2022 PEO York Chapter
Virtual Engineering Competition
Problem Statement

Background

Population growth requires infrastructure to expand without depleting resources that are required by later generations to live well. Green building is an idea that has evolved from this need. The concept of green building is sustainable construction. There is a demand for eco-friendly construction intended to reduce negative impact on our environment throughout the building construction process and throughout the building's useful life. The key stakeholders (building residents, businesses, the municipality, the public, etc.) believe in the protection of the environment and the well-being of the community it serves.

Sustainable infrastructure and improvements are key to societal and economic growth and the protection of the environment. Good planning and effective use of resources can minimize the environmental impacts of developing land. The environment will be affected by construction taking place but considering options to minimize effects is what makes a project green. With adequate planning for sustainable construction, this can help ensure the population develops responsibly, bettering the environment for future generations.

Problem Statement

There is a vacant parcel of land on the north side of Davis Drive, east of Longford Drive in Newmarket, Ontario. The site is surrounded to the north, east and west by low-density residential lands, with retail commercial properties in the vicinity and high-density residential property to the south. The site boundaries are outlined in white in the map below

The lot (piece of land being developed) has an area of 4,980 m². The landowner (the client) proposes to build a six-storey building with 1,500 m² of retail floor space on the ground floor and 60 apartment units in the five floors above. The retail space can include restaurants, shops, spas, supermarkets, etc. The required building footprint is 1,500 m^2.

The owner has asked your team to provide a design for the proposed development site. **What measures/improvements would you include in this development to minimize environmental impacts and promote the well-being of its users?** The design should include your designs for the future building and the remainder of the site outside of the building.

The client's objective is to build a sustainable and productive site that benefits the users and the community. The client is excited to see your creative yet practical/feasible designs for the proposed development. The client is willing to invest reasonable amount of money to construct a more innovative, sustainable building provided it serves the building users and provides long-term benefits, such as cost savings and better health.

The property is geotechnically sound, has no previous contamination, nor any potential or actual environmental concerns. The land has never been previously developed. The site is serviceable by existing municipal services (e.g., water. sewers, and garbage services).

Aspects to considered

The following are suggestions on aspects to consider. Your team's design should address at least one of these aspects with an appropriate level of detail and explain how your design achieves the objective. It is not necessary to address all the elements. Your team may choose to pick one or two aspects on which to focus your design. Teams are encouraged to brainstorm improvements that would make their design different than a conventional/regular building space.

- Features serving property uses
    - What features are there to serve pedestrians and car drivers?
    - What features are there to encourage sustainable forms of transportation?
    - What features deals with the waste generated on site?
- Environmental friendliness of building materials (wood, glass, steel etc.)
    - What types of material will be used for the building structure?
    - What types of material will be used for the insides of the building and uses?
- Energy efficiency of the building
    - What types of material will be used for the building structure (building envelope)?
    - What is the building's hot water and heating/cooling mechanism?
- Health, Safety, Security, accessibility considerations for property use
    - What does the ventilation and spacing look like for the different space uses (retail, residential) within the development to mitigate spread of COVID-19?
    - What are the security, safety, and accessibility features of the site?
- Environmental Design
    - For the remainder of the site that is not occupied by the building, what features will be built on it?

    - What other uses could be accommodated in the site to make it more compatible with the existing uses surrounding the site? (e.g., recreational or community use)
    - What else could be considered to reduce the development's carbon footprint and waste?
- Other aspects you want to add in (e.g., Energy, climate change)

Deliverables

The deliverables are what is provided to your client (the landowners) upon completion of your work. Your team must submit the following 2 deliverables:

- One site plan (drawing) of the team's proposed design for the property (in PDF)
    - The definition and example of a site plan can be found here
    - You can use PowerPoint or any other software to draw up this overall plan of your design. It should provide an overall view of the different features of your site design with clear label of each of the features and their sizes (in square meter).
- An 8-minute PowerPoint presentation of your team's solution to the problem statement. PowerPoint slides are to be submitted in PDF, ppt, or pptx format by 11:59 PM on March 24, 2022. Please double check the formatting on these files before sending them.

Deliverable Submission Method

Please submit your deliverables via google form:
Junior (Gr.8-10):
https://docs.google.com/forms/d/e/1FAIpQLSfX2JdFs7WIEcZfU0IJyrx_UnbJ7AgcfXQ6KFN8iueZl7m_ZQ/viewform?usp=sf_link
Combined (Gr. 8-12):
https://docs.google.com/forms/d/e/1FAIpQLSf5CkjvnaHDsZ64MYqvFliXHjLzDBy1NO5kEGgrp22XcMqTew/viewform?usp=sf_link