

Discovering the Hidden City: Exploring Infrastructure



Objectives:

Students will be able to:

- Identify various components of the built environment
- Identify how the infrastructure system supports human well being

Author:

Ecology Explorers Education Team; adapted from "Cityscapes by D. Shepardson.

Time:

50 minutes

Grade Level:

6-12

Standards:

Background:

Cities are designed human habitats that provide essential services and commodities that enable, sustain and enhance societal living conditions. Cities are designed with a variety of infrastructure that bridges the biophysical and social realms. It includes terrestrial ecological features (green infrastructure), modified watersheds, built structures (gray infrastructure), and social institutions (soft infrastructure) Most of these features are designed, engineered or managed by people. Some parts of the urban infrastructure are readily seen, while others are not. In this activity students will be asked to construct a poster of an urban environment based on cards describing aspects of the urban environment.

Vocabulary:

infrastructure: the basic structure of an organization or system which is necessary for its operation, esp. public water, energy, and systems for communication and transport

dumpster: a large trash receptacle designed to be hoisted and emptied into a truck

runoff: the draining away of water (or substances carried in it) from the surface of an area of land, a building or structure, etc.

Advanced Preparation:

Copy Task Cards for each group of 6

Materials:

- Large drawing paper (poster size)
- Colored pens/pencils
- Task cards (one set for each group)

Safety Precautions:

None

Recommended Procedure:

Engagement:

- 1) Think/Pair/Share: Have each student think of three critical components that must be in place for a city to function. Pair (or group) students to share their components, then create a class list.

Exploration:

- 3) Randomly distribute one task card to each group member. Group members may not show their cards to others, but they may read their cards aloud to the group.
- 4) The student who drew Card 1 is the group leader and is responsible for keeping the group on target and completing the task as stated on the card. The group will have 40 minutes to complete the task
- 5) The task is completed by using all the information stated on each card. Each card holder must ensure that all the information on his/her card is incorporated into the final product

- 6) Circulate among the groups to answer questions and facilitate the progress. Hint: it may be easiest to place some of the information on the poster as an aerial view and other components as a “street” view/cross-section

Explanation:

- 7) Facilitate discussion about the different types of infrastructure in their city diagrams:
- What parts of the city did you draw on your poster that were not included of the original list? What important jobs do these items do? Why is it easy to miss or forget about them when thinking about how a city works? How would your quality of life change if these parts suddenly stopped working?
 - What items on the poster represent green infrastructure? What is green infrastructure and what does it do for the people who live and work in cities?
 - What are some examples of soft infrastructure? How does soft infrastructure improve the safety and happiness of people in the city?
 - Why are underground features organized the way they are? Why is it important that sewers slope downhill? Why must natural gas and phone lines be near the surface? Why is the storm sewer placed beneath all the other utilities?
 - What parts of the city might make people unhappy or negatively impact their health? How would you solve these problems? Who should be responsible for making your suggested improvements?

Expansion:

- 8) What are some of the “sustainability” features in the diagram? What would you add to make this part of the city more sustainable?
- 9) In natural environments space, shelter, food, and water are limiting factors, how might these environment conditions serve as limiting factors in the built environment (cities).

Evaluation:

- Completed drawing
- Participation in discussion
- Written answers to questions 8 & 9.

Discovering the Hidden City

Task Cards



Card 1

You may not show this card to anyone in your group.

Group Task: You are walking on the sidewalk downtown and stop to look around you. You rarely go downtown and are quite impressed by how nice it is. Using the information on the cards, draw a cross section of the block illustrating what you observed and what you were thinking about above and below ground. You may need to create more than one drawing using different perspectives to incorporate all the information

- Storm sewer pipes are often 10 times larger than sewer pipes
- You have cell phone service
- There is a traffic light at the corner, it's connected to an underground power cable
- Natural gas is piped through metal pipes at least 3 feet below the street

Card 2

You may not show this card to anyone in your group.

- Main water pipes are buried about 4 feet below the street and smaller pipes lead into each building and the fountain in front of the courthouse
- Storm sewers are located below all the other utilities
- Electrical lines run into each building from above ground poles
- The buildings are either 3 or 4 stories and made of concrete or brick
- Natural gas pipes enter each building
- There is a bench near the corner and a trash bin and a recycling bin next to it
- A semi-truck and car just went by.
- The sun is shining on the other side of the street, so it is 10° F warmer

Card 3

You may not show this card to anyone in your group.

- Trees are found next to the bench and the fountain near the courthouse
- A separate high-pressure water pipeline is maintained to the two fire hydrants on the block
- Storm sewers drain water from rain and into the nearby river
- * An electrical transformer is located on one of the electrical poles
- * Litter has blown up against one of the buildings
- * Several people are waiting to cross the street at the corner with the traffic light
- * The restaurant is located next to the insurance company
- The sound of the semi-truck can be heard for a block

Discovering the Hidden City

Task Cards



Card 4

You may not show this card to anyone in your group.

- *Sewer pipes typically rely on gravity to feed the wastewater from the building to the wastewater treatment plant; therefore they are laid down on a slope
- Several bushes are located in front of the restaurant
- A drug store is located across from the restaurant
- Light poles are found next to the street and are connected to the electric power line
- People are entering and leaving the courthouse
- Litter is blowing along the sidewalk
- There is exhaust from the semi-truck

Card 5

You may not show this card to anyone in your group.

- Sewer pipes collect wastewater from each building and are often located 10 feet below the street
- Next to the restaurant are two large trash dumpsters
- The vacant lot is partially covered with weeds
- The lawn in front of the courthouse is well maintained
- Cars are parked along one side of the street
- Pigeons are roosting on the tops of buildings. Some are found on the sidewalk outside of the restaurant
- There is a bank nearby. In front of the bank are two trees and a bench

Card 6

You may not show this card to anyone in your group.

- Oil has leaked onto the street from vehicles and runs off into the storm sewer when it rains
- Solar panels provide shade in the parking lot and energy to the power grid.
- It is a sunny, spring day
- On the roofs of each building there are chimneys and vent pipes. Smoke from the chimney on the restaurant is visible
- The cement curb contains steel grates that allow the storm water to runoff the street and into the storm water sewer
- There is a bicycle rack by the courthouse entrance
- The restaurant is locally-owned and known for using locally grown produce