8dbmc Vancouver Canada 1999

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VANCOUVER CANADA
May 30 mai – June 3 juin, 1999

8th International Conference on Durability of Building Materials and Components

Service Life and Asset Management: Towards Integration and Application of Service Life Prediction Methods

CIB W78 Workshop

Service Life and Asset Management: IT in Construction

Program
Programme

8e Conférence sur la durabilité des composantes et des matériaux de construction

Gestion des biens et de la durée de vie en service : Vers l'intégration et l'application de méthodes de prévision de la durée de vie en service

CIB W78 Atelier

Gestion des biens et de la durée de vie en service : Technologies d'information en construction

National Research Council Canada
Conseil national de recherche Canada

Institute for Research in Construction
Institut de recherche en construction

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Conference Sponsors / Commanditaires de la conférence

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Welcome

On behalf of the National Research Council of Canada and the 8DBMC Organising Committee, it is my pleasure to welcome you to the 8th International Conference on Durability of Building Materials and Components and the CIB W78 Workshop on Information Technology in Construction.

This conference addresses many of the significant issues facing researchers and practitioners in the area of service life and asset management, and offers 280 contributions on the most recent technological advances at over 50 poster and oral sessions, as well as at approximately 25 workshops and meetings organised in conjunction with the conference. In total, over 15 CIB, RILEM or ISO working groups or commissions have made Vancouver their site for an annual workshop or meeting.

The 8DBMC Organising Committee and Conference Secretariats have done their very best to create a professional event of the highest standards and we are sure that this conference will provide you with a host of opportunities for networking, technology transfer and discussions with colleagues. Please take time to enjoy yourself in the unique setting of Vancouver, British Columbia.

You may rest assured that the organisers will remain at your disposal throughout the Conference for whatever help and assistance you may require.

Welcome to Vancouver.

Bienvenue

Au nom du Conseil national de recherches du Canada et du comité organisateur, j'ai le plaisir de vous accueillir à la 8e Conférence sur la durabilité des composantes et des matériaux de construction (8dcmc) et à l'Atelier W78 sur la technologie de l'information en construction

Cette conférence aborde un grand nombre de problèmes sérieux auxquels se heurtent chercheurs et techniciens en ce qui concerne la durée de vie et la gestion de l'actif. Y seront présentées 280 communications sur les dernières nouveautés technologiques dans le cadre de plus de 50 présentations orales et par affiches, ainsi qu'à environ 25 ateliers et réunions parallèles organisés dans le cadre de la conférence. En tout, plus de 15 groupes de travail et commissions CIB, RILEM ou ISO ont choisi Vancouver comme site de leur réunion ou atelier annuel.

Le comité organisateur de la 8dcmc et le secrétariat de la conférence ont préparé pour vous un événement professionnel de haute qualité au cours duquel nous sommes persuadés que vous trouverez de nombreuses occasions de réseautage, d'échanges technologiques et de discussion entre collègues. Prenez le temps de vous amuser dans le magnifique décor de Vancouver.

Si vous avez besoins de quelque aide que ce soit, les organisateurs se tiendront à votre entière disposition tout au long de la conférence.

Bienvenue à Vancouver!

Michael A. Lacasse,
Conference Chairperson / Président de la conférence

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Conference Committees & Secretariat / Comités et secrétariat de la conférence

Steering Committee / Comité de direction

Prof. Christer Sjöström, *Chairman*, KTH, Sweden
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Prof. P. Paramasivam, National University of Singapore, Singapore (Member at large)
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Dr. M-S. Cheung, Public Works Government Services Canada, Canada
Ms. Adaire Chown, NRCC/IRC, Canada
Assistant Professor Hitesh Doshi, Ryerson Polytechnic University, Canada
Assistant Professor Thomas Froese, University of British Columbia, Canada
Assistant Professor, Gilbert Y. Grondin, University of Alberta, Canada
Mr. Noel P. Mailvaganam, NRCC, Canada
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Dr. Michael A. Lacasse, *Conference Chairperson*, NRCC/IRC, Canada
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Laurier Forget, *Director of Conference Services*, NRCC/IRC, Canada
Pierre Lamoureux, *Conference Manager*, NRCC/IRC, Canada
Marie-Sophie Bourque, *Conference Assistant*, NRCC/IRC, Canada

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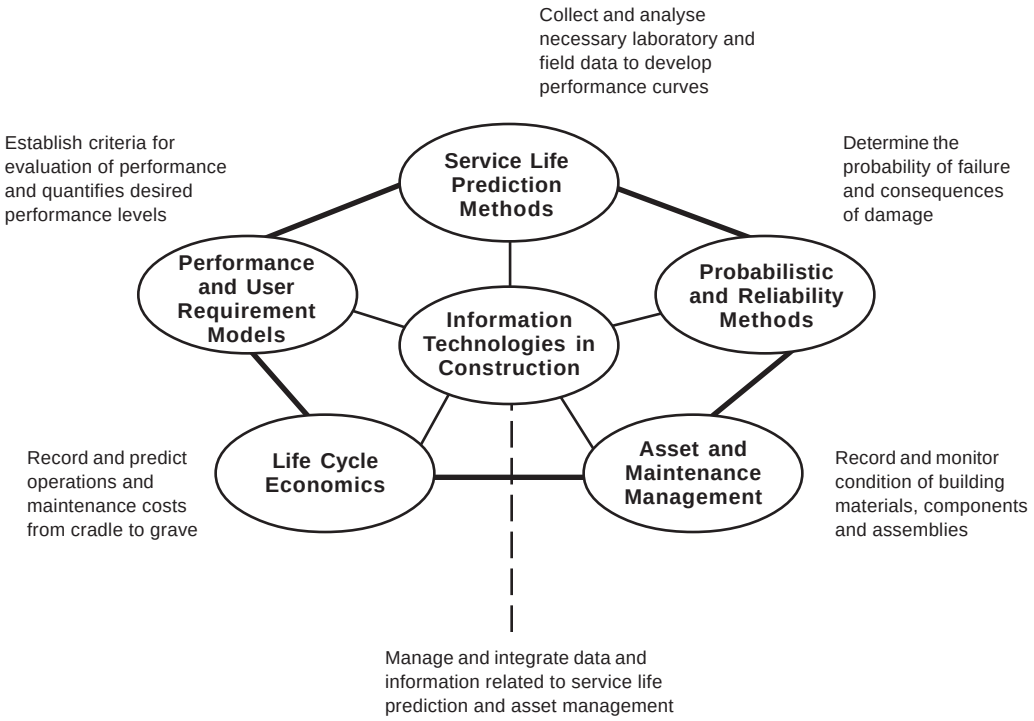
Conference Themes

The conference focuses on the approaches, methods, techniques, tools, systems and technology used to develop knowledge on service life and durability of construction and building materials, components and systems and the integration of this information towards asset management.

- Service life prediction – Materials characterization, durability of assemblies and generic methods.
- Service life tools – Probabilistic and reliability methods.
- Maintenance management of building assets and assemblies.
- Life cycle costing and economic issues.
- Performance requirements – CIB W60 Workshop: Serviceability of buildings.
- Design for durability, life cycle analysis and sustainablilty.
- Development of guides and standards.
- Information technology in construction – CIB W78 Workshop: Service Life – Asset Management Integration.

Service Life - Asset Management Integration



Scientific Program / Programme scientifique

Oral Plenary Presentations

Presentations will be 20 to 25 minutes long depending on the particular session and the requirements of the session chair. Paper sessions are demanding for the audience due to the short amount of time within which those attending must process both aural and visual information. As a result, authors should make every possible effort to facilitate this process. Meeting rooms will be made available to both meet with session chairs and arrange for slide or overhead review.

Oral Poster Presentations

Posters will be on display for the entire conference to allow for a greater number of delegates to view the author's work. Presenting authors will be offered 10–12 minutes to outline their work. Prior to the start of the poster session, authors will be required to meet with their session chairs in the assigned room as an aid to the chair to co-ordinate the session. Check the information booth announcement board in the main conference lobby for the location of the meeting room. Chairs will provide last minute instructions and other pertinent details regarding the presentation.

How to Read the Program

The Scientific Program is arranged chronologically by hour and day of the week over the remaining pages. We have tried to make the program "user friendly" by adding the following three features to facilitate your understanding and use of the Program.

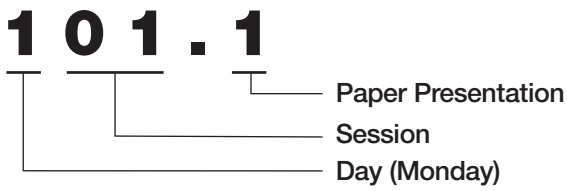
Session Numbering System

Every session has been assigned a number. The first three digits represent the day of the week:
100 = Monday; 200 = Tuesday; 300 = Wednesday; and 400 = Thursday.

The next set of numbers represent the order of paper presentation in each session.

In the case of **oral poster** sessions, the poster boards are numbered sequentially from 1–100. The numbers following the session number indicate the poster board number.

Example – Oral Plenary Presentation



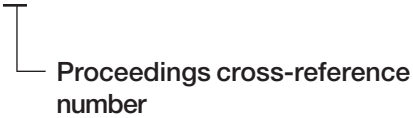
Example – Oral Poster Presentation

Example – Proceedings Reference Number

Following each paper title; author; and affiliation, a number appears in brackets. This number refers to the paper number in the Conference Proceedings.

Example –

101.1 INVESTIGATION OF CONCRETE JETTIES AT CFB ESQUIMALT AND PREDICTION OF FUTURE SERVICE LIFE, G. OVSTAAS[1], D.R. MORGAN[2], [1]G. Ovstaas & Associates, Victoria and [2]AGRA Earth & Environmental, Vancouver, BC, Canada (**5**)



Conference-at-a-Glance

	Monday, May 31	Tuesday, June 1	Wednesday, June 2	Thursday, June 3
08:30 – 09:30	**Session 100** *Regency C* Opening Plenary **Christer Sjöström** Service Life of Buildings and Building Products – Towards Application	**Session 200** *Regency C* Opening Plenary **Surendra P. Shah** High Performance Concrete: Strength versus Durability	**Session 300** *Regency C* Opening Plenary **Dudley R. Morgan** Service Life: Lessons Learned from Existing Structures	**Session 400** *Regency C* Opening Plenary **Charles Eastman** Information Exchange Architectures for Building Models
Coffee Break				
09:45 – 12:00 Concurrent sessions	**Session 101** *Plaza W* Service Life Prediction of Concrete Structures	**Session 201** *Plaza W* Durability of Brick Masonry, Stone and Tile	**Session 301** *Plaza W* Roofing Materials and Components (1)	**Session 401** *Plaza W* Design and Specification for Durable Concrete
	Session 102 *Plaza E* Environmental Characterization and Modelling	**Session 202** *Plaza E* Durability of Wood and Wood Components (1)	**Session 302** *Plaza E* Performance and Serviceability of Buildings (1)	**Session 402** *Plaza E* Design for Durability
	Session 103 *Plaza C* Maintenance management of building assemblies and facilities (1)	**Session 203** *Plaza C* Study on Strength and Durability of Concrete	**Session 303** *Plaza C* Life Cycle Models and Facilities Management	**Session 403** *Plaza C* Sustainable Design
	Session 104 *Regency C* IT and the Construction Process (1)	**Session 204** *Regency C* Virtual Reality and Human-Computer Interaction	**Session 304** *Regency C* Decision Support Systems (1)	**Session 404** *Regency C* Generic Methods in Service Life Prediction
Lunch				
13:30 – 15:30 Concurrent sessions	**Session 105** *Plaza W* Service Life Prediction of Concrete Structures (2)	**Session 205** *Plaza W* Durability of polymer-based materials (1)	**Session 305** *Plaza W* Roofing Materials and Components (2)	**Session 405** *Regency C* Rapportage – 8dbmc – "IT Futures"
	Session 106 *Plaza E* Building Façades and Components (1)	**Session 206** *Plaza E* Durability of Wood and Wood Components (2)	**Session 306** *Plaza E* Performance and Serviceability of Buildings (2)	
	Session 107 *Plaza C* Maintenance Management of Building Assemblies and Facilities (2)	**Session 207** *Plaza C* Corrosion of Concrete	**Session 307** *Plaza C* Probabilistic and Reliability Methods (1)	
	Session 108 *Regency C* IT and the Construction Process (2)	**Session 208** *Regency C* Design Systems	**Session 308** *Regency C* Decision-Support Systems (2)	
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	Session 112 *Plaza E* Building Façades and Components (2)	**Session 212** *Plaza E* Durability of Wood and Wood Components (3)	**Session 312** *Plaza E* Life Cycle Analysis (LCA)	
	Session 113 *Plaza C* Life Cycle Costing and Economics	**Session 213** *Plaza C* Corrosion of Concrete (2)	**Session 313** *Plaza C* Probabilistic and Reliability Methods (2)	
	Session 114 *Regency C* Computer-Integrated Construction	**Session 214** *Regency C* Product Modelling	**Session 314** *Regency C* Process Modelling	**Sessions in shaded areas are CIB W78 workshops.**
Posters	**Session 115** *Regency W* Maintenance Management and Life Cycle Costing	**Session 215** *Regency W* Studies on Strength and Durability	**Session 315** *Regency W* Life Cycle Analysis and Generic Methods	
	Session 116 *Regency W* Decision-Support Systems Product & Process Modelling	**Session 216** *Regency W* Computer-Integrated Construction IT in Construction Virtual Reality	**Session 316** *Regency W* Design Systems Life Cycle Analysis and Facilities Management	

Workshops-at-a-Glance

Sunday, May 30

CIB W86
Building Pathology
9:30 – 13:00
Balmoral Room

CIB W94
Design for Durability
9:30 – 13:00
Peacocks Room

CIB W86/W94
Joint Meeting
14:30 – 17:00
Peacocks Room

8dbmc Steering Committee
19:00 –
Windsor Room

Monday, May 31

CIB TG 33
Concurrent Engineering in Construction
Time: evening
Grouse Room

IRAP
Construction Sectoral Group
15:00 – 19:00
Balmoral Room

Tuesday, June 1

CIB W78
Information Technology in Construction
18:30 – 22:30
Grouse Room
Dinner Cruise

