

SWEducational

ACTIVITY PACKET



Transportation Engineering Edition



WHAT IS TRANSPORTATION ENGINEERING?

Transportation Engineering is the study of how to get people from place to place efficiently. Every day, people commute from work, travel to destinations, or take a trip to the grocery store. These trips can be traveled efficiently because of the roads and airports that Transportation Engineers helped design and improve. Transportation Engineers also work with bike lanes, parking lots, bus systems, and more!

Photo Raffle

Do you like prizes? How about showing off your project work? Submit a photo of your **completed Transportation Engineering activity (or a photo of your grid drawing)** through the link below! You'll see your project featured on the class page, and even be entered into a raffle for the chance to win a **GIFT CARD!**

Prize List

Gift Cards to...

- Ice Cream Shops
- Target
- Walmart
- Amazon
- Many more!

Get your cameras ready and stay tuned...these photo raffles will be in every summer packet!



Submit Here! Or type the link below:

https://docs.google.com/forms/d/e/1FAIpQLSdTJ7PwA45DH09Ug6MIW-f52BTjDFZtWZW4M7efZUAjdfHARCg/viewform?usp=sf_link

IMPORTANT TERMS

Road Infrastructure: everything that makes the road system work

- This includes the roads, train railways, bus stops, bridges, cross walks etc.
- In this activity you will get to design your own road infrastructure that helps complete the challenges!
- Can you think of anything else that could be considered road infrastructure?

Intersection: where two objects or paths cross

- An example of this is where two roads cross. Usually there is a stop sign or traffic light at these intersections.
- For this activity you will need to incorporate road intersections so that your traffic plan will work properly.
- Can you think of anything else that creates an intersection? It does not have to be related to transportation.

Straightaway: a straight section of road

- This is when the road does not have any intersections or curves
- You will want to incorporate straightaways because those are the easiest roads for your townspeople to drive on.
- What other types of roads are there?

Efficiency: taking up the least amount of time and energy with maximum productivity

- For example, you want your people to have the easiest path they can so that it takes the least amount of time and uses the least amount of gas.
- Engineers always want to be most efficient which is why they are always improving their designs to make things faster or easier to complete.
- What is an example of something you do every day and how you could make that task more efficient?

ACTIVITY INSTRUCTIONS

Today you will get to be the transportation engineer for your own town!

This activity will take you through 3 mini-exercises that will let you practice solving problems that Transportation Engineers encounter in their work. By designing and updating your town's road plans, you will get to see how road infrastructure changes with different town layouts and characteristics.

SUPPLIES

Remember to ask an adult before using materials!

- Printer (but if you don't have a printer, you can still do the activity!)
- Scissors
- Ruler
- Flat Surface
- Camera, phone, or other device to take photos (optional)

If you don't have a printer, you will also need:

- Pens, markers, and/or any other coloring tools
- Pencil
- Eraser
- Paper



STEPS

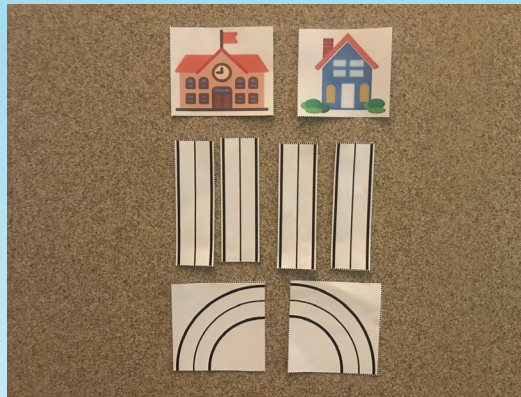
Part 1: Prepare

1. Print out the sheets at the end of this activity labeled in the top left corner with “Cut-Outs”
 - **OR** you can draw the road segments, intersections, and buildings on your own sheets of paper and cut them out
2. Cut out the templates on the dashed lines

3. Make sure that you have the following from the cutouts:
 - 12 straightaway road segments
 - 6 curved road segments
 - 3 three-way intersections
 - 4 houses
 - 1 school
4. Set these cutouts aside
5. Think of a fun name for your town, but avoid using the name of the town you live in! You'll be writing this name on a few activity sheets.

