URBAN UPDATE

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Urban Projects

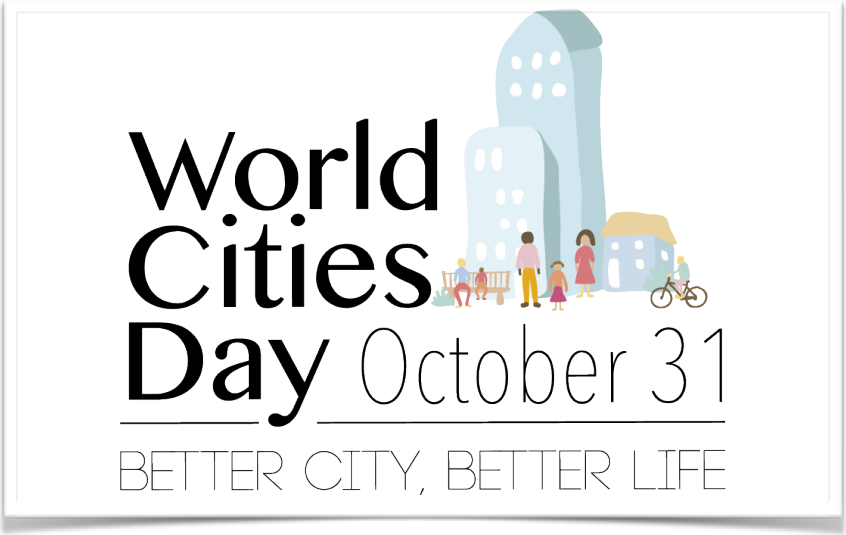
Contributed to the report on UN SDG 11 (Cities) for the Canadian Grand Engineering Challenges, submitted to the National Council of Deans of Engineering and Applied Science (NCDEAS). Accepted to serve on Donghui Lu's PhD Committee, and her defence on December 11. Donghui is supervised by Dr. Susan Tighe, and her thesis is on Pavement Flood Risk Assessment in the Changing Climate.

Engineering Education

Joined the Teaching and Learning Research Commons organized by Kyle Scholz, and participated in the first meeting to discuss "The Scholarship of Teaching: What's the Problem?" And Met with Monica Vesely to go through my Teaching Development Plan.

Teaching

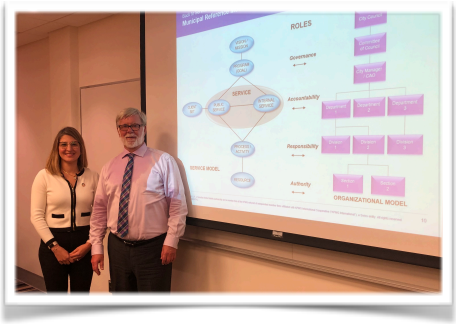
Applied to UNHabitat's Global Urban Lecture, through their Urban Knowledge Platform in partnership with universities.



World Cities Day

The United Nations has designated every 31st of October as World Cities Day. The aim is to promote the international community's interest in global urbanization, push forward cooperation among countries in meeting opportunities and addressing challenges of urbanization, and contributing to sustainable urban development around the world. In celebration of cities, I was invited as a guest speaker to the Structures Seminar Series at Queens University to give a talk on "Sustainability of Urban Infrastructure in Cities, Megacities, and Megaregions."

Event Highlights



Turkstra Talks. Alan Mitchell from KPMG, Oct 30.

Sustainability: Transdisciplinary Theory, Practice and Action. Attended with two presentations, Mississauga, Oct 16-18.

Game of Floods. Tested the game with my LITE Grant team, Oct 24.

Future Cities and Technological Stewardship. Participated in working groups, Evergreen Brickworks, Toronto, Oct 28-29.

Keep an eye out next month for...

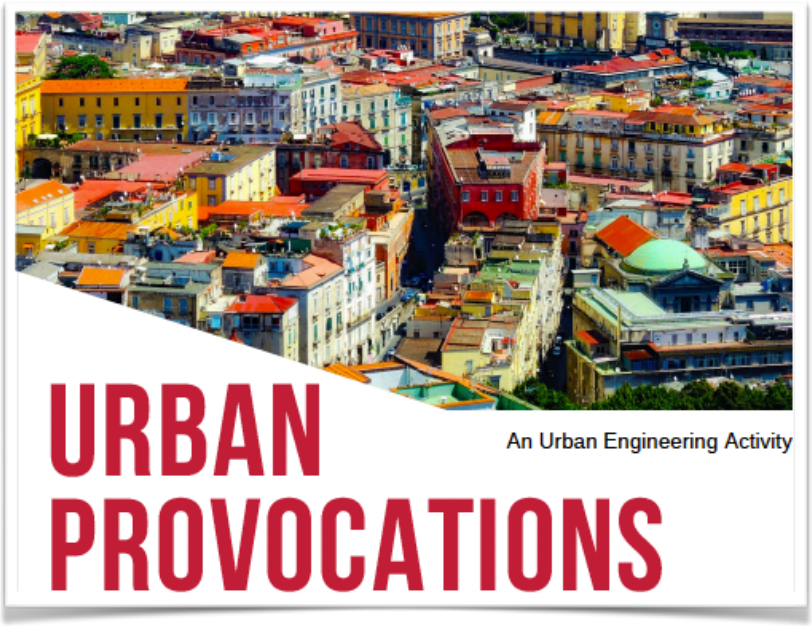
Here are events to look forward to in November 2019:

- In the Loop, Nov 1
- CEAB Visit, Nov 10-12.
- Waterloo Engineering Competition, Nov 8 and 9
- Turkstra Chair Advisory Board Meeting, Nov 18
- Turkstra Talks, Nov 19
- EcoSummit, Nov 20
- First Lego League "City Shaper, Nov 30

ARBOR AWARDS
RECIPIENT FOR LEADERSHIP & VOLUNTEERISM

SUSTAINABLE DEVELOPMENT GOALS
I WEAR AN SDG PIN

CITY AGE: BUILD FOR THE FUTURE
FOLLOWER



Urban Provocations for Grad Students

Starting this month is an activity for graduate students - Urban Provocations, which is a weekly discussion forum to provoke thoughts, discussions, questions, and creativity, and expand on interests and ideas around our urban environments, and around cities more broadly. Ultimately, the intention of Urban Provocations is to provide an invitation for urban exploration and self-expression. It is structured around the "six thinking hats" format which is a very effective tool for group discussions that encourages participants to think together. A provocative article, publication or news is selected and circulated one week in advance for reading.

