



CPATT

CENTRE FOR PAVEMENT AND
TRANSPORTATION TECHNOLOGY

CPATT NEWS

Issue 12 - Fall 2014

Message from the Director

NORMAN W. MCLEOD

CHAIR IN SUSTAINABLE PAVEMENT ENGINEERING

Welcome to our fall addition of CPATT News!

In this addition of our newsletter, we include research highlights, we welcome a new faculty member to the department of Civil and Environmental Engineering, and we celebrate various awards. We hope everyone had a wonderful summer. The CPATT laboratory has been busy with testing throughout the summer and will continue to be busy this fall.

We look forward to seeing you at the **CPATT/Chair Graduate Symposium on Friday October 24, 2014 from 12:30 - 3:00pm**. E5- Sedra Design Centre where several graduate students will showcase their research. You will be impressed by the breadth and depth of the on-going research.

Should you have any questions related to our activities please do not hesitate to contact us.

Sincerely,
Susan L. Tighe, PhD., P.Eng
Professor and Canada Research Chair
Norman W. McLeod Professor in Sustainable Pavement Engineering
Director of CPATT

Contents:

- Feature Faculty
- Research Focus
- Student Feature
- Individual Highlights
- Awards and Recognition
- Norman McLeod Chair
- Contact Us and Upcoming Events



Welcome our New Faculty Member



Dr. Hassan Baaj, PhD., P.Eng.

Dr. Hassan Baaj joined the Department of Civil and Environmental Engineering at the University of Waterloo this September as an Associate Professor in the area of Pavement Material Engineering. He will be a member of the Norman W. McLeod Chair in Sustainable Pavement Engineering team led by Professor Susan Tighe.

Hassan Baaj obtained his PhD from the Institut National des Sciences Appliquées in Lyon, France. He was then awarded with a postdoctoral fellowship at the Institute for Research in Construction at the National Research Council in Canada where he worked for a year. Hassan then joined the road construction industry in 2003 with Sintra in Québec (Colas Canada). During the next five years, he had the opportunity to lead and participate in several innovative projects in the roads industry and was in charge of several collaborations with the Ministry of Transportation Québec, municipalities, and a number of universities in Canada and abroad. In 2008, he joined Lafarge in France and took over the responsibility of the Research and Development (R&D) activities of the company in the area of roads at the Lafarge Research Center (LCR).

In addition to his industrial experience, Hassan has kept strong links with academia. He has co-authored more than 20 scientific articles and more than 50 industrial scientific and technical reports.

Main Research Interests

- Characterisation and modelling of the behaviour of construction materials (aggregates, cement, concrete, bitumen, and asphalt mixes).
- Flexible and rigid pavement engineering and design
- Optimization of the use of recycled materials in sustainable infrastructure systems
- Sustainable development and environmentally friendly solutions for road construction
- Influence of the characteristics of the aggregates on the durability of pavements

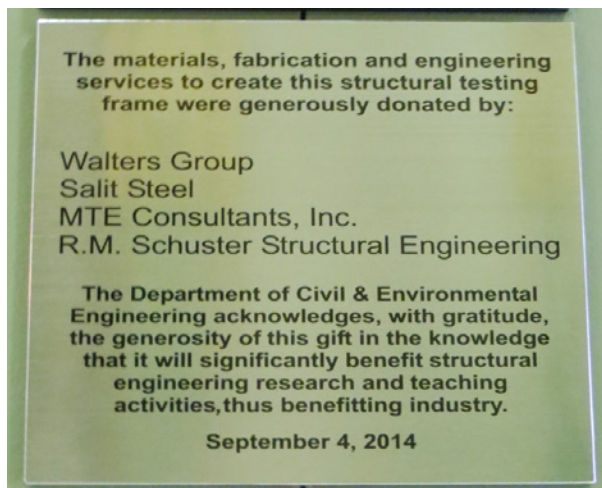
Professional Activity Highlights

- Active member of the *Ordre des Ingénieurs du Québec* (OIQ) - (Québec Association of Engineers)
- Adjunct Professor - *Ecole de Technologie Supérieure* (ETS), Montreal (Québec) - Feb. 2004 to Feb. 2006
- Member of the International Society of Asphalt Pavements (ISAP)
- Member of the Canadian Technical Asphalt Association (CTAA)
- Member of several technical committees of the RILEM
- Scientific Reviewer for several international journals and member of several scientific committee of international conferences

