

CCC 2008
Proceedings



Central European
Congress on
Concrete Engineering

2-3 October 2008
Opatija, Croatia



Hosted by CSSE
Croatian Society of
Structural Engineers

**OPATIJA
2008**



FOUNDING MEMBERS

The 4th Central European Congress on Concrete Engineering



Concrete Engineering in Urban Development

Invitation & programme overview

4CCC SYMPOSIUM – OPATIJA 2008

Organisers



Croatian Society of Structural Engineers

in association with



fib Croatian Member Group

Croatian Society for Concrete Engineering and Construction Technology

Civil Engineering Institute of Croatia

University of Zagreb

Scientific Committee

J. Radić (chairman), Croatia
A. Mihanović, Croatia
Z. Sorić, Croatia
K. Bergmeister, Austria
J. Kollegger, Austria
L. Sparowitz, Austria

G. L. Balázs, Hungary
G. Kolozsi, Hungary
Z. Kovács, Hungary
M. Kalný, Czech Republic
P. Štepanek, Czech Republic
J. L. Vitek, Czech Republic

Organizing Committee

D. Kolić (chairman), Croatia
D. Živni, Croatia
T. Trputac, Croatia
A. Kindij, Croatia
A. Mandić, Croatia

J. Bleiziffer, Croatia
M. Kušter, Croatia
M. Pauser, Austria
V. Šruma, Czech Republic
L. Dancs, Hungary

Scientific Symposium “Concrete Engineering in Urban Development” is the fourth and last event of the first round of the congress series “Central European Congress on Concrete Engineering”. The four founding countries are Austria, Croatia, Czech Republic and Hungary, represented by the following associations:



Message from the organizer

Dear Colleagues

It is my great pleasure to invite you to Croatia on international scientific symposium “Concrete Engineering in Urban Development” in Opatija, from 2nd to 3rd of October 2008.

This is the fourth Central European Congress on Concrete Engineering which brings together scientists and professionals from Austria, Croatia, Czech Republic and Hungary, as well as around the world. This event marks the end of the first round of CCC which started in 2005 in Graz, was then continued in 2006 in Hradec Kralove, in 2007 in Visegrád and has now arrived to Opatija. The new cycle starts next year in Austria’s Baden. Several topics have been elaborated over the past years – fibre reinforced concrete in practice, concrete structures for traffic network, innovative materials and technologies for concrete structures, while Opatija symposium is focusing on the role of concrete engineering in urban development.

Urban development for attractive and sustainable environment is a major challenge for all European countries and cities. Advanced techniques and know-how is required to improve the health, comfort, security and safety of people in closed and open spaces of the urban environment. Innovative concrete engineering could be the key to build cities of the future by increasing quality and efficiency while respecting and preserving natural and man-made environment.

This symposium provides forum for presentation and discussion of current activities and further progress in concrete engineering in urban development. The topics on which the symposium will focus include:

- project development and financing
- traffic structures
- water and environment
- residential and office buildings
- architectural shapes in urbanistic views

More than 100 contributions have been received and reviewed by the symposium scientific committee. Once again, it is my pleasure to invite you to visit the pearl of Adriatic – the city of Opatija, to join our efforts in progressing towards set goals.

Jure Radić
Croatian Society of Structural Engineers Chairman



PROGRAMME OVERVIEW

(Preliminary 15 July 2008)

1 October 2008 WEDNESDAY	
17:00 – 20:00	Registration
20:00	Welcome cocktail
2 October 2008 THURSDAY	
08:00 – 09:30	Registration
09:30 – 11:30	■ Session 1: Opening & keynote lectures
11:30 – 12:00	Coffee break & Opening of 4CCC Stands, poster session & exhibition
12:00 – 13:30	■ Session 2A: Traffic 1 ■ Session 2B: Design 1
13:30 – 14:45	Lunch break & exhibition
14:45 – 16:15	■ Session 3A: Traffic 2 ■ Session 3B: Design 2+Architecture
16:15 – 16:45	Coffee break & exhibition
16:45 – 18:30	■ Session 4A: Traffic 3 ■ Session 4B: Buildings 1
20:00	Banquet
3 October 2008 FRIDAY	
07:00 – 08:00	Water polo in the swimming pool on the terrace
09:00 – 10:30	■ Session 5A: Traffic 4 ■ Session 5B: Materials 1
10:30 – 11:00	Coffee break & exhibition
11:00 – 12:45	■ Session 6A: Buildings 2 ■ Session 6B: Materials 2
12:45 – 14:00	Lunch break & exhibition
14:00 – 15:30	■ Session 7: Traffic 5 & closing
15:30 – 18:30	Technical visit to Krk Bridge

