

Western Engineering Outreach

City Planners

Grade K-2

Meet Today's ENG HERO!



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Ayan is an assistant professor in the Civil and Environmental Engineering Department. He completed his Bachelor and Masters degrees in India before completing his PhD at the University of Waterloo. His research focuses on remote and autonomous techniques to assess faults and failures in structures. To learn more about Dr. Sadhu visit:

https://www.eng.uwo.ca/civil/faculty/sadhu_a/index.html

Learning Goal:

- Students will learn about civil engineering and city planning as they design and build their own cities
- Curriculum Connections: Grade 1 - Materials, Objects, and Everyday Structures

Materials Needed:

- Cardboard
- Glue
- Tape
- Scissors
- Popsicle sticks
- Paper
- Markers



Engineering and Science Connections:

Civil engineers design and build all different kinds of things that we walk by everyday. Often when people think of civil engineering they picture complex buildings, hydroelectric dams, and large bridges. But, civil engineers play a very important role in city planning. Choosing where buildings will go can be a complex process. Some things they must think about are: the size of the building, if the land is good to build on, and who will be using the building. From here, the engineer will oversee the construction of the building and work with City Planners to ensure everything goes smoothly.

Buildings are a major part of a city, however, cities would not work well without large road systems. Civil engineers also play a role in designing roads, assigning speed limits, and placing stop signs/stop lights. To prevent traffic during rush-hour the street lights at an intersection must be timed. Although civil engineers play an important role in city planning, they must work with Urban Planners, and other City staff to complete the process.

As we build our city, we will use something that every engineering uses: the Engineering Design Process. This is the process engineers use to solve problems. The EDP has 4 steps:

1. **Understand the Problem:** Describe the challenge you are trying to solve and any criteria (the conditions that the design must meet) and any limitations (like cost, time, size of team). Do research to see what others have done to solve that problem.
2. **Design a Solution:** Use the knowledge you have to brainstorm as many ideas as possible. Choose the best design you think will work to solve the problem.
3. **Build a Model:** Using the materials you have, build a model of your design.
4. **Test and Redesign:** See if your model works. If not, what needs to be changed or improved? Does it solve the problem? Build and test until you have success.

Video Recommendation: What is Urban Planning?

https://www.youtube.com/watch?v=_5ot_1tbOX8



Activity:

Before you begin, think about the following questions:

- What are some buildings in your neighbourhood?
- What are buildings that you have visited?
- What are the names of other structures that are not buildings?
- What are buildings and structures made out of?

You have just discovered an island that no one has ever been to before. After thinking about a lot of different factors, like the weather, the soil quality for growing food, the size of the island, and the distance to the nearest piece of land, you decide that you want to build a city on the island. Now it is up to you and your team of civil engineers and urban planners to plan the perfect city!

Part 1 – Plan

Before you start building, you need to think about the requirements of a city - all the things that people need to live. On a piece of paper, draw a map of your city. Make sure you include the required structures and think about where they will go. When you have included a building, put a checkmark in the “check” box.

Requirements

Island Name: _____

City Name: _____

Buildings/Structures:

Type	Check	Things to consider:
School		<ul style="list-style-type: none"> • Do people like being near the structure? • Does the structure require parking? • What kind of parking does it need? • Should the structure be challenging to get to? • Does the structure need to be big? (ie. should a hospital be bigger than a house?) • What different kinds of houses do people live in?
Hospital		
Police Office		
Fire Department		

10 Homes		
Park		
Grocery store		
Landfill		

Add three of your own building/structures:

Type	Check	Things to consider

Road Requirements:

1. Buildings must be connected by roads
2. Road must have speed limits (Slow: 40km/h, Medium: 60km/h, Fast: 80km/h)
 - a. these can be written on a white piece of paper and placed on the road
3. All intersections (where two roads meet) need a stop sign or stop lights
 - a. these can be cut out of coloured paper and placed in the middle of an intersection

Part 2 – Build

Now that you have your plan of the city, it is time to build. Use cardboard and popsicle sticks to make your buildings. You can use paper and markers to make your roads. It's okay if it does not look exactly like your plan. Sometimes during the building things need to change.

If we continue with the Engineering Design Process, the next step would be to test. We have already thought about our problem, designed a solution, and built it. It is hard to test without people to live there, but think about whether your city works well. Would you like to live there? Would you have fun living there? Will people be safe and happy? If so, you've done a good job!

What Did You Learn?



- What kind of engineer helps design buildings and structures?
- What do engineers need to consider when planning a new city, building, or structure?
- What did we build our building out of? What are real world structures made of?

Future Learning



- Take a walk or a drive to see what buildings and structures are in your area. What do you think they are made of? How would you change or improve your neighbourhood or city?
- Part of our city plan was considering roads. Take some time to discuss movement in your city. How do people get around? What is the easiest way to get around? What is the hardest way? What is your favourite way? Thinking about the movement of people may help city planners in their designs.

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.

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Thanks for discovering with us!