



## A1 Motorway Zagreb - Split - Dubrovnik

**The motorway section from Dugopolje to Šestanovac was opened to traffic on June 27, 2007. The section was ceremoniously opened to traffic by dr. Ivo Sanader, Prime Minister of the Republic of Croatia.**

This section from Dugopolje to Šestanovac, 37 km in length, is the first segment of the Dugopolje - Ploče Sector which is a part of the Zagreb - Split - Dubrovnik Motorway. The motorway route from Dugopolje to Šestanovac traverses a barely passable mountainous area, mostly in rocky terrain, where the route definition possibilities are quite limited. Horizontal and vertical elements of the route are

appropriate for the design speed of 120 km/h. The following route elements had to be applied in this difficult terrain:  
The cross section is formed of two pavements separated with the median of no less than 3 m in width. Each pavement consists of two traffic lanes 3.75 m in with, and of the stop lane 2.50 m in width. Shoulders and berms are designed with the minimum width of 1.75 m. The



Design speed $v_r$ (km/h)	120	
Min. radius of horizontal curvature $R_{min}$ (m)	750	
Min. length of transition curve $L_{min}$ (m)	110	
Min. radius of vertical curvature $R_{min}$ (m)	concave	13000
	convex	20000
Max. cross slope of the pavement $p_{max}$ (%)	6.6	

minimum clearance above the motorway is 4.5 m as measured from the pavement level. Thirteen structures were built on the Dugopolje - Šestanovac section: 1 bridge, 4 viaducts, 3 artificial tunnels and 4 tunnels, and 1 roadside rest area. The total value of the works, not including the VAT, amounts to KN 1.587.072.617.72. The Dugopolje - Šestanovac section is linked to the existing road network via the interchanges of Bisko, Blato na Cetini, and Šestanovac. All interchanges are designed as trumpet-type interchanges. Interchange legs are designed by means of horizontal elements that enable driving speeds of 60 (40) km/h.

By giving proper heed to regulations, standards and technical literature in the field of environmental protection, and by applying various protective measures during construction, with systematic monitoring of environment in the motorway zone, the Hrvatske autoceste Co. is planning with great care all measures and activities aimed at preserving natural environment in the motorway zone. In fact, as it uses and controls the use of environmentally friendly substances in motorway maintenance applications, while applying materials that are least harmful to the environment, the company Croatian Motorways can rightfully be considered as an



environmentally conscientious company.

The construction of the Dugopolje - Šestanovac section was preceded by numerous archaeological explorations of the localities situated in the zone of the works. From the very start, the Ministry of Culture's Historic Preservation Department in Split participated in elaboration of the environmental impact study for the Adriatic Motorway. In the scope of this effort, all localities likely to be endangered by the future construction work were identified.

In addition, the construction of the Dugopolje - Šestanovac section has enabled us to gain a much better insight into the history of the Dalmatian hinterland, from the Palaeolithic to the Late Middle Ages. However, many findings still need to be cleaned, restored and scientifically analyzed. Once this task is completed we will have a much clearer image of historic developments in the Hinterland.

Good cooperation between the Ministry of Culture and Croatian Motorways will result in successful completion of this project, without devastation of archaeological localities, and without delays in construction work. We can today rightfully say that environmental conscientiousness has been created which, together with proper legal framework, prevents devastation of cultural heritage, as witnessed by protective archaeological activities that are routinely undertaken on Croatian motorways. 🌱



The opening to traffic of new sections of the A1 Motorway, on the stretch from Dugopolje to Šestanovac, is a new step toward completion of the planned motorway network in Croatia. A great capital has thus been created, not only in terms of value of infrastructure facilities, but also in the light of impulse that has thus been given to economic growth in Dalmatian hinterland and, more broadly, to tourism development in Dalmatia.

