WATMOVES

WINTER 2018 | Issue 11

In this Issue:

University of Waterloo
ite

Canada's Oldest Student Chapter

A Message from the President and Vice President

Happy New Year and welcome to the WatMoves Winter 2018 issue!

It is my pleasure and honor to serve as the president of the University of Waterloo Institute of Transportation Engineers (UW-ITE) Chapter 2017/2018 term. Alongside an outstanding executive team, we have been working hard in the direction of the ITE mission statement "To provide the global community of transportation professionals with the knowledge, practices, and skills to serve the needs of their communities and help shape the future of the profession and transportation in the societal context".

Our team recognizes the importance of the opportunity the chapter provides to foster a balanced academic and social environment for graduate and undergraduate students in the area of transportation engineering. Our key objectives during our term as your executives are:

- Provide an open environment for students and faculty to share, learn, and collaborate through our academic and social events
- Serve as a channel that connects our students and prospective employers
- Increase our diverse academic and social events
- Increase our graduate and undergraduate awareness and chapter membership

In this issue, we highlight some of our events towards these goals. In addition, we highlight dedicated and rising members and featured sponsors.

Thank you to all our members and sponsors for making 2017 a busy and successful year, we look forward to a prosperous and eventful 2018!

Should you have any questions or suggestions, please do not hesitate to contact us

Sincerely

Zaid Alyami, PMP. P.Eng. PhD Candidate

President UW-ITE

1st Annual Student Best Presentation in Transportation Competition

UW-ITE chapter launched its first Annual Student Competition: "Best Presentation in Transportation" that took place late fall. The competition offers students a great opportunity to present and share a topic of interest related to transportation engineering to their peers and professionals. While technical competence is an important element, the main focus of the competition is on the ability to present and communicate effectively to one's peers and the public. The event started with a keynote presented by Professor Susan Tighe, Deputy Provost and Associate Vice-President Integrated Planning and Budgeting, Current President of Canadian Society for Civil Engineering and Norman W. McLeod Professor of Sustainable Pavement Engineering.

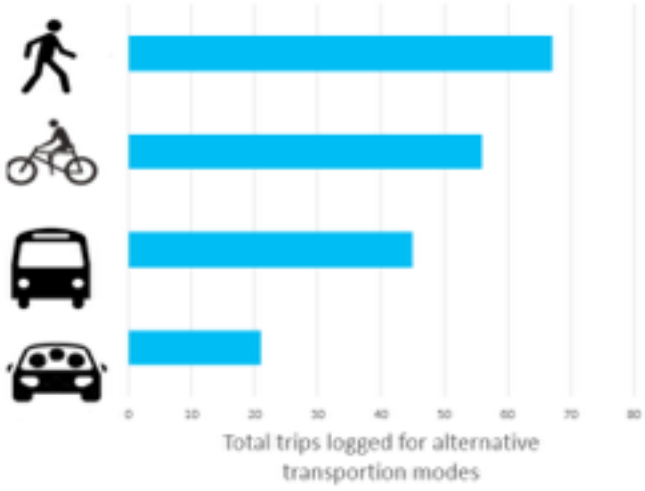
Students presented in areas related to transportation including: planning, traffic, sustainability and material. A panel from the industry participated in the competition evaluation including: Hassan Baaj, Assistant Professor and Director of the Centre for Pavement and Transportation Technology (CPATT), Mehran Kafi Farashah, Transportation Asset Management Engineer at The Regional Municipality of York and Sina Varamini, Manager of Research and Development at McAsphalt Industries Limited. The panel evaluated the presentations in five category: communication skills, performance, time management, clarity of presentation, and organization. Congratulations to the winners: Shenglin Wang and Haya Almutairi

1st Annual Student Best Presentation in Transportation Competition

Thank you to our Sponsors!

SUSTAINABILITY INITIATIVE

Wat Walk



Increasing temperature changes to more drastic events like flooding are recognized impacts of anthropogenic carbon footprint and global climate change which affects our wellbeing. Canada intends to achieve 30% reduction of GHG emission economy-wide in 2030 below 2005 level. On the provincial level, Ontario targets a 15% GHG reduction below 1990 level by 2020. As a region, Waterloo is dedicated to assisting in the "development and implementation of a community climate action plan" to mitigate climate change impacts. The University of Waterloo community is committed to establishing environmental sustainability as "a core part of its culture". Agreements, targets and commitments is an interesting narrative but with little time left to reach goals for 2020 or 2030, it has become important to take a bottom-up approach looking from our individual contribution.

