

IXD: Modelling & Materials / Project 2

# Space as data

DESN27425 / 17 November 2023 / Marina Au

The Keating Channel  
Pub & Grill

Villiers St  
at Cherry St

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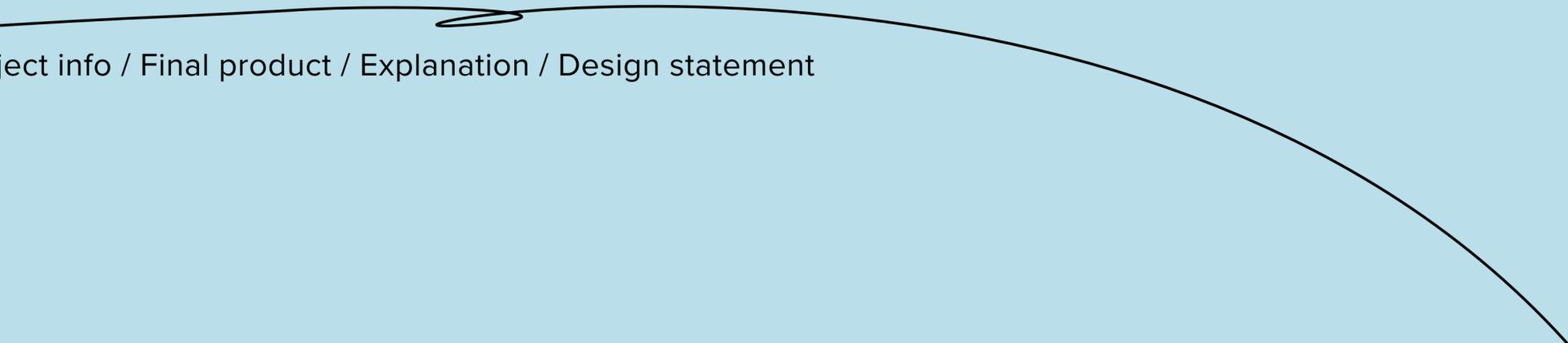
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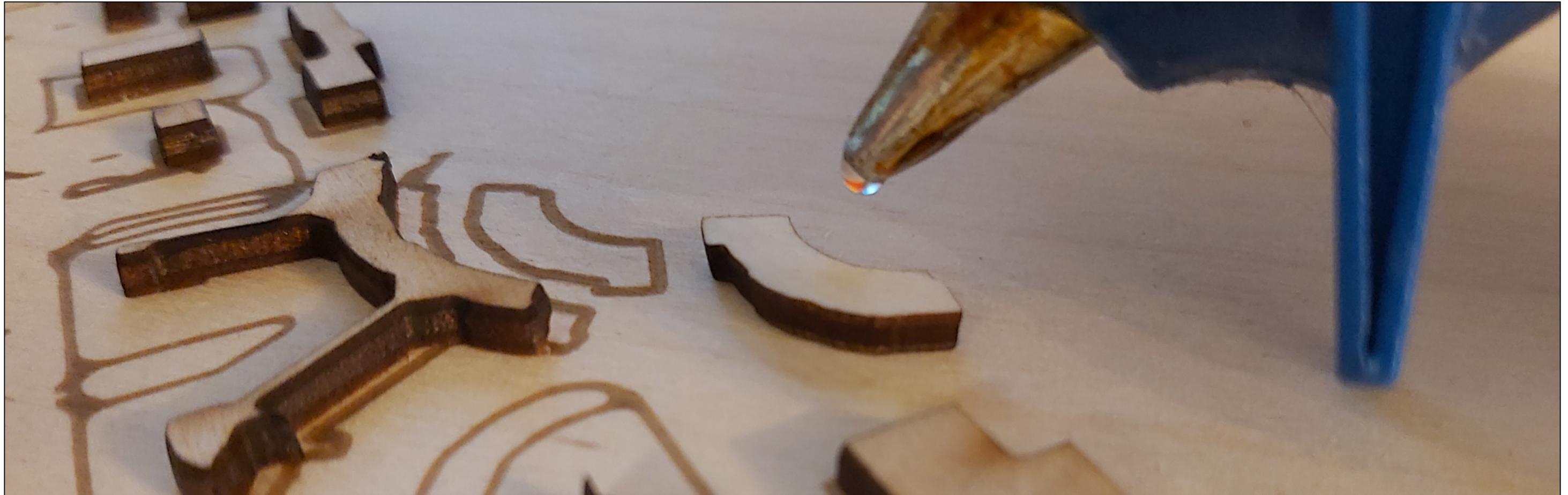
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# Introduction



Project info / Final product / Explanation / Design statement



Introduction /

## Project info

In this project, students were tasked in using one of three mediums to show geographical data. Weekly formstorming activities and spacial workshops were completed.

For this project, I decided to focus on deviate from locations that were significant and important to me, and instead focus on locations that were **'to others'**.