Wednesday June 2

Thursday, June 3

Forintek
Coordinating research in moisture protection for durable wood construction
8:30 – 12:00
Windsor Room

CIB TG 22
Environmental Design Methods in Materials and Structural Engineering
13:00 – 17:00
Cypress Room

ISO TC 59/SC 3
Functional/User Requirements and Performance in Building Construction
9:00 – 17:00
Stanley Room

ISO TC 59 / SC 4
Dimensional Tolerances and Measurement
Time: TBD
Seymour Room

CIB W83
Roofing Materials and Systems
9:00 – 17:00
Grouse Room

CIB W78
Information Technology in Construction
9:15 – 14:30
Peacocks Lounge
Balmoral Room
Peacocks Room

Friday, June 4

CIB TG 20
Geographic Information Systems
8:30 – 11:30
Cypress Room

CIB W60
Performance Concept in Building
9:00 – 13:00
Peacocks Lounge

CIB W80 RILEM 175-SLM
Prediction of Service Life of Building Materials and Components
13:15 – 17:30
Cypress Room

CIB W83
Roofing Materials and Systems
9:00 – 15:30
Grouse Room

ISO TC 59/SC 3
Functional/User Requirements and Performance in Building Construction
9:00 – 17:00
Stanley Room

ISO TC 59 / SC 4
Dimensional Tolerances and Measurement
Time : TBD
Seymour Room

Municipal Infrastructure Investment Planning (MIIP)
9:00 – 16:00
Regency Centre

CIB/ISO/STEP/IAI/ICIS
Information Framework for Construction
9:00 – 17:00
Balmoral Room

Saturday, June 5

ISO TC 59 / SC 2
Terminology and Harmonization of Languages
Time: TBD
Stanley Room

ISO TC 59 / SC 14
Design Life of Buildings
9:00 – 18:00
Seymour Room
Grouse Room

ISO TC 59 / SC 15 / WG (proposed)
Performance Descriptions for Single Family Housing Durability
13:00 – 16:00
Cypress Room

Sunday, June 6

ISO TC 59 / SC 13
Organisation of Information about Construction Works
Time: TBD
Cypress Room

ISO TC 59 / SC 14
Design Life of Buildings
9:00 – 19:00
Seymour Room
Grouse Room

Monday, June 7

ISO TC 59
Building Construction
Time : TBD
Cypress Room

ISO TC10/SC8/WG13
Computer-Aided Design (CAD) Technique - Use of Computers for the Preparation of Construction Documentation
9:00 – 17:00
Stanley Room

Tuesday, June 8

ISO TC 10 / SC 8
Construction Documentation
10:00 – 17:00
King George Room

TBD: To Be Determined

Monday, May 31

Sponsor of the Day
Standards Council of Canada

08:30 - 09:00	Official Opening and Plenary Session	*Regency Centre*
09:00 - 09:30	Invited Speaker, ***Dr.-Prof. Christer Sjöström***	*Regency Centre*
09:30 - 09:45	Coffee Break	*Regency Foyer*
09:45 - 12:00	Concurrent Sessions	*Regency Centre, Plaza - East, Centre, West*
12:00 - 13:30	Lunch	*Regency East*
13:30 - 15:30	Concurrent Sessions and Poster Sessions	*Regency Centre, West Plaza - East, Centre, West*
15:30 - 15:45	Coffee Break	*Regency Centre*
15:45 - 17:45	Concurrent Sessions and Poster Sessions	*Regency Centre, West Plaza - East, Centre, West*

08:30 - 09:30

100 **PLENARY** **Regency Centre**

Chair	**Michael Lacasse, Canada**	**Président**
Co-Chair	**Dana Vanier, Canada**	**Co-président**

INVITED SPEAKER

Dr. - Prof. Christer Sjöström
SERVICE LIFE OF BUILDINGS AND BUILDING PRODUCTS – TOWARDS APPLICATION
Royal Institute of Technology, Gävle, Sweden

09:45 - 12:00

101 **ORAL** **Plaza West**

Service Life Prediction of Concrete Structures (1)

Chair	**Dudley R. Morgan, Canada**	**Président**
Co-Chair	**Ton Siemes, The Netherlands**	**Co-président**

101.1 INVESTIGATION OF CONCRETE JETTIES AT CFB ESQUIMALT AND PREDICTION OF FUTURE SERVICE LIFE, G. OVSTAAS[1], D.R. MORGAN[2], *[1]G. Ovstaas & Associates, Victoria and [2]AGRA Earth & Environmental, Vancouver, BC, Canada (5)*

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09:45 - 12:00

102 **ORAL** **Plaza East**

Environmental Characterization and Modelling

Chair	**Svein E. Haagenrud, Norway**	**Président**
Co-Chair	**Peter Norberg, Sweden**	**Co-président**

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09:45 - 12:00

103 **ORAL** **Plaza Centre**

Maintenance Management of Building Assemblies and Facilities (1)

Chair	**Erik Brandt, Denmark**	**Président**
Co-Chair	**Qiping Shen, Hong Kong**	**Co-président**

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104 **ORAL** **Regency Centre**

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Chair	**Martin Betts, UK**	**Président**
Co-Chair	**Ziga Turk, Slovenia**	**Co-président**

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Co-Chair	**Dudley Morgan, Canada**	**Co-président**

105.1 SERVICE LIFE DESIGN FOR THE WESTERN SCHELDT TUNNEL, R. BREITENBÜCHER[1], C. GEHLEN[2], P. SCHIESSL[3], J. VAN DEN HOONAARD[4], T. SIEMES[5], *[1]KMW/Philipp Holzmann, AG, Frankfurt, [2]Institut für Bauforschung Aachen and [3]Technical University of Munich, Germany; [4]Rijkswaterstaat, The Hague and [5]TNO Building and Construction Research, Rijswijk, The Netherlands (1)*

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106 **ORAL** **Plaza East**

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Co-Chair	**Peter Norberg, Sweden**	**Co-président**

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Co-Chair	**Per Jostein Hovde, Norway**	**Co-président**

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108 **ORAL** **Regency Centre**

IT and the Construction Process (2)

Chair	**Rob Howard, Denmark**	**Président**
Co-Chair	**Martin Betts, UK**	**Co-président**

108.1 ANALYSIS OF PHENOMENOLOGICAL PERCEPTIONS OF EFFECTIVENESS OF INFORMATION TECHNOLOGY IN COMPUTERISED MAINTENANCE MANAGEMENT, P. CLARKE[1], J. CLARKE[2], *[1]University of Technology and [2]University of Sydney, Australia (220)*

108.2 GENERIC IT TRAINING: A PROCESS PROTOCOL MODEL, J.S. GOULDING, M.A. ALSHAWI, *University of Salford, UK (222)*

108.3 I.T. SURVEY WITHIN THE CONSTRUCTION INDUSTRY OF HONG KONG, K.G. FUTCHER[1], S. ROWLINSON[2], *[1]University of Loughborough, UK; [2]University of Hong Kong, China (221)*

108.4 SURVEY OF INFORMATION TECHNOLOGY AND THE STRUCTURE OF THE SAUDI ARABIAN CONSTRUCTION INDUSTRY, M.J. O'BRIEN, N.M. AL-BIQAMI, *University of Nottingham, UK (223)*

108.5 A SURVEY OF INFORMATION TECHNOLOGY IN THE CANADIAN CONSTRUCTION INDUSTRY, H. RIVARD, *Concordia University, Montreal, QC, Canada (224)*

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Durability of Materials

Chair	**Per Jernberg, Sweden**	**Président**
Co-Chair	**Abid Abutair, N. Ireland**	**Co-président**

109.1 LONG TERM MIGRATION OF SILICONE INTO STONE AND ITS PREVENTION, M. NAKAYAMA, M. SASAKI, *Kajima Technical Research Institute, Tokyo, Japan (56)*

109.2 EVALUATION OF SITE CONTROL TECHNIQUES TO ASSESS THE EFFECTIVENESS OF SURFACE TREATMENTS ON MASONRY, L. BINDA[1], G. BARONIO[1], B. LUBELLI[1], P. ROCCA[2], *[1]Polytechnic of Milan and [2]ICITE-CNR, Milan, Italy (51)*

109.3 COMPARATIVE STUDY OF CLEANING TECHNIQUES APPLIED TO ANCIENT CONCRETE, E. MARIE-VICTOIRE, A. TEXIER, *Ministère de la Culture, Champs-sur-Marne, France (55)*

109.4 MAPPING OF VISUAL DECAY FORMS AND INFRARED IMAGING OF STONE STRUCTURES FOR THE MAINTENANCE AND MONITORING STUDIES, A. TAVUKÇUO• LU, E.N. CANER-SALTIK, *Middle East Technical University, Ankara, Turkey (58)*

109.5 PREDICTION OF WOOD DECAY IN THE EXTERIOR WALL OF WOODEN HOUSES BY THE DETERIORATION OF NAILS, H. IMAMURA[1] M. KIGUCHI[2], *[1]Wood Technological Association of Japan, Tokyo and [2]Forestry and Forest Products Research Institute, Tsukuba, Japan (70)*

109.6 DURABILITY OF WOOD, K. ÖDEEN, J. NORÉN, *Royal Institute of Technology, Stockholm, Sweden (73)*

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Corrosion Resistance and Durability of Concrete

Chair	**Zoubir Lounis, Canada**	**Président**
Co-Chair	**Dana Vanier, Canada**	**Co-président**

110.7 THE USE OF GALVANOSTATIC PULSE MEASUREMENTS TO DETERMINE CORROSION PARAMETERS, D.W. LAW, S.G. MILLARD, J.H. BUNGEY, *Liverpool University, Liverpool, UK (30)*

110.8 CORROSION MONITORING USING A NEW SENSOR SYSTEM FOR INSTALLATION INTO EXISTING STRUCTURES, M. RAUPACH, *S and R Sensortec GmbH, Aachen, Germany (35)*

110.9 PREDICTION OF CONCRETE CRACK OPENING CAUSED BY REINFORCING BAR CORROSION, Y. KITSUTAKA[1], N. NAKAMURA[2], *[1]Tokyo Metropolitan University and [2]Japan Testing Center for Construction Materials, Tokyo, Japan (29)*

110.10 DURABLE CONCRETE THROUGH SKIN TREATMENT WITH CPF, J. SOUSA COUTINHO, *Oporto University, Oporto, Portugal (43)*

110.11 QUALITY CONTROL PROBLEMS IN HIGH PERFORMANCE CONCRETE STRUCTURES, K.A. MACDONALD[1], D.O. NORTHWOOD[2], *[1]Braun Intertec Corporation, Minneapolis, MN, USA; [2]Ryerson Polytechnic University, Toronto, ON, Canada (41)*

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111 **ORAL** **Plaza West**

Development and Use of Guides and Standards

Chair	**Christer Sjöström, Sweden**	**Président**
Co-Chair	**G. Adaire Chown, Canada**	**Co-président**

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111.2 INTERNATIONAL STANDARDS FOR SERVICE LIFE PLANNING OF BUILDINGS, G.J. FROHNSDORFF[1], C. SJÖSTRÖM[2], G. SORONIS[3], *[1]National Institute of Standards and Technology, Gaithersburg, MD, USA; [2]Royal Institute of Technology, Gävle and [3]Swedish Building Standards Institution, Stockholm, Sweden (144)*

111.3 SERVICE LIFE PERFORMANCE AUDIT: MEETING CLIENT REQUIREMENTS FOR DURABLE BUILDINGS, G.W. MOSS, *Building Performance Group Ltd, London, UK (146)*

111.4 ESTIMATING SERVICE LIVES USING THE FACTOR METHOD FOR USE IN WHOLE LIFE COSTING, K. BOURKE[1], H. DAVIES[2], *[1]BRE Ltd., Center for Whole Life Performance and [2]Hywell Davies Consultancy, Garston, UK (142)*

111.5 LIFE CYCLE COSTING FOR A DESIGN LIFE STANDARD, A.F. BENNETT[1], I.C. PAGE[1], K. BOURKE[2], S.N. TUCKER[3], T. NIREKI[4], *[1]Building Research Association of New Zealand; [2]Building Research Establishment, UK, [3]CSIRO, Australia, [4]Tsukuba Building Test Laboratory, Tsukuba, Japan (141)*

111.6 SERVICE LIFE PLANNING OF BUILDING COMPONENTS, G. HED, *KTH (Royal Institute of Technology), Gävle, Sweden (145)*

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112 **ORAL** **Plaza East**

Building Façades and Components (2)

Chair	**Eric F. Burnett, USA**	**Président**
Co-Chair	**Svend Svendsen, Denmark**	**Co-président**

112.1 ASSESSING THE SERVICE LIFE OF BUILDING ENVELOPE CONSTRUCTIONS, C. RUDBECK, *Technical University of Denmark, Lyngby, Denmark (98)*

112.2 COUPLED HEAT AND MASS TRANSFERS IN BUILDING MATERIALS, A.N. NOUMOWE[1], T. OHKUBO[2], M. MAKATAYAMA[2], K. WATANABE[2], *[1]Université de Cergy-Pontoise, France; [2]Building Research Institute, Tsukuba, Japan (87)*

112.3 A DECISION SUPPORT SYSTEM FOR PRELIMINARY DESIGN, E.H. DE GROOT, S.M. MALLORY-HILL, R.H.M. VAN ZUTPHEN, B. DE VRIES, Eindhoven *University of Technology, Eindhoven, The Netherlands (90)*

112.4 SURVEY OF THE DURABILITY OF FAÇADES OF 4000 DWELLINGS IN NORTHERN PORTUGAL, V. PEIXOTO DE FREITAS, M. SOUSA, V. ABRANTES, *University of Porto, Portugal (97)*