■ Main Hall

■ Kamelija II Hall

Technical programme

KEYNOTE PAPERS

J. Radić (Croatia)

Concrete Engineering in Urban Development of Croatia

H. Wetschnig (Austria)

Austrian Concrete Projects in Urban Development

J.L. Vitek & P. Šourek (Czech Republic)

Contemporary Development of Traffic Infrastructure in Prague

G.L. Balázs & G. Tassi (Hungary)

Concrete Structures for Urban Development in Hungary

TECHNICAL CONTRIBUTIONS

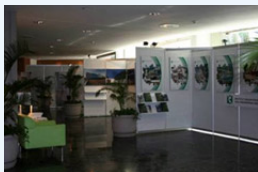
More than 100 technical contributions have been received and reviewed by the scientific committee. Detailed technical programme will be announced on the symposium website www.grad.hr/4ccc

Selected number of papers is scheduled for oral presentations and others will be delivered as posters.

EXHIBITION

Commercial Exhibition will be open in the Symposium Venue of the Ambassador Hotel. This will be a good opportunity for companies to display their projects, products and services.

If you wish to book a booth please check the symposium website at www.grad.hr/4ccc or contact the organizer at 4ccc@grad.hr or +385 1 4639 402.



TECHNICAL VISIT

3 October
Friday
15:30-18:30

KRK BRIDGES

25 persons minimum

Krk Bridge consists of two large reinforced concrete arch spans providing a fixed road link to the Island of Krk. The bridge was constructed using an innovative method in which concrete spandrel columns, temporary steel tension tie top chords and diagonals were combined to form a truss. With a span of 390 m the Krk bridge is still the largest conventional reinforced concrete arch span in the world, 28 years upon its completion. The span of the smaller arch is 244 m.

The repair works on the Krk bridge started several years after its completion with installation of laminated bearings and strengthening adjacent structural elements. In the 1990s the works were broadened to include the repair of columns of the smaller arch. The smaller arch has been recently repaired by removal of the contaminated concrete, its subsequent replacement with shotcrete and adding protective coating. The repair of the larger arch presents major challenge to bridge engineers. The arch is supported on submerged inclined struts. After many years of research and testing various corrosion protection systems, cathodic protection method was selected for this part of the structure.

The technical visit to the Krk bridge will be guided by engineers involved in repair & rehabilitation project.



Please confirm the attendance of the technical tour in the [registration form](#).

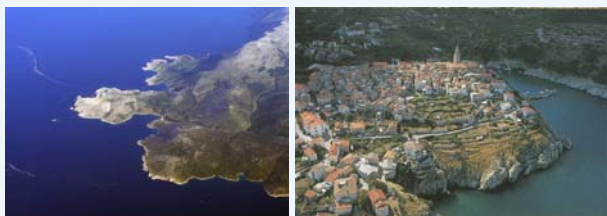
TOURS (optional)

2 October
Thursday
09:30-18:00

KRK ISLAND TOUR

Price: 65 € - 25 persons minimum

Trails of the rich history can be found in the roman mosaics, small medieval churches or glagolitic monuments, enter with us in the rich past of the Krk island. Our first destination will be a place called Punat, well known for the manufacture of the olive oil. From Punat a small boat will take us to the island of Košljun (ride takes around 10 minutes).



Košljun Island has been inhabited since Roman times, and from 12th century the island has been inhabited by the priests. On the island there is a Franciscian monastery and a museum. In the museum there are different expositions: ethnographical, sacral, archeological, numismatic. It is one of the cultural centers in Croatia - island of peace and tranquility.



After visiting Košljun, we visit the town of Krk. Krk is the capital of the Krk island, strolling down the streets we will see the old city walls, the "Frankopan" castle from the 12th century, and a cathedral built on the remains of the roman spa from the 1st century. On the end of our trail we will visit Vrbnik – town situated on a 50 m high cliff, surrounded with the sea from one side and with fertile vineyards from the other side.

