



# CPATT Newsletter



*Issue 1 – January 2011*

*Happy New Year to All*

*from the*

*Centre for Pavement and Transportation Technology*



UNIVERSITY OF  
**WATERLOO**



## Message from the Director – *Susan Tighe, PhD., PEng*



We are very pleased to be sending this, our first CPATT newsletter. In an effort to better communicate our news to you, our stakeholders, we will be publishing this newsletter three times annually. We will do our best to highlight some of our key on-going initiatives and keep you up-to-date on our activities. The last year was very busy, with the completion of many research projects. There has been renewed interest in our work through increased student enrolments in transportation and pavement engineering courses here at UW. There is increased emphasis on sustainable infrastructure and development of tools for managing climate change impacts on infrastructure. On-going collaborations with other universities,

private and public sector partners are resulting in advanced strategies to ensure long life infrastructure.

Since September 2010, regular CPATT faculty meetings have been hosted to develop research collaborations. Throughout the fall, these monthly meetings have resulted in a consistent core group of researchers from transportation, structural, and geotechnical engineering, but also materials engineering and the faculty of environment. We are now working toward developing a major collaborative research proposal in the area of Emergency Repairs to Infrastructure which will include roads and pavement, bridges, and underground infrastructure. The intent will be to work together to develop both short and long term repair strategies that are cost effective and suitable for a variety of conditions. More information on this project will be included in future newsletters. Also collaborations in mechanical engineering have resulted in the development of a new Braking Availability Tester for measuring contaminant on airport runway surfaces. Another ongoing collaboration with mechanical and electrical engineering involves the full scale development of many new innovations. We are also pleased to have the official announcement of the Norman W. McLeod Chair in Sustainable Pavement Engineering on January 28, 2011. The support of industry partners has allowed for the development of this chair, which will ultimately result in a new professor being hired in pavement engineering at the University of Waterloo.

If you would like to learn more about anything we have presented in this newsletter, please do not hesitate to contact either Laura Bland at [lbland@uwaterloo.ca](mailto:lbland@uwaterloo.ca) or Susan Tighe at [sltighe@uwaterloo.ca](mailto:sltighe@uwaterloo.ca) . We look forward to hearing from you!

Sincerely,

Susan L. Tighe, Ph.D., P.Eng.  
Professor and Canada Research Chair



*Meet the NEW CPATT Associate Director of  
Technical Activities*

***Jeffrey S. West, Ph.D., P.Eng.***

***Associate Professor***

***Department of Civil and Environmental Engineering***

Professor Jeff West has been an active member of CPATT since its inception, and he is the new director of Technical Activities. Jeff is a structural engineer with B.Sc. and M.Sc. degrees from the University of Manitoba, and a Ph.D. from The University of Texas at Austin. Prior to joining academia, he worked as a consultant in the field of structural evaluation and rehabilitation. Jeff's research interests include improved materials for concrete pavements and structures, and the evaluation, rehabilitation, strengthening and durability of structures. Recent projects include:

#### *Concrete Materials Research*

- Properties of structural concrete made with recycled concrete as aggregate (RCA) in new structural concrete
- Use of recycled wash water from ready-mixed concrete production in new concrete
- High-performance self-consolidating concrete (SCC) incorporating rice husk ash

#### *Concrete Pavement Research*

- Effect of dowel bar misalignment on the performance of concrete pavement joints
- Improved joint load transfer devices for jointed plain concrete pavement

#### *Structures Research*

- Shear connection devices for portable or temporary concrete/steel composite bridges
- Effect of mechanical damage on safety of timber utility structures
- Strengthening of timber hydro-electric structures using FRPs
- Enhanced fatigue life of concrete girders using external post-tensioning
- Improved ductility of FRP-strengthened girders through partial bonding
- Structural behaviour of concrete with stainless steel reinforcement

Jeff is Chair of American Concrete Institute (ACI) Committee 224 (Cracking), and a member of ACI Committees 130 (Sustainability of Concrete), 437 (Strength Evaluation of Existing Structures), and 222 (Corrosion) where he leads a task group on corrosion of prestressing steels. He is a licensed Professional Engineer in Ontario and the state of Texas (Inactive).



## Research Focus – John J. Carrick Pavement Laboratory Updates

The CPATT laboratory continues to be busy. Current on-going testing of hot mix containing Recycled Asphalt Shingles includes dynamic modulus, resilient modulus, thermal stress restrained specimen test and flexural fatigue beam. Aggregate testing of recycled concrete aggregate is demonstrating differences between three sources. Pervious concrete slabs continue to be tested in the walk-in freezer to evaluate maintenance treatments. In addition, various mixes from the perpetual pavement test sections are being prepared for testing.