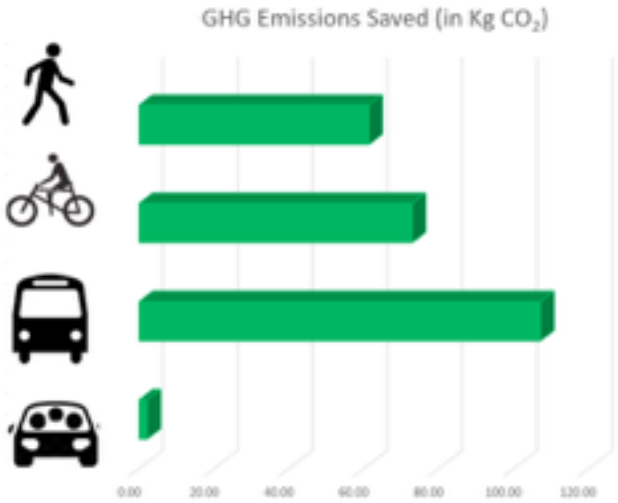
The goal of the UW-ITE Wat-Walk project is to sensitize individuals to the impacts that their transportation choices have on daily Greenhouse Gas (GHG) emissions. This knowledge can then serve to encourage reductions for climate change mitigation, thus enabling us to chart a new path for environmental sustainability, as a university community.

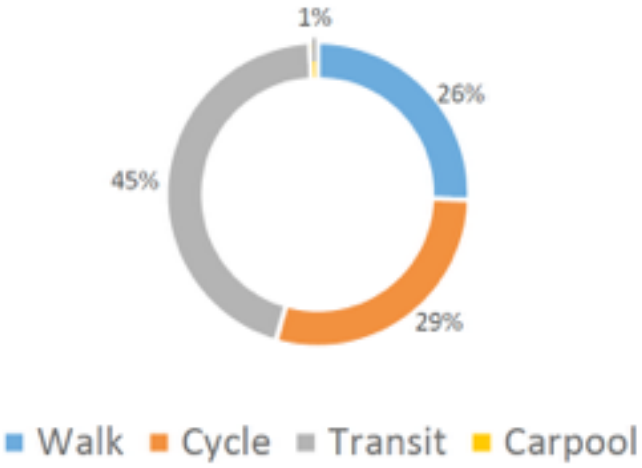
Wat-Walk took place following the thanksgiving weekend, from October 10- 13, 2017. The event was organized to invigorate alternative modes of transportation within the Waterloo community, in order to increase awareness of individuals' impact, increase individuals' wellness, and reduce GHG emissions.

SUSTAINABILITY INITIATIVE

Wat Walk, CONTINUED

In those four days, Wat-Walk recorded a total of 209 sustainable alternative trips, totalling 1641.8 km cumulatively. Figure 1 highlights the number of trips by alternative transportation mode while Figure 2 highlights the distance traveled by alternative mode. It was found that walking is the most common travel mode selected by participants, while transit accounted for the greatest distance.





ACADEMIC EVENTS

The UW-ITE chapter hosted a robust academic speaker series throughout the term, with speakers from various academic, industry, and agency backgrounds.

Dr. Ming Zhong, Ph.D., from Wuhan University of Technology in China, began the series with a discussion on the direction of integrated land-use transportation planning & modeling as it moves from theory and assumptions towards big data and high-fidelity.

Mehran Kafi Farashah, M.A.Sc., P.Eng., from the Regional Municipality of York, next gave a presentation outlining the region's transportation services with a focus on the asset management strategies that are being employed.