112.5 INVESTIGATION ON THE BEHAVIOUR OF POLYMER-CEMENT COMPOSITES IN ETICS RENDERINGS, F. VALLEE[1], M. RUBAUD[2], N. BLANCHARD[2], A. GANDINI[3], *[1]CSTB, St-Martin*

d'Hères, [2]CSTB, Marne-la-Vallée, [3]École Française de Papeterie et des Industries Graphiques, St-Martin d'Hères, France (100)

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113 **ORAL** **Plaza Centre**

Life Cycle and Economics

Chair	**David P. Rowe, UK**	**Président**
Co-Chair	**Arne Nesje, Norway**	**Co-président**

113.1 ACCRUED VALUE ASSESSMENT - A DYNAMIC APPROACH FOR INVESTMENT APPRAISAL AND FACILITIES MANAGEMENT, T.C. PLENTY, S.E. CHEN, W.D. McGEORGE, *University of Newcastle, Callaghan, Australia (167)*

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113.3 CONSIDERATION OF ENVIRONMENTAL ISSUES WHEN RENEWING FACILITIES AND INFRASTRUCTURE, S.F. PULLEN*, University of South Australia, Adelaide, Australia (169)*

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Computer – Integrated Construction

Chair	**Grahame Cooper, UK**	**Président**
Co-Chair	**Anders Ekholm, Sweden**	**Co-président**

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114.2 FIRST EXPERIENCES WITH AN INCEPTION SUPPORT MODELLER FOR THE BUILDING AND CONSTRUCTION INDUSTRY, S.S. OZSARIYILDIZ, F.P. TOLMAN, *TU-Delft, The Netherlands (214)*

114.3 INTEGRATION OF PLANNING AND CONTROL ACTIVITIES FOR BUILDING AND CONSTRUCTION: EXPERIENCING STANDARDS, R. JARDIM-GONÇALVES, P. SOUSA, J.P. PIMENTÃO, A. STEIGER-GARÇÃO, A. GRILO, L. TADEU, *Universidade Nova de Lisboa, Portugal (209)*

114.4 LEXIS, AN AEC INDUSTRY LANGUAGE, H. G. LESLIE, *Commonwealth Scientific and Industry Research Organisation, Sydney, Australia (211)*

114.5 KNOWLEDGE-BASED PRODUCT DATA SERVER FOR CONCURRENT ENGINEERING, P. KATRANUSCHKOV, R.J. SCHERER, *Dresden University of Technology, Dresden, Germany (210)*

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115 **POSTERS/AFFICHES** **Regency West**

Maintenance Management and Life Cycle Costing

Chair	**John Christian, Canada**	**Président**
Co-Chair	**Ivan S. Cole, Australia**	**Co-président**

115.12 EPIQR - A NEW SURVEYING TOOL FOR MAINTENANCE AND REFURBISHMENT, E. BRANDT[1], K.B. WITTCHEN[1], A. FAIST[2], J.L. GENRE[2], *[1]Danish Building Research Institute, Hoersholm, Denmark; [2]Swiss Federal Institute of Technology, Lausanne, Switzerland (148)*

115.13 A PLANNING SUPPORT SYSTEM FOR MANAGEMENT OF COMPONENTS MAINTENANCE, M. DE GRASSI, B. NATICCHIA, *University of Ancona, Italy (149)*

115.14 A COMPUTER-AIDED PRIORITISATION FRAMEWORK FOR PLANNED MAINTENANCE MANAGEMENT, Q.P. SHEN, *Hong Kong Polytechnic University, Kowloon, Hong Kong (156)*

115.15 PC/GIS BASED SYSTEM FOR MAINTENANCE MANAGEMENT OF HISTORIC (WOODEN) BUILDINGS - MMWOOD, S.E. HAAGENRUD[1], B. ERIKSSON[2], C. SJÖSTRÖM[2], T. SKANCKE[3], *[1]Norwegian Building Research Institute, Oslo, Norway; [2]Royal Institute of Technology, Gävle, Sweden; [3]NORGIT, Fredrikstad, Norway (151)*

115.16 MODELLING RUNNING AND MAINTENANCE COSTS FOR LIFE CYCLE COSTING APPLICATIONS IN BUILDINGS, A. AL-HAJJ, *Robert Gordon University, Aberdeen, UK (160)*

115.17 STONE CLEANING: DEVELOPMENT OF A LIFE CYCLE COST MODEL, R.A. LAING, A. AL-HAJJ, J. BALL, J. SCOTT, M.E. YOUNG, *Robert Gordon University, Aberdeen, UK (164)*

115.18 CONDITION SURVEY OF TORONTO'S HIGHRISE RENTAL STOCK, S.J. MARSHALL[1], G. GENGE[2], *[1]Canada Mortgage and Housing Corporation, Ottawa, ON and [2]Gerald R. Genge Building Consultants Inc., Sutton West,Canada (165)*

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116 **POSTERS/AFFICHES** **Regency West**

Decision-Support Systems/Product & Process Modelling

Chair	**Dana Vanier, Canada**	**Président**
Co-Chair	**Robert Woodbury, Australia**	**Co-président**

116.19 EXPLORING THE APPLICATION OF CASE-BASED REASONING TO COMPUTER-ASSISTED CONSTRUCTION PLANNING, J.H. RANKIN[1,2], T.M. FROESE[1], L.M. WAUGH[3], *[1]University of British Columbia, Vancouver, BC, Canada, [2]Construction Technology Centre Atlantic, Fredericton, NB and [3]University of New Brunswick, Fredericton, NB, Canada (242)*

116.20 AN INVESTIGATION INTO THE MAIN INFORMATION DIMENSIONS OF CORPORATE REAL ESTATE MANAGEMENT, J.L.R. LOPES, *University of Reading, UK (241)*

116.21 METAGAME ANALYSIS FOR DETERMINING CONSTRUCTION METHODS, T. KANETA, S. FURUSAKA, *Kyoto University, Kyoto, Japan (238)*

116.22 USE OF AUTOMATIC KEYPHRASE GENERATION FOR CREATION OF A CONSTRUCTION THESAURUS, B. KOSOVAC[1], D.J. VANIER[2], *[1]University of British Columbia, Vancouver, BC and [2]National Research Council Canada, Ottawa, ON, Canada (240)*

116.23 SL/AM-IT: A CD-ROM BASED, INTERACTIVE BIBLIOGRAPHY ON SERVICE LIFE PREDICTION, D.J. VANIER, M.A. LACASSE, D.R. PAYER, *National Research Council Canada, Ottawa, ON, Canada (244)*

116.24 PRODUCT MODELING FOR CONSTRUCTION MANAGEMENT, A. GHANBARI, T.M. FROESE, *University of British Columbia, Vancouver, BC, Canada* (264)

116.25 SPICE: IS A CAPABILITY MATURITY MODEL APPLICABLE IN THE CONSTRUCTION INDUSTRY?, M. SARSHAR, M. FINNEMORE, R. HAIGH, J.S. GOULDING, *University of Salford, UK (271)*

116.26 THE PRACTICAL NEEDS OF INTEGRATING SCOPE, COST, AND TIME, S. STAUB, M. FISCHER, *Stanford University, Stanford, CA, USA (275)*

Tuesday, June 1

08:30 - 09:15	Invited Speaker, ***Dr.- Prof. Surendra P. Shah***	*Regency Centre*
09:15 - 09:45	Coffee Break *Sponsored by: Canadian Portland Cement Association*	*Regency Foyer*
09:45 - 12:00	Concurrent Sessions	*Regency Centre, Plaza - East, Centre, West*
12:00 - 13:30	Lunch	*Regency East*
13:30 - 15:30	Concurrent Sessions and Poster Sessions	*Regency Centre, West Plaza - East, Centre, West*
15:30 - 15:45	Coffee Break *Sponsored by: Canadian Standards Association*	*Regency Centre*
15:45 - 17:45	Concurrent Sessions and Poster Sessions	*Regency Centre, West Plaza - East, Centre, West*
18:30	Technical Tour/Dinner Cruise	*Coal Harbour Marina*

08:30 – 09:15

200 **PLENARY** **Regency Centre**

Chair **Michael Lacasse, Canada** **Président**
Co-Chair **Dana Vanier, Canada** **Co-président**

INVITED SPEAKER

Dr. - Prof. Surendra P. Shah
HIGH PERFORMANCE CONCRETE: STRENGTH VS. DURABILITY
Northwestern University, Evanston, IL, USA

09:45 – 12:00

201 **ORAL** **Plaza West**
Durability of Brick Masonry, Stone and Tile

Chair **Lugia Binda, Italy** **Président**
Co-Chair **Erik Brandt, Denmark** **Co-président**

201.1 PHYSICAL AND MATHEMATICAL MODELLING OF MASONRY DETERIORATION DUE TO SALT CRYSTALLIZATION, L. BINDA, E. GARAVAGLIA, C. MOLINA, *Polytechnic of Milan, Italy (50)*

201.2 COMPARING LABORATORY AND FIELD DURABILITY TESTING OF STONE, B. WONNEBERGER, S.A. BORTZ, *Wiss, Janney, Elstner Associates Inc., Northbrook, IL, USA (59)*

201.3 EXPERIMENTAL PROGRAM TO EVALUATE BUILDING ELEMENTS SERVICE LIFE: FIRST RESULTS ON BRICKWORK, P.N. MAGGI[1], M.G. REJNA[1], B. DANIOTTI[1], F. RE CECCONI[1], T. POLI[1], G. RIGAMONTI[1], A. JORNET[2], T. TERUZZI[2], *[1]Polytechnic of Milan, Italy; [2]Scuola Universitaria Professionale della Svizzera Italiana, Canobbio, Switzerland (54)*

201.4 SURVEY RESULTS REGARDING ATTITUDE TOWARDS STONECLEANING OF BUILDING SANDSTONES, M.E. YOUNG, J. BALL, R.A. LAING, *Robert Gordon University, Aberdeen, UK (60)*

201.5 CHARACTERISATION OF MATERIALS USED IN THE REPLACEMENT OF SCULPTURES IN HISTORICAL MONUMENTS, F. BOUTIN, P. BROMBLET, *Laboratoire de Recherche des Monuments Historiques, Champs-sur-Marne, France (52)*

09:45 – 12:00

202 **ORAL** **Plaza East**
Durability of Wood and Wood Components (1)

Chair **Charlie Carll, USA** **Président**
Co-Chair **Jennifer O'Connor, Canada** **Co-président**

202.1 DURABILITY ASSESSMENTS OF WOOD-FRAME CONSTRUCTION USING THE CONCEPT OF DAMAGE-FUNCTIONS, M. NOFAL, M.K. KUMARAN, *National Research Council Canada, Ottawa, ON, Canada (72)*

202.2 MODELS FOR TIMBER DECAY AND TERMITE ATTACK, R.H. LEICESTER, G.C. FOLIENTE, *CSIRO, Melbourne, Australia (71)*

202.3 THE RESIDUAL STRENGTH OF TIMBER DEGRADED BY WOODWORM INFESTATION, J.R. GILFILLAN, D. CHRISTIE, S.G. GILBERT, *Queen's University, Belfast, UK (67)*

202.4 PREDICTION OF THE IMPACT OF THE ENVIRONMENT ON TIMBER COMPONENTS: A GIS-BASED APPROACH, I.S. COLE, G.S. TRINIDAD, W.Y. CHAN, *CSIRO, Melbourne, Australia (65)*

09:45 – 12:00

203 **ORAL** **Plaza Centre**

Study on Strength and Durability of Concrete

Chair	**Surendra Shah, USA**	**Président**
Co-Chair	**Claude Bedard, Canada**	**Co-président**

203.1 ASSESSMENT AND INTERPRETATION OF IN-SITU STRENGTH OF CONCRETE, K.C.G. ONG, N. NANDAKUMAR, *National University of Singapore, Singapore (21)*

203.2 CONCRETE, THE DURABLE BUILDING MATERIAL, M.R. SHIRLAW, *Canadian Portland Cement Association, Ottawa, ON, Canada (42)*

203.3 MICROSTRUCTURE OF AUTOCLAVED AERATED CONCRETE SUBJECTED TO CARBONATION, F. MATSUSHITA[1], Y. AONO[1], S. SHIBATA[1], T. KAMADA[2], *[1]Sumitomo Metal Mining Company Ltd, Yokohama and [2]Sumitomo Metal Mining Company Ltd, Ichikawa, Japan (15)*

09:45 – 12:00

204 **ORAL** **Regency Centre**

Virtual Reality and Human-Computer Interaction

Chair	**Rob Howard, Denmark**	**Président**
Co-Chair	**Anders Ekholm, Sweden**	**Co-président**

204.1 THE DEVELOPMENT OF AN INTEGRATED LIFE CYCLE COSTING MODEL USING OBJECT ORIENTED AND VR TECHNOLOGIES, A. AL-HAJJ[1], G. AOUAD[2], *[1]Robert Gordon University, Aberdeen and [2]University of Salford, Manchester, UK (276)*

204.2 PROPERTIES OF THE VIRTUAL BUILDING, P. CHRISTIANSSON, *Aalborg University, Aalborg, Denmark (277)*

204.3 VIRTUAL CONSTRUCTION FOR AUTOMATED SCHEDULE GENERATION, W.Y THABET, R.R. WAKEFIELD, A.F. WALY, *Virginia Tech, Blacksburg, VA, USA (280)*

204.4 VIRTUAL REALITY AS A DESIGN AND VISUALISATION TOOL IN THE HOUSEBUILDING INDUSTRY, J.K. WHYTE, N.M. BOUCHLAGHEM, A. THORPE, *Loughborough University, Loughborough, UK (281)*

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205 **ORAL** **Plaza West**

Durability of Polymer-Based Materials (1)

Chair	**L. Stewart Burn, Australia**	**Président**
Co-Chair	**Per Jostein Hovde, Norway**	**Co-président**

205.1 A NEW TYPE OF CLEAR COATING SYSTEMS FOR WOOD, K. MOTOHASHI, *Building Research Institute, Ministry of Construction, Tsukuba, Japan (80)*

