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WHAT'S NEW AT ISCP

10th ICCP UPDATES!Early Registration Ends March 31st

Planning to go the 10th International Conference on Concrete Pavements in Quebec in July? Register now to save \$100 (\$50 for students)! Early-bird registration rates expire March 31, 2012!

Register online now at: <http://www.concretepavements.org/10thiccp/registration.htm>. View the conference brochure online and download a printable flyer and registration form at: http://www.concretepavements.org/10thiccp/10th_iccp_flier_jan_12_low_res.pdf (1.3 MB). For the 10th ICCP details, please go to: <http://www.concretepavements.org/10thiccp/index.htm>.

Preliminary Conference Program Now Available Online

A preliminary program for the 10th ICCP has been posted online at: <http://www.concretepavements.org/10thiccp/program.htm>.

This program includes a listing of all accepted papers (titles and authors), as well as the tentative times and dates of all workshops, posterboard displays, exhibit hall activities and other conference events. Additional and final conference program information will be posted at this same site as it becomes available.

Le Festival d'été: A Wonderful Bonus During 10th ICCP in Québec!

While at the Conference, enjoy the **Québec City Summer Festival: July 5-15, 2012!** Located in the heart of Old Québec, *Le Festival d'été* has been the biggest outdoor music and arts festival in Canada since 1968 and will be occurring during the 10th ICCP! It combines 12 indoor and outdoor arenas and celebrates various music genres through nearly 300

performances by more than 100 musical acts, including such widely known bands as *LMFAO* and *Aerosmith*. In addition, *Cirque du Soleil* will bring a unique show to the summer festival in 2012! Jugglers, acrobats, stilt walkers and troupes of fascinating performers will captivate crowds in the winding streets of Old Québec!

The kids will love *Place de la Famille* for family fun and games all day long. Québec City will turn into an artistic center where all of the coffee houses and bars will offer shows of eclectic music...the whole city will be celebrating!

Admission to Le Festival requires a wristband

Wristbands are limited and will be distributed on a first-requested, first-served basis. They **must be requested by April 15th** on your Delegate or Exhibitor Registration form. The wristbands will be available in May. Please see the official website of *Le Festival d'été de Québec* for more information: <http://www.infestival.com>.

ISCP Welcomes Sponsors for the 10th ICCP

The International Society for Concrete Pavements (ISCP) welcomes sponsors for the 10th International Conference on Concrete Pavements (10th ICCP). Sponsorships are offered at four (4) levels: Platinum, Gold, Silver and Bronze.

For details on Sponsorship Opportunities, please go to: <http://www.concretepavements.org/10thiccp/sponsors.htm>

To become a sponsor, please contact: Sherry Sullivan, *Sponsorship Coordinator*
Phone: (416) 449-3708 ext. 234

E-mail: conference.sponsorships@concretepavements.org

SPONSORS:

PLATINUM Holcim (Canada), Inc.
GOLD American Concrete Pavement Association (ACPA)
Cement Association of Canada

GENIVAR
Ministry of Transportation of Ontario
National Precast Concrete Association (NPCA)
U.S. Federal Aviation Administration (FAA)

SILVER CEMEX
Concrete Reinforcing Steel Institute (CRSI)
Wirtgen

BRONZE Canadian Airfield Pavement Technical Group
Manitoba Infrastructure and Transportation
Stantec Consulting Ltd.

COLLABORATORS:

CP Tech Center
EPAVE
Federal Highway Administration
Office du tourisme de Québec
Transportation Association of Canada
Transportation Research Board (TRB)

CONFERENCE HOST:
Transports Québec

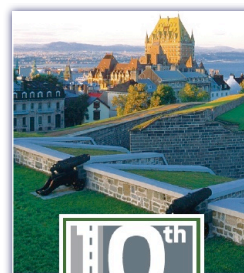
Transports
Québec



the
biggest
outdoor
music and
arts festival
in Canada
since 1968



Photo: Steve Deschênes



JULY 8-12, 2012
QUÉBEC CITY, QUÉBEC, CANADA

ORGANIZED BY:
INTERNATIONAL SOCIETY
FOR CONCRETE PAVEMENTS
IN COLLABORATION WITH
TRANSPORTS QUÉBEC

WWW.CONCRETEPAVEMENTS.ORG/10THICCP/
Photo: Québec's Summer Festival, featuring the Québec City skyline and the historic Old Québec.