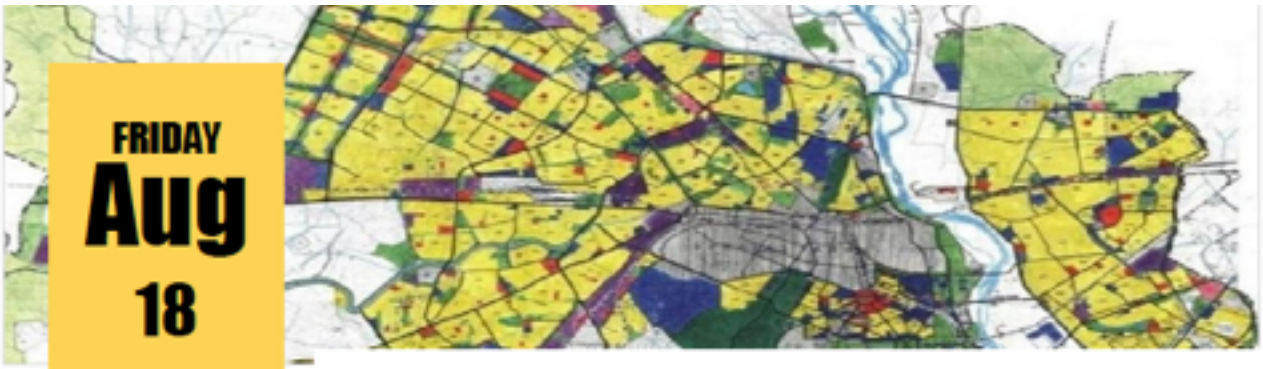
Nimit Mittal, M.Eng., P.Eng., from HDR, next provided a case study of the redesign of the six points interchange at the confluence of Kipling Ave., Dundas St. W. , and Bloor St. W. in the City of Toronto. The presentation highlighted the multi-modal design aimed to create a high quality public realm and create a transit-oriented mixed-use pedestrian-friendly community.

Dr. Lloyd McCoomb, PhD, P.Eng., from the University of Toronto presented on the design and construction of the Lester B. Pearson International Airport expansion.

Steve vanDeKeere, P.Eng., the Director of Transportation at the Region of Waterloo next presented on Waterloo Region's move toward the use of roundabout intersections, highlighting their safety and functional benefits, while providing insight into the performance of existing roundabouts.

Dave Hein, P.Eng., the Vice President of Transportation at Applied Research Associates Ltd., gave a presentation regarding pavement design, with a focus towards young engineers beginning their careers.

The UW-ITE chapter would like to thank all of the speakers as well as all of the people who attended the presentations. We are looking forward to another term full of interesting topics and discussion!



FRIDAY
Aug
18

TRANSPORTATION SEMINAR

MING
ZHONG

PROFESSOR
Intelligent Transportation Research Centre
WUHAN UNIVERSITY OF TECHNOLOGY

Where is Integrated Land-use Transport Modeling/ Planning Moving to: from Theory, Assumptions to Big Data and High-Fidelity?

Dr. Zhong will present his views on general research directions in contemporary integrated land-use transportation planning & modeling (ILUTP/ILUTM), which has been seen to move away from a static, theoretical aggregate approach with potential strong assumptions to a dynamic, data-driven, disaggregate one. It is also featured by better theories, less assumptions, more behavioral and a more comprehensive, detailed and accurate representation of time, space, and related processes – high-fidelity. It is argued that the latter treatment only becomes possible with the advanced data collection, management and processing offered by the information technology – Big Data. In the presentation, Dr. Zhong will highlight some ongoing projects to support such views and how these projects have been used to enhance the accuracy and fidelity of ILUTMs. At the end, the presentation will be wrapped up with a few conclusions and recommendations related to this topic.

Speaker

Dr. Ming Zhong is a Professor at Intelligent Transportation Systems Research Center (ITSC), Wuhan University of Technology (WHUT) and an adjunct professor at Department of Civil and Environmental Engineering, University of Waterloo. Before joining WHUT, he was an Associate/Assistant Professor of the Department of Civil Engineering, University of New Brunswick (UNB) from 2006 to 2013. He obtained his Bachelor and Masters degree in Transportation Management Engineering from Tongji University and Beijing Jiaotong University, respectively, and his Ph.D. degree in transportation engineering from the University of Regina, Canada in 2004. Before he moved to UNB in 2006, he was a Research Associate and a Natural Science and Engineering Research Council (NSERC) Postdoctoral Fellow at the Department of Civil Engineering, University of Calgary during 2004 – 2005. Dr. Zhong has also provided consulting services to several transportation agencies and has served on several technical committees of professional organizations, including Transportation Research Board (TRB), Transportation Association of Canada (TAC), and Canadian Institute of Transportation Engineers (CITE). He served as the Chair of Transportation Division of Canadian Society for Civil Engineering (CSCE) from 2012 to 2014.