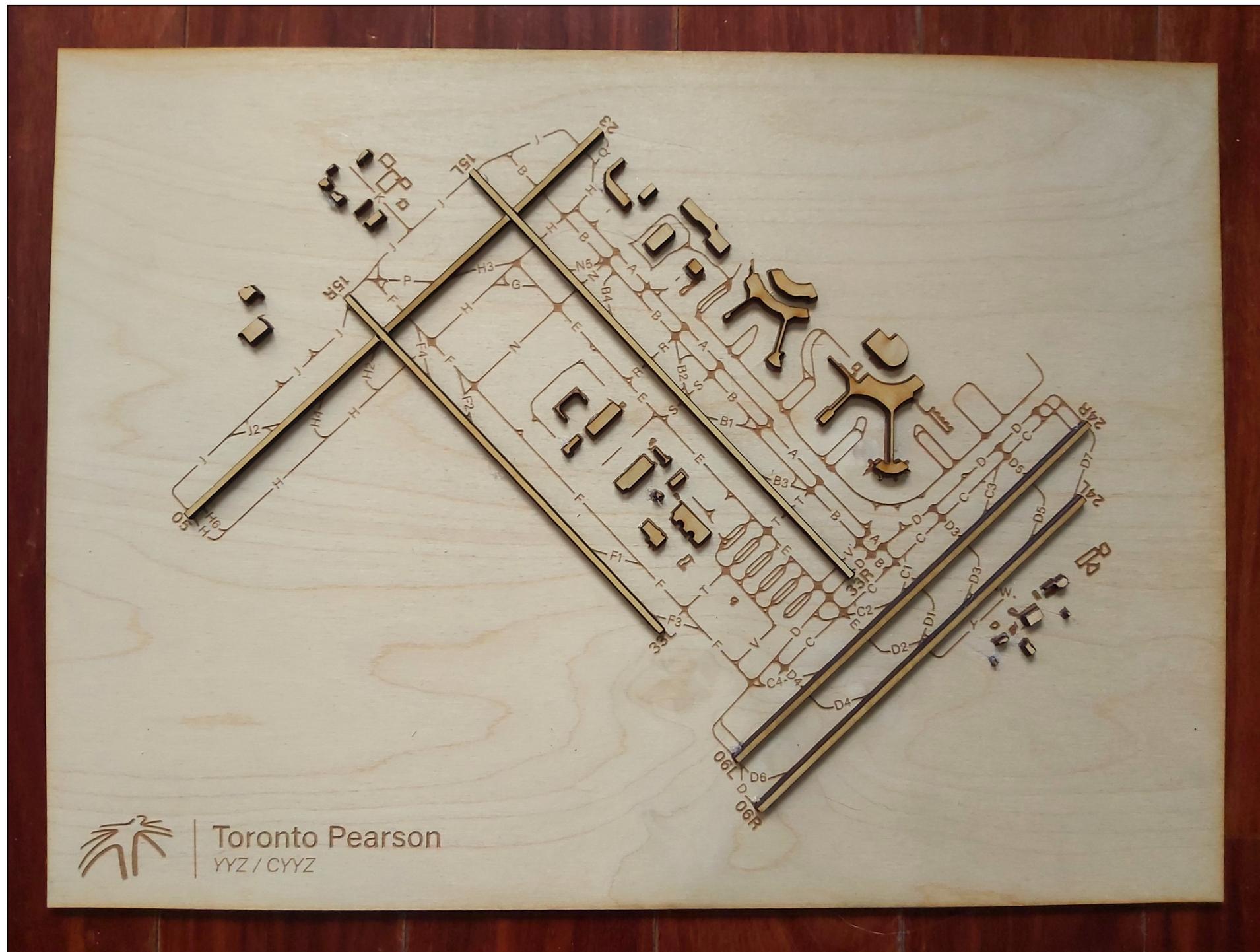
Introduction /

# Final product

This is an image of the final laser cutting piece I created for this project.

This is a laser cut print of [Toronto Pearson International Airport](#)'s runways, buildings and taxiways. It features the labels of each runway, as well as the taxiways and high speed exits.

I decided to choose this location for my project because I wanted to visualize one of the many 'unseen' spaces around the world that are filled with meaning and context, and heavily influence the structure of human society. Many people visit or even live in spaces without truly understanding the significance of the geographical data behind it, and that is the idea I wanted to convey in this project.



# Explanation

## Runways

CUT

- Long road strips where aircraft land and take off
- Labelled accordingly
- Runways are numbered according to their heading relative to the north magnetic pole, while removing the number in the ones place (ex. 50° = Runway 05, 330° = Runway 33)

## Title

ENGRAVE

- Left: Toronto Pearson International Airport's logo
- Right: condensed name of the airport
- Bottom: IATA / ICAO code



## Buildings

CUT

- Relevant buildings around the airport (ie. airport terminals, shipping centres, police/fire stations)

## Taxiways

ENGRAVE

- Roads that connect aircraft to and from the runways and terminals
- Labelled accordingly
- Taxiways are labelled with 1 letter, high speed exits (angled taxiways that allow aircraft to exit runways quicker) are labelled with a letter and a number

# Design statement

Throughout their lives, many people live without having known or seen or visited a place before. Similarly, many people may see and even enter certain areas and still lack the knowledge of how that space is used as a whole.

This laser cut map of Toronto Pearson International Airport helps others understand and appreciate one of the many 'unseen' geographical parts of the world that play a critical role in human society: airports. Today, aviation has become a normal aspect of life, deeply interwoven in the structure of human societies and its economies.

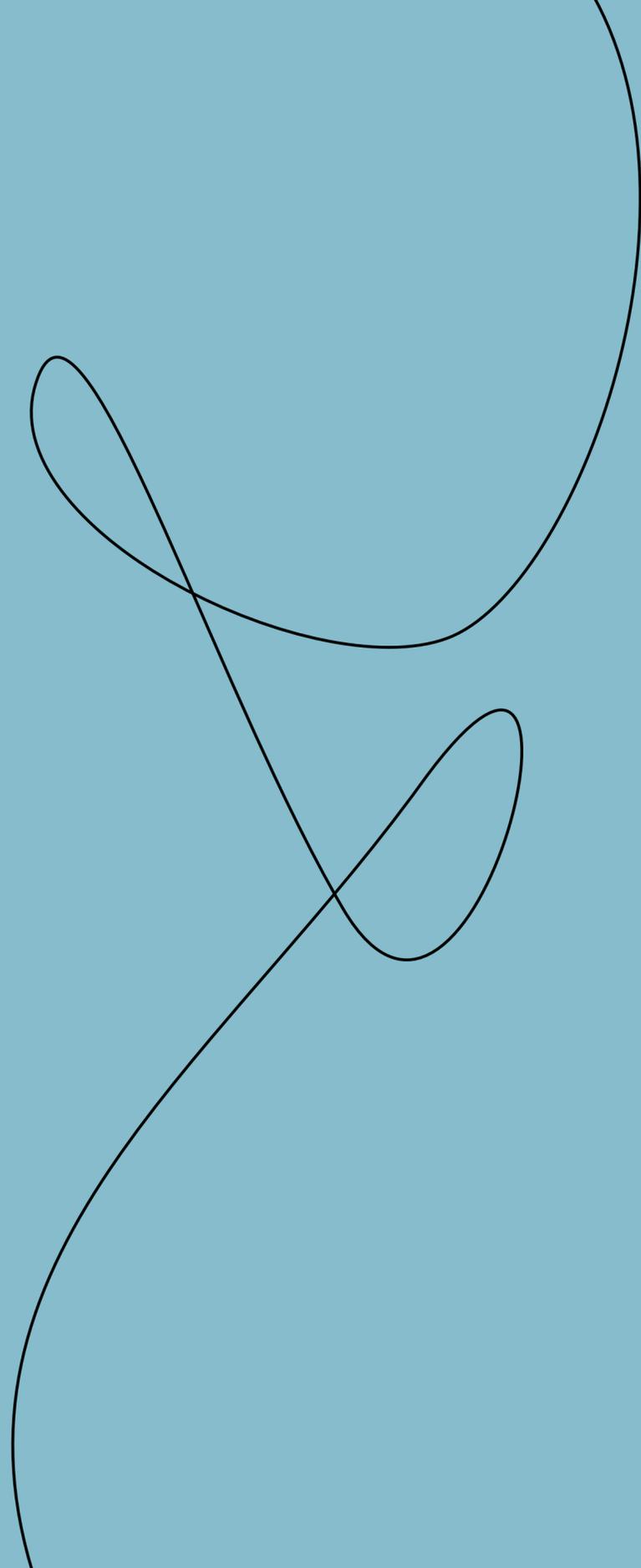
Using cuts and engravings, the piece creates hierarchy within itself and emphasizes certain types of geographical data over others to create a compelling, meaningful physical map.