Research Focus - Structures Lab



The Structures and Materials Laboratory recently commissioned a new large-scale structural testing frame. This testing system consists of a 2500 kN (560 kip) servo-hydraulic actuator installed in a structural steel portal frame. The system gives our laboratory the capacity to conduct flexural and shear testing of girder and floor system elements with spans in excess of 10 m and at high load levels. Furthermore, the frame will accommodate the testing of full-scale structural steel and concrete columns and walls under typical axial load levels from building and bridge applications.



The 2500 kN hydraulic actuator was acquired through a laboratory equipment grant from the Canadian Foundation for Innovation and the Ontario Research Fund. The grant application team consisted of CPATT researchers Dr. Khaled Soudki, Dr. Sriram Narasimhan, Dr. Susan Tighe, Dr. Scott Walbridge, and Dr. Jeff West. The grant application, entitled “Faculty for the assessment of engineering rehabilitation systems for infrastructure renewal”, provided the team with \$1.1 million dollars to purchase a high capacity fatigue frame, a uniaxial shake table, and the 2500 kN actuator. The grant also included a new hydraulic power supply to support the entire lab facility. The equipment has expanded the lab capabilities to a world-class level to conduct research on rehabilitation systems for structures and pavements.

The 2500 kN actuator has been installed in a large structural steel portal frame to create the structural testing system pictured. The materials, fabrication and engineering services necessary to produce this steel portal frame were generously donated by Walters Group Inc., Salit Steel, MTE Consultants, and R. M. Schuster, Professor Emeritus, University of Waterloo. A ceremony was held on September 4, 2014 to recognize the efforts of Dr. Schuster and the donations provided by Walters Group Inc., Salit Steel and MTE Consultants.

Research Focus - Structures Lab



The Principle Investigator for the grant application team was Prof. Khaled Soudki. Sadly, Dr. Soudki passed away in September 2013 after a courageous battle with cancer. This large-scale structural testing system has been named in his memory and honour of his leadership and dedication to excellence in research, training, and mentorship in the field of structural engineering.



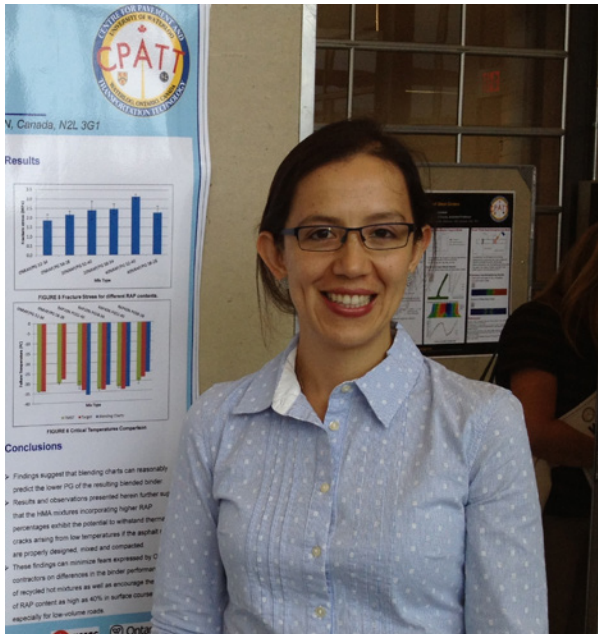
Steel Portal Frame Donors (from left):
Paul Spielmacher (Salit Steel), Ted Rowe (MTE Consultants Inc.), Dr. Reini Schuster, Yulun Sze (MTE Consultants Inc.),
Tim Verhey (Walters Inc.)

The equipment acquired through this grant has helped to create a world-class facility for the assessment of engineering rehabilitation systems for infrastructure renewal in the Structures and Materials Laboratory at the University of Waterloo. This facility will enable CPATT researchers to attract and train top quality graduate students, and will allow the researchers to develop, disseminate, and commercialize novel monitoring and repair technologies for infrastructure applications in Canada.