WHEN

Aug 18, 2017
11:00-12:00

WHERE

E2- 2350

UNIVERSITY OF WATERLOO

SEMINAR

Asset Management Practices for Transportation Services in York Region

Presenter: Mehran Kafi Farashah, M.A.Sc., P.Eng.

Date: September 8, 2017

Location: E2-2350

Mehran is an Asset Management Engineer at the Regional Municipality of York. He has over seven (7) years of municipal experience in the area of infrastructure asset management. His experience includes infrastructure asset management plan development, asset valuation, asset data collection and condition assessment guideline development, the application of lifecycle cost analysis and asset condition prediction models, and risk-based planning and decision making techniques to extend asset service life. Mehran is a professional engineer and holds both Bachelor's and Master's degree in Applied Sciences in Civil Engineering from the University of Waterloo

York Region

University of Waterloo ite

SEMINAR

Reconfiguration of the Six Points Interchange

Presenter: Nimit Mittal, M.Eng., P.Eng.

Date: October 5, 2017
Time: 11:00am - 12:30pm
Location: E2-2350

Nimit Mittal is a registered P.Eng. (in Ontario and Alberta) currently working at HDR as a Project Manager with over 14 years of industry experience in Project Management, Quality Management, Transportation Planning, Highway design, Construction Staging Design & Contract Administration. He has worked on many design build projects in the US and Canada. He is currently involved in major design build pursuits such as the Gordie Howe International Bridge and Finch West LRT as a roadway design lead. He is also involved in design jobs that include the "Complete Street Approach" theme and how the theme can best be incorporated into the standard practice for road design for local municipalities in the GTA. Nimit believes that by taking a "Simple Communication" approach, one can resolve major challenges that we all face during the project life cycle.

The Six Points Interchange at the confluence of Kipling Avenue, Dundas Street West and Bloor Street West in the City of Toronto was originally built in the 1950's as part of Toronto's sub-urban expansion. The existing car-centric design provides few neighbourhood amenities, no cycling infrastructure, isolates parts of the neighbourhood from each other and takes up 16 acres of valuable City-owned lands that are immediately adjacent to a subway and GO Train Station. The new vision was to create a high quality public realm and create a transit-oriented mixed-use pedestrian-friendly community that will serve as a new civic centre for south Etobicoke.

SEMINAR

The Re-Development of Toronto-Pearson International Airport

Presenter: Lloyd McCoomb Ph.D., P.Eng.
Date: September 28, 2017

Location: EIT 1015

Dr. Lloyd McCoomb began his career in 1964 with the Canadian Armed Forces, Military Engineering Branch. He joined Transport Canada in 1974, later joining the Airports Group in 1986 and over the next seven years served in a variety of executive positions culminating in the post of Airport General Manager, Toronto – Pearson International Airport.

Following creation of the Greater Toronto Airports Authority, Lloyd served as Vice President, Airport Planning and Development in which capacity he was responsible for the planning and construction of the GTAA's four billion dollar facility restoration and expansion program. In February 2007 Lloyd became the GTAA's President and Chief Executive Officer, a position from which he retired in March 2012. Most recently Lloyd served as Chair of the Board for the Canadian Air Transport Security Authority until October 2016 and continues as an adjunct professor at the University of Toronto Department of Civil Engineering.

Dr. McCoomb has a Bachelor of Applied Science and a Doctorate in Civil Engineering from the University of Toronto as well as a Master of Science from MIT.

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING
Transportation Research Institute

University of Waterloo
ite

SEMINAR

Title: Roundabouts: Feasibility and Design

Presenter: Steve van De Keere, P.Eng.
Director of Transportation at the Region of Waterloo

Date: October 31, 2017

Time: 1:00 pm - 2:20pm

Location: EIT 1015

Steve van De Keere is a professional engineer who has been with the Region of Waterloo since 1998. Prior to 1998, Steve worked for ten years in the consulting industry.

Steve's main interest lies with Transportation Engineering and he is passionate about roundabouts. Steve has been involved either directly or providing oversight in the implementation of nearly every one of the Region's 29 roundabouts.