This laser map shows how humans create meaning and structures to the places they create using geographical locations and layouts. This piece also aims to highlight how association ties us to certain kinds of information, proving how the environments that we live in and learn to know not only impacts our life, but also greatly shape us as individuals.



# Process

Research / Exploring / Laser cutting



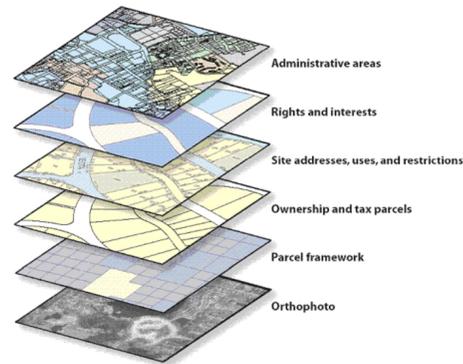
## Maps as Narrative

- Maps build worlds and transform fictions



## Maps as Data

- Map data can have layers of information



## Maps as Politics

- Maps can change how we understand time



## Laser-cutting

- Engraving



## Spatial AR Experience



Process / Research /

# Lectures

One of the main sources that helped inform and influence the success of this project were the **lectures** that were given throughout the course of this project.

**Week 7's** lecture provided a deeper introduction into each of the 3 mediums available for me to choose for this project (laser cutting, bi-variate data maps, and geospatial AR).

**Week 9's** lecture talked about different types of maps and how maps shape us and the world, and can be used to convey many different types of information.

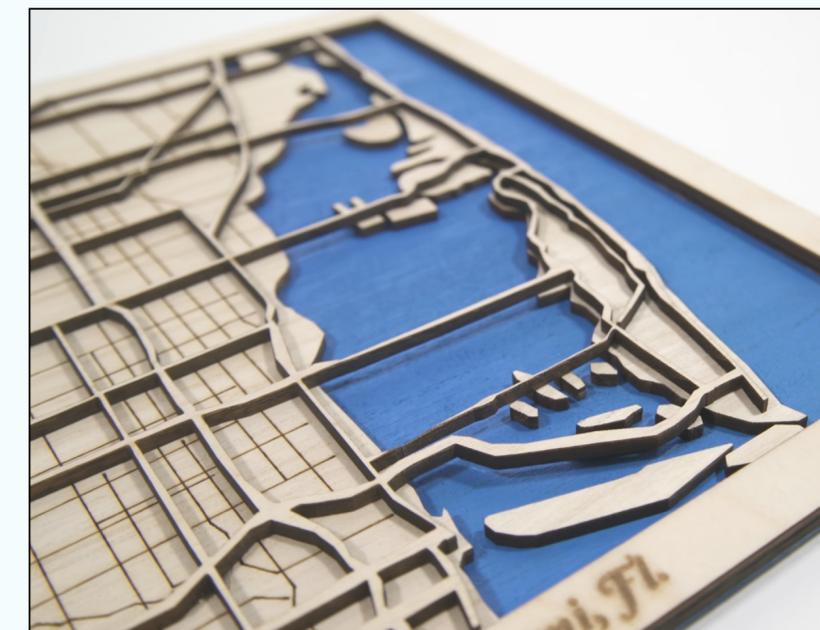
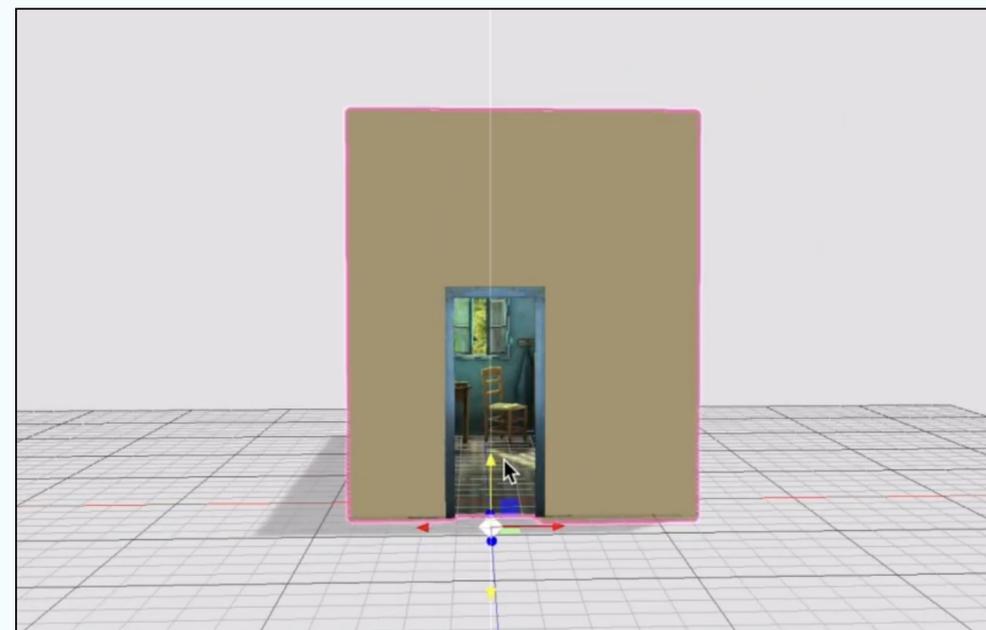