Cement
Association
of Canada
Association
Canadienne
du Ciment



National Concrete Pavement
Technology Center



Stantec





All current ISCP Members are eligible to join the blog.

Visit & Connect on ISCP's Linked in Professional Networking Group



Join ISCP's free LinkedIn group. LinkedIn is a professional business-oriented networking site: <http://www.linkedin.com/home>. The ISCP group was created in 2011 as an international forum and blog space to specifically facilitate concrete pavement knowledge sharing, technical interaction, exchange of information and networking between current ISCP members.

Some discussion guidelines for the blog are as follows:

- Technical questions / responses / comments on concrete pavement topics are highly encouraged.
- All questions and responses should be posted in a professional manner.
- Members should avoid republishing information from any past forums.

The blog may be reached at the following web address for LinkedIn members:

<http://www.linkedin.com/groups?mostPopular=&gid=3760764>.

For questions about the policies or terms and conditions, please contact the ISCP LinkedIn moderator, Jeff Roesler at: jroesler@illinois.edu.

CONFERENCE NEWS

3rd Workshop on Innovations & Modeling for Sustainable & Resilient Concrete Pavements will Precede the 10th ICCP in Québec

The 3rd Workshop on Innovations and Modeling for Sustainable and Resilient Concrete Pavements will precede the 10th ICCP in Québec on July 5-7, 2012 at the Manoir du Lac Delage, in Lac Delage. The workshop hotel is 25 km north from Québec City. This workshop will be the third in a series of fundamental workshops sponsored by the International Society for Concrete Pavements (ISCP). The theme of the 2012 workshop will be "Theoretical Modeling Requirements for Sustainable Concrete Materials, Technologies and Rigid Pavements". This workshop aims to bring together experts in concrete materials characterization, mechanics, modeling and design to critically discuss and develop concepts to address existing limitations, lack of knowledge, and future direction for improvement of concrete pavement analysis, design and construction.

The workshop registration and a speaking spot reservation **deadlines** are on or before **May 1, 2012**.

The registration fee of \$350 USD includes the workshop registration, as well as breakfasts, lunches and dinners. Spouses/Guests are welcome for meals (\$225USD). To register, please go to the ISCP website: www.concretepavements.org/3rdworkshop/.

Participants must reserve and pay for their own hotel room at the workshop location, *Manoir du Lac Delage*. Please go to: (www.lacdelage.com) and use the **registration code: 161839**.

Rooms rates are between \$124CDN and \$139CDN plus taxes.

Questions and proposed abstracts for participants registered for the workshop should be sent to:

Jeff Roesler (jroesler@illinois.edu) or Lev Khazanovich (khaza001@umn.edu).



EUPAVE & CIMbéton to Host Dedicated Bus & Tram Lanes Seminar in Paris, France

The European Concrete Paving Association (EUPAVE) and The Cement and Concrete Information Centre (CIMbéton) are hosting a two-day technical seminar and site visit: "Dedicated Bus and Tram Lanes", June 7-8, 2012 in Paris, France.

Speakers will discuss the new developments and advantages of dedicated lanes and visit two worksites to observe the on-site practice.

For information, please go to:

<http://www.eupave.eu/newsletter/newsletter15-012012.xml?lang=en>

For information through e-mail, please go to: info@eupave.eu



23rd Annual Concrete Materials Computer Modeling & Durability Workshop to be Held in July in Gaithersburg, Maryland, USA

NIST The National Institute of Standards and Technology (NIST), an agency of the U.S. Department of Commerce, will be hosting the 23rd Annual Concrete Materials Computer Modeling and Durability Workshop. The workshop is sponsored by the RILEM Educational Activities Committee (EAC) and will be held July 16-20, 2012 in Gaithersburg, MD USA. For the last 22 years, this workshop has provided a forum for more than 600 students, faculty, and researchers from industry and government to learn more about computational and experimental methods that are being used to understand, predict and improve concrete performance. The workshop's goal is to provide a background on the theoretical, computational and experimental approaches to understanding the processing and performance of concrete materials. Both computational modeling and experimental measurements are



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Institute - PRI

University of
Illinois at Urbana
Champaign, Illinois



Computer Modeling Workshop

16-18 July 2012



crucial for improving the assured delivery, performance and sustainability of concrete.