In his role as Director of Transportation, Steve is heavily involved not only with the traffic engineering aspects of the Regional road network, but also the operations and maintenance aspect of the Region's road network.

Steve will be discussing roundabouts, their feasibility, design strategies, case studies, and their role within the Region of Waterloo's traffic infrastructure plan

SEMINAR

Title: Pavement Structural Capacity Testing

Presenter: David Hein, P.Eng.
Principal Engineer, Vice-President Transportation
Applied Research Associates, Inc.

Time: 1:00pm - 2:20 pm, November 30, 2017

Location: EIT 1015

Mr. Hein is a graduate of the University of Waterloo with over 30 years of experience in roadway engineering and transportation asset management. Mr. Hein currently lead's the Applied Research Associates Transportation Special Projects Group , which is extensively involved with roadway asset management activities at Federal, provincial/state, and local levels. He is the past chair of the World Road Association pavements committee and currently the Canadian representative on the asset management committee. He is the past chair of the Transportation Association of Canada Pavements Committee, member of the Soils and Materials Committee and active member of the TAC Education Council.

He works extensively in the development and implementation of asset management plans for Public/Private/Partnership projects in Canada and the United States, was a co-author of the 1996 and 2015 TAC Pavement Design and Asset Management Guides and recently completed a TAC project synthesis best practices for 25 agencies across Canada.

Dave works extensively with the American Society of Civil Engineers (ASCE), is the president of the ASCE Transportation and Development Institute, past member of the Codes and Standards Committee and chairs two standards committees.

Dave's presentation will include a partial history of pavement structural capacity testing, back-calculation advancements, and an application of structural analysis to assess the impact of super-heavy loads on pavements from Alberta.

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SOCIAL EVENTS

Fall Open House

The UW-ITE chapter hosted the Fall Open House to kick off the term. Undergraduates and graduate students from Civil and Environmental Engineering Engineering were invited. The objective of the open house is to showcase the ITE Chapter and benefits of being an ITE member. The open house started with a presentation to provide an overview of the objectives and plans of the UW-ITE. Many interested students attended and were excited to learn more about the chapter. After a brief introduction of the chapter, an open session over . Pizza was open to students to ask and learn more about ITE. Sign up stations were available on site with UW-ITE members helping students to sign up. The event achieved a big success in recruiting students to be members and to join the UW-ITE chapter.

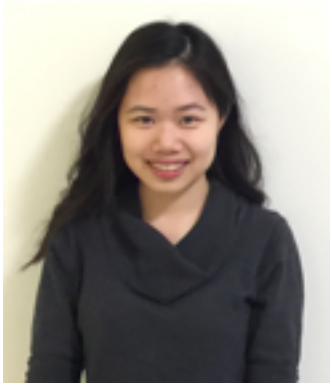
UW- ITE Bowling Night

The winter term was started with an evening of bowling. The event started with an introduction and networking session followed by team building activities were members were assigned team randomly to play bowling. The event was closed by dinner and close remarks by members and UW-ITE executives.

STUDENT SPOTLIGHT

The University of Waterloo offers world class undergraduate and graduate programs in Transportation. UW-ITE would like to present some of our students, their experiences and their work.

AUDREY TAM
UNDERGRADUATE



Audrey is an undergraduate student in her 3A Civil Engineering term (B.ASc). During the Fall 2017 term, she had the opportunity to work on the Hurontario LRT RFP phase with Stantec Consulting LTD. She continues to work on the project part-time during her Winter 2018 studies. Her past co-op terms include Metrolinx and the Ministry of Transportation of Ontario.

Audrey has experience in Provincial Highways Management and Rapid Express Rail Transit.As an undergraduate student, her intention has always been to pursue a career in the transportation industry. She looks forward to participating in fast paced and challenging projects in her future coop terms. While her past work terms have given her a lot of project management experience, she is hoping to further her technical skills at future placements.

In her free time, Audrey volunteers for St. John Ambulance and other Civil Engineering design teams such as Habitat for Humanity.

STUDENT SPOTLIGHT

DAHLIA MALEK
GRADUATE, MASC

Dahlia Malek is a graduate student in the Master of Applied Science (M.A.Sc.) program in the department of Civil & Environmental Engineering at the University of Waterloo. She joined the Centre for Pavement and Transportation Technology (CPATT) research group in Fall 2017 as a new M.A.Sc. student, under the supervision of Dr. Susan Tighe. Dahlia completed her undergraduate degree in Civil Engineering, also at the University of Waterloo.

