

**Modernization and Restructuring of the Road Sector Project
(MARS IBRD Loan 8749-HR)**

**TERMS OF REFERENCE
FOR THE DEVELOPMENT OF DESIGN DOCUMENTS "LEGAL COMPLIANCE OF
GUARDRAILS ON HAC-OPERATED MOTORWAYS"**

Zagreb, July 2018

1. INTRODUCTION

The Modernization and Restructuring of the Road Sector project (Croatia MARS, in further text “the Project”) is a World Bank-funded (IBRD Loan 8749-HR) undertaking that aims to support the Croatian Government in enhancing operational efficiency and improving financial sustainability of the road sector. The Project provides a comprehensive solution that covers institutional, operational and financial concerns. The Project supports governance, planning and monitoring reforms that will make Road Sector SOEs more effective and enable their efficiency. Support targets institutional investment management and company level governance and management arrangements to promote a performance-based culture and ensure that future investments are economically justified. The Project will also address operational practices, making operations more effective to maximize revenues and lower operational costs.

The Project encompass (under its component B-6) consulting services on carrying out of technical studies for purpose of increasing road safety on the motorway system. One such study is related to improving the safety aspects of guardrails on HAC-operated motorways.

1.1. The current condition of guardrails on HAC-operated motorways

Hrvatske Autoceste d.o.o. (Croatian Motorways Ltd.) have built 914 km of motorways in the past period and equipped them with appropriate traffic signs and road furniture including guardrails.

Given that the construction of the motorways and equipment has been carried out in phases over a number of years, the technological solutions of guardrails (classes, necessary work width, installation) have been changed by the development of technology and the adoption of legal acts. The sections of the A1, A3, A4, A5, A10 and A11 motorway have been constructed over a long period of time, some of them prior to the adoption of the EU Directive (2008/96/EC) and the existing Rulebook on Traffic Signs, Signaling and Road Furniture (NN 33/05, NN 64/05, NN 155/05, NN 14/11) and standard HR EN 1317.

Installation of guardrails on motorways was prescribed by Clause 89 of the Rulebook on Traffic Signs, Signaling and Road Furniture.

Since most of the sections on motorways A1, A3 and A4 were built and designed prior to entry into force of the stated Rulebook, the installed guardrail systems do not comply with the prescribed conditions on the class of protection. On A1 motorway section (Dugopolje - Ploče) and A5 motorway section (Osijek - Sredanci) the guardrail system partially complies with the prescribed conditions. On A10 and A11 motorway sections on which the guardrail system was installed in line with the regulations on the protection class it is necessary to check if there are some dangerous spots that are not adequately protected.

2. OBJECTIVES OF THE ASSIGNMENT

The current guard-rail system shall be complied as soon as possible with the relevant regulations and other binding documents (Clause 6 of the TOR). However, considering the comprehensiveness and the costs of the project it is necessary to establish the schedule of compliance. The schedule shall be planned in line with the guardrail system and type of danger regarding the position of protection on the road.

The designer needs to visit all sections of the motorways operated by HAC, analyze the condition of the existing guardrail and suggest ways of protecting the characteristic sections of the motorway with the

guardrail depending on the road position and in line with the current regulations, standards and rules of the trade. It is necessary to analyze on which official passages it is necessary to install protective road systems for fast-changing dismantling passes, taking into account the requirements for safety, functionality and operational parameters. Design documents shall be prepared in three phases.

The first and the second phase of the design documents development need to be safety-audited by the chartered road safety auditor (see Clause 9 of the TOR).

3. SCOPE OF WORKS

3.1. Phases of the Design Documents Development:

1. Conceptual design
2. Traffic detailed designs
3. Tender documents

3.2. First phase – Conceptual Design

The first phase of the Design Documents Development implies preparation of the "Analysis of the condition of the guardrail on motorways operated by Croatian Motorways with the proposed technical solution of its compliance with the valid regulations and standards".

The conceptual design should determine the schedule of compliance of safety systems per motorway sections according to the condition of the guardrail system i.e. the type of danger related to the position of protection and give the assessment of costs of compliance for each motorway section. All motorway sections that are in traffic shall be included: A1, A3, A4, A5, A10 and A11 (total length of 914 km).