Part 2: A Route to School

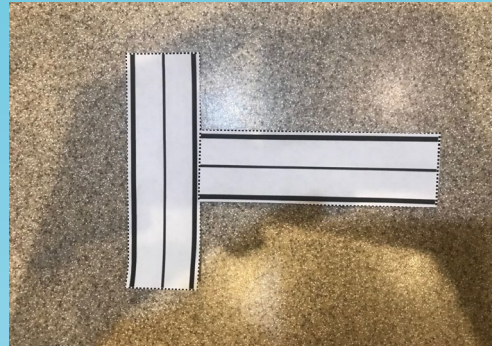
1. Gather the following (you will be using all of these road segments):
 - 4 straightaway road pieces
 - 2 curved road pieces
 - 1 school
 - 1 house



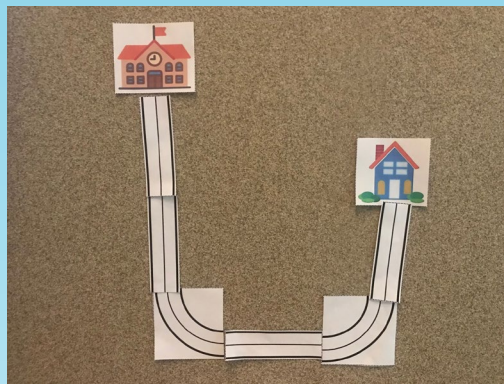
2. Place the house piece and school piece down on a flat surface. Be sure to keep the house within 1 foot of the school. Below is one example layout:



3. Using all of your road segments, build a roadway that connects your house and school pieces. How to connect the road segments:



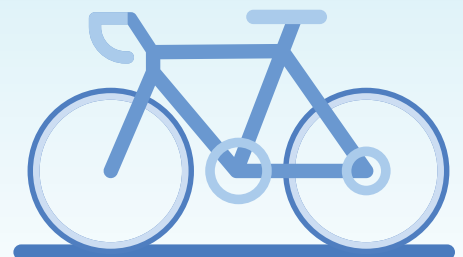
Here's one example of a road layout (try to create a different layout!):



4. Snap a photo of your layout (optional).
5. Be sure not to move your pieces. You'll need them for the next part of the activity!

Thinking Questions:

- Could you have built your road segment with less pieces than you were given?
- How would your road look if you were only given one curved road piece?
- What happens if more people and houses come to the neighborhood? (We'll be exploring this question in the next part of the activity!)



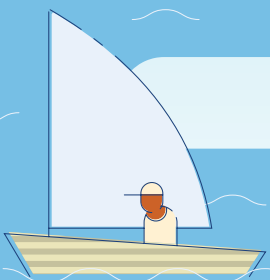
Part 3: More People Move In

Your town is getting popular! Three more families want to move to your town and send their kids to the local school. You'll need to update the road infrastructure plans so that these families can access the school.

1. Remember, keep all your road pieces and buildings from the last part in the same place!
2. Gather the following (you do not have to use all of the road segments):
 - 3 more houses
 - 8 more straightaway road segments
 - 3 more curved road segments

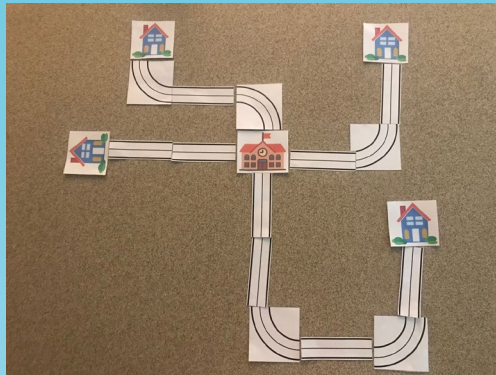


3. Place the new houses around the school. You can place them however you would like, but make sure to keep them within 1-2 feet of the school! Below is one example of a layout:



4. Using as many of your new road segments as you need, connect every house to the school. There should be only one path from each house to the school.

Here's one example of a road layout (try to create a different layout!):



5. Snap a photo of your layout (optional)
6. **If you don't have a printout, draw your layout on the next page. Feel free to be creative and use any colors you'd like! (Tip: You may want to draw your town in pencil first to make sure you can fit all of your pieces on the grid!)
7. Be sure not to move your pieces yet. You'll need them for the next part of the activity!