Her research project is on the topic of precast concrete inlay panels (PCIP). PCIP are being researched as a solution for addressing deep-seated rutting problems that have been observed on high-traffic volume asphalt highways. The installation of PCIP is a long-lasting, rapid repair technique. The use of PCIP, compared to the traditional repair method, is expected to minimize construction-related lane closures and associated impacts, which include increased traffic congestion, road-user delays, and increased safety risks.

Dahlia's research will focus on performing finite element modelling of the PCIP pavement structure to understand the behaviour of this unique type of pavement and to predict its long-term performance. The aim of this research is to establish performance and life-cycle costs, provide design and construction recommendations, and contribute to developing guidelines for implementing PCIP.

Precast Concrete Inlay Panels installed in the roadway

Dahlia is interested in transportation and structural engineering, and aims to apply this knowledge to working in industry later in her career.

Dahlia is a council member of the Civil & Environmental Engineering Graduate Association (CE2GA), and enjoys long-distance running and practicing karate with the Karate Club in her spare time.

STUDENT SPOTLIGHT

MATTHEW MURESAN
GRADUATE, PhD

Matthew Muresan is a graduate student in the PhD program at the Unversity of Waterloo's Civil and Environmental Engineering Department. He joined the Innovative Transportation System Solutions (iTSS) Lab in 2013 as a Master's student and has worked under the supervision of Dr. Fu, the directory of the iTSS Lab.

As a Master's student Matthew's research topic was related to transportation and emissions modelling, and finding better ways to connect these two models. His work also examined the effectiveness of ECO-based driving strategies from an emissions perspective using the platform he developed.

Since the completion of his Master's, he has been working on a topic related to the optimisation of traffic signals for his PhD. His specific interest is in finding ways to apply new techniques, such as Machine Learning (e.g. Deep Reinforcement Learning), and new Big Data sources (e.g. passive Bluetooth and WiFi signal detection) to optimise traffic signal controls.

In 2017 he was awarded an NSERC PGSD award, and prior to that he was a recipient of the Ontario Graduate Scholarship. Matthew is also the recipient of a Mitacs Globalink award and will travel to China as a visiting scholar at Wuhan Institute of Technology from March 2018 until June 2018.

Simulation environment to test Machine Learning signal control

Matthew has always had an interest in computer applications and transportation systems. As a youth he enjoyed using computer programming to solve problems and had an interest in hobby electronics as well as playing transportation simulation games. Now as a PhD student he hopes to find ways to improve the operation of traffic systems and to help prepare our networks for the technological changes of the future.

PROJECT HIGHLIGHT

Precast Concrete Inlay Panel (PCIP) Installation for Highways

Research Team: Daniel Pickel, Dahlia Malek, and Dr. Susan Tighe

Precast Concrete Inlay Panels (PCIP)

PCIP are a type of precast concrete pavement that are being researched for use as a high-performance, rapid repair technique on high-traffic volume highways. Precast concrete pavements have an expected service life of 20+ years for repairs and require minimal field curing time which allows for rapid construction, unlike cast-in-place concrete.

Installation of PCIP in the right-most lane on Highway 400

Background

Pavements on high-traffic volume highways typically experience a faster rate of degradation and require more rehabilitation than low-volume roads.

Some of Ontario's 400-series highways experience an average annual daily traffic of more than 400,000 vehicles/day. The Ministry of Transportation of Ontario (MTO) has observed deep-seated asphalt rutting on some of these highways; this problem is caused by issues in lower layers of the pavement structure. The existing repair strategy of milling and replacing the asphalt has a short lifespan and often requires repair in only 3 to 5 years.

Repeated repair is costly for agencies, and lane closures to perform repairs cause increased traffic congestion and delays for highway users, increased vehicle emissions and safety risks for road users and construction workers. To minimize these impacts, the MTO typically requires that lane closures on high-traffic volume highways occur between the hours of 10 p.m. and 6 a.m. To achieve this, rapid repair strategies are required.

Objectives

The main objective of this research is to develop a solution that is high-performing, constructible within the time constraints, and cost-effective.