205.2 NEW PREDICTION METHODS OF SERVICE LIFE OF POLYMERIC FINISHING MATERIALS, T. FUKUSHIMA, *Building Research Institute, Ministry of Construction, Tsukuba, Japan (78)*

205.3 SERVICE LIFE PREDICTION OF POLYMERIC BUILDING MATERIALS USING THE "ACID DEW AND FOG TEST", U. SCHULZ[1], P. TRUBIROHA[1], T. BOETTGER[2], H. BOLTE[2], *[1]Bundesanstalt für Materialforschung und prüfung (BAM), Berlin and [2]Universität Leipzig, Germany (81)*

205.4 DEVELOPMENT OF A DURABILITY CLASSIFICATION SYSTEM FOR ASSESSING THE PROTECTIVE COATINGS FOR CONCRETE, R.S. BASSI, *Building Research Establishment, Watford, UK (75)*

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206 **ORAL** **Plaza East**

Durability of Wood and Wood Components (2)

Chair	**Robert Leicester, Australia**	**Président**
Co-Chair	**Jennifer O'Connor, Canada**	**Co-président**

206.1 MEASURING MOISTURE CONTENT IN WOOD WITH BUILT IN PROBES 20+ YEARS EXPERIENCE, E. BRANDT, M. H. HANSEN, *Danish Building Research Institute, Hoersholm, Denmark (63)*

206.2 IN-SERVICE MOISTURE CONTENT OF HARDBOARD LAP SIDING IN SOUTHERN FLORIDA, C. CARLL, A. TENWOLDE, V. MALINAUSKAS, M. KNAEBE, P.G. SOTOS, *USDA, Forest Service, Madison, WI, USA (64)*

206.3 MATHEMATICAL MODELLING OF SORPTION PROCESSES IN TIMBER BASED ON NUMERICAL ANALYSIS, G. DAI, K. AHMET, *University of Luton, UK (66)*

206.4 THE PROBLEM OF THE DURABILITY OF MATERIALS USED IN THE REHABILITATION OF HISTORIC TIMBER ROOFS, C. BERTOLINI CESTARI, C. CRAVERO, S. CURTETTI, C. LOMBARDI, *Polytechnic of Turin, Italy (61)*

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207 **ORAL** **Plaza Centre**

Corrosion of Concrete (1)

Chair	**P.A. Muhammed Basheer, N. Ireland**	**Président**
Co-Chair	**Adrian Long, N. Ireland**	**Co-président**

207.1 STEEL CORROSION IN CONCRETE: A COMPREHENSIVE EXPERIMENTAL PROGRAM AND PRELIMINARY RESULTS, C.Q. LI, M. CLEVEN, F. ISAAC, *Monash University, Clayton, Australia (32)*

207.2 CHARACTERISING CHLORIDE PENETRATION RESISTANCE OF CONCRETE, V. SIRIVIVATNANON, R.P. KHATRI, *CSIRO, Sydney, Australia (37)*

207.3 A SIMPLIFIED METHOD TO ESTIMATE CORROSION RATES - A NEW APPROACH BASED ON INVESTIGATIONS OF MACROCELLS, M. RAUPACH[1], J. GULIKERS[2], *[1]Schiessl & Raupach, Consulting & Engineering, Aachen, Germany; [2]Ministry of Transport, Public Works and Water Management, Utrecht, The Netherlands (36)*

207.4 ELECTROLYTIC RESISTIVITY OF COVER CONCRETE: RELEVANCE, MEASUREMENT AND INTERPRETATION, R. WEYDERT, C. GEHLEN, *Technical University of Aachen, Germany (39)*

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208 **ORAL** **Regency Centre**

Design Systems

Chair	**Per Christiansson, Denmark**	**Président**
Co-Chair	**Robert Woodbury, Australia**	**Co-président**

208.1 PROJECT MANAGEMENT ISSUES IN REMOTE CAD OUTSOURCING, G.L.M. AUGENBROE[1], S.R. LOCKLEY[2], *[1]Georgia Institute of Technology, Atlanta, GA, USA; [2]University of Newcastle upon Tyne, UK (245)*

208.2 THE DYNAMIC DEFINITION OF DESIGN ELEMENT SPECIFICATIONS VIA A PRODUCT SUPPLIER DATABASE WEB-SITE, J. UNDERWOOD, M.A. ALSHAWI, G. AOUAD, T. CHILD, I. FARAJ, *University of Salford, UK (252)*

208.3 AN INTERNET-BASED DISTRIBUTED BUILDING DESIGN SERVICE FRAMEWORK, C.S. HAN, J.C. KUNZ, K.H. LAW, *Stanford University, Stanford, CA, USA (248)*

208.4 TOWARDS MODEL BASED DESIGN - A CASE STUDY: THE MODULAR DESIGN SYSTEM, E.D. GRIFFITH, D.K. HICKS, K.D. McGRAW, M.P. CASE, *US Army Construction Engineering Research Laboratories, Champaign, IL, USA (247)*

208.5 EXPLORING AND COMPARING DESIGNS: THE SAME GAME? R.F. WOODBURY, S. DATTA, T-W. CHANG, A.L. BURROW, *University of Adelaide, Australia (253)*

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209 **POSTERS/AFFICHES** **Regency West**

Building Façades and Components: Life Cycle Costing

Chair	**Per Jernberg, Sweden**	**Président**
Co-Chair	**Georg Soronis, Sweden**	**Co-président**

209.27 REDUCTION OF CRACKS IN PLASTER REVESTMENT, A. MÜLLER, R.H. ROMAGNA, *Universidade Federal de Santa Catarina, Florianópolis, Brazil (95)*

209.28 EVALUATION OF THE LONG-TERM PERFORMANCE OF WATER REPELLANTS ON RENDERED AUTOCLAVED AERATED CONCRETE, H. KUS, P. NORBERG, *Royal Institute of Technology, Gävle, Sweden* (91)

209.29 ELECTRICAL MEASUREMENT OF MOISTURE CONTENT IN POROUS BUILDING MATERIALS, P. NORBERG*, Royal Institute of Technology, Gävle, Sweden (96)*

209.30 FOUNDATION FAILURES IN NEW RESIDENTIAL CONSTRUCTION, R.R. MARSHALL, *Halsall Associates Limited, Toronto, ON, Canada (94)*

209.31 REAL ESTATE RENOVATION DECISIONS BASED ON COST APPROACH APPRAISING PRINCIPLES, I. PŠUNDER, *University of Maribor, Slovenia (168)*

209.32 REHABILITATION AND THE COSTS TO SUSTAIN DWELLING SERVICES, I.M. JOHNSTONE, *University of Auckland, New Zealand (162)*

209.33 FORECASTING THE RUNNING COSTS OF SPORT AND LEISURE CENTRES, R.J. KIRKHAM, A.H. BOUSSABAINE, R.G. GREW, S.P. SINCLAIR, *University of Liverpool, UK (163)*

209.34 DETERMINING THE IMPACT OF QUALITY UPON LIFE CYCLE COSTS, L.A. NEWTON, A.J. CHRISTIAN, *University of New Brunswick, Fredericton, NB, Canada (166)*

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210 **POSTERS/AFFICHES** **Regency West**

Innovative Materials

Chair	**Abid Abutair, N. Ireland**	**Président**
Co-Chair	**Mostafa Nofal, Canada**	**Co-président**

210.35 COMPOSITE SCRIM REINFORCED-CEMENTITIOUS BOARDS: ACCELERATED AGING AND PERFORMANCE PREDICTION, G.J. VENTA, J.F. PORTER, M. PIERSON, *Bay Mills Limited, St. Catharines, ON, Canada (49)*

210.36 DURABILITY OF HIGH PERFORMANCE CONCRETE CONTAINING PALM OIL FUEL ASH, A.S.M. ABDUL AWAL, M. WARID HUSSIN, *Universiti Teknologi Malaysia, Johor Bahru, Malaysia (44)*

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210.42 EXPERIMENTATION ON PHYSICAL DURABILITY OF MULTILAYER PANELS CAST IN SITU, R. MONTAGNA[1], M.G. PAURI[1], U. SCARTOZZI[2], *[1]Ancona University, Ancona and [2]Ancona University, Grottammare, Italy (17)*

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Durability of Polymer-Based Materials (2)

Chair	**Kenji Motohashi, Japan**	**Président**
Co-Chair	**Larry W. Masters, USA**	**Co-président**

211.1 CORRELATION OF THE EFFECTS OF ARTIFICIAL AND NATURAL WEATHERING AT ELASTOMERIC BUILDING SEALANTS, H. BOLTE, T. BOETTGER, *University of Leipzig, Germany (76)*

211.2 THE EFFECTS OF HEAT AGING ON ACRYLONITRILE-BUTADIENE-STYRENE (ABS) BLENDS, B.E. TIGANIS, L.S. BURN, *CSIRO, Victoria, Australia (82)*

211.3 CERAMIC TILE FINISHING SYSTEMS FOR EXTERIOR USING ORGANIC ADHESIVES, T. KONDO[1], K. MOTOHASHI[2], T. NAKAI[3], E. TAKADA[4], *[1]Shimizu Corporation, Tokyo, [2]Building Research Institute, Ministry of Construction, Tsukuba, [3]Kaneka Corporation, Tokyo and [4]TOTO Ltd, Gifu, Japan (79)*

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Durability of Wood and Wood Components (3)

Chair	**Robert Leicester, Australia**	**Président**
Co-Chair	**Erik Brandt, Denmark**	**Co-président**

212.1 DOCUMENTATION OF CORRECT USE OF WOOD PROTECTION BY DESIGN, M. VESTERGAARD, *Danish Technological Institute, Copenhagen, Denmark (74)*

212.2 DESIGNING FOR DURABLE WOOD CONSTRUCTION: THE 4 DS, D.G. HAZLEDEN[1], P.I. MORRIS[2], *[1]HouseWorks Building Science Inc. and [2]Forintek Canada Corporation, Vancouver, BC, Canada* (69)

212.3 PROTECTION OF WOOD BY DESIGN, M.H. HANSEN, A. NICOLAJSEN, *Danish Building Research Institute, Hoersholm, Denmark (68)*

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Chair	**Byung Hwan Oh, Korea**	**Président**
Co-Chair	**Adrian Long, N. Ireland**	**Co-président**

213.1 IN-SITU ASSESSMENT OF CORROSION INDUCED DAMAGE OF THE DICKSON BRIDGE DECK, R. FAZIO[1], M.S. MIRZA[1], E. Mc CAFFERTY[2], R.J. ANDREWS[2], P.A.M. BASHEER[2], A.E. LONG[2], *[1]McGill University, Montreal, QC, Canada, [2]Queen's University of Belfast, Northern Ireland, UK (26)*

213.2 THE EVALUATION OF FLEXURAL STRENGTH OF RC BEAMS DAMAGED BY REBAR CORROSION, H.S. LEE[1], T. KAGE[2], T. NOGUCHI[3], F. TOMOSAWA[3], *[1]Hanyang University, Seoul, Korea; [2]Ministry of Construction, Tsukuba and [3]University of Tokyo, Japan (31)*

213.3 DURABILITY OF CRACKED FIBRE REINFORCED CONCRETE STRUCTURES EXPOSED TO CHLORIDES, E.J.D.P. HANSEN, T. EKMAN, K.K. HANSEN, *Technical University of Denmark (DTU), Lyngby, Denmark (27)*

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Co-Chair	**Ziga Turk, Slovenia**	**Co-président**

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214.4 HIGHLIGHTS OF THE DEVELOPMENT PROCESS OF INDUSTRY FOUNDATION CLASSES, T. LIEBICH[1,2], J. WIX[2,3], *[1]Thomas Liebich Consultancy, München, Germany; [2]AEC3 Ltd, Thatcham and [3]Jeffrey Wix Consultancy, Thatcham, UK (265)*

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Co-Chair	**Bengt Eriksson, Sweden**	**Co-président**

215.43 DURABILITY OF MORTAR LININGS IN DUCTILE IRON PIPES, I.S. MELAND, *SINTEF, Trondheim, Norway (16)*

215.44 EFFECT OF WATER STORAGE TIME ON FROST RESISTANCE OF CONCRETE, K. NORDSTRÖM, G. FAGERLUND, *Lund Institute of Technology, Lund, Sweden (20)*

215.45 FIRE DURABILITY OF VOLCANIC PUMICE CONCRETE WITH SPECIAL REFERENCE TO THIN WALLED FILLED SECTIONS, K.M.A. HOSSAIN, *Papua New Guinea University of Technology, Lae, Papua New Guinea (14)*

215.46 EFFECT OF MATRIX PROPORTIONS AND CURING TEMPERATURE ON THE PHYSICAL, MECHANICAL AND DURABILITY PROPERTIES OF LIME-NATURAL POZZOLAN PASTE, A. ÇOLAK, B. SAYIL, *Istanbul Technical University, Istanbul, Turkey (11)*

215.47 SO_2 ENVIRONMENT DEGRADATION OF SYNTHETIC PASTES OF PORTLAND CEMENT, C. SABBIONI[1], G. ZAPPIA[1], C. RIONTINO[1], M.T. BLANCO-VARELA[2], J. AGUILERA[2], F. PUERTAS[2], A. PALOMO[2], K. VAN BALEN[3], E.E. TOUMBAKARI[3], *[1]National Research Council, Bologna, Italy; [2]Ist. Eduardo Torroja de Ciencias de la Construcción, Madrid, Spain; [3]Katholieke Universiteit, Leuven, Belgium (24)*

215.48 SERVICE LIFE PREDICTION OF FLAT ROOFS WITH POLYMER MODIFIED BITUMINOUS WATERPROOFING MEMBRANES, A. TISO[1], S. CROCE[2], E. DE ANGELIS[2], *[1]DIC, UCLA - CONICIT, Venezuela; [2]Politecnico di Milano, Italy (103)*

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Computer Integrated Construction
Information Technology in Construction
Virtual Reality

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Co-Chair	**Grahame Cooper, UK**	**Co-président**

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216.51 CONSTRUCTION INFORMATION ACCESS THROUGH A "MALLEABLE FRAME", Y. ZHU, R. ISSA, *University of Florida, Gainesville, FL, USA (215)*