Lunch in a typical restaurant is included.

To book a tour please contact Conference Secretariat at 4ccc@grad.hr

TOURS (optional)

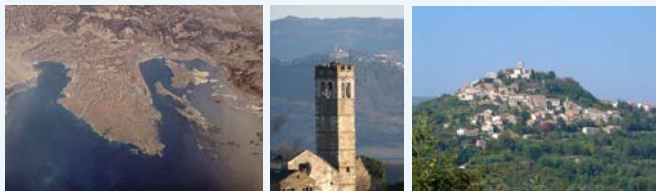
3 October
Friday
09:30-18:00

TOUR OF ISTRIA – DELICIOUS OF ISTRIA

Price: 60 € - 25 persons minimum

Situated near the base of the Istrian peninsula Pula is the largest city in Istria. One of the most famous sights in the whole of Croatia is the Roman amphitheatre in Pula, which has been well preserved. Built during the 1st century AD, the three-story amphitheatre is the sixth largest in the world.

Green Istria is the right place for all those who have enough of city life, crowds, who wish to return to nature, to its peacefulness and tranquility. The inland Istria is showing a growing number of agro tourism points (today reaching the number of around 200). The accommodation units are constructed in typically Istrian tradition, usually called Istrian taverns, mostly isolated. Istria is a homeland the world known truffle.



The culinary chefs agree upon one thing only: the truffle should be placed at the very top of the gastronomic delicacies list. The truffle is a mysterious and unique tuber, completely concealed underground. A specialty added to foodstuff, known for its quality and used since the ancient Roman times is olive oil.

And what about wine...it is enough to say that the Istrian peninsula has a form of a grape ...Malmsey (Malvazija), Terran...Cheers! If you ate too much, a glass of biska, a traditional Istrian grape brandy with leaves of mistletoe or komovica will certainly help. Istrians have been historically devoted to the grapevine. A proverbial saying confirms it : *Bread is for the flesh and wine is for the soul*

Lunch is included.



To book a tour please contact Conference Secretariat at 4ccc@grad.hr

REGISTRATION

REGISTRATION FEES		Before July 31	After July 31
	Author Participant	300 €	350 €
	Accompanying Person	150 €	150 €
	Student	50 €	50 €

To register please fill out the Symposium Registration Form and send it by fax or by e-mail to the Symposium Secretariat:

- fax: [+385 1 4828 052](tel:+38514828052)
- e-mail: 4ccc@grad.hr

The participant registration fee includes:

- Proceedings as a printed volume as well as on CD-ROM
- Conference bag
- Admission to all Technical Sessions
- Refreshments & lunches
- Welcome Cocktail on Wednesday 1 October 2008
- Banquet on Thursday 2 October 2008
- Technical visit on Friday 3 October 2008 (please confirm your attendance in the registration form)

Accompanying Persons

- Welcome Cocktail on Wednesday 1 October 2008
- Banquet on Thursday 2 October 2008
- Accompanying person bag

REGISTRATION DESK Working hours	The registration desk will be located at the Conference Venue of the Hotel Ambassador. We advise you to collect your registration documents as soon as possible after your arrival at the hotel. Our staff at the registration desk will be pleased to assist you with all your enquiries.	
	Wednesday, October 1	17:00-20:00
	Thursday, October 2	08:00-09:30

VENUE & ACCOMMODATION

VENUE

The conference will be held in the Congress Hall of the Hotel "Ambasador" in Opatija, Croatia.

ACCOMMODATION



Ambasador Hotel *****

We recommend the accommodation at the Ambassador Hotel where the conference venue is located, and special discount rates will be available for conference participants. This is a top five-star hotel, the leading business-convention, incentive and resort hotel of the Kvarner region.

Rooms: 227 rooms and suites with balconies - air conditioning, mini bar, hair-dryer, IDD telephone with automatic message alert, ISDN line (on request), Sat./Pay TV.

Leisure: outdoor swimming pool, sun terrace, indoor pool with heated sea water, sauna, massage, solarium. Business center, offices and PC units for rent. Parking lot (100 vehicles) and underground garage (60 vehicles) with direct access to the hotel.

To benefit from the special hotel rates, booking must be made using accommodation form available from symposium website www.grad.hr/4ccc, and not later than 19 September 2008.

