snow drifts
			7	Protection of structures from vibrations
1	1	7		Road structural elements
			1	Earth works
			1	Stability of cut or embankment slopes
			2	Embankment on low bearing foundation soil
			3	Geosynthetic materials
			2	Pavement structure
			1	Traffic load
			2	Climate and hydrological conditions
			3	Characteristics of pavement structure materials
			4	Pavement structure bearing capacity
			5	New asphalt pavement structures
			6	New concrete pavement structures
			7	Pavement structures strengthening
			3	Drainage system
1	2			<b>Designing Bridges</b>
			1	General guidelines for road bridges designing
			2	Edge beams, kerbs and walkways
			3	Railings and barriers
			4	Bridge waterproofing
			5	Bridge drainage and piping
			6	Bridge bearings
			7	Bridge expansion joints
			8	Road-Bridge transition
			9	Joints of concrete structures
			10	Formwork, finishing and facing of concrete surfaces
			11	Bridge maintenance equipment and maintenance plan
			12	Bridge instalations
1	3			<b>Designing Road Structures</b>
			1	Bored piles and wells
			2	Culverts
			3	Gravity retaining walls
			4	Anchored structures

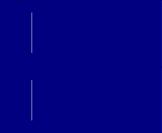
		5	Cut-and-covers and galleries
<b>1</b>	<b>4</b>		<b>Designing Road Tunnels</b>
		1	General
		2	Definitions
		3	Principles of tunnel designing
		4	General design criteria
		5	Ground investigations
		6	Design methods and rock classification systems
		7	Excavation design
		8	Tunnel lining design
		9	Measurements and monitoring
		10	Tunnel ventilation
		11	Tunnel lighting
		12	Tunnel management
		13	Tunnel operations organisation
<b>2</b>			<b>Construction</b>
<b>2</b>	<b>1</b>		<b>General Technical Conditions</b>
		1	General
		2	Technical regulations
		3	Terminological vocabulary
		4	Technical report
		1	Technical report for earth works performance
		5	Attestation of conformity system
		6	Measurement, taking over and final statement of account of works
		7	Measurement of evenness
		8	Measurement of skid resistance
		9	Measurement of density and moisture
		1	Isotope gauge method
		2	Substitute methods
		10	Random selection of measurement points and sampling locations
		11	Site management
		1	EU Directives
		2	Technical specifications
		3	Coordination of safety and health at work
		4	Safety plan for civil engineering construction
		5	Environmental impact and mitigation measures
		6	Construction waste management
<b>2</b>	<b>2</b>		<b>Special Technical Conditions</b>
		1	Preparatory works
		2	Earth works and foundation

		3		Pavement structure
		4		Drainage
		5		Craftmen works
		6		Traffic equipment and signalization
		7		Third party services
<b>2</b>	<b>3</b>			<b>Technical Conditions for Tunnel Construction</b>
		1		Site management
		2		Earthworks on portals
		3		Retaining structures and slope support
		4		Underground excavations
		5		Profile control and tolerances
		6		Rock classification
		7		Tunnel excavation retaining vault
		8		Waterproofing and permanent groundwater drainage
		9		Concrete works and reinforcement
		10		Geotechnical measurements and geological mapping
		11		Pre-drilling and grouting
		12		Earthing
		13		Electrical and mechanical equipment
		14		Bill of works
<b>3</b>				<b>Maintenance</b>
<b>3</b>	<b>1</b>			<b>Road Administration and Protection</b>
		1		Introduction
		2		Road administration
		3		Road protection
		4		Appendices
<b>3</b>	<b>2</b>			<b>Routine Maintenance</b>
		0		General
		1		Routine, periodic, and extraordinary inspections
		2		Cleaning of drainage structures
		3		Roadside mowing
		4		Shoulder maintenance
		5		Pavement cleaning
		6		Pavement patching
		7		Crack and joint sealing
		8		Repair of gravel, sand and crushed stone pavement
		9		Structures cleaning
		10		Minor repairs of walls and crib walls
		11		Repair and maintenance of slopes
		12		Cleaning of traffic signs and road equipment