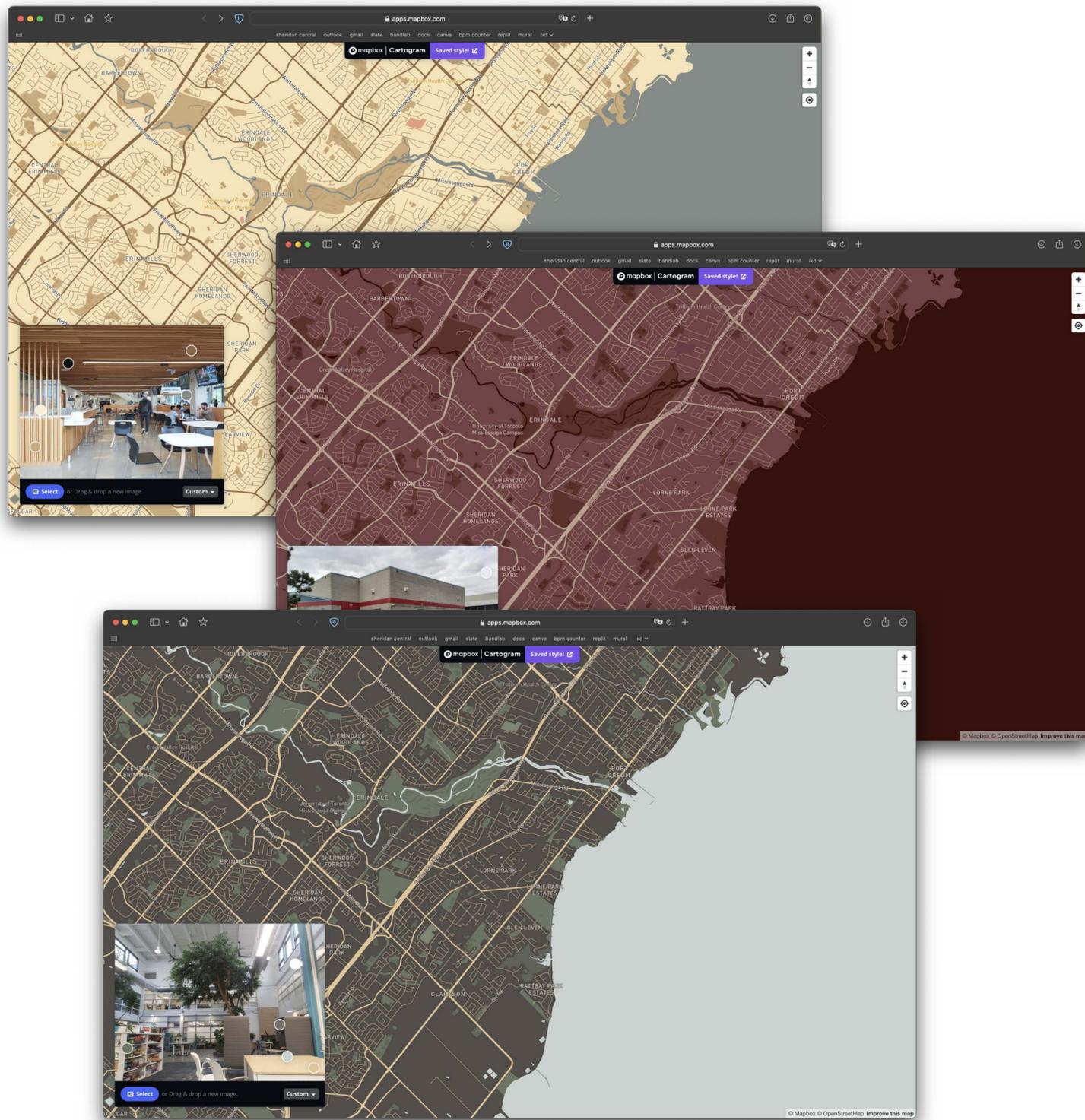
Process / Research / Internet

# Laser cut & AR

Finally, before beginning the exploration phase of this project, I searched for examples of the different mediums online.

I viewed examples of [AR portals](#), as well as [laser cut maps](#) of various locations around the world. Through this research, I learned how to create AR portals, and also how laser cut maps can be formatted as gifts to other people. In the image on the top right, a special area on a map of Vancouver, BC,

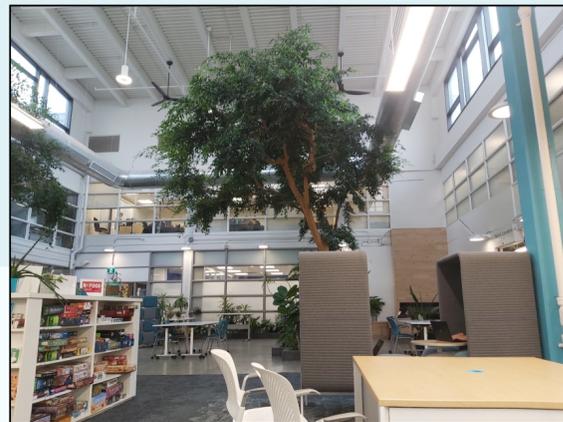




Process / Research /

# Mapbox Cartogram

These are some images of the Mapbox Cartogram exploration I did, while completing Formstorming Activity #1. I explored multiple **monochromatic** colour palettes, and tried using light and dark colours together to create **high contrast** maps, such as the one on the bottom left.