Felixa Peršića 5, 51410 Opatija, Croatia

Tel: +385/(0)51/74 33 33

Fax: +385/(0)51/74 34 44

e-mail: ambasador@liburnia.hr

website: www.liburnia.hr

Single room bed&breakfast 89 € / day

Double room bed&breakfast 130 € / day

Taxes are not included (cca 1,50 € per person per day)

VENUE & ACCOMMODATION

ACCESS



BY CAR

Via Slovenia: Ljubljana - Postojna (Pivka) - Rupa (Jelsane) border crossing - Opatija

Via Italy: Trieste - Kozina border crossing - Pasjak border crossing - Rupa (Jelšane) - Opatija

Via Zagreb: motorway A1&A6 Zagreb - Karlovac - Rijeka - Opatija

Route planner is available at

<http://www.visitopatija.net/kakodonasauto.do?lang=en>

BY TRAIN

The nearest train stations:

Matulji, 5 km from Opatija, +385 51 274 102

Rijeka, 15 km from Opatija, 385 51 211 111

Zagreb, 200 km from Opatija, +385 060 333 444

Information about travelling within Croatia:

www.hznet.hr

Arriving from Italy, the nearest station is Trieste.

More information: www.fs-on-line.it

BY PLANE

The nearest airports:

Rijeka Airport, Krk Island (RJK) www.rijeka-airport.hr,

45 km from Opatija, app. 1 hour by car (organized bus transportation to Rijeka, 30 mins drive)

Zagreb Airport (ZAG) www.zagreb-airport.hr

190 km from Opatija, app. 2 hours by car

Pula Airport (PUY) www.airport-pula.hr

100 km from Opatija, app. 1 hour by car

Ronchi dei Legionari Airport, Trieste, Italy (TRS)

www.aeroporto.fvg.it

110 km from Opatija, app. 1 hour by car

Ljubljana Airport, Slovenia (LJU) www.lju-airport.si

130 km from Opatija, app. 1.5 hours by car

Marco Polo Airport, Venice, Italy (VCE)

www.veniceairport.it

250 km from Opatija, app. 2.5 hours by car

VENUE & ACCOMMODATION

ACCESS

BY COACH

Arrivals from Zagreb:

+385 (0) 60 313 333

+385 (0) 60 340 340

www.akz.hr

Arrivals from Rijeka:

+385 (0) 51 660 360

www.autotrans.hr

Arrivals from Trieste:

www.croaziainfo.it

Arrivals from Ljubljana:

<http://www.ap-ljubljana.si/eng/>

BY BOAT

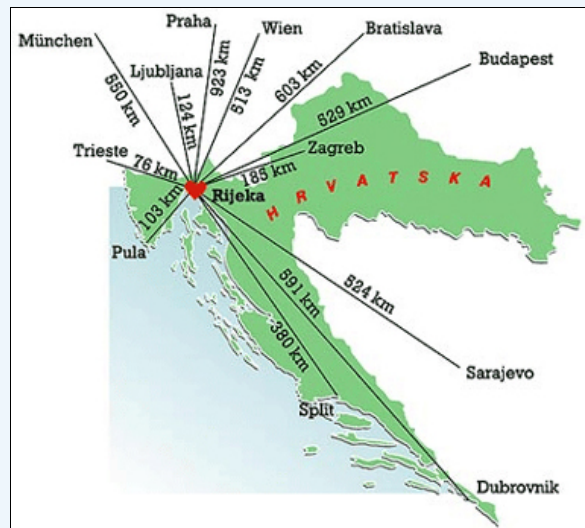
If you plan to travel by sea please visit following sites:

Opatija Harbour

<http://www.opatija.net/nautika.asp?l=en>

Ferry lines in Croatia

www.jadrolinija.hr



TRAVEL TIPS

Travelling documents: A passport or some other identification document recognised by international agreement. Visa requirements may be checked at www.mfa.hr. The Conference Secretariat in Zagreb will be pleased to send an official letter of invitation to obtain visa, upon request. It is understood that such an invitation is not a commitment on the part of the organizer to provide any financial support. Please contact 4ccc@grad.hr

Croatian Currency: Croatian kuna (HRK or Kn). Exchange rates are (May 2008): 100 € = 725 Kn, 100 Kn = 13,8 €. Credit cards are accepted in almost all hotels, marinas, restaurants and shops (American Express, Diners, Eurocard/Mastercard, Visa)

Time zone: GMT +1 in winter and GMT +2 in summer.