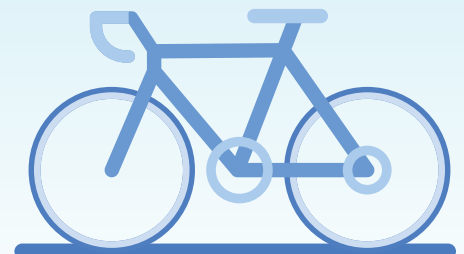
Thinking Questions:

- How many roads can connect to the school?
- Do you think having multiple roads will be efficient?

Part 4: Connectivity

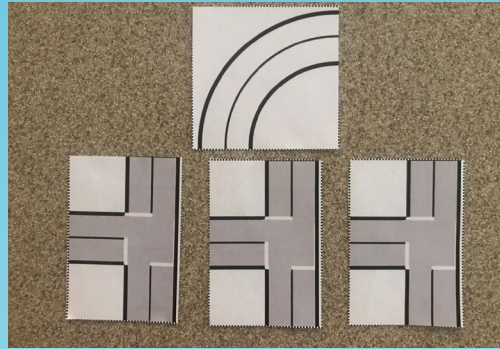
The people of your town have concerns that they won't be able to travel where they want to as easily in the current road infrastructure. The school also wants less roads connecting to them so that they will be able to control traffic more easily. To help connect the roads, you'll be adding in a few intersections to your town plans.

1. For this activity, you can shift your houses, but only by a few inches! Keep the school in the same place.



2. Gather the following (you do not have to use all of the road segments):

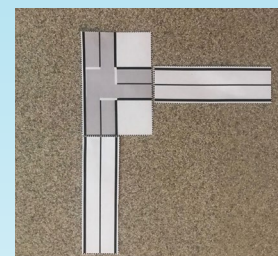
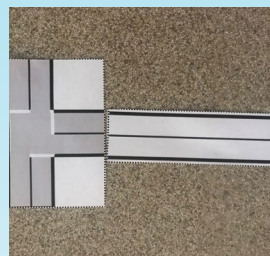
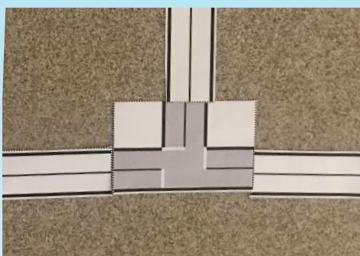
- 1 more curved road segment
- 3 three-way intersections



3. Connect at least two of the house's paths to school to each other with these new road segments and intersections. Do this by replacing any straightaway segments with curved road segments, getting rid of some road segments, moving around road segments, or make any other changes to road features that you need.

Note:

- The **ONLY** way you can connect roads is with the given intersections, and all three sides of the intersections must be connected with a road or building (see below)



Here's one example of a road layout (try to create a different!):



4. Snap a photo of your layout (optional).
5. **If you don't have a printer, draw your layout on the next page. Feel free to be creative and use any colors you'd like! (Tip: You may want to draw your town in pencil first to make sure you can fit all of your pieces on the grid.)

Thinking Questions:

- What other types of intersections are there that you've seen?
- If you could, would you have used any of these intersections in this part of the activity? Why or why not?

OTHER LINKS AND VIDEOS

- Street Plan Game: A game where you can create your own roadway designs.
<https://streetplan.net/MyState/MyOrg/MyProj/51934>
 - Click "Close Control Center" to get to the main window screen.
 - Video Tutorial:
https://www.youtube.com/watch?v=Uy3G0DphLMc&feature=emb_title
 - More How-To Videos:
<https://streetplan.net/HowToVideos>
- What Does a Transportation Engineer Do?
<https://www.sciencebuddies.org/science-engineering-careers/engineering/transportation-engineer#whatdotheydo>
- What Does a Transportation Engineer Do Video
<https://www.youtube.com/watch?v=ksTY7JeT78w>
- Video from a Female Transportation Engineer
https://www.youtube.com/watch?v=scqBHHO_4mA
- Crash Course Video on Transportation Engineering
<https://www.youtube.com/watch?v=erYf6NNw8Ec>