Donors with UW Graduate Students

Student Feature - Xiomara Sanchez



Meet Xiomara Sanchez

Xiomara was born and raised in Bogota, Colombia. She completed her bachelor's degree in Civil Engineering in 2004 at the University of Los Andes in Bogota, one of the Top 5 Universities in Latin America. She started her career working in a laboratory for quality control of pavement materials for two years. After this two years she felt the desire to deepen her knowledge and started a MASc in Civil Engineering, conducting research on the long term performance of Portland Cement Concrete for highway applications in her city. After a few months she started working for an important consulting firm in her country where she had the chance to be involved in pavement design, evaluation and supervision for different roadway and airport projects across Colombia and Panama. Xiomara has always been interested in pavement

management and admired Prof. Susan Tighe's research so after her MASc she joined the CPATT group in the spring of 2011. Her PhD research is entitled "Determining the amount of Reclaimed Asphalt Pavement (RAP) in Hot Mix Asphalt (HMA) in Ontario". She will be defending her thesis shortly.

Feature Project - Determining the amount of RAP in HMA in Ontario

PG58-34, PG52-34, and PG52-40.

This project is carried out through the partnership with the Ministry of Transportation Ontario (MTO), the Ontario Hot Mix Producers Association (OHMPA), DBA Engineering Ltd., and Natural Sciences and Engineering Research Council of Canada (NSERC).

The research involved a comprehensive laboratory investigation on the long term performance of the Recycled Hot Mix (RHM) with 20% and 40% RAP content and compares the results with control mixtures without RAP. Conventional Superpave 12.5 mm surface coarse mixtures were designed with four different binders performance grade: PG58-28,

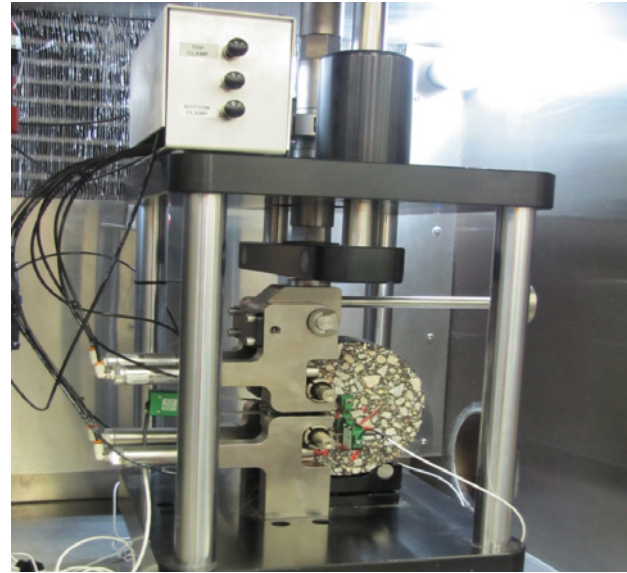


40% RAP Mixture Representation



Student Feature and Project Cont'd

There are two main objectives pursued, the first one is related to obtaining the performance grade of the resulting blended binder without extraction; and the second is finding the performance parameters more affected by the addition of RAP that could lead to quantify the amount of RAP already added in the RHM. Several performance tests were conducted to study the susceptibility of the material to thermal cracking, rutting and fatigue. The binders were also extracted and recovered in order to collate with the back-calculated results. Thanks to OHMPA's mediation, it was possible to send samples to the Asphalt Institute for the Disk Shaped Compact Tension Test, used to measure the fracture energy of the mixtures at low temperatures. Another novel technique was the acquisition and use of the RHEA Software by Abatech Inc., to analyze the results from the dynamic modulus test of the mixtures and the binders.