		13		Maintenance and replacement of traffic signs
		14		Roadside cleaning
		15		Emergency response
		16		Environment protection
		17		Appendices
			1	Bill of works
			2	Routine maintenance documentation
			3	Routine maintenance equipment
			4	Road closure plans
<b>3</b>	<b>3</b>			<b>Winter Service</b>
<b>4</b>				<b>Road Supervision</b>
		1		Scope of the guideline
		2		Legal basis
		3		Definitions
		4		Management and inspection program on federal-aid highway construction projects - USA
		5		FIDIC conditions of Works contract
		6		IFIs' conditions of works contract
		7		Construction supervision services
		8		Works construction
		9		Taking over of works
		10		Inspection-in-depths
		11		Maintenance supervision
		12		Appendices
			1	Construction site and waste management
			2	Works contract
			3	Construction diary and ledger of quantities
			4	Relation of executed works
			5	Entry in official records
			6	Taking over of construction products
			7	Fire safety performance of construction products

**Action Plan for the Implementation of Program for improvement of the road design services**

Activity	Objective	Institutions / Stakeholders involved	Schedule for the Year 1 (Oct'09 – Sept'10)	Estimated cost EUROS
			Q1 Q2 Q3 Q4	
Engage STTA/Organisation to provide training for the existing engineers:	The basic goal of these seminars is to familiarize current road designers in Kosovo with the latest knowledge on road design and to give them some theoretical insight on things that they use in practise but are unfamiliar with the background principles.	Group of experts on professional education, Slovenia consultants, <b>KPEP</b>		30.000,00
Two 45 hour seminars covering				
- Basic traffic flow				
- Basic technical elements for public roads				
	<b>PHASE 2*</b>			
Prepare University curriculum for specialization in road design based on following courses:	To ensure properly educated and qualified road design engineers in the future, additional subjects or courses at the University should be organized and added to the existing civil engineering curriculum.	Joint working group of experts on professional and University education (GOK, University, Slovenian consultants)		1.420.000,00
- TRANSPORT INFRASTRUCTURE MANAGEMENT				
- ROAD INTERSECTIONS AND ACCESS POINTS				
- CONSTRUCTION AND MAINTENANCE OF THE TRAFFIC FACILITIES				
- TRAFFIC AREAS IN URBAN ENVIRONMENT				
- PAVEMENT STRUCTURES				
- TRANSPORTATION PLANNING				
- TRANSPORTATION ROUTES DESIGN				
- TRAFFIC TECHNOLOGY				
	<b>PHASE 2*</b>			

<p>Train (learning by doing) engineers during the implementation of the pilot project</p>	<p>Existing engineers learn through real life project and gather experience for future independent work.   <b>NOTE:</b> This pilot project exceeds given time frame of one year. The cost is proportionately dived over the life span of the pilot project.</p>	<p>Slovenian engineers, consultants, GOK, Kosovo engineering companies, <b>KPEP</b></p>		<p>6.000.000,00</p>
<p>Evaluation of the existing and preparation of improvements or brand new legislation and regulative documentation</p>	<p><b>PHASE 3 *</b>                  Improvement of the existing legislation and preparation of missing bylaws, standards and technical specifications</p>	<p>Slovenian engineers, consultants, GOK, Slovenian chamber of engineers)</p>		<p>750.000,00</p>
<p>Prepare professional certification and licensing program</p>	<p><b>PHASE 1 *</b>                  Professional education and licensing of engineers</p>	<p>Slovenian engineers, consultants, GOK, Slovenian chamber of engineers) , <b>KPEP</b></p>		<p>450.000,00</p>
<p><b>PHASE 3 *</b></p>				

\* For phases see chapter **Field activities to achieve purposes** in the final report (from page 5 on)

GOK = Government of Kosovo

KPEP = Kosovo Private Enterprise Program