## A2 Motorway Zagreb - Macelj

### Krapina - Macelj Section opens to traffic

The last section of the Zagreb-Macelj Motorway has been opened to traffic on schedule, before the start of the tourist season, which is in full harmony with plans defined three years ago. This final section was ceremoniously opened to traffic on June 29, 2007 by Prime Minister Sanader in the presence of numerous guests. Thus the long standing wish of the

Republic of Croatia to link the north and south of Croatia with a high-standard motorway network has been fulfilled. This was also technically the most demanding section because the terrain traversed by the motorway route presented many difficulties. The hilly landscape, geotechnically quite unfavourable for the builders, called for



construction of as many as 6 tunnels and 9 viaducts on no more than 20 km of the route. Unfortunately, as funding obtained during financial closing for this project proved insufficient to build the entire section in full motorway profile, we are now faced with the situation in which 3.7 km of the section near Đurmanec, including the longest structure, Sveta tri kralja Tunnel, have been realized in the semi-motorway profile only.

We are however certain that traffic indicators will very soon show that additional funding must be gathered for the extension to the full motorway profile of this short but very demanding motorway section. 🌱

## A6 Motorway Rijeka - Zagreb

**As of June 15, 2007, drivers enjoy advantages of the full motorway profile on the Vrbovsko - Bosiljevo section.**

For safety reasons and to avoid spreading the works over several tourist seasons, the company Rijeka - Zagreb Motorway has been making efforts, since the onset of works, to reduce the construction time. Quite aware of the situation, the contractors have succeeded in reducing this time, and so the section was completed on June 8, 2007 rather than in September 2007. Thus the work was realized three months ahead of schedule.

The construction work on a part of the Vrbovsko-Bosiljevo section, 8.8 km in total length, included addition of the right-hand (southern) pavement so that the full motor-

way profile can be obtained, and construction of the Veliki Gložac Tunnel (1139 m), Zečeve Drage Viaduct (915 m), Severinske Drage Viaduct (725 m), Osojnik Viaduct (435 m) and Varoš Viaduct (402 m).

The fact that structures account for 3.62 km or one fourth of the route illustrates well the magnitude of this demanding enterprise.

The entire road sector from Zagreb to the Stara Sušica Viaduct has now become, following completion of the Vrbovsko-Bosiljevo section, a full profile motorway, on which drivers will benefit from a much higher level of traffic safety.



The total value of this investment amounts to KN 394 million, which includes the price of construction works, equipment, design and land purchase.

The ceremonious opening of the Vrbovsko-Bosiljevo Section in full motorway profile has marked the completion of the Phase IIA of the Rijeka - Zagreb Motorway construction project. The company Rijeka-Zagreb Motorway has thus gained as many as 102.37 km of the full profile motorway, 13 tunnels, 26 viaducts, and 6 bridges. The remaining 44.13 km of the roadway to be extended to the full motorway profile will be realized by the end of 2008 in the scope of the Phase II B of the Rijeka - Zagreb Motorway construction project.

By completion of the Rijeka - Zagreb Motorway, the motorway network of Croatia will be crowned with an extremely significant high-standard roadway linking Rijeka, our greatest port, with the nation's capital. 



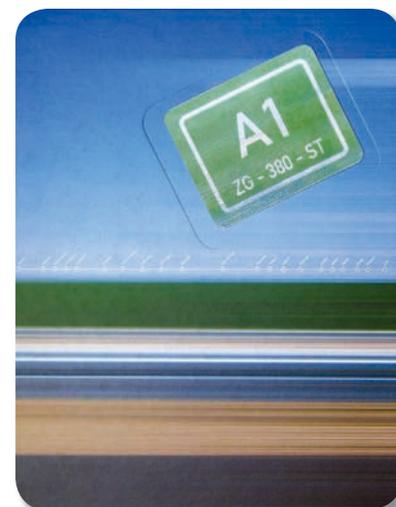
## The company Croatian Motorways publishes monograph A1 ZG-380-ST.

**The company Croatian Motorways publishes a new revised and expanded edition of the monograph A1 ZG-380-ST.**

This monograph presents and evaluates the Zagreb to Split motorway construction project in a personal, yet technically competent and creative way, offering it, embodied in words and pictures, as an inspiration and permanent heritage to future generations. Construction of the Zagreb to Split motorway is a unique enterprise, and may be regarded as one of those rare projects that are realized once in a generation or even once in a century. Although last sections were built rapidly and efficiently, it should be noted that they come as a result of decades of struggle for

realisation of this vision, and as an outcome of the long tradition in engineering education and persistent work of all participants. By ceremonious opening of the 380 km long Zagreb-Split Motorway in 2005, and by ceremonious opening to traffic of the Dugopolje - Šestanovac section in 2007, the north and south of Croatian have finally become linked with a rapid and modern roadway.