CAL POLY ENGINEER SPOTLIGHTS



KATHERINE

Transportation engineering connects us to our favorite places like restaurants, playgrounds, amusement parks, grandma's house, and so much more! You see cars on the roads, boats at the docks, planes ready for take-off at the airport, and trains on the tracks...transportation engineering takes part in making all of these happen! Transportation engineering is EVERYWHERE, and it's super unique. You see a road in your neighborhood and you may think "that is just a simple strip of pavement", BUT what a lot of people DON'T know is that there is a lot of engineering and planning to make your neighborhood streets safe for you! Transportation engineers are like street doctors, we fix roads, and we build new ones! We help build a safer community for everyone which is why I love transportation engineering so much! So, the next time you are on the roads, think of the uniqueness of transportation engineering!





MEGAN

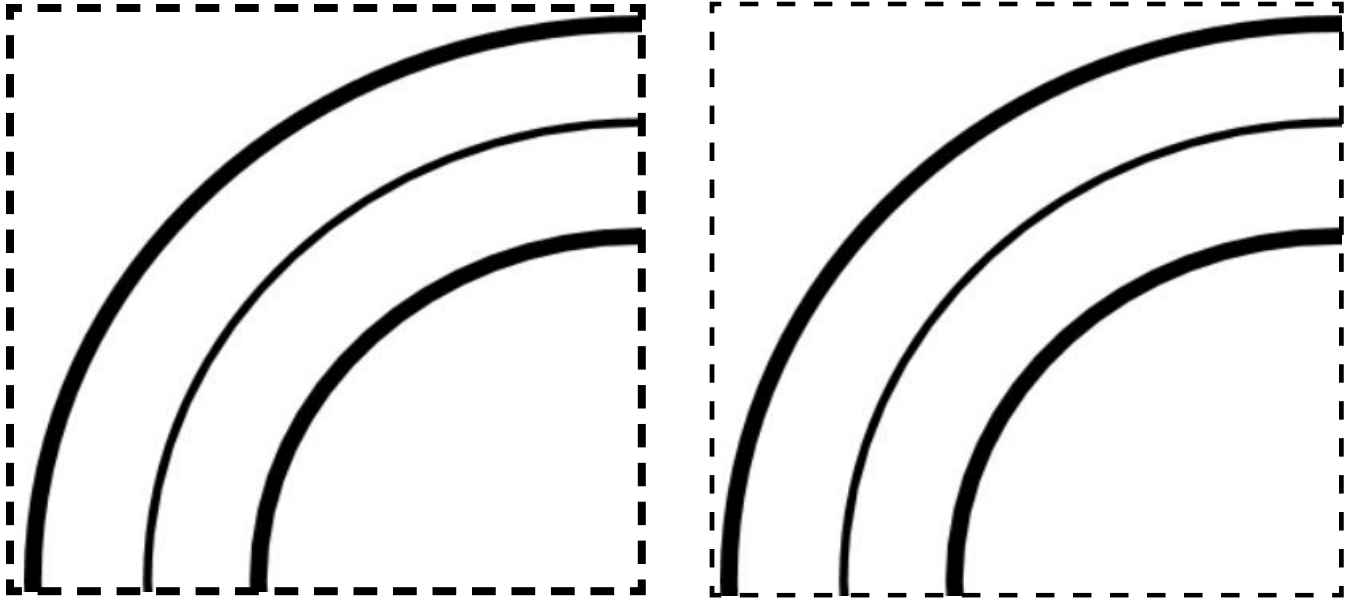
My name is Megan, and I am a Civil Engineering major, with a concentration in Transportation Engineering. Transportation engineers design and plan infrastructure projects related to all forms of transportation that you may use - from transit, walking, biking, driving, even e-scooters! What I love most about transportation engineering is that it is a very community-oriented profession, and it is always evolving. Engineers focus on designing safe, sustainable, and accessible transportation systems for their communities!

One area of focus I enjoy is designing complete streets, which are streets that are designed for all types of users (your school bus, walkers, bikers, etc.) of all ages and abilities, rather than just automobiles. During my previous internship I worked on a project with fellow interns to design a complete street for a city block. A few of our suggestions included narrowing the driving lanes to encourage cars to drive slower, widening the sidewalks and adding a bike lane! This is just one example of the variety of exciting projects you may work on as a transportation engineer!