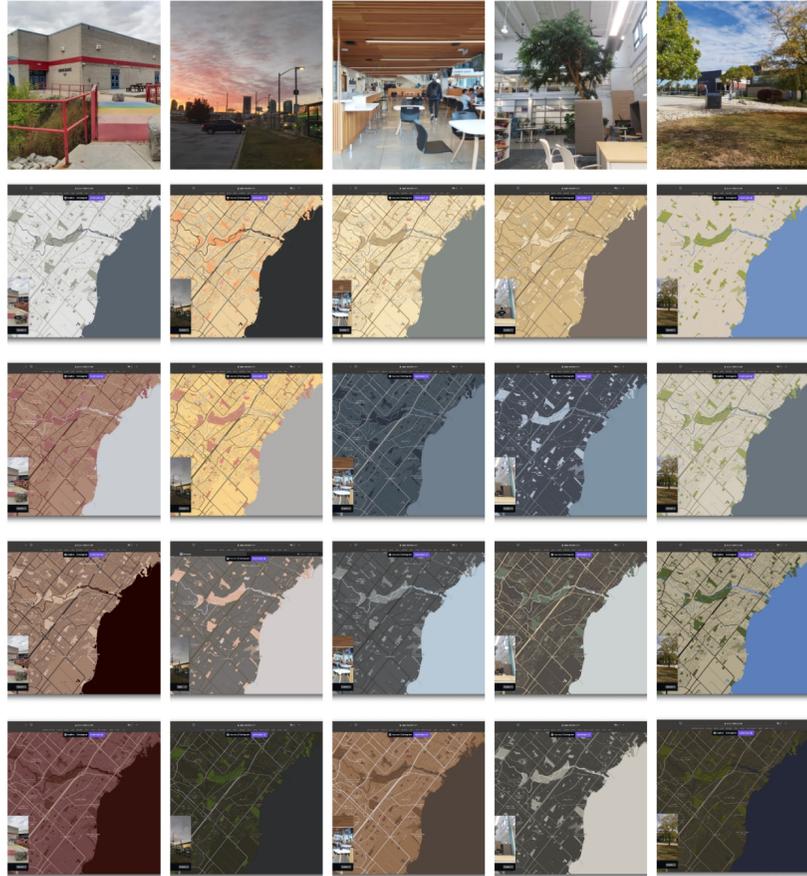


Process / Research /

# Spatial workshop #1

These are the images I gathered for Spatial Workshop #1.

These are images of certain areas of Sheridan's campuses (Mississauga and Oakville).



Process / Research /

# Formstorming #1

This is a collage of the images I gathered for Formstorming Activity #1.

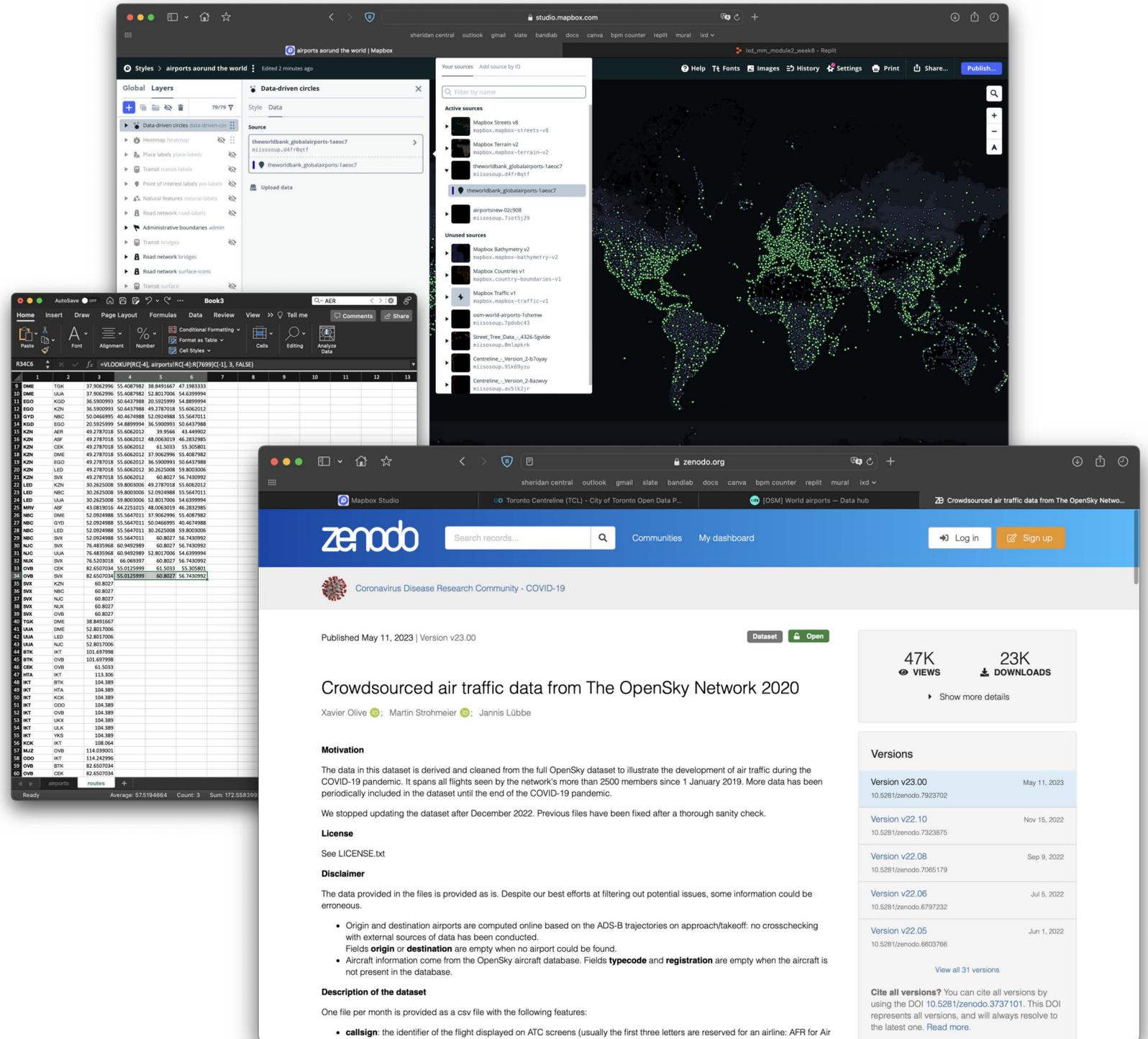
Here, I used the images from the first Spatial Workshop activity, as well as a few of my own, to create various map colour palettes in Mapbox Cartogram.