216.52 THE PROJECT REPORTER: MULTIMEDIA PROGRESS REPORTING FOR CONSTRUCTION PROJECTS, I.M.H. SAAD, *Bradley University, Peoria, IL, USA (226)*

216.53 UTILITY ASSESSMENT OF ELECTRONIC NETWORKING TECHNOLOGIES IN CONSTRUCTION, M. ABDUH, M.J. SKIBNIEWSKI, *Purdue University, West Lafayette, IN, USA (216)*

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216.55 AN AUTOMATED MODEL FOR GENERATING A SHORT INTERVAL SCHEDULE, A.F. WALY, W.Y. THABET, R.R. WAKEFIELD, *Virginia Polytechnic Institute and State University, Blacksburg, VA, USA (229)*

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Wednesday, June 2

08:30 - 09:15	Invited Speaker, ***Dr. Dudley R. Morgan***	*Regency Centre*
09:15 - 09:45	Coffee Break *Sponsored by Standards Council of Canada*	*Regency Foyer*
09:45 - 12:00	Concurrent Sessions	*Regency Centre, Plaza - East, Centre, West*
12:00 - 13:30	Lunch Invited Speaker, ***Wim Bakens,*** *Secretary General, CIB*	*Regency East*
13:30 - 15:30	Concurrent Sessions and Poster Sessions	*Regency Centre, West Plaza - East, Centre, West*
15:30 - 15:45	Coffee Break *Sponsored by Forintek*	*Regency Centre*
15:45 - 17:45	Concurrent Sessions and Poster Sessions	*Regency Centre, West Plaza - East, Centre, West*
19:00	Conference Dinner	*Regency East*

08:30 - 09:15

300 **PLENARY** **Regency Centre**

Chair	**Michael Lacasse, Canada**	**Président**
Co-Chair	**Dana Vanier, Canada**	**Co-président**

INVITED SPEAKER

Dr. Dudley R. Morgan
SERVICE LIFE: LESSONS LEARNED FROM EXISTING STRUCTURES
AGRA Earth & Environmental Limited

09:45 - 12:00

301 **ORAL** **Plaza West**

Roofing Materials and Components (1)

Chair	**Ralph Paroli, Canada**	**Président**
Co-Chair	**Brian Kyle, Canada**	**Co-président**

301.1 PERFORMANCE OF TAPE-BONDED SEAMS OF EPDM MEMBRANES: RESISTANCE TO PEEL-CREEP, W.J. ROSSITER, JR., M.G. VANGEL, K.M. KRAFT, *National Institute of Standards and Technology, Gaithersburg, MD, USA (106)*

301.2 WATERPROOFING DURABILITY: A SURVEY OF SEVERAL APP MODIFIED ROOF MEMBRANES IN SERVICE FOR MORE THAN 20 YEARS IN EUROPE, PM. SARTORI, M. BECUZZI, *ICITE-CNR, Milano, Italy (109)*

301.3 COMPARATIVE TESTING AND RATING OF THIRTEEN THERMOPLASTIC SINGLE PLY ROOFING MEMBRANES, C.G. CASH, *Simpson Gumpertz & Heger Inc., Arlington, MA, USA (101)*

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301.5 NATURAL AGEING OF WATERPROOFING MEMBRANES, PM. SARTORI, M. BECUZZI, C. POLLASTRO, *Consiglio Nazionale delle Ricerche, Milano, Italy (110)*

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302 **ORAL** **Plaza East**

Performance and Serviceability of Buildings (1)

Chair	**Gerald Davis, Canada**	**Président**
Co-Chair	**Marlene Hermans, The Netherlands**	**Co-président**

302.1 PERFORMANCE CONCEPT IN PROCUREMENT OF DURABILITY AND SERVICEABILITY OF BUILDINGS, G.K.I. ANG[1], D.P. WYATT[2], [1]*Government Building Agency, The Hague, The Netherlands;* [2]*University of Brighton, UK (173)*

302.2 ENSURING BUILDING SERVICEABILITY AT THE DESIGN STAGE, R. BECKER, *TECHNION - Israel Institute of Technology, Haifa, Israel (175)*

302.3 MANAGING THE LIFE CYCLE REQUIREMENTS OF FACILITIES, P. HUOVILA, *VTT Building Technology, Espoo, Finland (179)*

302.4 WHOLE LIFE PERFORMANCE STRATEGY: BEYOND INCREMENTAL COST AND SERVICE LIFE, D.P. ROWE, *University of Bath, UK (180)*

302.5 ARE FACILITIES MEASURING UP? MATCHING BUILDING CAPABILITIES TO FUNCTIONAL NEEDS, G. DAVIS, F. SZIGETI, *International Centre for Facilities, Ottawa, ON, Canada (177)*

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303 **ORAL** **Plaza Centre**

Life Cycle Models and Facilities Management

Chair	**Dana Vanier, Canada**	**Président**
Co-Chair	**TBA**	**Co-président**

303.1 A BUILDING LIFE-CYCLE INFORMATION SYSTEM FOR TRACKING BUILDING PERFORMANCE METRICS, R.J. HITCHCOCK, M.A. PIETTE, S.E. SELKOWITZ*, Lawrence Berkeley National Laboratory, Berkeley, CA, USA (257)*

303.2 THE DEVELOPMENT OF INDUSTRY FOUNDATION CLASSES FOR FACILITIES MANAGEMENT, J. WIX[1], K.Q. YU[2], P.S. OTTOSEN[3], [1]*AEC3/Jeffrey Wix Consulting, Thatcham, UK;* [2]*Timberline Software Corporation, Beaverton, OR, USA;* [3]*Aalborg University, Aalborg, Denmark (262)*

303.3 INFORMATION ANALYSIS FOR ROOFING SYSTEMS MAINTENANCE MANAGEMENT INTEGRATED SYSTEM, M.A. HASSANAIN[1], T.M. FROESE[1], D.J. VANIER[2], [1]*University of British Columbia, Vancouver, BC and* [2]*National Research Council Canada, Ottawa, ON, Canada (256)*

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304 **ORAL** **Regency Centre**

Decision Support Systems (1)

Chair	**Per Christiansson, Denmark**	**Président**
Co-Chair	**Grahame Cooper, UK**	**Co-président**

304.1 MANAGING AND EXPLOITING KNOWLEDGE ASSETS IN THE CONSTRUCTION INDUSTRY, D. BLOOMFIELD[1], I. FARAJ[1], P. JARVIS[2], C. ANUMBA[3], [1]*BRE Ltd, Garston,* [2]*University of Edinburgh and* [3]*Loughborough University, Loughborough, UK (232)*

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304.3 CONSTRUCTABILITY KNOWLEDGE-INTENSIVE DATABASE SYSTEM, N. KARTAM, K. AL-RESHAID, H. ASKAR, *Kuwait University, Safat, Kuwait (239)*

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Co-Chair	**Ralph Paroli, Canada**	**Co-président**

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305.5 THE EFFECTS OF ULTRAVIOLET RADIATION ON POLYCARBONATE GLAZING, G.F. TJANDRAATMADJA[1], L.S. BURN[1], M.C. JOLLANDS[2], [1]*CSIRO and* [2]*Royal Melbourne Institute of Technology, Melbourne, Australia (83)*

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Performance and Serviceability of Buildings (2)

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Co-Chair	**Gerald Davis, Canada**	**Co-président**

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306.4 COMMUNICATING PERFORMANCE REQUIREMENTS - TOOLS FOR TRANSFERRING CLIENT-ORIENTED MAINTENANCE INFORMATION, A.A.J. DAMEN, M.H. HERMANS, *Damen Consultants, Rotterdam, The Netherlands (176)*

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Probabilistic and Reliability Methods (1)

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Co-Chair	**Konrad Moser, Switzerland**	**Co-président**

307.1 DURACRETE: SERVICE LIFE DESIGN FOR CONCRETE STRUCTURES, T. SIEMES[1], C.EDVARDSEN[2], [1]*TNO Building and Construction Research, Delft, The Netherlands;* [2]*Consulting Engineers and Planners AS (COWI), Lyngby, Denmark (125)*

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307.3 DURABILITY ASSESSMENT OF BUILDING SYSTEMS, J. LAIR[1], J.F. LE TENO[1], D. BOISSIER[2], [1]*Centre Scientifique et Technique du Bâtiment (CSTB), Grenoble et* [2]*Centre Universitaire des Sciences et Techniques (LERMES/CUST), Clermont-Ferrand, France (121)*

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Decision-Support Systems (2)

Chair	**Robert Woodbury, Australia**	**Président**
Co-Chair	**Per Christiansson, Denmark**	**Co-président**

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308.2 AN INTEGRATED DECISION-SUPPORT SYSTEM MODEL FOR CONSTRUCTION MANAGEMENT EXECUTIVES, A. DIKBAS, B. MORTEN, S. BAYRAMOGLU, I. YITMEN, *Istanbul Technical University, Istanbul, Turkey (235)*

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308.4 SLAB FORMWORK DESIGN USING GENETIC ALGORITHM, H. AL-TABTABAI, A.P. ALEX, R. JAMES, *University of Kuwait, Safat, Kuwait (231)*

308.5 COST ESTIMATION OF HIGH PERFORMANCE CONCRETE (HPC) HIGH-RISE COMMERCIAL BUILDINGS BY NEURAL NETWORKS, C.F. FANG, T.M. FROESE*, University of British Columbia, Vancouver, BC, Canada (237)*

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Co-Chair	**TBA**	**Co-président**

309.58 SUSTAINABLE DESIGN FOR BUILDINGS IN DEVELOPING COUNTRIES, A.R. MAKENYA[1], G. SORONIS[2], *[1]KTH-Royal Institute of Technology, and [2]Swedish Building Standards Institution, Stockolm, Sweden (197)*

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309.60 TENETS OF SUSTAINABLE ROOFING, T.W. HUTCHINSON[1], K. ROBERTS[2], *[1]Legat Architects, Chicago, IL, USA; [2]Glanville Consultants, Abingdon, UK (196)*

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Design for Durability and Generic Methods

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Co-Chair	**TBA**	**Co-président**

310.64 A NATURAL PROGRESSION: NEGLECT TO DECAY, D.P. WYATT, *University of Brighton, UK (205)*

310.65 IMPROVEMENT OF TRADITIONAL BUILDING MATERIALS AND TECHNIQUES, A.B. NGOWI, *University of Botswana, Gaborone, Botswana (201)*

310.66 QUALITY CONTROL WITH THE ASSURANCE OF NORMATIVE PRECISION OF GEOMETRICAL PARAMETERS IN ERECTION OF ONE-STOREY FRAMED BUILDINGS, J. PARASONIS, *Vilnius Gediminas Technical University, Vilnius, Lithuania (202)*

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310.70 PHENOMENOLOGICAL MODEL OF BUILDING MATERIAL STRAIN, O.V. SINYAYEV, *Cherepovets State University, Cherepovets, Russia (139)*

310.71 DURABILITY OF SOIL CONTAMINATED BY OIL, Y.J. AL SHAKARCHI, H. ABDOUL RASOOL, *University of Baghdad, Iraq (128)*

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311 **ORAL** **Plaza West**

Roof Maintenance Management (3)

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Co-Chair	**Brian Kyle, Canada**	**Co-président**

311.1 DECISION-SUPPORT SYSTEM FOR SERVICE LIFE ASSET MANAGEMENT: THE BELCAM PROJECT, Z. LOUNIS[1], D.J. VANIER[1], M.A. LACASSE[1], B.R. KYLE[2], [1]*National Research Council Canada, Ottawa, ON and* [2]*Public Works and Government Services Canada, Hull, QC, Canada (114)*

311.2 CONDITION ASSESSMENT OF FLAT ROOFS , INCLUDING THE USE OF EXPERT SYSTEMS, G. SAUNDERS, A. GOODIER, *Building Research Establishment Ltd, Watford, UK (115)*

311.3 IMPROVEMENT OPPORTUNITIES IN ROOFING ASSETS MANAGEMENT: EXPERIENCES FROM THE US ARMY, D.M. BAILEY, I. ADIGUZEL, *U.S. Army Construction Engineering Research Laboratory, Champaign, IL, USA (111)*

311.4 PREDICTIVE MAINTENANCE - WHAT SHOULD BE IN A CONDITION DATABASE, B.H. HERTLEIN, *STS Consultants Ltd, Vernon Hills, IL, USA (112)*

311.5 EFFECTIVE ROOF MANAGEMENT - UNDERSTANDING THE LIFE CYCLE OF YOUR ROOF SYSTEMS, C.P. HODGES, *Facility Engineering Associates, Fairfax, VA, USA (113)*

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Life Cycle Analysis (LCA)

Chair	**Kathryn Bourke, UK**	**Président**
Co-Chair	**Edwin Bartlett, UK**	**Co-président**

312.1 LCA AS PERFORMANCE REQUIREMENT IN THE DUTCH BUILDING DECREE BY 2001, N. SCHOLTEN, *TNO Building and Construction Research, Delft, The Netherlands (186)*

312.2 IMPACT OF ENVIRONMENTAL, HEALTH AND SAFETY ISSUES ON COATING USED FOR OFFSHORE FABRIC MAINTENANCE: A LCC ANALYSIS, A. AL-HAJJ[1], N. THOMPSON[2], [1]*Robert Gordon University and* [2]*Salamis (Marine and Industrial) Limited, Aberdeen, UK (182)*

312.3 RELIABILITY AND WHOLE LIFE PERFORMANCE: INTEGRATING THE SUPPLY CHAIN, E.V. BARTLETT, M.R. CLIFT, *Building Research Establishment, London, UK (183)*

312.4 LIFE CYCLE ASSESSMENT AND THE DESIGN AGENDA: THE STANDARDS IMPERATIVE, A.R. MAKENYA[1], D.P. WYATT[2], G. SORONIS[3], [1]*KTH-Royal Institute of Technology, Stockolm, Sweden;* [2]*University of Brighton, UK;* [3]*Swedish Building Institution, Stockolm, Sweden (185)*

