

# **CROATIA**

## **"Modernization and Restructuring of the Road Sector Project"**

### **Terms of Reference**

## **ROAD ASSET MANAGEMENT SYSTEM (RAMS) SCOPING CONSULTANCY**

### ***1. BACKGROUND***

#### **The Croatian Road Sector**

In 2016, the Croatian road network comprised 26,954 km of classified roads, which included motorways (1,420 km - including planned sections), state roads<sup>3</sup> (7,098 km), county roads (9,499 km) and local roads (8,937 km).

Croatia tops the list of countries in South-Eastern Europe by density of motorways (22.79 km of network /1000 km<sup>2</sup> land area). In part this outcome was due to a large road network expansion during 2001-2008, when investments in motorways were aimed at fully integrating the Croatian territory after the 1990's war, spurring industry growth and tourism, and integrating the Croatian network into the broader European network. As a result 660 km of motorways were built through two four-year Public Road Construction and Maintenance Programs. Investments slowed amid the global economic recession in 2009, but despite the economic slowdown, road investment was still significant.

The motorway network is managed by four concessionaires: publicly-owned Croatian Motorways (HAC) and Motorway Zagreb-Rijeka (ARZ), and privately held Bina Istra and Autocesta Zagreb Macelj (AZM). HAC is a limited liability company for the management, construction, operation and maintenance of 914 km of motorways. It was established in 2001 as one of the legal successors to the Croatian Road Authority, which ceased to exist. ARZ started operations in 1998 as a limited liability company for construction, operation, management and maintenance of 187 km of motorway, mainly along the Rijeka-Zagreb section. HAC ONC, a joint subsidiary of HAC and ARZ, was created in 2013 from the operations and maintenance departments of the two companies, and was contracted in 2014 on a non-competitive basis to perform routine maintenance and toll collection activities for both the HAC and ARZ motorway sections. The relationships between HAC-ONC and HAC and ARZ are determined by a four-year contract expiring in 2018.

State roads are managed by Croatian Roads (HC), established in 2001 as the other legal successor to the Croatian Road Authority. HC is a publicly-owned limited liability company for managing, constructing, operating and maintaining the state road network. County roads and local roads are owned and managed by regional and local governments.

## **2. OBJECTIVE OF THE CONSULTANT'S WORK**

1. To review existing Road Asset Management Systems (RAMS) and/or elements thereof such as Pavement Management Systems (PMS) or Structure Management Systems (SMS) in use on the State Motorway and State Road networks of the Republic of Croatia, as managed currently by companies HAC, ARZ and HC and/or the County Road Authorities (ŽUC).
2. To identify key requirements for a nationwide RAMS covering as a minimum the existing networks of HAC, ARZ and HC and allowing for expandability to future extensions or modifications of said networks as well as to the ŽUC.
3. To define Terms of Reference (ToR) for one or more (depending on Croatian Government's decisions in the context of the World Bank - funded project) future contracts for development of the nationwide RAMS.

## **3. SCOPE OF WORKS**

### ***1) Review of existing systems***

The future nationwide RAMS will not be a “greenfield project” as Croatian road administrators are already known to use, to some degree, Pavement Management Systems and other elements of a RAMS. The aim of the review is to establish a reliable recording of the current situation, to evaluate its adequacy and to assist in dimensioning of subsequent work on the development of the future RAMS.

Existing systems to be reviewed include:

- Existing RAMS elements such as, indicatively, pavement and/or structure management systems and/or road inventories, at (part of) HAC / ARZ / HC / ŽUC networks
- Existing GIS systems covering HAC / ARZ / HC / ŽUC networks
- Existing HAC / ARZ / HC / ŽUC traffic databases

Characteristics of such systems to be expressly identified and evaluated include:

- Existing road reference systems and reference methodologies
- Existing road inventories containing condition, traffic, and road safety data as well as the respective data collection methodologies
- Existing inspection and maintenance procedures
- Software and hardware description and usage protocols for operating, maintaining and updating
- Existing interactions between system and data collections, processing and storage
- Technical (skill, knowledge) and institutional capacities and operational arrangements within HAC / ARZ / HC / ŽUC with regard to RAMS

## ***II) Identification of requirements for RAMS***

### Overview

The required Road Asset Management System (RAMS) shall comprise the following:

- (1) Organizational scheme (people, procedures and processes)
- (2) Software and hardware

The RAMS will have two main functions:

- (A) A reliable, precise and user-friendly data inventory for pavements, structures and other elements of road infrastructure
- (B) A tool to assess, prioritise and cost future periodic maintenance and rehabilitation needs, using international state-of-the-art practice

A RAMS is aimed at monitoring both the technical (cost-effective asset condition preservation) and service (road user safety, functionality and comfort) characteristics of the road assets.

Asset management covers the full life-cycle of assets from planning to disposal. However, the RAMS will be focused on the operation stage, incorporating relevant information from the end of the construction stage (e.g. as-built info), existing condition and traffic data, as well as analysis and prioritization of maintenance plans.