3.2.1. Contents of the conceptual design

- Goals and the spatial analysis of the project area;
- Analysis of traffic technical condition of guardrails on HAC-operated motorways (in line with the requirements HR EN 1317);
- Analysis of the traffic safety status through the degree of accident hazard type "slipping off the road and crash against the guardrail";
- Defining a task to increase the level of traffic safety on motorways;
- Proposed typical technical solutions for the protection of characteristic motorway sections related to road position;
- The dynamics of replacement or installation of parts of the guardrail on motorway sections depending on the condition of the guardrail and the danger level associated with the road protection position;
- Estimate of costs of work on replacement i.e. installation of new parts of guardrail on motorway sections;
- Conceptual design draft and conclusion.

Conceptual design shall contain all elements necessary for applying for the EU funds.

3.2.2. Components of the task and deadlines

A) Preparation of the report on the existing condition of guardrails:

- review of the existing documents (the results of reviews will be provided to the designers in line with Directive 2008/96/EC (Road Safety Inspection, Network Safety Management, Black Spot Management)
- site visit of motorways, detailed inspection of the existing guardrail systems and the survey of the existing condition of guardrails,
- analysis of the found condition,
- preparation of the report.

Time of completion for preparation and delivery of the report is 60 days as of the signing of the Contract.

B) Review of the report by the Client

The Client will review the Report within 15 days.

The prerequisite to continue the design development is for the Client to accept the report.

All comments and requirements of the Client will be elaborated through the development of the Conceptual design.

C) Preparation and delivery of Conceptual design

Time of completion for the conceptual design elaboration is 45 days as of receipt of the report.

D) Review of the Conceptual design by the Client

The Client will review the conceptual design within 45 days and if it is acceptable, he will confirm it to the Designer. The requested modifications or revisions will be implemented by the Designer in the final version of the Conceptual design.

E) Development of the final version of the Conceptual design

The deadline for the preparation and delivery of the final version of the Conceptual design is 15 days as of review i.e. confirmation of the Client from point D.

3.2.3. Delivery of the First phase

The deadline for the completion and delivery of the conceptual design is 6 months as of signing of the Contract. Conceptual design is delivered to the Client in six (6) hard copies and two (2) electronic copies. Only MS file formats (*.doc, *.xls) shall be accepted as well as drawings in the graphic part of the file with *.dwg extension and print ready "pdf" format.

3.3. Second phase – development of traffic detailed designs per motorway sections and issuance of approvals

The second phase of development of design documents implies development of traffic detailed designs and issuance of approvals by the Ministry of the Sea, Transport and Infrastructure in line with Article 61 of the Roads Act (NN 84/11, 22/13, 54/13, 148/13, 92/14).

In accordance with the proposals and conclusions of the Conceptual design the "Analysis of the condition of the guardrail on motorways operated by Croatian Motorways with the proposed technical

solution of its compliance with the valid regulations and standards" the development of traffic detailed designs of guardrails per motorway sections will be undertaken.

While preparing traffic detailed designs for motorway sections the designer shall analyse the existing guardrails on central reserve and by the edge of carriageway, detect all potentially dangerous locations by the edge of carriageway that are not properly protected and offer adequate solutions for guardrail protection with acceptable protection class (H), necessary work width (W) and acceleration severity index for occupants (ASI) in line with the relevant regulations, standards and rules of the trade. While preparing traffic detailed designs the designer shall take into account the position of utilities (electric lines, optic cables etc.) and offer solutions for its installation that will not damage the existing power lines.

To speed up the process of design documents development, the traffic detailed designs shall be developed through two simultaneous activities. One team of experts shall work on the development of the traffic detailed designs for A3, A4, A5 and A11 motorway sections, and the other team shall work on the development of traffic detailed designs for A1 and A10 motorway sections.

3.3.1. Contents of traffic detailed designs

- General part;
- Technical description;
- Specification for equipment and works (bill of quantities);
- Layouts and drawings;
- Details.

3.3.2. Components of the task and deadlines

A) Development of traffic detailed designs for motorway sections:

The deadline for the development and delivery of traffic detailed designs is 270 days after delivery of the final version of the Conceptual design.

B) Review of the traffic detailed designs by the Client

The Client will review the traffic detailed designs within 90 days as of delivery of the traffic detailed designs. The Designer will implement the requested modifications or upgrades in the final version of the traffic detailed designs.

C) Development of the final version of traffic detailed designs

The deadline for the development of the final version of the traffic detailed designs is 60 days as of the review by the Client from point B.