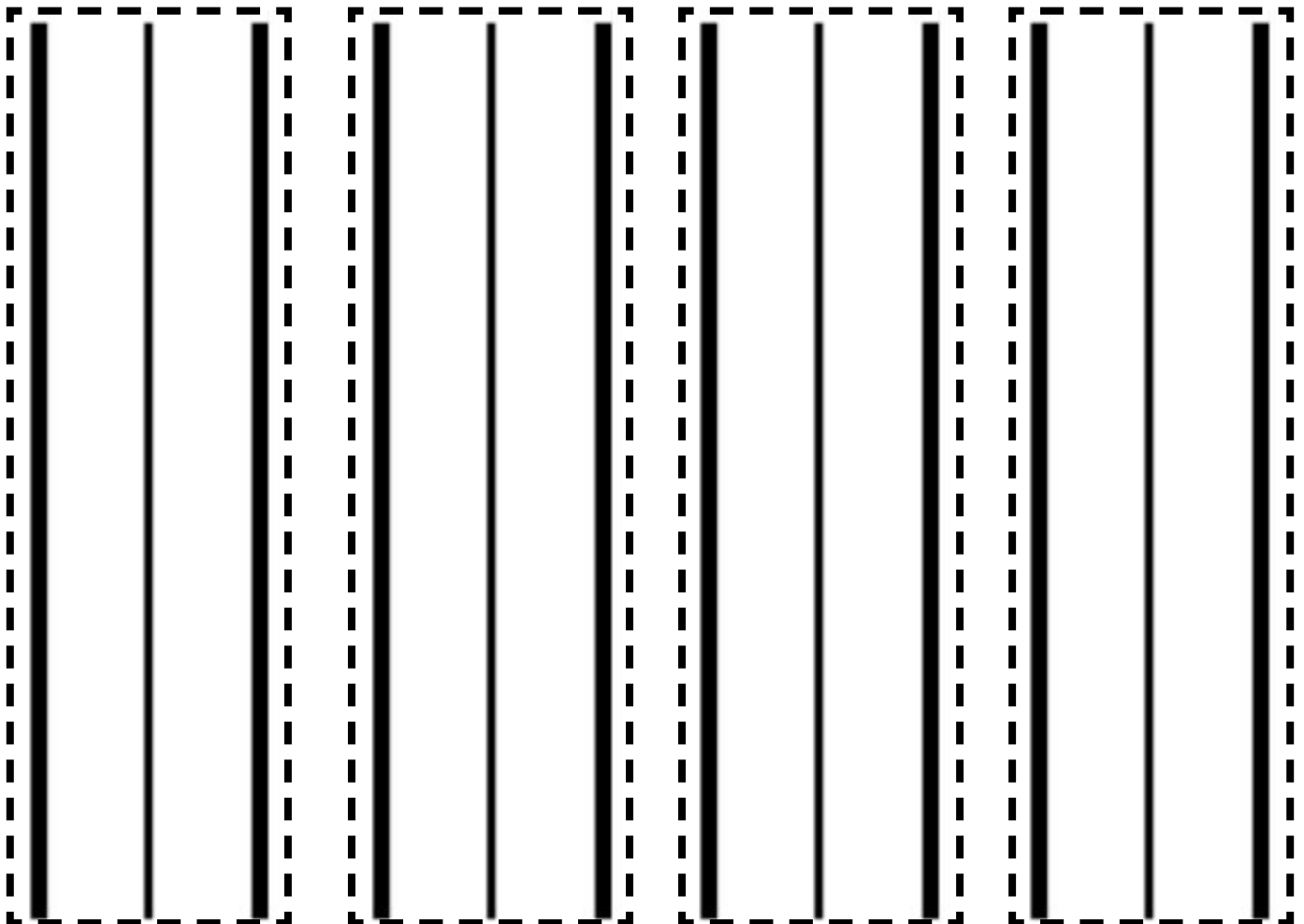


CUT-OUTS (PRINT 3 COPIES OF THIS SHEET)