This book shows how a long-standing wish of Croatian people has been fulfilled, and is also a tribute to all participants in this remarkable undertaking. 



## Second Croatian conference on road maintenance held in Šibenik

The second Croatian conference on road maintenance entitled "Road Maintenance 2007" was held on the 28<sup>th</sup> and 29<sup>th</sup> of May 2007 in Šibenik. The main theme of the conference was the "Implementation of the Law on Public Roads".

The Law on Public Roads is the basic document that regulates maintenance and protection of public roads, and transport operated on such roads. This is why the analysis of implementation of this Law, and regulations derived from this Law, is an indispensable prerequisite for future activities aimed at boosting the quality of maintenance in order to improve situation on roads and increase traffic safety to the benefit of road users.

### Discussion themes:

- legal framework for public road maintenance,
- planning and implementation of public road maintenance activities,
- protection of public roads and traffic safety.

The conference was organized by HRVATSKI CESTAR, an economic association, together with Hrvatske autoceste d.o.o (HAC), Hrvatske ceste d.o.o., Autocesta Rijeka-Zagreb d.d. and the Society of Croatia's Coun-

ty-Level Road Administrations. The Conference was sponsored by the Ministry of Sea, Tourism, Transport and Development.

The participants were initially greeted by the HAC Board President Mr. Mario Crnjak, and the conference continued with presentations given by the following HAC employees:

### Stjepan Klarić:

Regular motorway maintenance standard

### Danijel Bakliža:

Environment protection and monitoring during motorway maintenance activities

### Zoran Sinovčić:

Byelaw on maintenance of electric power facilities and plants, specialized electric systems, devices and installations

### Željko Pranjić, Tin Dumbović, Tamara Martinčić:

Planning and monitoring regular motorway



maintenance activities via the HAC integrated information system (IISHAC)

### Vesna Čleković and Dino Budimlija:

Road data base in Hrvatske autoceste 

## New radio communication system in Učka Tunnel and radio-transmitted recommendations for Istrian Upsilon users

Fully aware of significance the Učka Tunnel has for linking Istria with inland regions of Croatia, Bina-Istra has installed and put to use a new radio communication system for use in the tunnel. The advanced radio system enables drivers to benefit from an efficient radio link while driving through the tunnel. This investment will increase the tunnel safety level, and will be an added-value to services already offered by Bina-Istra to Istrian Upsilon users.

The new system is of exceptional significance to all emergency teams such as the emergency medical service, police, fire brigade, and the mountain rescue service. When developing this project, Bina-Istra closely cooperated with all emergency services and, as a result, it installed the equipment capable of covering all frequencies used by the mentioned services. To accommodate requirements of the Interior Ministry or police, Bina-Istra installed a special equipment that can support the so called TERrestrial Trunked RAdio system or TETRA.

Not only does the system increase the level of safety and provide better-quality services to the users, it also has another significant feature. In fact, the system enables Bina-Istra to transmit safety messages to drivers while they are passing through the tunnel. By means of pre-recorded typical messages, the drivers are reminded about safety measures and basic traffic rules that have to be respected while driving through the tunnel.

In addition, thanks to the new radio communication system, as many as three radio stations can broadcast their programs in the tunnel, without any interruptions. In order to keep drivers informed at any given moment, the radio system covers broadcasting frequencies used by two regional stations - Radio Istria and Radio Rijeka - with more than half a million of regular listeners, and one national radio station - Croatian Radio's Second Program, which broadcasts full traffic information throughout the day and is the reference radio station for information provided by the Croatian Automobile Association.



Wishing to increase even further the quality of information provided to drivers, and to influence the way the drivers think and thus, indirectly, to enhance driving safety, Bina-Istra launched in early summer a number of radio-transmitted recommendations for Istrian Upsilon users, mostly aimed at cautioning the drivers about high-intensity or slow moving traffic spots along the Istrian Upsilon. These recommendations for drivers are broadcast by the above mentioned three radio stations. 