### Data

Data types used in a RAMS typically comprise the following categories:

- (i) Network links and nodes
- (ii) Road hierarchy (official, functional, type)
- (iii) Type of asset (pavement, bridges, tunnels etc.)
- (iv) Location (GPS-based, incl. geometric characteristics, or linear location)
- (v) Technical condition for pavement (cross-section information, pavement structure, history of overlays or other periodic maintenance interventions, surface type, pavement problems such as rutting, cracking, potholes, disintegration, bleeding, depressions, shoving, undulations, edge break etc., strength, structural, roughness and other readings), structures (individual piers, spans, abutments, bearings and expansion joints, approaches, bridge protection works, training works, bridge construction and maintenance history, design capacity, load capacity, hydrology, etc.), drainage and other elements
- (vi) Service / functional characteristics (safety, quality-of-ride, traffic service level etc.)
- (vii) Usage regulations (e.g. heavy-vehicle restrictions)
- (viii) Traffic volumes (and composition, variations)
- (ix) Works record

Database characteristics to be addressed and defined are the following:

- Storage capacity
- Querying and reporting capabilities incl. custom reporting
- GIS interface
- Definition of homogeneous sections for integration

- Expandability (modification of parameters and network editing should be possible without reprogramming)
- No. of users and level of access
- User Language (Croatian / English)
- Operating System and Database Management System
- Security as per function level
- Data exporting
- User documentation
- Security of data and from unauthorized access
- How the data is stored and shared to allow access to users across the country

### Draft Road Asset Management Strategy

The Consultant shall prepare a draft Road Asset Management Strategy comprising:

- state-of-the-art approach with emphasis on cost-effectiveness of road maintenance
- Levels of Service and Key Performance Indicators,
- engineering standards for periodic maintenance and rehabilitation
- impact on / inputs to planning and budget
- identification of risks (such as damage due to storm or accident; works by third parties e.g. utilities; legislative changes; overloading; new roadside development etc.)
- information/data sharing especially with the Ministry of Maritime Affairs, Transport and Infrastructure

Emphasis shall be placed on the suitability of existing pavement / structure managements systems to be part of the RAMS (e.g. can they be incorporated in it).

The draft Road Asset Management Strategy shall be finalized following review by the Croatian Government.

### **III) Terms of Reference for development of future RAMS**

On the basis of the detailed requirements identified in “2” above, in line with the Road Asset Management Strategy as approved by the Croatian Government, and following consideration of (a) international state of the art, (b) desired levels of service, (c) engineering standards and (d) impact on planning and budget, the consultant shall define the scope of works / Terms of Reference (ToR) for development of a nationwide RAMS, including as a minimum the following:

#### III.1 – Data Requirements and Database Design

- Data types
- Scope of data collection
- Methods for data collection and evaluation

- Utilization of / links to existing databases / systems
- RAMS database organization and updating

### III.2 – Management Organization and HR Skills

- Organizational and institutional arrangements – RAMS units
- Staff specialties, experience, skills and training
- Maintaining the RAMS

### III.3 – Procedures and Processes

- Integration of RAMS and operational and maintenance manuals & quality processes
- Linkage to maintenance budget, rolling maintenance programs, roadworks costing and road user costing
- Linkage of RAMS to Key Performance Indicators and Levels of Service and to risk management systems

### III.4 – Hardware and Software and Maintenance Thereof

- Decision on degree of utilization of any existing (sub)systems
- Functional specifications for database
- Input, output and storage devices
- Software
- Security
- Testing and acceptance process
- Linkage / interoperability to HDM-4, GIS and/or other applications

### III.5 – Field and office work for collection, verification and evaluation of data

### III.6 – Draft budget and timescale for RAMS development

### III.7 – Experience and other requirements for future RAMS contractor(s)

## ***4. OBLIGATIONS OF THE CLIENT AND THE CONSULTANT***

The Client shall make available to the Consultant all relevant material (reports, data, other information) in its possession, but the Consultant shall be fully responsible for the interpretation and use of the material in question as well as for the conversion of available data into a form that can be used in the system he sets up.

The Client shall delegate specific officers with appropriate experience to assist the Consultant in the access of any existing systems / laboratories / information for the purposes of the Consultancy work.

The Client will liaise as necessary with other agencies and the motorway management / operation / maintenance companies as required in order to facilitate the Consultant's work.

The Client shall provide an office for use by the Consultant for his assignment, word processing, internet link, and photocopying facilities as necessary.

The Consultant shall be responsible for own travel, accommodation and telecommunication expenses.

#### **4. I. CONSULTANT'S EXPERIENCE REQUIREMENTS**

The Consultant should include the following minimum team member configuration:

- Team leader / senior roads or traffic engineer with at least 10 years of overall experience, of which at least half in road management / maintenance / operation
- Structural engineer with at least 7 years of overall experience, specialized in construction or maintenance or design of road structures
- Database specialist or GIS with at least 7 years of overall experience
- As an advantage would be previous particular experience in work with road asset management system;
- Third-party certified accreditation to ISO 9001;

#### **4.II. MILESTONES AND DELIVERABLES**

The Consultant is expected to provide services for a period of 4 months from the contract signing date. There may be an opportunity for downstream work in terms of supervision of the setting up of the new system, but as indicated above not to actually implement the setup of the system.

The following deliverables are required:

- Inception report within 2 weeks from the commencement date
- Review report within 8 weeks from the commencement date (conclusion of Task 1)
- Draft motorway asset management strategy within 11 weeks from the commencement date (conclusion of Task 2)
- ToR / scope of work for RAMS contract(s) on conclusion of the assignment.