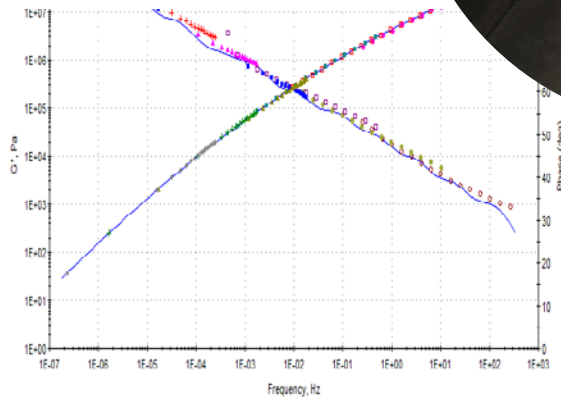
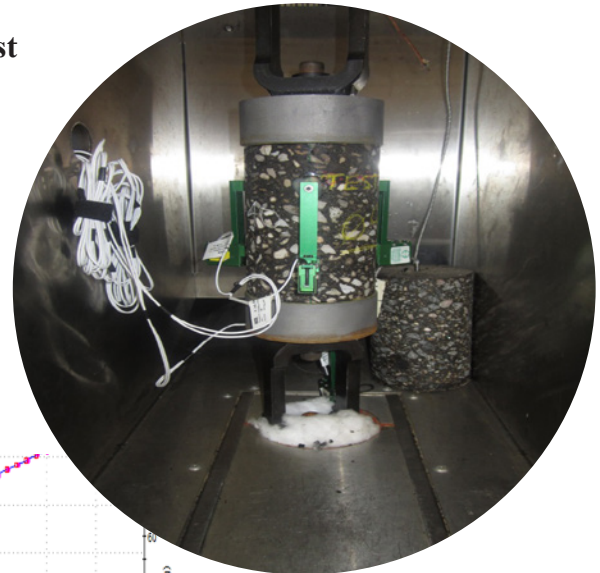


Disk-Shaped Compact Tension Test



Mixing RHM in the Laboratory

Dynamic Modulus Test



Sample ID: 40-50-28

Example of RHEA Software Output

Laboratory Focus with Janki Bhavsar



Meet Janki Bhavsar

Janki is a Masters candidate in the department of Civil and Environmental Engineering at the University of Waterloo under the supervision of Dr. Susan Tighe. She completed her undergraduate studies in Civil Engineering at the University of Waterloo in June 2013 and joined the CPATT group in September 2013.

In her spare time, Janki enjoys travelling, camping, sketching, swimming and playing intramural sports. She enjoys volunteering for student groups on campus such as UW-ITE and CE2GA. She is also the department champion to encourage more graduate students to engage in a healthy lifestyle whilst working as a student. She is known as the “organizer” by her CPATT colleagues due to her interest in planning social events for the group members.

CIR and CIREAM

Janki’s graduate research scope explores the field and laboratory performance of Cold In-place Recycling (CIR) treatment with emulsified asphalt in comparison with the performance of Cold In-place Recycling with Expanded Asphalt Mixture (CIREAM).

Both CIR and CIREAM meet the criteria for a sustainable pavement because of the safe, efficient, economic, and environmentally friendly characteristics. They allow an in-place reprocess and reuse of existing road materials, without off-site transportation. CIR and CIREAM has shown to conserve around 62% of aggregate, and reduce 52% of carbon dioxide and 54% of nitric oxide and nitrogen dioxide compared with a traditional rehabilitation technique (mill 100mm and place 130mm HMA). Studies show that CIR and CIREAM can reduce the cost of 42% if a 50-year period with a 5% discount

rate was concerned, which means that CIR and CIREAM are more cost-effective than the traditional rehabilitation technique.



Making Mixed Samples for Lab Testing

Student Feature and Project Cont'd



For the lab performance, Janki will be carrying out tests on mixed samples obtained from Southern and Northern Ontario. Tests such as Dynamic Modulus, Fatigue Beam and Thermal Stress Restrained Specimen Tests (TSRST) will be carried out for performance evaluations.

Once field and lab data has been collected, an evaluation and statistical analysis will be carried out with the data. It will include development of guidelines for usage and evaluate best practices. This would be of great value for further development of these technologies in the industry.