# Brinje Tunnel

The Brinje Tunnel, operated by Croatian Motorways is this year's winner of the euroTAP tunnel testing campaign. Out of the total of 51 tunnel tested throughout Europe the Brinje Tunnel was ranked first, 18 tunnels were rated very good, 11 good, 12 acceptable, while 10 tunnels received a poor or very poor rating.



The EuroTAP (European Tunnel Assessment Programme) is one of the eight tunnel-safety research projects worth EUR 4.2 million, which are financially backed by the European Commission with EUR 1.5 million. Eleven automobile associations from ten European countries take part in the EuroTAP project. One of them is our HAK (Croatian Automobile Club) which is also the only automobile association from non-EU countries.

### About the tunnel:

The Brinje Tunnel is a bi-tube tunnel situated on the Mala Kapela Tunnel - Žuta Lokva section of the Zagreb - Split - Dubrovnik Motorway (A1 Motorway). The length of the left-hand tube is 1542 m, while the right-hand tube is 1540 m long. The tunnel was opened to traffic in 2004, and both tunnel tubes are in use. The maximum allowable driving speed is 100 km/h. The north portal of the tunnel lies at 496 m above sea level, and the south one is at the altitude of 495 m. In the cross section, the tunnel is formed of two driving lanes each 3.5 m in width, two

marginal strips 0.35 m in width, and the inspection path 0.9 m wide. The new Austrian tunnelling method (NATM) used in tunnel construction proved to be quite appropriate as it is readily adjustable to varied geological conditions encountered along the route. The total value of investment is KN 270 million (or EUR 36 million).

### Tunnel equipment:

The tunnel is equipped with the top-of-the-range traffic monitoring and operation system. The traffic is monitored every day, around the clock, from the Road Maintenance and Traffic Control Centre based in Brinje. It is equipped with video cameras so that the situation in tunnel is instantly shown on monitors in the Traffic Control Centre. The cameras can also automatically detect traffic interruptions, opposite-direction driving, and they can record the number and type of vehicles, and provide full information to the Centre enabling it to foresee and prevent traffic interruptions. Variable message signs are used to issue warning messages and speed limit instructions to the

drivers. The users have at their disposal the SOS communication system for emergency interventions, by which the users can provide information to and seek assistance from the traffic control centre in case of breakdown or an accident. The tunnel is equipped with 10 lay-bys with emergency telephones. Each tunnel tube is equipped with a lay-by for vehicles 40 m long and 3.5 m in width. Emergency escapes for pedestrians are provided via passages (cross cuts), situated at every 240-300 m, which connect the two tunnels. There are 3 such cross cuts in the tunnel.

### Fire protection:

The Brinje Tunnel is equipped with an automatic fire detection and alarm system covering the total length of the tunnel, and with manual fire alarm devices at tunnel portals. It is also equipped with fire hydrant network and manual fire extinguishers.

### Emergency duty service:

24 hours a day emergency service is provided by the HAC fire brigade stationed at the southern portal of the Mala Kapela Tunnel.

### Passenger information service:

An appropriate radio broadcasting system is used to provide radio connection between radio stations in the tunnel and outside radio stations, enabling transmission of one or several public radio programs, and providing helpful information to users listening to the radio inside the tunnel. Radio transmitted information for passengers is provided at the following frequencies: HR 1 - 102.3 MHz and HR 2 - 97.5 MHz. Mobile phones can also be used in the tunnel. 



## Rijeka - Zagreb Motorway adopts SAP, a complex business and information system

Rijeka-Zagreb Motorway implements the SAP system.

SAP is a complex business and information system that will enable us to efficiently organize internal business processes through integrated solutions based on state-of-the-art technologies.

The implementation of the SAP system started in December 2006. It is currently planned that the SAP system will be included in company operations in early September 2007. The version SAP ERP 2004 ECC5.0, based on the OS Platform, Windows 2003 R2 Enterprise Edition, and using Oracle as the relational data base, will be implemented.

The project encompasses implementation according to the ASAP project management methodology, and the project team is formed of the process owners and key users from the ARZ company, and SAP consultants from KING ICT and B4B. The project team is made of approximately 45 persons, which includes Supervisory Board and Project Management staff.