15:45 - 17:45

313 **ORAL** **Plaza Centre**

Probabilistic and Reliability Methods (2)

Chair	**Ton Siemes, The Netherlands**	**Président**
Co-Chair	**Konrad Moser, Switzerland**	**Co-président**

313.1 EVALUATING THE RELIABILITY OF STRUCTURAL MASONRY ELEMENTS USING THE RESPONSE SURFACE TECHNIQUE, L. SCHUEREMANS[1], D. VAN GEMERT[1], M. MAES[2], [1]*Catholic University of Leuven, Belgium;* [2]*University of Calgary, AB, Canada (124)*

313.2 FAILURE PROBABILITY OF DETERIORATING REINFORCED CONCRETE BEAMS, B. TEPLÝ, D. NOVÁK, Z. KERŠNER, W. LAWANWISUT, *Technical University of Brno, Czech Republic (126)*

313.3 DEVELOPMENT OF A RELIABILITY-BASED DURABILITY DESIGN METHOD FOR TIMBER CONSTRUCTION, G.C. FOLIENTE[1], R.H. LEICESTER[1], I.S. COLE[1], C. MACKENZIE[2], [1]*CSIRO, Melbourne and* [2]*Timber Research and Development Advisory Council, Brisbane, Australia (120)*

313.4 TOWARDS THE PRACTICAL EVALUATION OF SERVICE LIFE - ILLUSTRATIVE APPLICATION OF THE PROBABILISTIC APPROACH, K. MOSER, *Swiss Federal Laboratories for Materials Testing and Research, Duebendorf, Switzerland (123)*

313.5 DEVELOPMENT OF PREDICTION MODELS FOR SEWER DETERIORATION, D.M. ABRAHAM, R. WIRAHADIKUSUMAH, *Purdue University, West Lafayette, IN, USA (117)*

15:45 - 17:45

314 **ORAL** **Regency Centre**

Process Modelling

Chair	**Martin Betts, UK**	**Président**
Co-Chair	**Godfried Augenbroe, USA**	**Co-président**

314.1 REFOCUSING PROJECT DELIVERY SYSTEMS ON ADDING VALUE, B.L. ATKIN, *The Royal Institute of Technology, Stockholm, Sweden (268)*

314.2 PROCESS MODELLING FOR PLANNING AND MANAGEMENT OF FACILITIES: A RE-ENGINEERING APPROACH, P.M. OJWAKA, *Tampere University of Technology, Tampere, Finland* (274)

314.3 INDUSTRY FOUNDATION CLASS MODELING FOR ESTIMATING AND SCHEDULING, T.M. FROESE[1], K.Q. YU[2], [1]*University of British Columbia, Vancouver, BC, Canada;* [2]*Timberline Software Corporation, Beaverton, OR, USA (270)*

314.4 MODEL BASED CONSTRUCTION PROCESS MANAGEMENT, J. LAITINEN, *YIT Corporation, Helsinki, Finland (272)*

314.5 MEASURING INFORMATION INTEGRATION IN PROJECT TEAMS, B.L. ATKIN, *The Royal Institute of Technology, Stockholm, Sweden (267)*

314.6 COST-LOADED PRODUCTION MODEL FOR PLANNING AND CONTROL, M. FISCHER[1], F. AALAMI[1], C. KUHNE[2], A. RIPBERGER[2], [1]*Stanford University, Stanford, CA, USA;* [2]*Technical University Munich, Germany (269)*

15:45 - 17:45

315 **POSTERS/AFFICHES** **Regency West**

Life Cycle Analysis and Generic Methods

Chair	**Kathryn Bourke, UK**	**Président**
Co-Chair	**Arne Nesje, Norway**	**Co-président**

315.72 USE OF SERVICE LIFE DATA IN LCA OF BUILDING MATERIALS, S.M. STRAND, P.J. HOVDE, *Norwegian University of Science and Technology, Trondheim, Norway (187)*

315.73 BUILDING DURABLE AND SUSTAINABLE THE DUTCH WAY AND THE CONSEQUENCES FOR THE HEALTHY INDOOR CLIMATE, M. HAM, A. VAN BRONSWIJK, *Eindhoven University of Technology, Eindhoven, The Netherlands (184)*

315.74 EVALUATION OF FUNCTIONALITY OF BUILDING COMPONENTS APPLICABLE TO SERVICE LIFE DESIGN, M.G. REJNA, *Polytechnic of Milan, Italy (138)*

315.75 QUALITATIVE SIMULATION FOR ASSESSMENT OF CHEMICAL-PHYSICAL COMPATIBILITY AMONG BUILDING COMPONENTS, B. NATICCHIA, *University of Ancona, Italy (136)*

315.76 EMPIRICAL VS. THEORETICAL LIFE PREDICTION FOR SUBFLOOR STRUCTURAL CONNECTORS, P.W. HABERECHT, C.D. KANE, *Building Research Association of New Zealand, Wellington, New Zealand (131)*

315.77 DEGRADATION ANALYSIS BY STATISTICAL METHODS, B. LEIRA, J. LINGÅRD, A. NESJE, E. SUND, S. SAEGROV, *SINTEF, Trondheim, Norway (134)*

315.78 SERVICE LIFE PREDICTION FOR FLOOR COVERINGS, J. PAULSEN*, Royal Institute of Technology, Stockholm, Sweden (137)*

315.79 CRITICAL LOSS OF PERFORMANCE - WHAT FAILS BEFORE DURABILITY, A.M. AIKIVUORI*, VTT Building Technology, Oulu, Finland (127)*

15:45 - 17:45

316 **POSTERS/AFFICHES** **Regency West**

Design Systems

Life Cycle Analysis and Facilities Management

Chair	**Anders Ekholm, Sweden**	**Président**
Co-Chair	**Dana Vanier, Canada**	**Co-président**

316.80 EXPERT VALIDATION OF TALL-D: A KBS FOR TALL BUILDINGS DESIGN, M. RAVI, C. BÉDARD, *Concordia University, Montreal, QC*, *Canada (251)*

316.81 A SEMANTICALLY RICH REFERENCE MODEL FOR BUILDING DESIGN, M.J. O'BRIEN, A. BAIG, *University of Nottingham, UK (250)*

316.82 SYDOX/MATCOMP/Xi: AN INFORMATION SYSTEM ADAPTED TO THE NEEDS OF CONSTRUCTION ACTORS, M. MOMMESSIN[1], A.F. CUTTING-DECELLE[1], A.M. DUBOIS[2], J.E. DUBOIS[3], [1]*Université de Savoie, ESIGEC/LGCH, Le Bourget Du Lac,* [2]*CSTB, Sophia-Antipolis and* [3]*Université de Paris VII/ITODYS, Paris, France (273)*

316.83 INTEGRATION OF PARAMETRIC GEOMETRIC MODELING AND CONSTRUCTION SIMULATION, K.M. NASSAR, Y. BELIVEAU, *Virginia Polytechnic Institute and State University, VA, USA (249)*

316.84 IMPROVING THE BRIEF THROUGH INFORMATION AND PROCESS MODELLING, F. YUSUF[1], M.A. ALSHAWI[2], [1]*Mara Institute of Technology, Shah Alam, Malaysia;* [2]*University of Salford, UK (254)*

316.85 IMPLEMENTATION OF A DYNAMIC INFORMATION SYSTEM FOR DESIGN, S. FRIDQVIST, *Lund University, Lund, Sweden (246)*

316.86 LIFE-CYCLE COST DESIGN METHODS AND TOOLS, S. PULAKKA, *VTT, Building Technology, Espoo, Finland (260)*

316.87 INTEGRATING PERMANENT EQUIPMENT TRACKING WITH ELECTRONIC OPERATIONS AND MAINTENANCE MANUALS, D. WIRT[1], W.E. SHOWALTER[2], G. CROUCH[2], [1]*Anderson and Associates and* [2]*Virginia Polytechnic Institute and State University, Blacksburg, VA, USA (261)*

316.88 THE BENEFITS AND COSTS OF INFORMATION TECHNOLOGY SYSTEMS IN BUILDING MAINTENANCE MANAGEMENT BASED ON INTERVIEWS, M. NAARANOJA, *Vaasa Polytechnic, Vaasa, Finland (259)*

Thursday, June 3

08:30 - 09:15	Invited Speaker, ***Prof. Charles M. Eastman***	*Regency Centre*
09:15 - 09:45	Coffee Break *Sponsored by: Canadian Standards Association*	*Regency Foyer*
09:45 - 12:00	Concurrent Sessions	*Regency Centre,* *Plaza - East, Centre, West*
09:45- 14:30	W78 Charettes "IT Futures"	Peacocks Lounge Balmoral, Peacocks Room
12:00 - 13:30	Lunch	*Regency East*
13:30 - 15:15	Rapportage : *8DBMC "IT Futures*"	*Regency Centre*
15:15 - 15:45	Coffee Break	*Regency Foyer*
15:45- 16:45	Closing Plenary Session	*Regency Centre*

08:30 - 09:15

400 **PLENARY** **Regency Centre**

Chair	**Dana Vanier, Canada**	**Président**
Co-Chair	**Michael Lacasse, Canada**	**Co-président**

INVITED SPEAKER

Professor Charles M. Eastman
INFORMATION EXCHANGE ARCHITECTURES FOR BUILDING MODELS
Georgia Institute of Technology, Atlanta, GA, USA

09:45 - 12:00

401 **ORAL** **Plaza West**

Design and Specification for Durable Concrete

Chair	**Konrad Moser, Switzerland**	**Président**
Co-Chair	**Mostafa Nofal, Canada**	**Co-président**

401.1 DESIGN OF CONCRETE TO RESIST CARBONATION, P.A.M. BASHEER, D.P. RUSSELL, G.I.B. RANKIN, *Queen's University of Belfast, UK (40)*

401.2 EFFECT OF REPEATED LOAD ON MICRO STRUCTURE AND CARBONATION OF CONCRETE AND MORTAR, K. TANAKA[1], J.H. JEON[1], T. NAWA[2], H. HASHIDA[3], [1]*Tokyo Institute of Technology, Yokohama,* [2]*Hokkaido University, Sapporo and* [3]*Shimizu Corporation, Tokyo, Japan (25)*

401.3 GAS PERMEABILITY OF CONCRETE: DEFINITION OF A PRECONDITIONING PROCEDURE FOR MEASUREMENTS AND CROSSOVER TRIALS, D. QUENARD[1], M. CARCASSES[2], [1]*CSTB, Saint Martin d'Hères, Grenoble and* [2]*LMDC-INSA-UPS, Toulouse, France (23)*

401.4 DURABILITY OF AUTOCLAVED AERATED CONCRETE, E. BOHNER, K. ÖDEEN, *Royal Institute of Technology, Stockholm, Sweden (10)*

401.5 INFLUENCE OF EARLY AGE THERMAL CRACKING ON DURABILITY OF MASSIVE CONCRETE STRUCTURES IN MARINE ENVIRONMENT, G. DE SCHUTTER, *University of Ghent, Belgium (12)*

09:45 - 12:00

402 **ORAL** **Plaza East**

Design for Durability

Chair	**David Wyatt, UK**	**Président**
Co-Chair	**Kathryn Bourke, UK**	**Co-président**

402.1 A SYSTEMATIC VIVENDI FOR DESIGN FOR DURABILITY, A. LUCCHINI[1], D.P. WYATT[2], [1]*Politecnico di Torino, Italy;* [2]*University of Brighton, UK (200)*

402.2 BUILDING DURABILITY - KNOW WHAT YOU KNOW OR LET'S USE THE KNOWLEDGE WE ALREADY HAVE, BEFORE WE IMPROVE UPON IT, W.H. GUMPERTZ, D.A. RUTILA, *Simpson Gumpertz & Heger Inc., Arlington, MA, USA (199)*

402.3 DESIGN FOR DURABILITY? - A SPECIFIER OBSERVED, S. EMMITT, *Leeds Metropolitan University, Leeds, UK (198)*

402.4 OPTIMISATION OF THE LIFE SPAN OF BUILDING COMPONENTS, H. TEMPELMANS PLAT, *Eindhoven University of Technology, Eindhoven, The Netherlands (204)*

09:45 - 12:00

403 **ORAL** **Plaza Centre**

Sustainable Design

Chair	**Georg Soronis, Sweden**	**Président**
Co-Chair	**Claus Rudbeck, Denmark**	**Co-président**

403.1 DESIGNING FOR DISASSEMBLY TO EXTEND SERVICE LIFE AND INCREASE SUSTAINABILITY, P. CROWTHER, *Queensland University of Technology, Brisbane, Australia (190)*

403.2 THE ADOPTION OF HONG KONG'S ECO-LABELLING SCHEME FOR BUILDINGS, H.A. DAVIES, *Hong Kong Polytechnic University, Kowloon, Hong Kong (191)*

403.3 THE ENVIRONMENTAL IMPACT OF INSULATION, N.A. HENDRIKS, J. DE HOOG, *Eindhoven University of Technology, Eindhoven, The Netherlands (195)*

403.4 GREENING OF CANADA'S NATIONAL MASTER SPECIFICATION, T. DUNBAR, B.R. KYLE, *Public Works and Government Services Canada, Hull, QC, Canada (192)*

09:45 - 12:00

404 **ORAL** **Regency Centre**

Generic Methods in Service Life Prediction

Chair	**Svein Haagenrud, Norway**	**Président**
Co-Chair	**Geoffrey Frohnsdorff, USA**	**Co-président**

404.1 SERVICE LIFE PREDICTION AND ECONOMIC ASSESSMENT OF PARKING GARAGE OPTIONS, A. WISEMAN, B.R. KYLE, *Public Works and Government Services Canada, Hull, QC, Canada (140)*

404.2 DURABILITY ASPECTS OF FIBER REINFORCED COMPOSITES, S.J. BHIDE, M.M. ZURALE, *MAEER'S Maharashtra Institute of Technology, Pune, India (129)*