Designing a dream city is easy; rebuilding a living one takes imagination." - Jane Jacobs

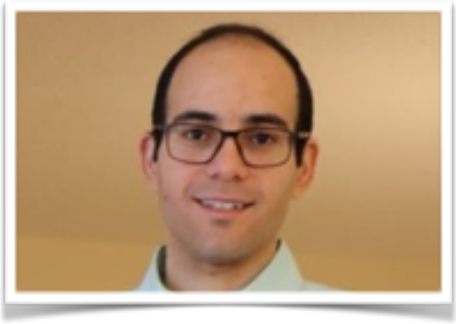
Faculty Contribution

Daniel Lacroix is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Waterloo. His primary interests include mitigating hazards associated with mid- to high-rise timber and timber-hybrid structures subjected to extreme loading (e.g. earthquake, blast, impact). Dr. Lacroix's expertise is in the structural and dynamic performance of wood systems under blast and impact loading, strengthening and retrofitting of wood structural elements, as well as performance and evaluation of innovative systems to increase the use of wood in the industry. As a proponent for the adoption of mass timber products by the industry, Dr. Lacroix has recently been venturing in the life cycle assessment, cost-benefit analysis, and impact of widespread adoption of wood on climate change and carbon sequestration. One of several active research projects is the development of an analytical model capable of predicting the fibre-reinforced polymer (FRP) confined behaviour of wood. FRP is a common material used for strengthening of aging infrastructure and in blast engineering.

"*Why wood and blast? Wood is light and brittle and thus not favourable to resist blast loads?*" Those two questions, Dr. Lacroix has received and continue to receive on a regular basis. First, from an urban perspective, green house gas (GHG) emissions from cities account for 70% of global emissions and are projected to increase to 76% by 2030 at current trends of urbanization and economic growth (ICLEI 2010) with carbon dioxide (CO_2) as the main perpetrator. One of the advantages of using wood products is the trees' ability to remove CO_2 from the atmosphere by absorbing and storing it during their growth, thereby reducing the impact of climate change by creating "carbon sinks". Whereas wood has historically been limited to low- and mid-rise structures (i.e. six storeys or less), a new generation of engineered wood products, namely cross-laminated timber (CLT) and glued-laminated timber (glulam), have contributed to a renewed interest in extending the concept of wood-based systems to mid- and high-rise applications (e.g. Brock Commons, Vancouver, BC; Origine, Québec City, Qc). The National Building Code of Canada will allow mass timber construction up to 12 storeys in its 2020 edition, which would potentially encourage the adoption of wood-based products in taller structures often found in cities. Amongst other benefits, using wood can reduce the construction time, and the aesthetics of exposed wood which has shown to reduce stress and heart rate while increasing concentration of occupants.

"*And, how does the above relate to blast loads?*" Due to the increasing presence of tall mass timber and timber-hybrid buildings, they could be at risk of blast and impact loading due to the higher-profile associated with the structure or even the possibility of being located within the vicinity of other targeted high-profile infrastructure. Dr. Lacroix's research is aimed at establishing the behaviour of various wood products (e.g. timber, glulam, CLT) at high strain rates arising from blast and impact loads as well as developing accurate evaluation strategies, and economically viable and structurally sound retrofit techniques with the ultimate objective of further enhancing current blast design guidelines.

Student Contribution



Mansour Esnaashary Esfahani is a PhD candidate in the Department of Civil and Environmental Engineering of the University of Waterloo under the supervision of Professor Carl Haas. He obtained his Bachelor in Civil Engineering from Isfahan University of Technology in 2012. Then, he earned his MASc in the field of structural engineering from Sharif University of Technology in 2014. He worked as a construction manager and structural consultant in one of the biggest construction projects (Isfahan City Center) in Iran, for three years. He came to Canada in 2017 and started his PhD. His PhD research focuses on improving the success of adaptive reuse projects by optimizing the pre-project planning. He tries to use advanced construction technologies during pre-project planning of adaptive reuse projects.

Typically, the building cycle in many parts of the world relies on demolishing old buildings and constructing new ones. In moving towards sustainability, adaptive reuse of existing buildings is often considered to be a more beneficial alternative to demolition and new construction. Mansour works to improve the success of adaptive reuse projects by optimizing the pre-project planning. To achieve this goal, he developed a list of scope elements associated with adaptive building reuse projects and a methodology to optimize the effort allocated to the process of pre-project planning (scope definition). Information should be collected to define the scope elements. The methodology identifies the scope elements for which their definition should be improved, and determines the optimum amount of information that should be collected for them in rank order of providing the least cost effort. The majority of information about existing buildings to define the scope of adaptive reuse projects can be presented as a digital twin. Thus, the future plan of Mansour's research focuses on creating digital twin for existing buildings. He assesses the certainty of the information provided by digital twins. In addition, he validates the developed optimization methodology by demonstrating its function to find the optimum amount of information that should be collected from existing buildings and presented in digital twins.