The NIST Computer Modeling Workshop series focuses on the computational and experimental materials science of concrete, including simulation of micro-structural development and prediction of physical properties. Lectures on experimental methods will show how techniques like neutron scattering, electron microscopy and various X-radiation probes (like diffraction and tomography) are used to inform and validate models. This portion of the workshop will feature a series of tutorial-style lectures, including a detailed hands-on tutorial on the installation and use of NIST's Virtual Cement and Concrete Testing Laboratory software.

The 2012 workshop, sponsored by The RILEM Educational Activities Committee (EAC), offers the following:

- (1) participating PhD students may be entitled to a 3-year FREE membership in RILEM
- (2) RILEM EAC can, as an independent body, legitimize course points (work load)
- (3) RILEM EAC can issue certificates for course participation.



The deadline for **registration** is **June 30, 2012**.

To register online, please go to:

https://www-s.nist.gov/CRS/conf_disclosure.cfm?conf_id=5142

For more information, please go to:

http://www.nist.gov/el/building_materials/modeling-workshop.cfm.

For a list of accommodations, please go to:

http://www.nist.gov/el/building_materials/upload/WorkshopHotels.pdf.

For questions about the workshop, please contact:

Mary Lou Norris, *Public and Business Affairs Office*

E-mail: marylou.norris@nist.gov | Phone: (301) 975-2002

International Conference on Long-Life Concrete Pavement (LLCP) 2012 to be Held in September in Seattle, Washington, USA

Registration has begun for the International Conference on Long-Life Concrete Pavements, which will be held in Seattle, Washington at the Sheraton Seattle Hotel in Seattle, Washington on September 18-21, 2012. This 2½-day conference is being organized by the Federal Highway Administration (FHWA) and the National Concrete Pavement Technology Center as part of technology transfer activities under the Advanced Concrete Pavement Technology (ACPT) Program that operates within FHWA.

The conference will provide an international forum to address various aspects of concrete pavement design, construction and materials technologies that result in long life for sustainable concrete pavements. The focus of the conference will be implementable design; concrete materials; construction, maintenance and rehabilitation techniques that result in long-lasting concrete pavements. The LLCP Conference is targeted at Federal, State and Municipal engineers; consulting engineers; contractors; materials suppliers; and academia who are involved with pavement, materials and geotechnical engineering in various aspects of concrete pavement design, construction, testing, evaluation and rehabilitation.

The conference program will consist of about 40 peer-reviewed papers/presentations on best practices related to LLCPS and will include:

- 2 forums of invited presentations from U.S. highway agencies
- Poster program targeted at research in progress
- Mini-symposium on concrete pavement durability: A primary requirement for achieving long-life concrete pavements (under site-specific exposure conditions)

The Preliminary Conference Technical Program consists of:

- | | |
|--|--|
| • Plenary Session | • SHRP2 LLCP Products |
| • U.S. Long-Life Pavement Practices | • Sustainability Considerations |
| • Optimizing Design for LLCPS | • National Concrete Consortium Forum |
| • Optimizing Materials for LLCPS | • Concrete Pavement Durability Symposium |
| • Considerations for LLCPS | • Concrete Pavement Durability Symposium (Part II) |
| • Long-Life Repairs and Rehabilitation | • Poster Program |

Registration dates are: **Early May 31, 2012**
Late July 31, 2012
Very Late after July 31, 2012

For conference information, please go to:

<http://www.fhwa.dot.gov/pavement/concrete/2012conf.cfm>.

To register, please go to:

http://registeruo.niu.edu/iebms/wbe/wbe_p1_main.aspx?oc=40&cc=WBE4012096.

If you are a potential **exhibitor**, please secure your spot as soon as possible.

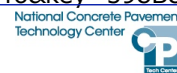
For more information about the conference and about the exhibitor program, please contact:

Shiraz Tayabji, Fugro Consultants, Inc.: Phone: 410-302-0831 | E-mail: stayabji@aol.com

To reserve a hotel room, please call: 1-800-325-3535


or for the Conference Hotel website, please go to:

<http://www.starwoodmeeting.com/StarGroupsWeb/res?id=1111041746&key=598B8>.