PROJECT HIGHLIGHT

Precast Concrete Inlay Panel (PCIP) Installation for Highways

Research Team: Daniel Pickel, Dahlia Malek, and Dr. Susan Tighe

Current Research

PCIP were developed as a solution to the deep-seated rutting problem. To date, this project has included:

- Design of the panels, panel support layers, and detailing;
- Trial installation of the panels on Highway 400;
- Instrumenting the site to collect data
- Construction feasibility assessment of the panels for overnight repairs;
- Preparation of preliminary guidelines for implementing PCIP.

A major component of this work has been to develop a design that can be feasibly constructed overnight. The trial installation proved that this can be accomplished, as the panels were successfully installed during overnight lane closures.

Placement of panels during overnight construction

Further Research

Another major consideration is to evaluate the long-term performance of the PCIP installation. This will be performed through continued data collection and monitoring of the trial site, analysis of the field data, and creation of a finite element model to predict performance.

A life-cycle cost analysis will be performed to compare the PCIP technique to the existing mill-and-replace strategy.

Significance

Successfully implementing PCIP as a rapid repair strategy will provide superior performance from an engineering and user-comfort perspective, minimize construction-related impacts on highway users, and reduce spending on repeated repairs.

Canada's Oldest Student Chapter

SPONSOR PROJECT HIGHLIGHT

McAsphalt Industries

By: Sina Varamini, R&D manager at McAsphalt Industries Limited, and Adjunct Professor at the University of Waterloo (Department of Civil and Environmental Engineering)

McAsphalt Industries is a diversified company committed to the development, production, distribution and marketing of asphaltic products, related services and technologies. It offers a wide range of asphalt products from numerous strategically located terminals across Canada. McAsphalt also operates three state-of-the-art testing and research centers that are strategically located across Canada to solve every technical challenge of today's road construction industry by developing new and innovative processes, paving technologies and materials. Below are some of recent examples of product developments.

As part of our commitment to the development of new and green asphaltic products, R&D team developed a high-performance mixture that was produced and paved using standard practices and equipment. This mix was tailored to traffic volume and climatic conditions specific to the job location by performing series of performance testing to ensure the level of resistance mix will exhibit when subject to distresses, including: (1) permanent deformation (also known as "rutting") caused by repetitive traffic loading coupled with relatively hot summer temperatures; (2) fatigue cracking due to repeated long-term traffic load; (3) low-temperature cracking caused by shrinkage during winter temperatures; and (4) exposure to multiple freeze-thaw cycles. Additionally, warm mix technology was incorporated into this mix to produce and pave the mix at temperatures that were significantly lower than temperatures required for conventional asphalt mixtures. Such reduction in temperature was translated into lowered emissions and energy consumption at the producing plant and no visible job site fumes to increase worker safety during the paving operations as shown in Figure 1.

Figure 1. No visible job site fumes to increase worker safety during the paving operations

SPONSOR PROJECT HIGHLIGHT

McAsphalt Industries, CONT.

By: Sina Varamini, R&D manager at McAsphalt Industries Limited, and Adjunct Professor at the University of Waterloo (Department of Civil and Environmental Engineering)

In helping road agencies repairing cracks wider than those conventional asphaltic products cannot seal, our R&D team developed a line of hot-applied sealant branded as *MACSEAL M.A.R.S* to repair wide cracks and other severe pavement distresses.

Figure 2. Kettle with agitator used to heat the product to the discharge temperature and a box used to guide the material into the cracks

This sealant consists of a blend of specially engineered polymer modified binder a carefully selected aggregate fraction. To apply the product, a kettle with agitator is used to heat the product to the discharge temperature as shown in Figure 2. Initial field trials were conducted last year at different airports across the Ontario province, where cracks on runways, taxiways were sealed. After the first winter, all the repairs were found in good conditions. MACSEAL M.A.R.S is also being applied throughout different municipalities to repair cracks on busy road sections.

If any more information is required on these two products, please contact Dr. Sina Varamini at McAsphalt Industries.

SPONSORS

We would like to thank our sponsors for their continuous support and help to achieve our chapter's goals.

If you would like to get more information on sponsorship opportunities and advantages, please contact us at uw.ite.sc@gmail.com or visit our website https://www.civil.uwaterloo.ca/ite/contact/

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