The project involving SAP implementation in ARZ is known as LUX.

Once implemented, the SAP will become the standard business solution in ARZ. It will replace several distinct information systems (applications) that have so far provided an independent support to company operations. After SAP implementation, the complexity of these IT systems will be reduced and business processes will become integrated.

The company will thus obtain a system with an integrated data base and software with a very speedy access, i.e. the data will become available as soon as they are recorded.

The system will enable use of an integrated system for: finances, controlling, long-term asset management, investment management, human resources and payroll management, material book-keeping, sales, and payment and maintenance monitoring activities. In addition, the system will enable storage of great quantities of crucial company data (e.g., data regarding materials, services, suppliers, contracts, cost items, etc.)

The SAP system is highly flexible and thus capable of fulfilling specific operations-oriented requirements, while enabling submittal of



reports in full accordance with instructions specified by the company's top management. Once the entire operations of the company, with all business processes, are covered by this system, the business processes will be operated much faster and the company's efficiency will increase, which will ultimately result in financial savings.

By standardizing our operations as described above, our company will have reached, in this segment as well, the level of the leading domestic and foreign companies, which are fully aware of the significance of information systems for conducting business in a modern and efficient manner. 

## Preservation of Istrian cultural heritage

### Renovation of kažuns (corbelled stone huts) - yet another Bina-Istra project of significance for the local community

In consultation with the Ethnographic Museum of Istria, Ministry of Culture, and the Town of Vodnjan, Bina-Istra has been providing support and funding for the preservation of the southern Istria's cultural heritage along the Istrian upsilon route.

The project, aimed at preserving and renovating kažun huts in Vodnjan area, has been largely supported by Bina-Istra Company which has so far invested the total of 400,000.00 kunas (about EUR 55,000.00) in this laudable work. Bina-Istra initiated the project by financing "disassembly" of kažuns that used to stand along the route of the now already built Vodnjan - Pula section. The huts were disassembled stone by stone, and the

resulting stone blocks were arranged on pallets and transported to the Town of Vodnjan whose authorities provided for their storage. In addition, the same company financed ethnographic survey of all kažuns situated along the route. This survey work was performed by experts from the Ethnographic Museum of Istria. Thus the full ethnographic documentation was prepared for about 200 kažuns (with picture of each individual kažun, its location, coordinates, and description). The Town of Vodnjan also received direct financing which was to be used for remediation and renovation of kažuns in the wider town area.

However, the Town of Vodnjan used this financing not only for renovation purposes,

but also to make local population more aware of the need to preserve the ethnoheritage, and to encourage active participation of town residents and all good-willed people in the renovation of kažuns and dry stone walls. The town organized weekend workshops, opened to public participation, in the scope of which kažuns were renovated stone by stone. By the end of May this incentive has already proven to be highly successful, as about 400 persons took part in this praiseworthy project. They received awards for participation in this renovation work which resulted in full rehabilitation of 4 kažuns and in reconstruction of ten meters of dry stone walls. 



## 35<sup>th</sup> ASECAP Study and Information Days

Following the last year's congress held in Pula and hosted by HUKA, the European association with tolled motorways, bridges and tunnels (ASECAP) organized this year's congress on the island of Crete, in Greece. The congress was held from the 27<sup>th</sup> to 30<sup>th</sup> of May in the tourist resort of Heronissos situated near the Crete's capital Heraklion. The congress was attended by 360 delegates and 150 accompanying persons.



The congress was hosted by the Greek concession company TEO, which is majority-owned by the Greek government. In addition to TEO, Greek motorways are also managed by private companies. Greece currently has 950 km of motorways, and the government's objective is to build the total of 2000 km by the year 2015. In his statement, the State Secretary for Public Works and Environmental Protection noted that the Greek Government opted for public-private partnership (PPP) and concession model for financing motorway construction projects, and that the majority of concession contracts have been advertised or signed in the scope of the program entitled Roads of Development.