Curved Road Segments

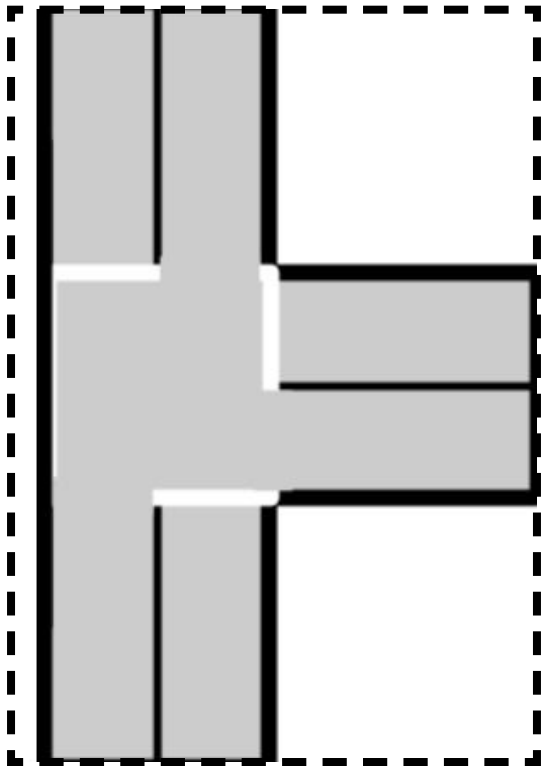
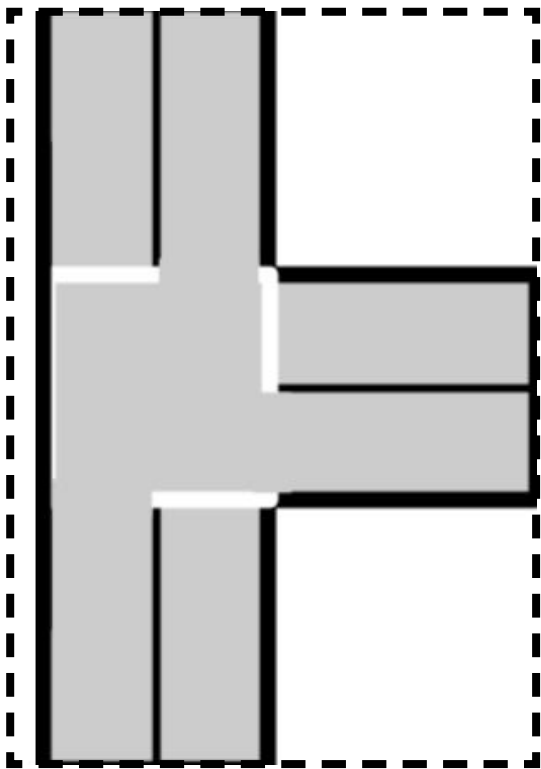
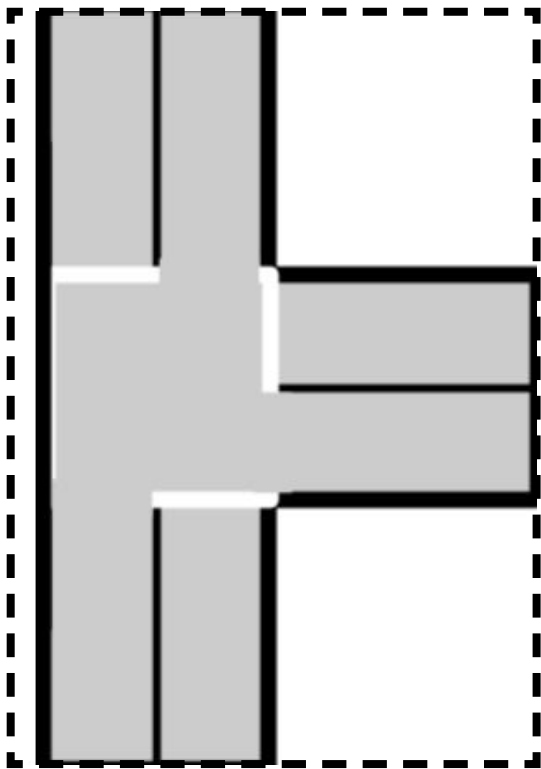


Straight Road Segments



CUT-OUTS

Intersections



CUT-OUTS

Buildings