4th International Conference on Accelerated Pavement Testing to be Held September 19-21 in Davis, California, USA

Registration is underway for the 4th International Conference on Accelerated pavement Testing (APT2012), sponsored by The Transportation Research Board Full-Scale and Accelerated Pavement Testing Committee (AFD40) and Co-Hosted by the University of California Pavement Research Center (UCPRC) and Illinois Center for Transportation. This conference provides a forum for participants to address the various aspects and benefits of accelerated pavement testing (APT) from an international perspective. It also provides attendees with an opportunity to share their knowledge and experiences, and to gain insight into needs and upcoming trends for future developments in accelerated pavement



**APT
2012**

4th International
Conference on
Accelerated
Pavement Testing

Davis, California, USA
September 19-21, 2012

testing. The theme for the conference is "Implementation of APT Results".

Registration Deadlines:

- Early Bird April 1, 2012
- Standard April 2- August 16, 2012
- Late August 17 - September 10, 2012
- Sponsored Student August 15, 2012
(a limited number for currently registered students and post-doctoral students within 18 months of graduation)

To register and for more information, please go to:

<http://www.ucprc.ucdavis.edu/apt2012/>

For questions about the conference, please contact:

David Jones, Pavement Research Center, University of California, Davis

Phone: (530) 754-4421 | E-mail: djjones@ucdavis.edu

For sponsorship opportunities, please contact:

Helen Bassham, Conference Logistics Lead, Technology Transfer Program

Phone: (510) 665-3628 | E-Mail: hbassham@berkeley.edu

Conference Co-Chair: Imad L. Al-Qadi, University of Illinois Center for Transportation

John Harvey, University of California Pavement Research Center

Angel Mateos, CEDEX, Spain



INDUSTRY RESOURCES

First 2012 Issue of CP Road Map E-News Now Available

The CP Road Map E-News is the newsletter of the Long-Term Plan for Concrete Pavement Research and Technology (CP RoadMap), a national research plan developed and jointly implemented by the concrete pavement stakeholder community.

Moving Advancements into Practice (MAP) Brief

The January-February 2012 MAP brief describes the use of precast concrete pavements in the United States and in other countries. For the full newsletter, please go to:

<http://www.cproadmap.org/publications/e-news.cfm#map>

News from the Road

Maryland DOT Investigates Use of Concrete Maturity Method

In the report, *Implementation of the Concrete Maturity Meter for Maryland*, Morgan State University researchers evaluated the use of the concrete maturity method for determining concrete strength.

To read this article, please go to: <http://www.cproadmap.org/publications/e-news.cfm#NR1>.

The National CP Tech Center Publishes Comprehensive Study on Pervious Concrete

The October 2011 report, *An Integrated Study of Pervious Concrete Mixture Design for Wearing Course Applications*, presents the results of a comprehensive study on portland cement pervious concrete (PCPC). In this study, the researchers conducted a variety of fundamental material property investigations, including the role of air entrainment, effect of de-icing on durability, and mixture proportions.

To read this article, please go to: <http://www.cproadmap.org/publications/e-news.cfm#NR2>.

To download a pdf of the full report, please go to:

http://www.intrans.iastate.edu/reports/pervious_overlay_report_w_cvr.pdf

National Concrete Pavement
Technology Center



Wisconsin DOT Explores Lowering the Cementitious Materials Content of Concrete Pavements

A study designed to explore the feasibility of reducing the cementitious materials content (CMC) in concrete pavements is outlined in the recent report, *Reduction of Minimum Required Weight of Cementitious Materials in WisDOT Concrete Mixes*. The cementitious materials considered in this study included portland cement, fly ash and ground granulated blast furnace slag.

To read this article, please go to: <http://www.cproadmap.org/publications/e-news.cfm#NR3>

To download the pdf of the article, please go to:

<http://wisdotresearch.wi.gov/wp-content/uploads/WisDOT-WHRP-project-0092-08-08-brief.pdf>

This work is meeting research needs identified in CP Road Map Track 1: *Materials and Mixes for Concrete Pavements*: <http://www.cproadmap.org/research/Track1.cfm>



Michigan Researchers Evaluated Use of Recycled Concrete for New Construction

In the report, *Using Recycled Concrete in MDOT's Transportation Infrastructure - Manual of Practice*, Michigan researchers analyzed the use of crushed concrete aggregate (CCA) as an aggregate source in new construction. CCA is a granular material manufactured by removing, crushing, and processing existing concrete pavement for reuse as virgin aggregate. To read this article, please go to:

<http://www.cproadmap.org/publications/e-news.cfm#NR4>.

To download the pdf of the the report, please go to:

http://www.michigan.gov/documents/mdot/MDOT_Research_Report_RC1544_368544_7.pdf



Pavement demolition equipment:
a) diesel hammer
b) multi-head pavement breaker
c) resonant breaker
(Hoerner et al. 2001).