### ASECAP STEERING COMMITTEE AND GENERAL ASSEMBLY SESSIONS

The Steering Committee and General Assembly sessions were held before the start of the congress. Mr. Fabrizio Palenzona, president of the Italian AISCAT was elected as new ASECAP president for the next two-year term. Mr. Panagiotis Delimitos from the Greek TEO, Mr. Jose Luis Feito from the Spanish ASETA, and Mr. Henri Stouff from the French ASFA, were elected as Vice-Presidents. The former president Mr. Joao Bento was elected as the honorary president of ASECAP. During the session, the Italian AISCAT presented the new web portal called G.R.E.A.T. This portal hosts the ASECAP glossary which contains an extensive number of definitions relating to the field of road transport. The portal can be accessed through [www.asecap.com](http://www.asecap.com). During the General Assembly session, Poland and Slovakia were granted full membership, while Kapsch became an associate member. The number of ASECAP members has been steadily in-

creasing every year, and so today this organisation has as many as 20 members.

On the first day of the congress, the main topic was the "Revised Transport White Paper and the role of the motorways management as a premise for mobility and growth in the future Europe".

Three themes were considered in the scope of technical sessions: "Optimizing road engineering for improved safety", "The role of Vehicle Infrastructure Integration (VII) in motorways' operations: best practices and future developments", and "Grantor and concessions relations in building, financing and operating a European road network: Indicators of quality". The company Hrvatske autoceste d.d. made its presentation in the scope of the first technical session. Some presentations are already available on the web site [www.asecap.com](http://www.asecap.com).

### INTEROPERABILITY

In the final portion of the round table on the European electronic toll collection services, it was emphasized that it may seem that no progress has been made in reaching interoper-

erability of electronic toll collection systems. However, this is not so as much time had to be devoted to establish the new framework for the future interoperability. Common lines of such framework are now being discussed, regional projects such as PISTA, MEDIA and others, have been developed, etc. Although interoperability will most certainly be reached, it will not happen overnight as highly varied tolling systems are at the negotiating table. The technical aspect is in fact the least of problems encountered in this area. More significant are the issues such as the implementation and enforcement, contractual elements, assuming risks and taking on tasks, as well as legal and tax-related elements. That is why it is of crucial significance that all interested parties keep on participating in discussions about details of future co-operation. The ASECAP Steering Committee is also in favour of continued activity in the scope of the CESARE IV project which should bring some new solutions in this field.

The next congress will be held in Morocco on May 18-21, 2008.



## Statistical data

### TRAFFIC

NUMBER OF VEHICLES ON TOLL PLAZAS

Company	Until the end of June 2007		Total
	Light vehicles (categories 1 and 2)	Heavy vehicles (categories 3 and 4)	
HAC	12.107.442	1.877.071	13.984.513
ARZ	5.275.067	913.853	6.188.920
BINA-ISTRA	1.849.358	216.738	2.066.096
AZM	2.559.511	350.427	2.909.938
<b>TOTAL</b>	<b>21.791.378</b>	<b>3.358.089</b>	<b>25.149.467</b>

### TOLL REVENUES (without VAT)

1EUR = 7,5 KN

Company	Until the end of June 2007		% (07/06)
	KN	EUR	
HAC	522.984.542	69.731.272	16.24
ARZ	184.900.717	24.653.428	16.47
BINA-ISTRA	58.852.369	7.846.983	13.09
AZM	45.569.930	6.075.990	*
<b>TOTAL</b>	<b>812.307.558</b>	<b>108.307.673</b>	<b>15.26</b>

\*As of May 2007, AZM introduced 2 new toll stations thus the data are not yet comparable.

### TRAFFIC SAFETY

Number of traffic accidents:	Until the end of June 2007				
	HAC	ARZ	BINA-ISTRA	AZM	CROATIA
- with fatal casualties	18	6	4	1	<b>29</b>
- with injuries	126	30	16	6	<b>178</b>
- with material damage	667	156	77	9	<b>909</b>
<b>TOTAL number of accidents</b>	<b>811</b>	<b>192</b>	<b>97</b>	<b>16</b>	<b>1116</b>
<b>TOTAL number of deaths in fatal accidents</b>	<b>23</b>	<b>8</b>	<b>4</b>	<b>1</b>	<b>36</b>



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