404.3 INVESTIGATIONS OF MASS AND ENERGY FLOW IN EXISTING BUILDINGS, H. KLOFT, J.-D. WÖRNER, *Darmstadt University of Technology, Darmstadt, Germany (133)*

404.4 ASSESSING THE REMAINING SERVICE LIFE OF EXISTING BUILDING COMPONENTS FOR INSURANCE, P.D. MAYER[1], P. WORNELL[2], [1]*Housing Association Property Mutual and* [2]*Building Performance Group, London, UK (135)*

404.5 TOTAL LIFE CYCLE COST, D.K. SMITH, *Naval Facilities Engineering Command, Washington, DC, USA (170)*

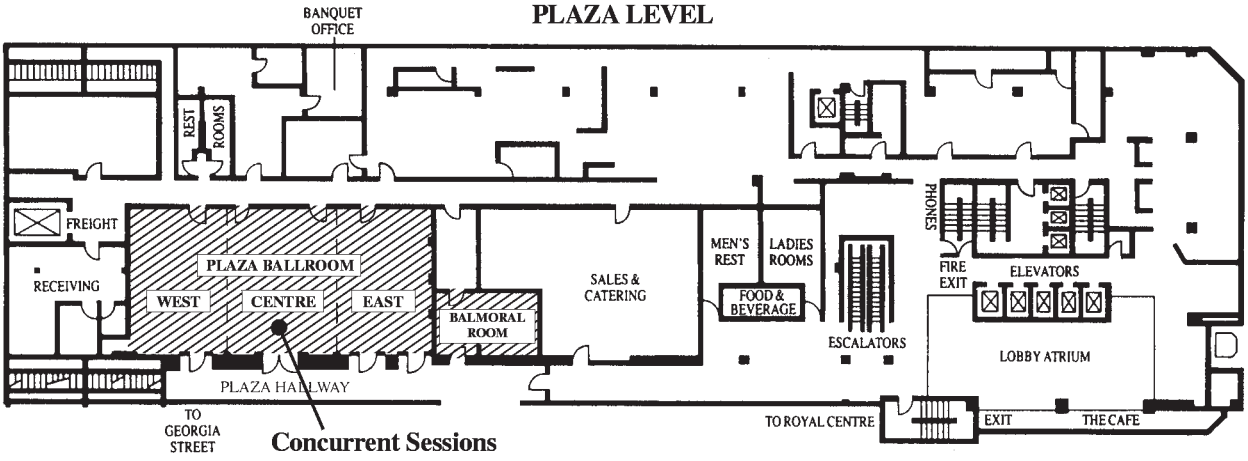
13:30 - 15:15

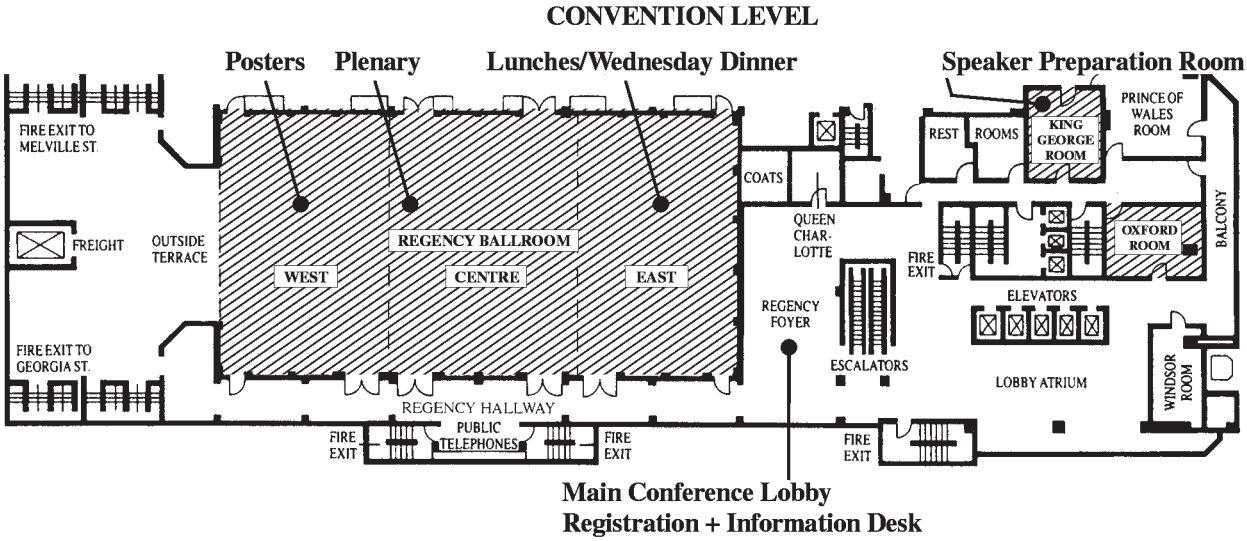
405	**8DBMC Rapportage** **"IT Futures" Rapportage**	**Regency Centre**
Chair	**Michael Lacasse, Canada**	**Président**
Co-Chair	**Dana Vanier, Canada**	**Co-président**

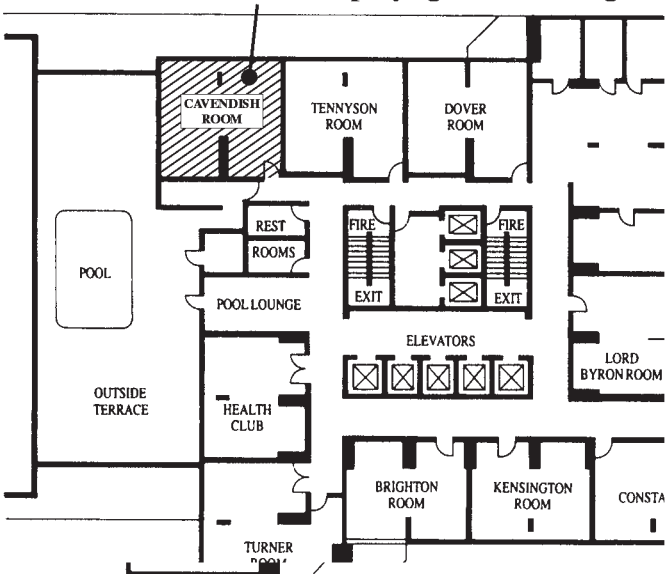
15:45 - 16:45

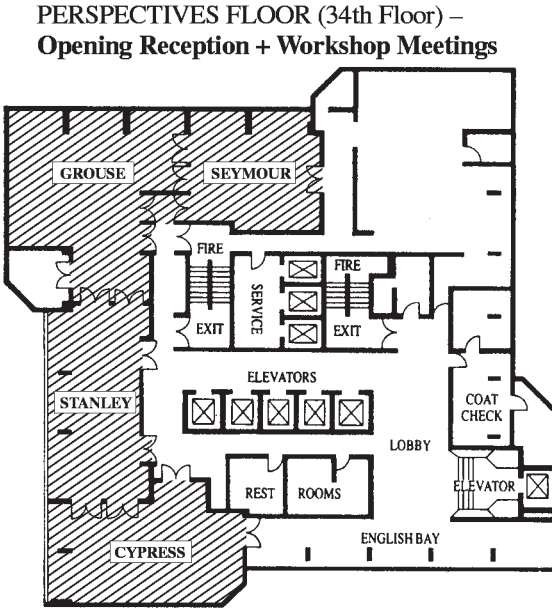
406	**CLOSING PLENARY SESSION**	**Regency Centre**
Chair	**Michael Lacasse, Canada**	**Président**
Co-Chair	**Dana Vanier, Canada**	**Co-président**

Floorplan – Hyatt Regency Hotel



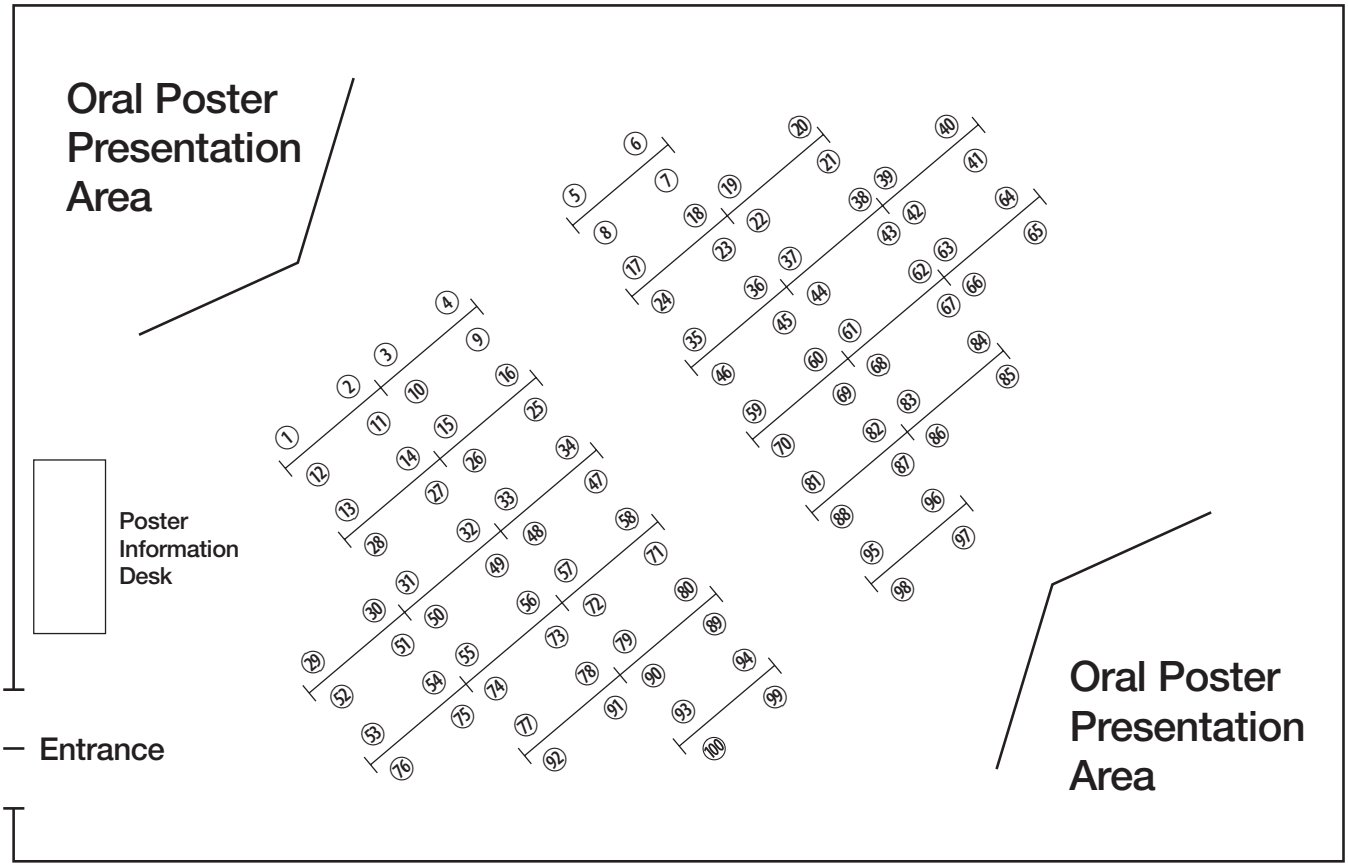






Poster Sessions

Regency Ballroom West



Technical Tour

A technical tour and dinner cruise of Vancouver Harbour on the MV Britannia has been arranged for delegates on the evening of Tuesday, June 1. The cruise starts at Stanley Park and follows the south shore of Vancouver's Inner Harbour. The view to the north is of the dramatic mountains that frame the harbour. To the south we will pass Canada Place. Beyond that we enter the working port where container ships, bulk carriers, and another cruise terminal at Ballantyne Pier, recently rebuilt, all play a role in supplying Canada with its needs and exporting its products. The cruise continues continues under the Second Narrows Bridge towards Deep Cove and Indian Arm, where residential and park areas of Vancouver can be seen. Simon Fraser University sits on the hill to the south as we turn back to follow the north shore, with its bulk commodity terminals for coal, grain and sulphur. This shore also has the shipbuilding and repair facilities, including the new fast ferry facility. We pass close to Lions Gate suspension bridge and follow the edge of Stanley Park back to the dock.

Here are directions to Coal Harbour, by foot (20 min):

Turn right out of the hotel driveway. Walk up to Georgia Street (first set of lights) and turn right. Proceed along Georgia Street (West) for eight blocks and turn right at Denman Street. Harbour Cruises will be on your left at the foot of Denman Street (down the ramp onto the dock).

Departure: 18:30 hrs

Visite technique

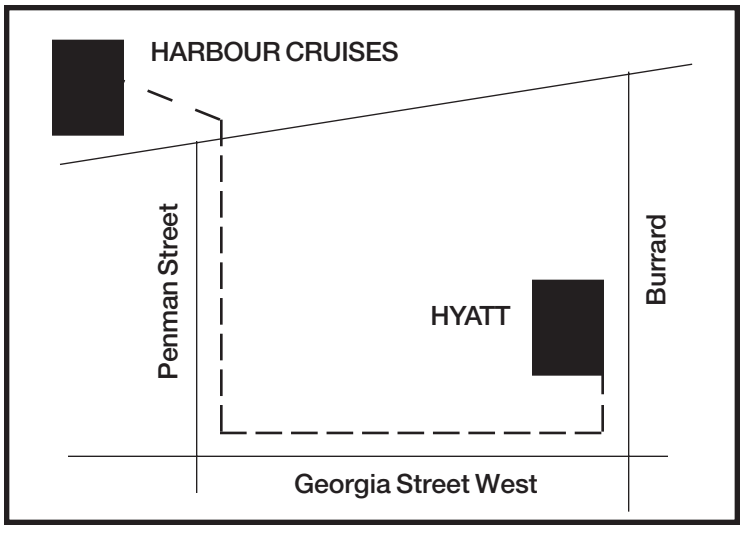
Le mardi soir, 1er juin, une visite technique et un dîner-croisière dans le port de Vancouver ont été organisés au nom des délégués. La croisière part du parc Stanley et suit la côte sud de l'arrière-port de Vancouver. Au nord, on peut admirer les montagnes qui encadrent le port. Au sud, nous passerons devant Canada Place. Au-delà, nous entrons dans le port proprement dit où les porte-conteneurs, les vraquiers, un autre terminal de paquebots de croisière au Ballantyne Pier, récemment construit, contribuent tous à répondre aux besoins d'approvisionnement du Canada et à exporter ces produits. Nous passons ensuite sous le pont Second Narrows vers Deep Cove et Indian Arm d'où l'on peut voir certaines zones résidentielles et parcs de Vancouver. L'Université Simon Fraser est située sur la colline derrière nous lorsque nous retournons vers l'ouest en suivant la côte Nord. Ici, nous verrons les terminaux de marchandises en vrac, charbon, céréales, soufre. Ce rivage comprend également les installations de construction navale et de réparation, en particulier les nouvelles installations du traversier rapide. Nous longeons le pont Lions Gate et suivons le bord du parc Stanley au retour vers le quai.