Coring Asphalt samples for Dynamic Modulus Testing



Innovative materials being prepared for testing, such as Recycled Concrete Aggregate



Evaluating Non Destructive Testing Methods for Hot Mix Asphalt



Preparing Hot Mix Asphalt containing Recycled Asphalt Shingles flexural fatigue beams



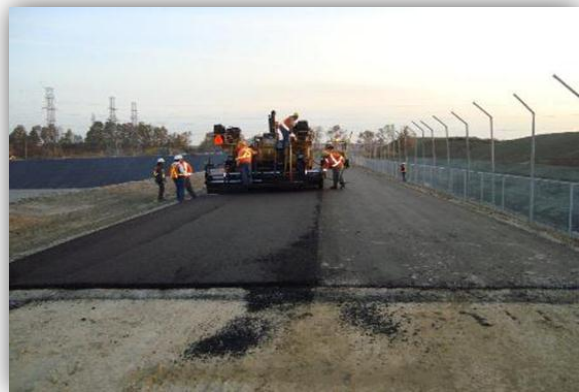
## Research Focus – CPATT Test Track Updates

The CPATT Test Track continues to provide valuable data for education of undergraduate and graduate students. The original flexible sections are now 8.5 years old and the research team is starting to consider various preservation treatments. The southbound lanes which have heavily loaded vehicles are showing some rutting and more progressive distresses as compared to the northbound lanes which have lower loads. Future activities will focus on full scale evaluation of preservation treatments.

The Recycled Concrete Aggregate (RCA) sections, which are now almost 3 years old, are showing the 30% RCA in the concrete is performing the best at this point in time. The newest section, hot mix asphalt containing Recycled Asphalt Shingles (RAS), was installed in October 2009 and is showing excellent performance to date. There should also be opportunities to build new test sections in the coming year. More to follow later.



Constructing the Concrete Test Sections that contain various amounts of Recycled Concrete Aggregate



Paving newest section – Hot Mix Asphalt, Base Mix contains Recycled Asphalt Shingles



Teaching undergraduate and graduate students about innovative pavement technologies at the CPATT Test Track



CPATT Flexible Test Sections – 8.5 years old, still performing well under heavy traffic



## Research Focus – *Satellite Test Section Updates*

Several satellite test sections related to various research projects are located across Canada. The primary goal of the satellite test sections is to evaluate various materials and pavement designs under varying environmental and traffic loading conditions.



Measuring the longitudinal profile for MTO with the CPATT Surpro



Installing water quality instrumentation



Field work with northern region MTO to improve seasonal load restrictions



Pervious concrete slabs extracted during construction for laboratory testing



## Research Focus – Structures and Concrete laboratory Updates

Many CPATT research activities utilize the shared resources in the Structures and Concrete Laboratory in the Department of Civil and Environmental Engineering. Current projects involve the use of recycled concrete aggregate (RCA) in structural concrete, testing of improved joint-load transfer devices for concrete pavement, and several concrete materials and durability studies. Some of the research equipment acquired by CPATT since its inception are installed in this laboratory. The most recent addition was a 8 cu. ft. concrete pan mixer. As well, a recent CFI Equipment Grant by five CPATT members will add two high capacity testing frames, a shake table and a new hydraulic power supply to further increase materials and structures testing and research capabilities.



New Concrete Pan Mixer (8 cubic ft)  
(aggregate bins and hopper system in background)



Test apparatus used to study effect of RCA on  
reinforcement bond to concrete



Fracture energy testing of concrete containing RCA



Testing crushing strength of RCA



## Upcoming Events

*January 14, 2011*

CPATT Board of Advisor's meeting, held at the Ministry of Transportation Ontario (MTO), Downsview, ON

*January 23-27, 2011*

Transportation Research Board Meetings (CPATT Presentations and Posters Listed on Page 9)

*January 25, 2011*

Transportation Research Board University of Waterloo Friends and Alumni Reception 5:30-7:30pm

Calling all Civil Engineers! Join us for an alumni reception, registration required

Follow the link to register: <http://www.engineering.uwaterloo.ca/alumni/Events/TRB.html>

Location: Maryland C, Washington Marriott Wardmann Park Hotel

*January 28, 2011*

Norman W. McLeod Chair in Sustainable Pavement Engineering Launch 11:00am - E5 Foyer

Contact Laura Bland, [lbland@uwaterloo.ca](mailto:lbland@uwaterloo.ca), for more information