Process / Exploring / Bivariate data map /

# Global flight paths

After the first Formstorming and Spatial Workshop activity, I began exploring the different mediums to decide on one direction for the final deliverable.

One of the first ideas I had for this project was to create a bivariate data map of **global air traffic**, which would display the most frequently travelled flight routes through the opacity of the flight lines. However, one of the biggest problems I encountered with this idea was that not only was it difficult to find a geoJSON dataset of all the flights from a certain year: it was also **too much data** to work with, and I didn't know how to translate the origin-destination points to curved flight path lines for Mapbox.

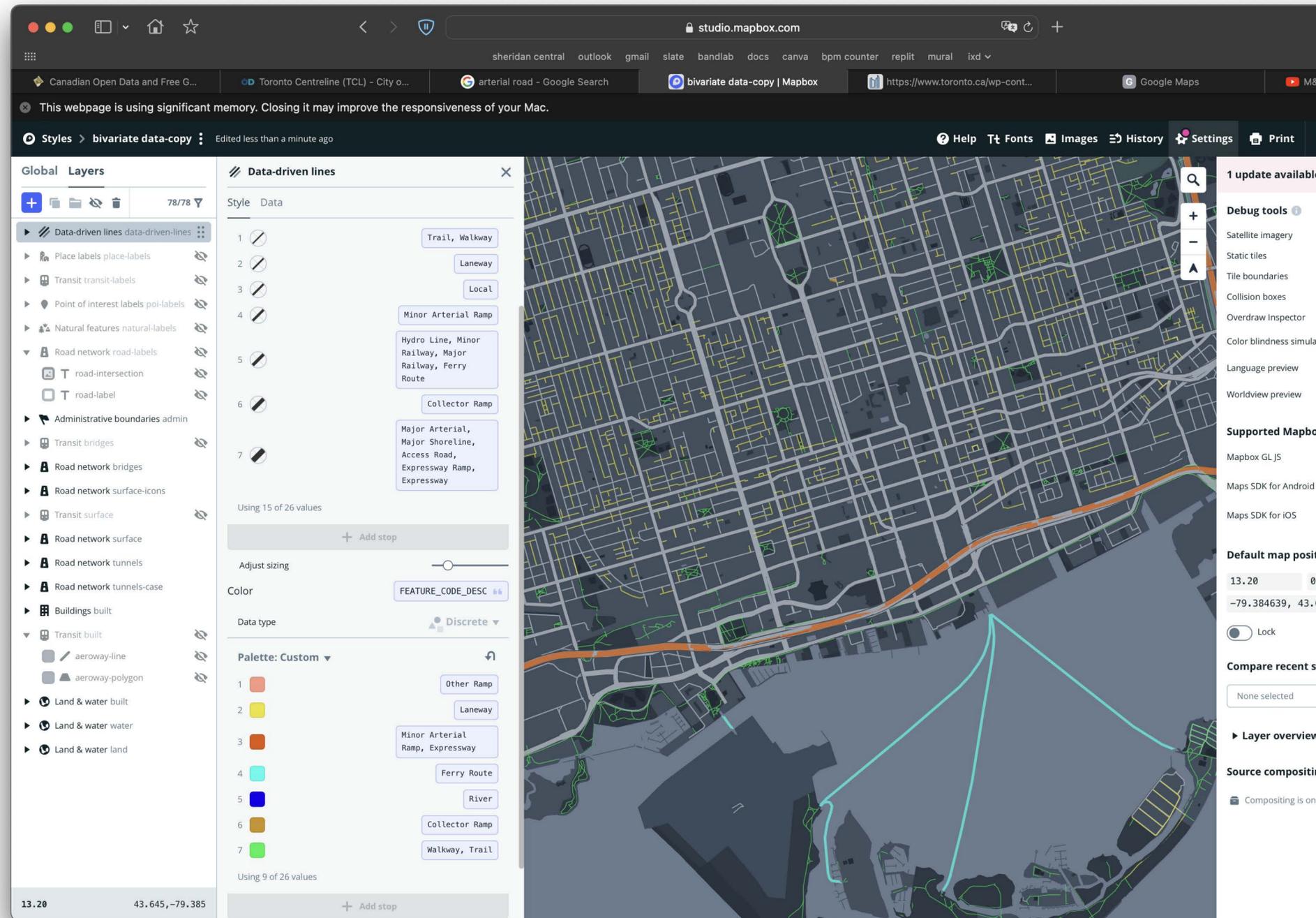


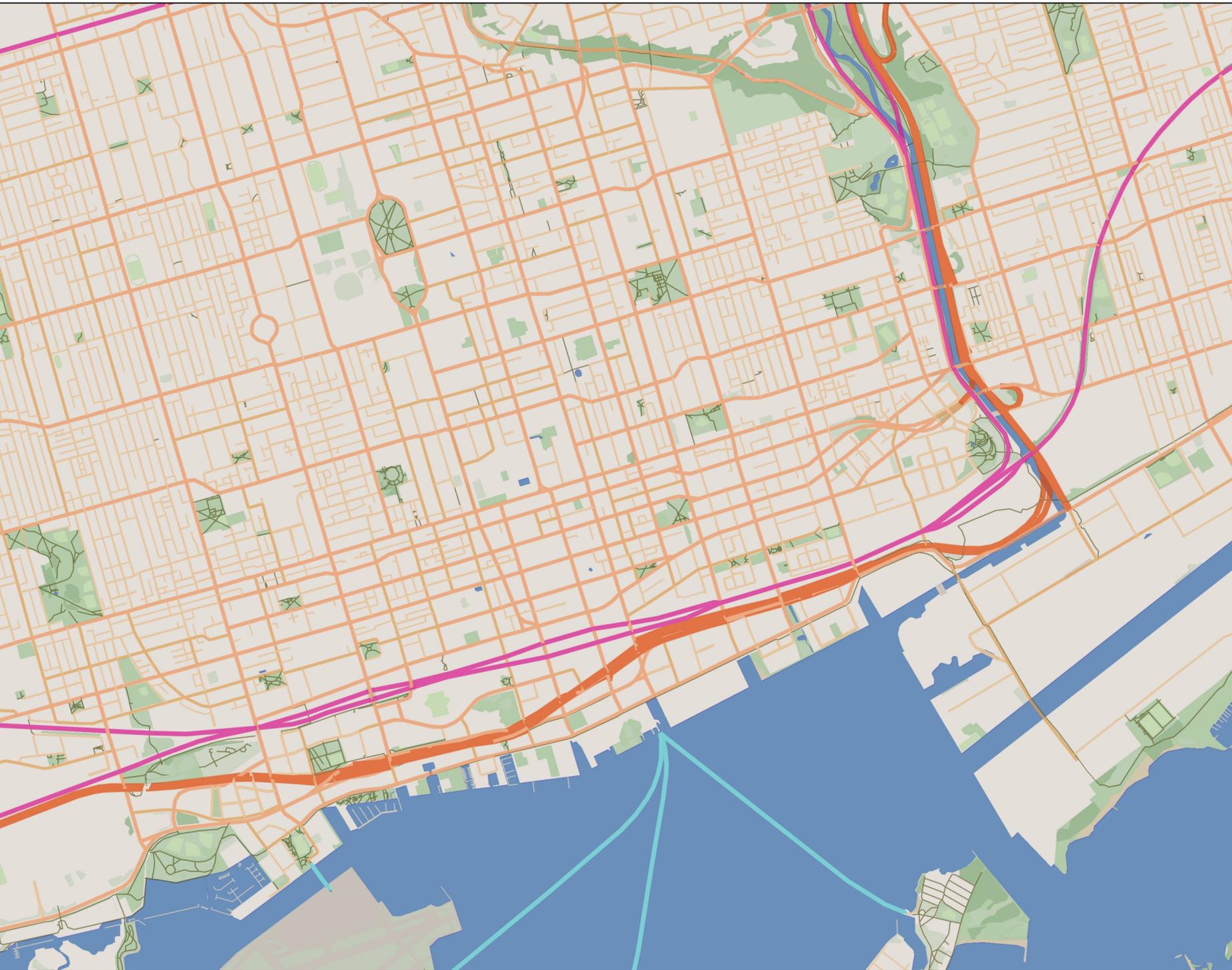
Process / Exploring / Bivariate data map /