Voici les directions pour piétons pour se rendre à Coal Harbour (20 min) :

Tournez à droite rendu à l'extérieur de l'hôtel et rendez-vous à la rue Georgia (premier feu de lumières) et tournez à droite. Suivez la rue Georgia (ouest) pour huit (8) coins/rues et tournez à droite sur la rue Denman. Harbour Cruises est situé à votre gauche au bas de la rue. (prenez la rampe pour se rendre sur le quai d'embarquation).

Départ : 18 h 30

An overview of the harbour facilities will be provided by Peter Smith, of AGRA Simons, Vancouver.



Une description des installations portuaire sera donnée par Peter Smith, AGRA Simons, Vancouver.

Conference Information

On-Site Registration

The Conference Secretariat will operate a registration and information desk located on the Hyatt Regency's Convention Level on the following dates and times:

Sunday, May 30	1400 - 1900 hrs
Monday, May 31	0700 - 1800 hrs
Tuesday, June 1	0730 - 1800 hrs
Wednesday, June 2	0730 - 1800 hrs
Thursday, June 3	0730 - 1630 hrs

Fees

Fees include applicable taxes for non-Canadian residents.

Regular Participant	$1300 Can.
Student	$600 Can.
Accompanying Person	$200 Can.

Regular participants and students are entitled to attend all scientific oral and poster sessions, the welcoming reception, daily lunches, the conference dinner, the technical tour including dinner, receive a copy of the Conference Proceedings, delegate list and Final Program.

Program for Accompanying Persons

A hospitality lounge including daily refreshments will be made available to all registered accompanying persons throughout the conference. The accompanying persons' registration fee covers access to the lounge, the welcoming reception, the technical tour including dinner and the conference dinner. Tourism counsellors will be available daily from 09:00 – 17:00 hours in the hospitality lounge, located on the Fourth floor in the Cavendish Room, to provide information on the various tourist opportunities available in Vancouver and the region.

Accommodation

Check-out is 12 noon.

Renseignements sur la conférence

Inscription sur place

Le secrétariat de la conférence tiendra un bureau d'inscription et d'information au niveau du Centre des congrès du Hyatt Regency aux dates et heures suivantes :

Dimanche 30 mai	14 h – 19 h
Lundi 31 mai	7 h – 18 h
Mardi 1er juin	7 h 30 – 18 h
Mercredi 2 juin	7 h 30 – 18 h
Jeudi 3 juin	7 h 30 – 16 h 30

Frais

Les frais comprennent les taxes applicables pour les résidents non canadiens.

Participant régulier	1 300 $ Can
Étudiant	600 $ Can
Personne accompagnante	200 $ Can

Les participants réguliers et les étudiants ont droit d'assister à toutes les séances scientifiques d'exposés oraux et de présentation par affiches, à la réception d'accueil, aux déjeuners quotidiens, au banquet de la conférence, à la visite technique comprenant le dîner et de recevoir un exemplaire des actes de la conférence, la liste des délégués et le programme final.

Programme pour les personnes accompagnantes

Un salon de réception et des rafraîchissements durant toute la journée seront accessibles à toutes les personnes inscrites qui accompagnent d'autres participants durant la conférence. Les frais d'inscription des personnes accompagnantes incluront, en plus de l'accès au salon de réception, la réception d'accueil, la visite technique, comprenant le dîner et le banquet de la conférence. Des conseillers en tourisme seront accessibles tous les jours de 9 h à 17 h dans le salon de réception Cavendish au 4e étage afin de fournir de l'information sur les diverses possibilités qu'offrent Vancouver et la région.

Hébergement

L'heure de départ à 12 heures.

Social and Meal Program

Sunday, May 30	Welcoming reception *Perspectives Level*
Monday, May 31	Lunch *Regency East*
Tuesday, June 1	Lunch *Regency East* Technical Tour / Dinner *MV Britannia*
Wednesday, June 2	Lunch *Regency East* Dinner *Regency East*
Thursday, June 3	Lunch *Regency East*

* Refreshment breaks will be scheduled in mid-morning and mid-afternoon each day of the conference in the Regency Foyer.

Welcoming reception

A welcoming reception will be held for all delegates and accompanying persons beginning at 18:00 hrs on Sunday, May 30, Perspectives Level.

Technical Tour – Dinner Cruise

On the evening of Tuesday, June 1st (18:30 hrs), a technical tour and dinner cruise on the MV Britannia of Vancouver Harbour has been arranged for delegates and registered accompanying persons.

Conference dinner

On the evening of Wednesday, June 2 (19:00 hrs), a conference dinner has been arranged for delegates and accompanying persons in the Regency East Ballroom.

General Information

Audio Visual Equipment

Overhead, slide projectors, flipcharts and one full multi-media projector for Powerpoint presentations will be provided at all conference sessions. Presenters who require additional equipment other than the equipment being provided by the Conference are to make arrangements, at their expense, directly with the official audio-visual supplier.

TelAv Audio Visual Services
Tel: (604) 255-1151
Fax: (604) 255-0225
Contact : Mr. Michael Fuoco

Fonctions sociales et repas

Dimanche 30 mai	Réception d'accueil *Perspectives Level*
Lundi 31 mai	Déjeuner *Regency East*
Mardi 1er juin	Déjeuner *Regency East* Visite technique / Dîner *MV Britannia*
Mercredi 2 juin	Déjeuner *Regency East* Dîner *Regency East*
Jeudi 3 juin	Déjeuner *Regency East*

* Les pauses-rafraîchissements sont prévues en avant-midi et en après-midi chaque jour de la conférence.

Réception d'accueil

Au moment de l'inscription le lundi 30 mai au Hyatt Regency Hotel, une réception d'accueil aura lieu pour tous les délégués et les personnes accompagnantes dimanche le 30 mai au niveau Perspectives.

Visite technique et dîner-croisière

En soirée le mardi 1er juin (18 h 30), une visite technique et un dîner-croisière dans le port de Vancouver ont été organisés pour les délégués et les personnes accompagnantes inscrites.

Dîner de la conférence

Le soir du mercredi 2 juin (19 h), un banquet aura lieu pour permettre aux délégués et aux personnes accompagnantes de se rencontrer.

Renseignements généraux

Équipement audiovisuel

Des rétroprojecteurs, des projecteurs de diapositives, des tableaux à feuilles mobiles et un projecteur multimédia pour les présentations en Power Point seront fournis dans toutes les séances de la conférence. Les présentateurs qui ont besoin d'équipement supplémentaire autre que celui fourni par la conférence doivent prendre des dispositions à cet effet, à leurs frais, directement auprès du fournisseur audiovisuel officiel

TelAv Audio Visual Services
Tél.. : (604) 255-1151
Téléc. : (604) 255-0225
Contact : M. Michael Fuoco

Badges

All conference participants and accompanying persons will be issued a name badge at the on-site registration desk. These must be worn at all times to gain access to the scientific sessions, posters, meals, social functions and accompanying persons' lounge.

Foreign Exchange and Banking Facilities

Foreign exchange and regular banking services are available in the Royal Bank Building connected to the Hyatt Regency Hotel. Hours are Monday to Friday, 8 am to 5 pm. Exchange rates can be found at www.xe.net/currency.

Many other banks are located within walking distance of the conference venue and all have automatic teller machines that can be accessed 24 hours a day by account holders and some credit cards.

Language

The official conference language is English. There will be no simultaneous interpretation service provided during the conference.

Liability

The Conference fees DO NOT include provisions for the insurance of participants against personal injuries, sickness, theft or property damage. This also applies to any event held in conjunction with the official conference program. Participants and accompanying persons are advised to arrange for insurance they consider necessary. The Conference Organizing Committee, the Secretariat, sponsors and agents acting on behalf of the conference do not assume any responsibility for loss, injury or damage to persons or belongings, whatever their cause may be.

Messages

Individuals wishing to contact registered delegates at the conference venue may telephone (604) 683-1234 to leave a message during regular conference business hours. There is no paging of delegetes but all messages will be posted at the conference registration desk located outside the plenary room on the hotel's convention level.

Smoking Policy

Smoking is prohibited in all plenary, poster session areas, workshops, meals and the opening reception.

Anyone wishing to smoke may do so in the hotel's front lobby or outdoors.

We thank you for your understanding and co-operation.

Insignes

Tous les participants à la conférence et les personnes accompagnantes recevront au bureau d'inscription sur place une insigne avec leur nom. Ils doivent les porter en permanence afin d'accéder aux séances scientifiques, aux affiches, aux repas et aux fonctions sociales et au salon des personnes accompagnantes.

Change et services bancaires

Des services de change et des services bancaires réguliers sont accessibles dans l'immeuble de la Banque Royale relié à l'hôtel Hyatt Regency. Les heures d'ouverture sont du lundi au vendredi, de 8 h à 17 h. On peut trouver les taux de change sur le site www.xe.net/currency

Il existe de nombreuses autres banques non loin du lieu de la conférence qui possèdent toutes des guichets automatiques que les détenteurs de compte et de certaines cartes de crédit peuvent utiliser 24 heures sur 24.

Langue

La langue officielle de la conférence est l'anglais. Durant la conférence, il n'y aura pas de services d'interprétation simultanée.

Responsabilité

Les frais d'inscription à la conférence ne comprennent pas les dispositions d'assurance des participants pour les blessures personnelles, la maladie, le vol ou le dommage aux biens. Cela s'applique également à tout événement se déroulant parallèlement au programme officiel de la conférence. Il est conseillé aux participants et à leurs personnes accompagnantes de prévoir les assurances qu'ils jugent nécessaire. Le comité organisateur de la conférence, le secrétariat, les commanditaires et les agents agissant au nom de la conférence n'assument aucune responsabilité à l'égard des pertes, blessures ou dommages aux personnes ou aux biens, quelle qu'en soit la cause.

Messages

Les personnes qui souhaitent communiquer avec les délégués inscrits à la conférence peuvent téléphoner au (604) 683-1234 pour laisser un message pendant les heures normales de la conférence. Il n'y a pas de service de recherche de personnes mais tous les messages seront affichés au bureau d'inscription de la conférence situé à l'extérieur de la salle plénière au niveau des salles de congrès de l'hôtel.

Speaker Preview Room
For presenters using 35 mm slides for their presentations, a slide preview room will be made available during the conference business hours.

Taxes
A federal tax (GST) of 7% is applied to most goods and services in Canada and is similar to a value-added tax to those that exist in Europe. In addition, a provincial tax in B.C. of 10% is also applied to most goods and services. Non-residents can apply for a GST rebate on most goods purchased for use outside Canada.

Details are included in the booklet entitled "GST Rebate for Visitors" published by Revenue Canada, Customs and Excise, which will be available at the hotel registration desk.

Tourist Information
For information on Vancouver and its attractions, please call 1(800) 663-6000 or visit the tourism counsellors in the Cavendish Room (4th level).

Proceedings
Additional copies of the 8dbmc Proceedings may be purchased as a set of four volumes for $ 325.00. Volume Four (Information Technolgy in Construction: CIB W78 Workshop) may be purchased separately for $ 100.00.

Anyone wishing to purchase the Proceedings following the conference should complete the order form and return it to the Research Press at the address indicated on the form.

Politique antitabac
In est interdit de fumer dans les salles de réunion, salle d'affichage, salle de repas et à la réception d'ouverture, y compris les dans la zone d'inscription.

Pour ceux qui veulent fumer, s.v.p. utilisez le foyer principal de l'hôtel ou à l'extérieur.

Nous vous remercions de votre collaboration.

Salle de visionnement pour les conférenciers
Les intervenants qui utilisent des diapositives de 35 mm pourront accéder à une salle de visionnement de diapositives pendant les heures normales de la conférence.

Taxes
Une taxe fédérale (TPS) de 7 p. 100 s'applique à la plupart des produits et services au Canada et est assimilable aux taxes à la valeur ajoutée qui existent en Europe. De plus, une taxe provinciale de 10 p. 100 propre à la Colombie-Britannique s'applique également à la plupart des produits et services. Les non-résidents peuvent demander une exemption de la TPS sur la plupart des produits achetés pour une utilisation extérieure au Canada.

Vous trouverez des détails dans la brochure intitulée « Remboursement de la TPS aux visiteurs », publiée par Revenu Canada, Douanes et Accise, que l'on pourra se procurer au bureau d'inscription de l'hôtel.

Information touristique
Pour obtenir des renseignements sur Vancouver et ses possibilités, appeler 1-800 663-6000 ou informez-vous auprès des conseillers en tourisme dans la salle Cavendish (4e étage).

Actes de la conférence
Des copies supplémentaires, des Actes de la conférence peuvent être achetées pour 325 $ Can. Le volume numéro 4 (Information in Construction: CIB W78 Workshop) peut être acheter séparément pour 100 $ Can.

Tous ceux qui veulent se procurer des Actes après la conférence doivent remplir le formulaire de Research Press inclu dans la trousse de délégué et de le retourner à Research Press à l'adresse indiquée sur le formulaire.

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