Dr. Susan Tighe, graduate and undergraduate students and staff Fall 2010





## Transportation Research Board CPATT/UW Papers

Papers to be presented are:

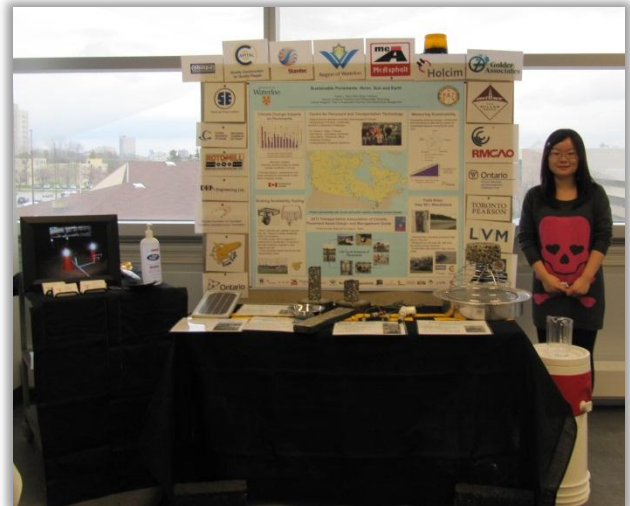
- *Field and Laboratory Evaluation of Recycled Asphalt Shingle Mixes, A Canadian Study* – author: Riyadh Ul-Islam, Shirley Ddamba, Susan Tighe, Ryan Essex and Harayan Hanasoge
- *Pervious Concrete Pavement – A Sustainable Solution* – authors: Vimy Henderson and Susan Tighe
- *Evaluation of Pervious Concrete Pavement Maintenance Methods at Field Sites in Canada* – authors: Vimy Henderson and Susan Tighe
- *Managing Airfield Pavements under Contaminant Conditions* – authors: Susan Tighe
- *Accurate and Less Expensive Pavement Distress Surveying Using Multi-Photogrammetric-Output Fusion* – authors: Ahmed M., Carl Haas and Ralph Haas
- *Improving Supply Chain Visibility* – authors: Carl Haas
- *Advances in Digital Photogrammetry Applications for 3D Pavement Data Collection* – authors: Ahmed M., Carl Haas, Ralph Haas, and Ningyuan L.
- *Automated Quality Assurance Methodology for Archived Transit Data for AVL-APC Systems* – authors: Marian Saavedra, Bruce Hellinga and Jeffrey Casello
- *Method for Predicting Mean and Variance of Transit Segment and Route Travel Times* – authors: Soroush Salek, Reza Noroozi, Jeffrey Casello and Bruce Hellinga
- *Analysis of Stated-Preference and GPS Data for Bicycle Travel Forecasting* – authors: Jeffrey Casello, Akram Omar Nour, Kyrylo Cyril Rewa and John Hill
- *Analytical Alternative to Transit Signal Priority Microsimulation Modeling: Model and Application* – authors: Zeeshan Aaby and Bruce Hellinga
- *Estimating Signalized Intersection Delays to Transit Vehicles for Archived AVL-APC Data* – authors: Fei Yang, Bruce Hellinga and Jordan D. Hart-Bishop
- *Accident Prediction Models for Winter Road Safety: Does Temporal Aggregation of Data Matter?* – authors: Taimur Usman, Liping Fu and Luis Fernando Miranda-Moreno
- *Empirical Models for Prediction of Pervious Concrete Pavement Performance Deterioration* – authors: Amir Golroo and Susan Tighe
- *Method to Estimate Distribution of Average Vehicle Delay at Signalized Intersections* – authors: Reza Noroozi and Bruce Hellinga
- *Private Bus Operations' Objectives in Evaluation for Transit Investments in Developing Countries: Conceptual Framework* – authors: Abel Doderio Lopez, Jeffrey Casello and Angel R. Molinero
- *Real-Time Freeway Travel Time Prediction Using Vehicle Trajectory Data* – authors: Pedram Izadpanah, Bruce Hellinga and Liping Fu
- *Simultaneous Design of Urban Road and Public Transit Networks* – authors: Elnaz-Amirkabir Miandoabchi, Samira Farahani and Wai Yuen Szeto



## Announcements

### WE Innovate

- CPATT Participated recently in the UW Faculty of Engineering WE Innovate. It served as a good opportunity to meet potential research partners. Photo below of our poster and Tracy Zhou, co-op student (Civil Engineering Undergraduate Student)



### Welcome New Students

- Amin Hamdi
- Attila Hertel
- Zaid Alyami
- Samantha Pinto
- Mehran Kafi Farashah

### Congratulations!

CPATT's newest member was born on August 25<sup>th</sup>, 2010 in Santiago, Chile. A beautiful, healthy, baby girl, **Marina Lopez Chamorro**. Marina's parents, Alondra, (PhD Candidate) and Alvaro are enjoying their new bundle of joy!  
*WELCOME TO THE WORLD MARINA!*



### With Regret Rose Haas

With regret, we announce the passing on November 2, 2010 of Rose Haas, wife of Dr. Ralph Haas, Founding Director of CPATT, and mother of Dr. Carl Haas, Immediate Past Director of CPATT.



