GREEN INFRASTRUCTURE STUDENT HACKATHON GUIDELINES

INTRODUCTION

The Green Infrastructure Student Hack-a-thon aims to engage students from multidisciplinary backgrounds around green infrastructure. Green infrastructure refers to natural and human-made elements that provide ecological and hydrological functions and processes that help to address environmental resilience and climate change. These processes include absorbing rainwater, improving the water quality of stormwater runoff, reducing effects of urban heat, enhancing bio-diversity, increasing the urban forest canopy, and improving air quality.

Designed to meet environmental performance requirements over the long-term, green infrastructure is also a cost effective way of reducing future infrastructure demands while creating more desirable communities to live in. Examples of green infrastructure may include natural systems and heritage features, parklands, storm water management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs and green walls. Please see examples of green infrastructure projects at http://www.ryerson.ca/water/education/outreach/greeninfrato/

Green infrastructure performs a holistic role and should be viewed in a collaborative way that crosses jurisdictions, sectors, and issues. That is why a multi-disciplinary approach is required to design an ecologically sustainable, economically feasible, and socially valuable green infrastructure intervention.

WHAT ARE THE ISSUES?

As Toronto grows, urban intensification continues to strain the City's infrastructure and pose threats to the health of our natural ecosystems and ourselves. A rise in wet weather and intensified rain events as a result of climate change has resulted in increased stormwater runoff – entering the City's sewer system and carrying with it debris and pollutants that enter into our rivers and Lake Ontario, decreasing base flow to waterways (as groundwater), and causing serious creek slope erosion.

The urban heat island effect is also a growing issue and is exacerbated by increased impermeable surfaces, such as buildings and pavement. This occurs when heat from solar radiation is absorbed by human-made surfaces such as rooftops and pavement, and then released into the air increasing the temperature of the area (*https://www.cip-icu.ca/Files/Resources/STUDIO2-RYERSON-UHI-TOOLKIT-FINAL-REPORT.aspx)*.The urban heat island is intensified by the use of automobiles, air conditioning, and lack of vegetation.

Ecosystem degradation is widely understood to be a negative effect of urban intensification and human development. A loss of tree canopy and vegetation can reduce the natural environment's ability to retain and clean water, cool the local ambient temperature, and provide habitat for important animals, birds, bees and insects. This is particularly impactful along river banks and the Lake Ontario shoreline, where a complex ecosystem with high bio-diversity delivers several important water cleaning services.

As a result, our traditional infrastructure is challenged to support and service our growing city. Municipal water infrastructure, designed for less intense rain events, is particularly susceptible to urban intensification as it quickly becomes overburdened. Investigating in green infrastructure may well be a more cost effective and sustainable approach than continuing to rely on building ever expanding centralized solutions.

WHAT IS THE CHALLENGE?

To develop innovative ideas and designs for a green infrastructure product that provides a wide variety of benefits to the surrounding urban community and the natural environment.

Product Objectives

- Incorporate some or all of the unit parameters outlined in the Judges Scorecard (Appendix A).
- Incorporate the knowledge learned during the presentations and workshops provided during the Hack-a-thon on Saturday, October 28th.
- Raise awareness and increase public knowledge of green infrastructure and its benefits.
- High durability to withstand all four seasons.
- Innovative, creative, unlike anything in the current market – think outside of the box!

HACKATHON GUIDELINES

The purpose of this hack-a-thon is to design a new and innovative green infrastructure product that will have a positive impact on outdoor spaces. This could range from a software application to a physical product or unit. The solution must be feasible, be immediately implementable (i.e., not dependent on future technologies or discovery), and designed for use in the public or private realm. The goals are to design a solution that does not currently exist in the marketplace, or a significant innovation to an existing product that seeks to solve the challenges identified by speakers during the hack-a-thon workday.

Eligibility

- Open to students and recent graduates from all academic disciplines.
- Participants will be placed/formed into 4-5 member teams. Teams are encouraged to comprise participants from different programs/disciplines. For example, previous winning teams have included a variety of participants from business, engineering, urban planning, and environmental studies.

Final Submission

- Teams deliver a 5-minute presentation on their solution/product and describe how this solution solves challenges identified by speakers and meets the needs of the judges scorecard (Appendix A).
- Submissions must include the following:

- A name for the team's product.
- A visual concept drawing.
- A verbal justification that follows the categories outlined in Appendix A.

Participants will receive mentoring and have the opportunity to network with green infrastructure professionals. Winning teams will receive a cash prize, gain access to the innovation zones at Ryerson University and best designs may be transformed into real green infrastructure.

Appendix A: Scorecard for Judges

Category:	Description:
Ecological Services: __ /40 **Water**	• Does the product include rainwater harvesting and/or infiltration-based practices? • Developing efficient non-traditional methods of managing stormwater in the public realm has been identified as a particular challenge. Does the product effectively manage stormwater runoff? • Does the product promote infiltration to sustain shallow groundwater systems? • Does the product reduce pollutants from storm/rainwater?
Carbon/Air Quality	• Does the product help moderate microclimates and reduce local ambient air temperature through vegetation? (Evapotranspiration, natural shade or structural shade?) • Does the product enhance the urban forest canopy? • Does the product improve air quality by filtering particulate pollution? • Does the product feature building materials and coatings that reduce off-gassing air pollutants?
Habitat	• Does the product improve or provide local habitat for native plants and/or birds, bees, mammals, amphibians, reptiles, and/or insects?
Maintenance	• Is the product durable: can it withstand four seasons • Does the product have minimal maintenance? For ex, urban agriculture requires planting, harvesting, mulching, composting, removal of seasonal drip irrigation, how has ongoing maintenance been minimized in your design?
Social/Community __ /30	• Ownership or stewardship of green infrastructure projects has been identified as a particular challenge to the development and ongoing longevity of green infrastructure projects. Developing a connection between the project and the community in which it is situated is vital. How does your solution achieve an active responsible community? • Does the product provide place-making abilities to create community? • Does the product promote mental and emotional health, skin cancer

	prevention (shade), and encourage physical activity? • Does the product help alleviate food security issues? Beautification benefits? • Does the product engage the public? Ensuring the public understands green infrastructure and its benefits has been identified as a challenge to green infrastructure implementation. Ensuring that projects have an educational component or have a supportive story that leaves a lasting impression on the community is important. • A part of the challenge of implementing green infrastructure is aversion to change. How do we engage the public and government on an emotional level that will compel society to try new and innovative ways of doing things? • Rain gardens, water harvesting systems, projects in public spaces that will be cared for by community, all need post-installation management and maintenance. Many projects fail due to lack of community capacity and support to manage and recruit volunteers. Does your design account for this? How will your design help create a replicable model that can be applied in different communities?
Business Case __ /30	• Capital investment has been identified as a specific challenge to the development of green infrastructure. Has the group developed a business plan that justifies the investment and identifies monetary savings such as water savings, power savings? Has the team made any effort to valuate (place a dollar value) the benefits? Benefits like improved public health (through a decrease in air pollution), mental and physical health (Increased greenery and recreation space) in a city? • Is the product innovative and unique from what currently exists in the marketplace? Or has an existing product or solution been significantly innovated and improved? • Has the team thought of the user? Investor? • One way to gain support for new projects is to use metrics to measure the success of similar projects. Does the product include performance monitoring features to measure the success of the design for years to come?
Overall Concept __ /100	