Samples of Dynamic Modulus Testing

For the field testing, different sections of roadways which have used these technologies will be highlighted. Firstly, a pavement distress evaluation for the designated sections would be conducted. In addition, samples would be extracted from the designated sections to be evaluated for Tensile Strength Ratio (TSR) and retained stability.



Compacting Mixed Sample in the Superpave Gyratory Compactor



CPATT Soccer Team Summer 2014

Thanks for organizing the team Janki!

Gene Chartier Seminar



“Careers in Transportation Engineering” and “Rural-Urban Transitions”

On July 24, 2014 a seminar, which was sponsored by the Norman W. McLeod Chair, CPATT, the Student Chapter CSCE, and the Student Chapter ITE, was held at the University of Waterloo. The speaker was UW Alumni Gene Chartier, P.Eng. The seminar covered various careers found in transportation engineering and differences found between working in the public and private sectors and how each sector can benefit ones career experiences as a transportation engineer.

The seminar summarized aspects and tips that students should remember when continuing on their career path in transportation engineering. Gene then continued to describe a project he had completed regarding rural-urban transition challenges. This project analyzed techniques used by engineers to inform drivers of the speed change when entering an urbanized area. The purpose of these techniques, used at the gateways of a town, is to influence driver perception of the road designation change and to increase the safety on the road for both drivers and pedestrians. The study which introduced a technique of dragon tooth paint markings, which creates a perception of speeding was found to be a success for the project.



Icelandic Road and Coastal Administration



The Centre for Pavement and Transportation Technology hosted a group of 45 engineers from the Icelandic Road and Coastal Administration on September 19, 2014. The day consisted of presentations by Susan Tighe (UW), Hassan Baaj (UW), Doubra Ambaiowei (PhD Candidate), Mark Popik (Thurber Engineering), and Marcelo Gonzalez (PhD Candidate). Below are a few pictures from this event.



Seminar - Prof. Xuan-cang Wang



The Centre for Pavement and Transportation Technology and the Norman W. McLeod Chair hosted a seminar on September 25, 2014 at the University of Waterloo. The guest speaker was Prof. Xuan-cang Wang, Director of Pavement Structure and Material Laboratory, Highway Engineering Institute, Chang'an University, China. His presentation was on the "Introduction of China's over 100,000 km Freeway Network Planning, Design, Construction and Maintenance Management". A copy of the presentation can be found at our [website](#).



UW Engineering and Construction Professional Network



UW Engineering Construction Professional Network provides in-depth seminars and workshops geared towards first and second year students to develop and learn the professional tactics to apply to jobs and network with industry members. The group is open to all students and it provides the senior year students at the University of Waterloo an opportunity to give back and share their knowledge of experience from co-op terms to the junior year students. The first event was the resume seminar critique session where the students were able to learn the strategic methods of building a resume that stands out amongst others. The UW Engineering Construction Professional Network recently provided an engaging session where students had a chance to learn from each individual job discipline separately; structural engineering, transportation engineering, manufacturing engineering, mining engineering, construction management, and research.

In the upcoming weeks there will be professional interview workshops where students get to group with third year students to receive a highly engaging practice interview for each of the available job disciplines. In addition, there will be an Industry Meet Student Event where industry members from the GTA will come to the University of Waterloo to share their knowledge and network with students.



Awards and Recognition



Awards and Recognition

2014 Irene Marguerite McLeod Postgraduate Scholarship - Doubra Ambaiowei - This scholarship was established by Dr. Norman W. McLeod, FRSC, in honour of his wife, Irene Marguerite McLeod. It is awarded annually for postgraduate research in (1) bituminous materials, including recycling; (2) flexible pavement design; (3) any phase of land transportation by vehicles, excluding railroads, in order of preference.



2014 Canadian Technical Asphalt Association's Graduate Scholarship - Gulfam Jannat - This scholarship is awarded to graduate students in the fields of chemistry, chemical engineering, and construction or civil engineering. The student awarded the scholarship contributes to the advances in any facet of asphalt technology.