## January 2011 Highlights

### *Feature Project – Pavement Asset Design and Management Guide*

The Transportation Association of Canada (TAC) is sponsoring a pooled fund study to develop the new 2011 Pavement Asset Design and Management Guide (PADMG). The study is being funded by several agencies including all of the Canadian provincial transportation departments, several major cities and several industry associations. The development of the Guide is a collaboration of a Canadian consortium of consultants and academics from across Canada. The team is led by Dr. Susan Tighe from the University of Waterloo. Team members include: Curtis Berthelot (University of Saskatchewan), Lynne Cowe Falls (University of Calgary), Guy Dore (University of Laval), Dave Hein (ARA Inc.), Donaldson MacLeod, Daryl Nixon (EBA Engineering Consultants Ltd), Harry Sturm (Stantec Consulting Ltd.), Ludomir Uzarowski (Golder Associates Ltd.), and Ralph Haas (Special Advisor, University of Waterloo).

The PADMG is an up-to-date, practical consolidation of Canadian pavement design and management practices for practitioners in various sectors including public and private organizations and universities. It highlights Canadian state-of-the-practice pavement design and management practices and technologies. In addition, tools for asset management of transportation infrastructure are also included. The final draft of the Guide is scheduled to be submitted in September 2011 and a workshop will be hosted at the TAC Annual Conference on the new Guide.

### *Feature Student – Vimy Henderson, PhD Candidate*



Vimy Henderson completed her Bachelor of Applied Science in Civil Engineering at the University of Waterloo in 2008 and is currently working on achieving her doctoral degree; her research topic is “Evaluation of the Performance of Pervious Concrete Pavement in the Canadian Climate”. Vimy has presented papers related to her research at national and international conferences receiving multiple Best Paper Presentation Awards.

During her co-op terms in her undergraduate degree she worked for a variety of groups, both in the public and private sectors. Some of the highlights include HCM Contractors in Calgary, AB, Dufferin Concrete in Kitchener, ON and three terms with Dr. Susan Tighe at CPATT at the University of Waterloo. After completing her PhD she hopes to join a consulting firm.

Vimy grew up on a horse farm north of London, ON where her passion for horses and riding developed. During her spare time she is often riding and competing horses or skiing in the winter months.



## News and Announcements

### Scholarships and Award Recipients

- **Shirley Ddamba** (MASC Candidate) – *2010 CTAA Scholarship*
- **Mohammad Adnan Mushtaq** (MASC Candidate) – *TAC Scholarship*
- **Vimy Henderson** (PhD Candidate) – *Best Paper Presentation AISIM 2010*
- **Dr. Susan Tighe** – *University of Waterloo Faculty of Engineering En-Hui Yang Research Innovation Award*
- **Amma Djane Wakefield** (MASC Candidate)
  - *2009 CTAA Earl Kee Award - Best Paper by a New Author*
  - *2009 CTAA Norman W. McLeod Award - Best Technical Presentation*