# Toronto Centerline

The next dataset I used to test bivariate data maps was that of [Toronto's roads](#) and [pathways](#). This dataset was retrieved from the city of Toronto's open data portal.

After importing this dataset into Mapbox, I colour coded the data by type of pathway/road, as well as the significance of the road. Highways, as well as train and ferry routes were presented using the **thickest** lines, while local roads and pedestrian trails used the **thinnest** lines.





[Process](#) / [Exploring](#) / [Bivariate data map](#) /

# Toronto Centerline

This is an image of the final map I created using the Toronto Centerline (TCL) dataset.

Because this dataset doesn't display any dynamic, changing data, I continued looking for more datasets online.

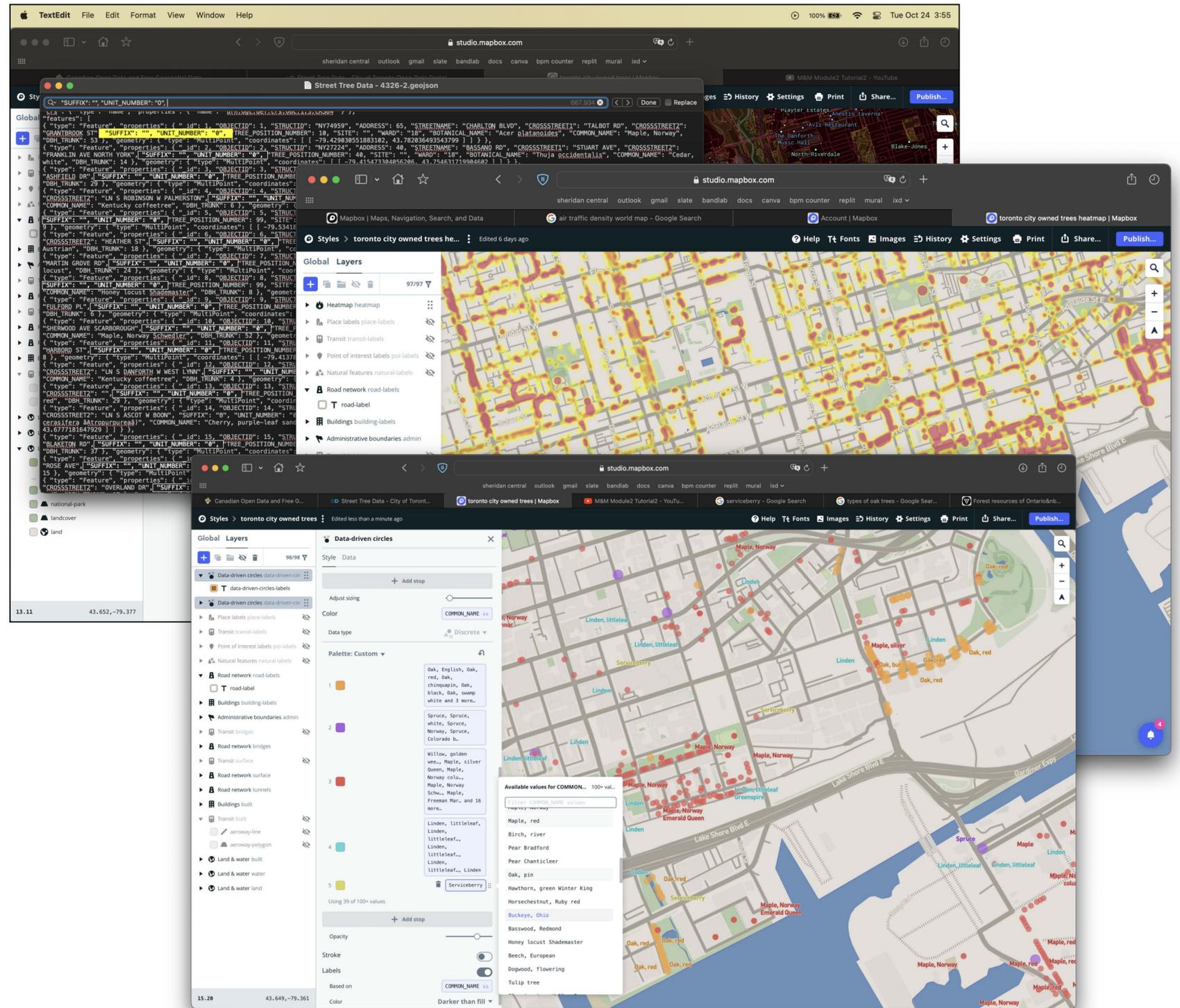
Process / Exploring / Bivariate data map /