D) Issuance of the prior consents (approvals) by the Ministry of the Sea, Transport and Infrastructure

The deadline is 30 days as of development of the final version of the traffic detailed designs.

3.3.3. Delivery of the Second phase

The deadline for development, approval issuance and delivery of traffic detailed designs per motorway sections is 15 months after the delivery of the final version of the Conceptual design.

Traffic detailed designs are delivered to the Client in six (6) hard copies and two (2) electronic copies. Only MS file formats (*.doc, *.xls) shall be accepted as well as drawings in the graphic part of the file with *.dwg extension and print ready "pdf" format.

3.4. Third phase – development of tender documents for execution of works

When developing traffic detailed designs for the guardrail system on motorway sections it is necessary to prepare the tender documents for the execution of works as well.

3.4.1. Contents of tender documents

- Technical description;
- Specification for equipment and works (bill of quantities);
- Layouts and drawings.

3.4.2. Delivery of the Third phase

The foreseen deadline for the development of the tender documents for the execution of works is two months as of delivery of the approved traffic detailed designs for motorway sections.

The Tender documents are delivered in two (2) hard copies and one (1) electronic copy. Only MS file formats (*.doc, *.xls) shall be accepted as well as drawings in the graphic part of the file with *.dwg extension and print ready "pdf" format.

A part of Tender documents related to the Bill of quantities shall be prepared in MS Excel format with the entered formulas and protected pages with the permitted entry only in the unit rates cells, all in line with the Client's "standard Bill of quantities" and shall be submitted in electronic copy.

4. DELIVERABLES

PHASES	TIME
1. Conceptual design	6 months as of signing of the Contract
2. Traffic detailed designs	15 months as of delivery of the Conceptual design
3. Tender documents	2 months after delivery of the traffic detailed designs

5. DURATION OF THE ASSIGNMENT

The total duration of the task is 1 year and 11 months as of signing of the Contract.

6. REGULATIONS AND OTHER BINDING DOCUMENTS

The relevant Rulebook on traffic signs, signals and road furniture (NN 33/05, 64/05, 155/05, 14/11) prescribes the classes of safety barriers depending on the road category and the part of the road where they are placed (carriageway edge, central reserve and structures). The said Rulebook does not define the time frame of the transition period for compliance, i.e. for complying the safety barrier class.

Design documents shall be prepared in line with the technical documents for the motorways and relevant regulations on physical planning, environmental protection, construction, public roads, traffic safety on roads, relevant Croatian and EU standards on traffic sign-work and road furniture, General technical conditions for works on roads, Volume I – VI (Zagreb, December 2001, Croatian Roads and Croatian Motorways).

Clause 7 of the Rulebook on Traffic Signs, Signalling and Road Furniture prescribes that traffic signs and road marking must be developed and installed in line with the Croatian standards. In Croatia, the Act on Construction Products (NN, No. 76/13, 30/14, 130/17) regulates systems for assessing and verifying the permanence of properties of construction products and all other activities and controls regulated by the implementation of EU Regulation No. 305/2011 EZZ that prescribes harmonized conditions for trade in construction products and other issues essential for placing on the market or making available on the market of construction products. The technical regulation on construction products (NN, No. 33/10, 87/10, 146/10,81/11, 100/11, 130/12, 81/13, 136/14, 119/15 and 35/18) prescribe technical properties and other requirements for construction products and their installation into structures.

Design documents shall be developed in line with the above Rulebook and the following Croatian standards:

- HRN EN 1317-1:2011, Road restraint systems –Part 1: Terminology and General criteria for test methods (EN 1317-1:2010)
- HRN EN 1317-2:2011, Road restraint systems–Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers including vehicle parapets (EN 1317-2:2010)
- HRN EN 1317-3:2011, Road restraint systems–Part 3: Performance classes, impact test acceptance criteria and test methods for crash cushions (EN 1317-3:2010)
- HRN ENV 1317-4:2004, Road restraint systems –Part 4: Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers (ENV 1317-4:2001)
- HRN EN 1317-5:2012, Road restraint systems–Part 5: Product requirements and evaluation of conformity for vehicle restraint systems (EN 1317-5:2007+A2:2012)
- HRN EN 1317-5:2012/Ispr.1:2012, Road restraint systems –Part 5: Product requirements and evaluation of conformity for vehicle restraint systems (EN 1317-5:2007+A2:2012/AC:2012)
- HRS CEN/TS 1317-8:2012, Road restraint systems –Part 8: Motorcycle road restraint systems which reduce the impact severity of motorcyclist collisions with safety barriers (CEN/TS 1317-8:2012)
- HRN EN 12767:2008, Passive safety of support structures for road equipment - Requirements, classification and test methods (EN 12767:2007)

When developing design documents the Designer shall study the actual conditions on site and comply their conceptual designs accordingly. Collection of all documents and maps required for the development of the documentation shall be included.