Electricity: 220V, 50 Hz. Connection for appliances is 2-pin plug.

Water: Tap water is potable throughout Croatia

Allowed speed: 50 km/h - within residential areas; 80 km/h - outside of residential areas; 100 km/h - on major roads; 130 km/h - on motorways

Important telephone numbers: International dialing code for Croatia: 385

Ambulance service: 94

Fire brigade: 93

Police: 92

Automobile breakdown service: 987

General information: 981

Information on local and long-distance telephone numbers: 988

Information on international telephone numbers: 902

[Croatian Automobile Club \(HAK\)](#): +385 - (0)1 - 4554 433 or 4640 800

Customs regulations: Customs regulations of the Republic of Croatia are harmonised with the standards of EU Member States. Foreign currency can be freely brought in and out of the country; domestic currency: up to 2,000 HRK. Professional and technical equipment of a high value should be reported at the border. Accompanied dogs and cats must have an International Certificate issued by an authorised veterinarian evidencing that at least 15 days, but not more than six months, passed since the vaccination against rabies. Tax refund to foreign citizens for purchased goods exceeding 500 kuna, providing that the form entitled "Porezni cek" ("Tax Cheque") is stamped by customs officers upon leaving the country. Information: [Customs Administration of the Republic of Croatia](#) (Tel: +385 - (0)1 - 6102 333)

Medical service: Foreign tourists do not pay for medical services if the Health Care Convention was signed between Croatia and the country they come from. Expenses of health services provided to persons coming from the countries with which the Health Care Convention was not signed are charged directly to users according to the price list. There are hospitals and clinics in all the major towns, and health centres, as well as pharmacies, in all smaller places. For patients whose lives are in danger, there is emergency transport by air (helicopter) or sea (speedboat).

TRAVEL TIPS

Working hours: Shops and department stores are open between 8 a.m. and 8 p.m., and on Saturdays from 8 a.m. to 2 p.m., or to 3 p.m. A smaller number of stores close between noon and 4 p.m. Many stores are also open on Sundays, especially in the summer, and a smaller number in the larger cities are open 24 hours a day. Public services and companies usually work from 8.30 a.m. to 4.30 p.m. from Monday to Friday.

Environment protection: Protection of biodiversity is in accordance with the valid EU regulations. As regards bathing, the sea at the Croatian Adriatic is of high quality according to EU criteria. In case of an accident or pollution of the sea, please advise the National Centre for Search and Rescue at Sea to the telephone 9155(toll-free telephone), which is included in the network of international institutions of the same level. In case of an extraordinary pollution of the environment on the mainland, please inform the National Centre for Notification, the telephone number 985 or the Police the telephone number 92. Additional information about environment and health care: Tel: 0800 200 037

Radio news in foreign languages during the tourist season: On the second Channel of the Croatian Radio along with regular news, HAK will be giving reports on road conditions in the English, German and Italian language, and several times a day also information for boaters. Also on the Second Channel of the Croatian Radio, every hour on the hour, news and reports on the conditions of the roads are broadcast in alteration directly from the studios of: the Third Programme of the Bavarian Radio, the Third Programme of the Austrian Radio, RAI Uno and the British Virgin Radio.

Climate: Opatija has a mild Mediterranean climate. Thanks to its location below Učka mountain, the climate is gentle with enough moisture, and that is why Opatija is famous for rich vegetation and its parks. The bathing season lasts from June to the end of September, and winters are gentle. That makes the rest in Opatija pleasant through the whole year.

Climate in Opatija	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max temperature (°C)	8	10	12	16	21	25	29	28	24	19	14	10
Min temperature (°C)	2	3	5	8	12	15	18	18	15	11	7	3
Hours of sunshine	4	4	6	7	6	10	11	10	8	6	4	3
Rainy days	7	6	7	7	6	5	4	4	5	7	9	9
Water temperature of the Adriatic	11	10	11	13	17	21	23	24	22	19	16	13

7-day weather forecast for the region is available from Meteorological and Hydrological Service website www.dhmz.hr

Opatija



Welcome!



Croatia