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VOLUME 9, NUMBER 3

Updates from the States: Oklahoma

Ongoing and completed research in Oklahoma is addressing research needs outlined by the CP Road Map. In the State of Oklahoma, concrete pavement research is coordinated through the Oklahoma Department of Transportation (ODOT) Research, Development and Technology Transfer (RDTT) Program. This program identifies research needs, arranges for the conduct of, and secures appropriate funding for research projects with specific objectives and prescribed timeframes. To read this brief article, please go to: <http://www.cproadmap.org/publications/e-news.cfm#DOT>.

For a pdf version of the January-February CP Road Map issue, please go to: <http://www.cproadmap.org/publications/MAPbriefJan-Feb2012.pdf>

If you'd like to find out more about the CP Road Map or learn how you can get involved, please contact Dale Harrington, *Program Manager*:
Phone: 515-964-2020 | E-mail: dharrington@snyder-associates.com.

NEW RESEARCH REPORTS

Mechanistic Modeling of Unbonded Concrete Overlay Pavements

Roberto Ballarini, *Principal Investigator, Professor of Civil Engineering, University of Minnesota*
Report no. MnDOT 2012-02

January 2012

An unbonded concrete overlay (UBCO) system is a Portland cement concrete (PCC) overlay that is separated from an existing PCC pavement by an asphalt concrete (AC) interlayer. Current UBCO design procedures are based on empirical equations or highly simplified mechanistic models. To overcome the limitations, fracture mechanics concepts, specifically the finite element method-based cohesive zone model (CZM), are introduced in this research as a new paradigm for analyzing UBCOs with the ultimate goal of establishing a more rational design procedure.

To illustrate the advantages of a fracture mechanics-based approach to design, specific attention is paid to one type of failure associated with pavement structures: reflection cracking. The design against reflection cracking approach relies on a load-carrying capacity equivalency between the designed UBCO and a reference newly designed single layer PCC pavement. An illustrative fracture mechanics-based design procedure for UBCOs is developed and proposed by a large number of crack propagation simulations of both the UBCO composite and the reference single layer pavement. Preliminary comparisons of the results with field observations suggest that the fracture mechanics paradigm offers promise for improved design of UBCOs against reflection cracking and other potential loading conditions that could be analyzed using nonlinear fracture mechanics models. It is recommended that an experimental program be established to assess the accuracy of the model predictions, and additional experiments and three-dimensional fracture mechanics simulations be considered to provide additional insights as to whether UBCOs can be "thinned-up."

To download a pdf of the 79-page document, please go to:
<http://www.cts.umn.edu/Publications/ResearchReports/reportdetail.html?id=2090>.



UNIVERSITY OF MINNESOTA



CENTER FOR TRANSPORTATION STUDIES

Minnesota DOT Releases Pervious Concrete Pavement Report

The Minnesota Department of Transportation (MnDOT) recently published a report titled "Pervious Concrete Test Cells on MnROAD Low-Volume Road". The report is aimed at local agencies who are interested in pervious pavement's ability to reduce storm water runoff by allowing direct infiltration through the pavement structure. However, concerns about the ability of pervious pavements to perform in Minnesota's extreme climate, maintenance needs and effect on groundwater quality needed to be understood.

This 373-page report describes the design, construction and early performance of 3 pervious concrete test cells constructed at the Minnesota Road Research site (MnROAD). These cells were constructed to evaluate to evaluate the performance of a low volume road constructed with pervious concrete in a cold weather climate.

The three cells discussed in this report are:

- Porous concrete overlay
- Pervious concrete on granular subgrade
- Pervious concrete on cohesive subgrade

The project report describes each phase of the research project, including:

- Research synthesis
- Construction sequence
- Hydrologic evaluation
- Implementation
- Acoustic properties of clogged pavements.
- Mix design, concept design and geotechnical exploration
- Initial testing
- Early two year performance
- Effect of sound absorption on OBSI

Many significant findings from this study will contribute to the improved design and maintenance of pervious concrete pavements.