7. LANGUAGE

All deliverables to the Client shall be submitted in Croatian, and the communication between the Client and the Consultant shall be in Croatian and when necessary in English.

8. NECESSARY QUALIFICATIONS

8.1. Qualifications of the Company

Business entity shall prove its experience in providing equivalent or similar services as in the subject of this procurement.

8.1.1. General experience

- Business entity has developed at least 1 (one) traffic study or design in the minimum procurement value of HRK 750,000.00 (or 100.000 EUR).

The following shall be considered as advantage:

- higher number of developed traffic studies and designs
- experience in the EU member states
- experience in the Republic of Croatia

Eligibility is proven with the following:

- The list of services provided in the year when the public procurement started and over 5 (five) years that have preceded that year.

8.1.2. Special experience

- Business entity has developed traffic studies and designs of guardrails on motorways in the total minimal length of 75 km over the last 5 years.

The following will be considered as advantage:

- higher number of developed traffic studies and designs
- experience in the EU member states
- experience in the Republic of Croatia
- developed traffic studies and designs in the last 3 years

Eligibility is proven with the following:

- The list of services provided in the year when the public procurement started and over 5 (five) years that have preceded that year.

8.2. Key personnel qualifications

The minimum number of the required experts for the provision of Service:

- 1 (one) chartered engineer of road traffic engineering or civil engineering (**team leader**)
- 5 (five) engineers BSc in Traffic / MEng (traffic engineering) or BSc / MEng (civil engineering).
- 1 (one) chartered road safety auditor

The project team shall include at least one graduate engineer of traffic and one graduate civil engineer.

For the proposed graduate engineers who will be involved in the execution of the Contract, the entity submits a statement that they will be available, for chartered engineers a certificate of entry in the Register of Chartered Engineers of the competent Chamber of Engineers and for road safety auditors an

authorization issued by the Ministry of the Sea, Transport and Infrastructure in accordance with the Rulebook on Road Safety Audit and Training of Road Safety Auditors (OG 16/16).

9. ROAD SAFETY AUDIT

During development of the design documents in line with Clause 70 of the Roads Act, Rulebook on Road Safety Audit and Training of Road Safety Auditors and Directive 2008/96/EC of European Parliament and the Council of 19 November 2008 on the road infrastructure safety management, road safety audit shall be performed as well. The Designer shall engage independent road safety auditor within the costs of development of the subject design documents. The road safety audit is conducted by the auditor that independently conducts the review of the conceptual design and traffic detailed designs. The road traffic auditor shall be independent i.e. shall not take part in the development of the design documents or be employed by the legal entity that is in charge of developing it. The auditor will conduct the road safety audit, and present his findings and recommendations to the Designer and the Client's relevant staff. In that regard the report on the road safety audit will be prepared as well. In the report the Auditor will indicate precisely i.e. define in what area there are deficiencies in road safety, and provide the Designer with the relevant suggestions/comments. The obligation of the Auditor is to participate in the meetings (on call) with the Designer and the Client (regarding audit, given recommendations on design documents, necessary compliance and modifications in the design documents etc.). Based on the received report, the Client prepares a written response to the Auditor, detailing the conclusions as follows: which comments will be fully taken into account, which comments will partially be taken into account (stating the reasons and suggestions to remedy the shortcomings), with which comments from the report the Client disagrees (with an explanation why they can not be taken into account). The auditor confirms or refuses the conclusions of the response and informs the Client thereof. If the Auditor rejects the conclusions, the Client shall submit the complete documentation to the Ministry of Sea, Transport and Infrastructure, which issues the final opinion. The auditor will prepare and submit reports in Croatian in 3 (three) hard copies and two (2) electronic copies. The electronic copy of the reports is submitted in "pdf" format, as well as in original formats (eg. *.doc, *.xls). The Designer is liable to participate in the implementation of the road safety procedure, and at the Client's request the Designer is liable to perform all modifications and amendments to the design documents.