### Thesis Completion Announcements

**\*\*Please contact Laura Bland for more information: [lbland@uwaterloo.ca](mailto:lbland@uwaterloo.ca)\*\***

- **Performance Evaluation of Recycled Asphalt Shingles (RAS) in Hot Mix Asphalt (HMA): An Ontario Perspective**  
*Riyad Ul-Islam – MASC, Civil Engineering, Supervisor: Dr. Susan Tighe*
- **Measuring Work Zone Throughput and User Delays**  
*Mohammad Adnan Mushtaq – MASC, Civil Engineering, Supervisor: Dr. Susan Tighe*
- **Quantifying Pavement Sustainability for Ontario Highways**  
*Peter Chan – MASC, Civil Engineering, Supervisor: Dr. Susan Tighe*
- **Pavement Performance Modeling of Unique Crosswalk Designs**  
*Shila Khanal – MASC, Civil Engineering, Supervisor: Dr. Susan Tighe*
- **Improving the Highway Safety through Network Level Friction Testing and Cost Effective Pavement Maintenance**  
*Amir Halim – PhD, Civil Engineering, Supervisor: Dr. Susan Tighe*
- **Non-Destructive Evaluation of Asphalt Pavement Joints using LWD MASW Test**  
*Antonin du Tertre – MASC, Civil Engineering, Supervisors: Dr. Susan Tighe, Dr. Giovanni Cascante*
- **Predicting pervious concrete pavement performance for usage in cold climates**  
*Amir Golroo – PhD, Civil Engineering, Supervisor: Dr. Susan Tighe*
- **A Decision Support System for Value-Based Evaluation and Conditional Approval for Construction Submittals**  
*Khaled Sherbini – PhD, Civil Engineering, Supervisor: Dr. Carl Haas*
- **Data Fusion for Materials Location Estimation on Construction**  
*Saiedeh Razavi – PhD, Civil Engineering, Supervisor: Dr. Carl Haas*
- **A Risk-Based Optimization Framework for Security Systems Upgrades at Airports**  
*Khaled Berbash – PhD, Civil Engineering, Supervisor: Dr. Carl Haas*
- **Numerical Investigation of the Effects of Shrinkage and Thermal Loading on the Behaviour of Misaligned Dowels in Jointed Concrete Pavement**  
*Cyril Levy – MASC, Civil Engineering, Supervisor: Dr. Jeff West*



## *Speakers Corner - What in your opinion are the most important qualities you look for in a new employee?*

- Attitude: work ethic, enthusiasm, common sense, problem solving approach
- Skills: communication and analytical

In some cases I am looking at what relevant Canadian experience the person has but I am not anticipating too much experience from the student. A piece of advice for potential applicants: evaluate yourself and be objective and very realistic. Always tell the truth during a job interview; you will look better with less experience but more comfort/confidence than just improvising.



**Dr. Ludomir Uzarowski, PEng,**  
Golder Associates Ltd.

- Inquiring mind, curious and desire to innovate and learn new skills
- Desire for continuous learning through hands-on involvement and capable to manage projects and people
- Good sense of humor



**Michael Esenwa, PEng, McAsphalt**  
Industries, Ltd

When recruiting students and staff there are three qualities I look for:

- Good Attitude – willing to learn, open minded and pleasant to work with
- Good Work Ethic – hard working, dedicated, willing to learn new things
- Leadership – initiative, creativity and excellent communication skills



**Dr. Susan Tighe, PEng, University**  
of Waterloo

A good quote to remember: “The best job goes to the person who can get it done without passing the buck or coming back with excuses.” – Napoleon Hill, 1883-1970, Speaker and Motivational Writer.

The two most important characteristics I look for when hiring a new employee are desire and confidence. I need to know that the potential employee wants to be in the position and has real enthusiasm for the work being done. Not just they want a job, but they are truly interested in the field and are looking long term. The second trait is confidence. Confidence comes from experience and experience comes from making mistakes. If you are afraid to make mistakes then you learn nothing and will never gain the experience necessary to excel. These are two special characteristics that don't always exist together but they are important to me when hiring a new employee.



**Gary Moore, PEng, City of**  
Hamilton



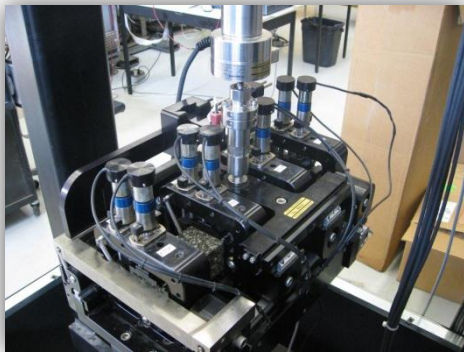
## CPATT Photos – Review of 2010



Testing Freeze-Thaw Durability of Pervious Concrete



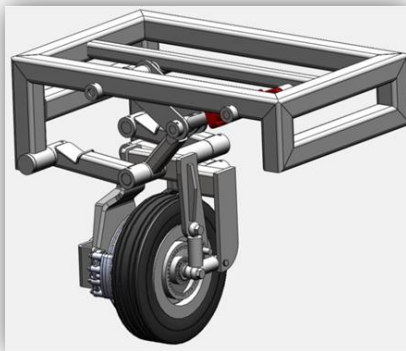
Assessing Effects of Potato Waste as a De-Icing Agent



Performance Testing of HMA Containing Recycled Asphalt Shingles



Collecting Data from Instrumented Perpetual Pavement on Highway 401



Developing Braking Availability Tester



Monitoring Performance of Crosswalk Field Sites