2014 [Distinguished Alumni Award from the University of Alberta](#) - Ralph Haas - U of A's Alumni Association's most prestigious award recognizes the outstanding accomplishments of alumni who have earned national or international prominence as a result of their outstanding professional achievements and/or service to society. Follow the link above to watch the video! Congratulations Ralph! Congratulations as well on your special award for 50 year's involvement in TAC. Great Work!

2014 TAC Award of Academic Merit- Susan Tighe - Susan Tighe was presented with the 2014 TAC Award of Academic Merit at the Transportation Association of Canada Annual Conference. This award is presented for long-term contribution to the advancement of the academic field and to the development of tomorrow's transportation leaders.

2014 TAC Foundation Scholarship Recipients

- Sina Varamini, PhD Candidate - Waterloo Alumni Centennial Award
- Adam Felinczak, BAsC Candidate - Peto MacCallum Award
- Edward Lau, BAsC Candidate - MMM Group Limited Award

Congratulations Sina, Adam and Edward on your awards!

Norman W. McLeod Chair in Sustainable Pavement Engineering



We are very pleased to announce the renewal of our various partners who have recently renewed their commitment to the Norman W. McLeod Chair in Sustainable Pavement Engineering:

- Ministry of Transportation Ontario
- Shiloh CanConstruct
- Stantec Consulting Ltd.



We have successfully hired the Norman W. McLeod Junior Research chair, Hassan Baaj, who started September 1st. We are very happy he has joined our team here at the UW as he will greatly add to the capacity. A new post doc will also be joining the group, Dr. Prabir Das, starting in October. We are also happy to host Professor Jennifer Yang from Southeast University, and visiting students Alex Strutzke from Philipps-University of Marburg/Germany, and Ye Yu from Southeast University in China.

The Chair has also sponsored the CSCE events on Careers in Transportation as described on page 9. Also the Chair sponsored the Transportation Association of Canada (TAC) centennial session of Pavement.

2014 CPATT/Chair Graduate Poster Symposium

Join industry members and CPATT faculty members for a graduate student poster symposium, where students will be showcasing their current research projects. This is a great event to mingle with industry partners and learn about current research projects.

Please join us, details below:

Date: Friday October 24th, 2014

Time: 12:30pm - 3:00pm

Location: University of Waterloo, Engineering 5 (E5) Adel Student Design Centre (Level 1)

Parking: Please see the [UW Map](#) and [Parking Locations](#) for the best options for parking.

Contact Us and Upcoming Events



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Dr. Jeff West, Associate Director
519-888-4567 ext. 33323
jswest@uwaterloo.ca

Dr. Hassan Baaj, Associate Professor
519-888-4494
hassan.baaj@uwaterloo.ca

Upcoming Events

[Academy of Municipal Asset Management](#)

- Asset Management of Public Buildings - October 6-10, 2014
- Asset Management of Road Networks - October 27-31, 2014
- Public Sector Finance Fundamental - November 3-7, 2014

October 18, 2014 - [Go ENG Girl](#) - University of Waterloo - This event is an opportunity for Grade 7-10 girls to visit the University of Waterloo and learn about engineering.

November 16 - 19, 2014 - [Canadian Technical Asphalt Association Conference](#) - Winnipeg, MB

December 8-9, 2014 - [Ontario Hot Mix Producers Association Fall Asphalt Seminar](#) - Niagara Falls, ON

January 11-15, 2015 - [Transportation Research Board 94th Annual Meeting](#) - Washington, D.C.

CPATT Board Members

Susan Tighe (Director) University of Waterloo
Jeff West (Associate Director) University of Waterloo
Rico Fung (Chair) Cement Association of Canada
John Carrick Jr., McAsphalt Industries Ltd.
Sandy Brown, Ontario Hot Mix Producers Association
Becca Lane, Ministry of Transportation Ontario
Matt Karan, Former Stantec Consulting Ltd.
Carl Clayton, Stantec Consulting Ltd.
Gary MacDonald, Regional Municipality of Waterloo
Murray Ritchie, The Murray Group Ltd.
Neil Thomson, University of Waterloo
Ralph Haas, University of Waterloo
Gerhard Kennepohl, University of Waterloo
Hassan Baaj, University of Waterloo