For a pdf download, please go to: <http://www.dot.state.mn.us/materials/researchdocs/201123.pdf>

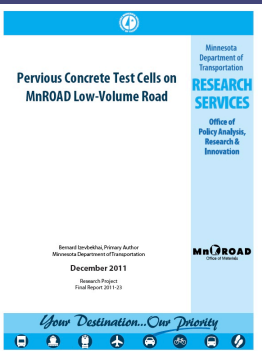
To request either of these documents in an alternative format, please contact:

Bruce Lattu, Minnesota DOT

Phone: 651-366-4718 or 1-800-657-3774 (Greater Minnesota, USA)

711 or 1-800-627-3529 (Minnesota Relay)

E-mail: bruce.lattu@state.mn.us. (Please submit any requests at least one week in advance).



CALL FOR PAPERS

June 30, 2012: CALL FOR ABSTRACTS Now inviting abstracts of papers for the Fifth North American Conference on the Design and Use of Self-Consolidating Concrete (SCC) that will be held at Chicago, Illinois, on May 12-15, 2013 (SCC2013). Paper should address recent innovation, application, production, and other aspects of SCC. All accepted papers will be published in the conference proceedings, and selected papers will be published in a special issue of the *Journal of Cement and Concrete Composite*. For details, please visit the conference website at <http://www.intrans.iastate.edu/events/scc2013/>.

UPCOMING EVENTS

APRIL
2012

2nd International Conference on Microstructure Related Durability of Cementitious Composites

April 11-13, 2012 in Amsterdam, the Netherlands
<http://microdurability.tudelft.nl/>

9th National Conference on Transportation Asset Management

April 16-18, 2012 in San Diego, California
<http://www.TRB.org/Conferences/AssetManagement2012>

International RILEM Symposium for Multi-scale Characterization, Modeling and Simulation of Infrastructure Materials

April 19-20, 2012 in Stockholm, Sweden
<http://www.rilem.net/gene/main.php?base=600040>

TRA Transport Research Arena Europe 2012, Athens Sustainable Mobility through Innovation

April 23-26, 2012 in Athens, Greece
<http://www.traconference.eu>

JUNE
2012

9th International Transportation Specialty Conference

Part of the Canadian Society of Civil Engineering (CSCE) 2012 conference
June 6-9, 2012 in Edmonton, Alberta, Canada <http://csce2012.ca/>

EUPAVE - Dedicated Bus and Tram Lanes Seminar and Site Visit

June 7-8, 2012 in Paris, France
<http://www.eupave.eu/documents/news-items/20123101.xml?lang=en>

fib Symposium: Concrete Structures for Sustainable Community

June 11-14, 2012 in Stockholm, Sweden
<http://www.fibstockholm2012.se/>

Symposium of Advances in Pavement Mechanics

Part of the 2012 Joint Conference of the Engineering Mechanics Institute & 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability (EMI-PMC 2012)
June 17-20, 2012 in Notre Dame, Indiana, USA <http://nd.edu/~emipmc12/>

International Congress on Durability of Concrete

June 18-21, 2012 in Trondheim, Norway
<http://www.icdc2012.com>

7th RILEM Conference on Cracking in Pavements

June 20-22, 2012 in Delft, the Netherlands
<http://www.rilem2012.org>

JULY
2012



3rd Advanced Workshop on Concrete Pavements

July 5-7, 2012 Lac Delage, Quebec, Canada
http://www.concretetpavements.org/3rdworkshop/http://www.concretetpavements.org/3rdworkshop/advanced_workshop_brochure_01_20_2012_web.pdf



10th International Conference on Concrete Pavements

Organized by ISCP, July 8-12, 2012 in Quebec City, Canada
<http://www.concretetpavements.org/10thiccp>

AUGUST
2012

MAIREPAV7 Conference

August 28-30, 2012 in Auckland, New Zealand
<http://www.mairepav7.co.nz/>

For events taking place September through December, 2012 and in 2013, please go to:
<http://www.concretetpavements.org/calendar.htm>.



The ISCP Newsletter is produced monthly by:

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ISCP would like to acknowledge the

National Concrete Pavement Technology Center and **EUPAVE** for contributions to this issue.

ISCP invites ISCP members and friends to submit articles and calendar items to the Editor-in-Chief for future issues.

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Please visit the **ISCP Website** at www.concretetpavements.org for more information about ISCP.

Maps, globes: National Geographic Family Reference Atlas of the World ©2002 National Geographic Society, Washington, D.C. & Concise Earth Book World Atlas ©1987 Graphic Learning International Publishing Corporation, Boulder, Colorado, Esselte Map Service AB Stockholm. All additional sources noted on perspective pages.