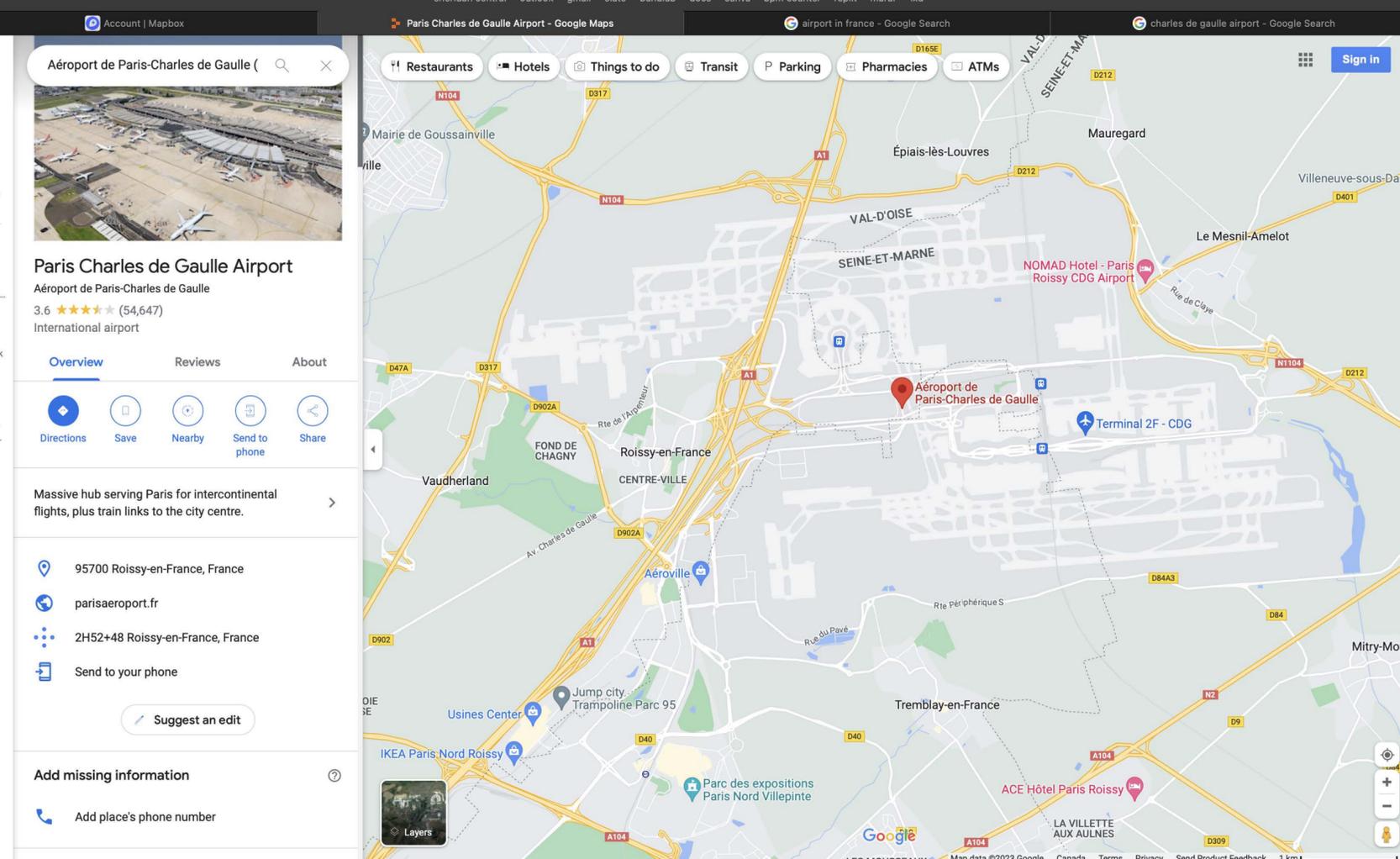
# City-owned trees

To explore more bivariate data mapping, I continued looking for more datasets using Toronto's open data portal.

Another dataset I tried using was a dataset of all the [city-owned trees](#) in Toronto. This dataset was abundant, as there were many city-owned trees around Toronto, and it also included the type of trees they were (ex. Japanese maple, white spruce, silver birch, etc.).

However, an issue that I ran into with this type of data was that Mapbox [limits](#) the [data sorting](#) to 7 colours/line widths, and there were more than 100 types of trees in my dataset. To try to counter this, I tried sorting my data by tree category (ex. birch, maple, etc.).





Process / Exploring / Laser cutting /

# Finding areas

I began exploring the laser cutting medium by creating a design for a **phone case stand** in Illustrator, as part of an in-class activity that was completed this project.

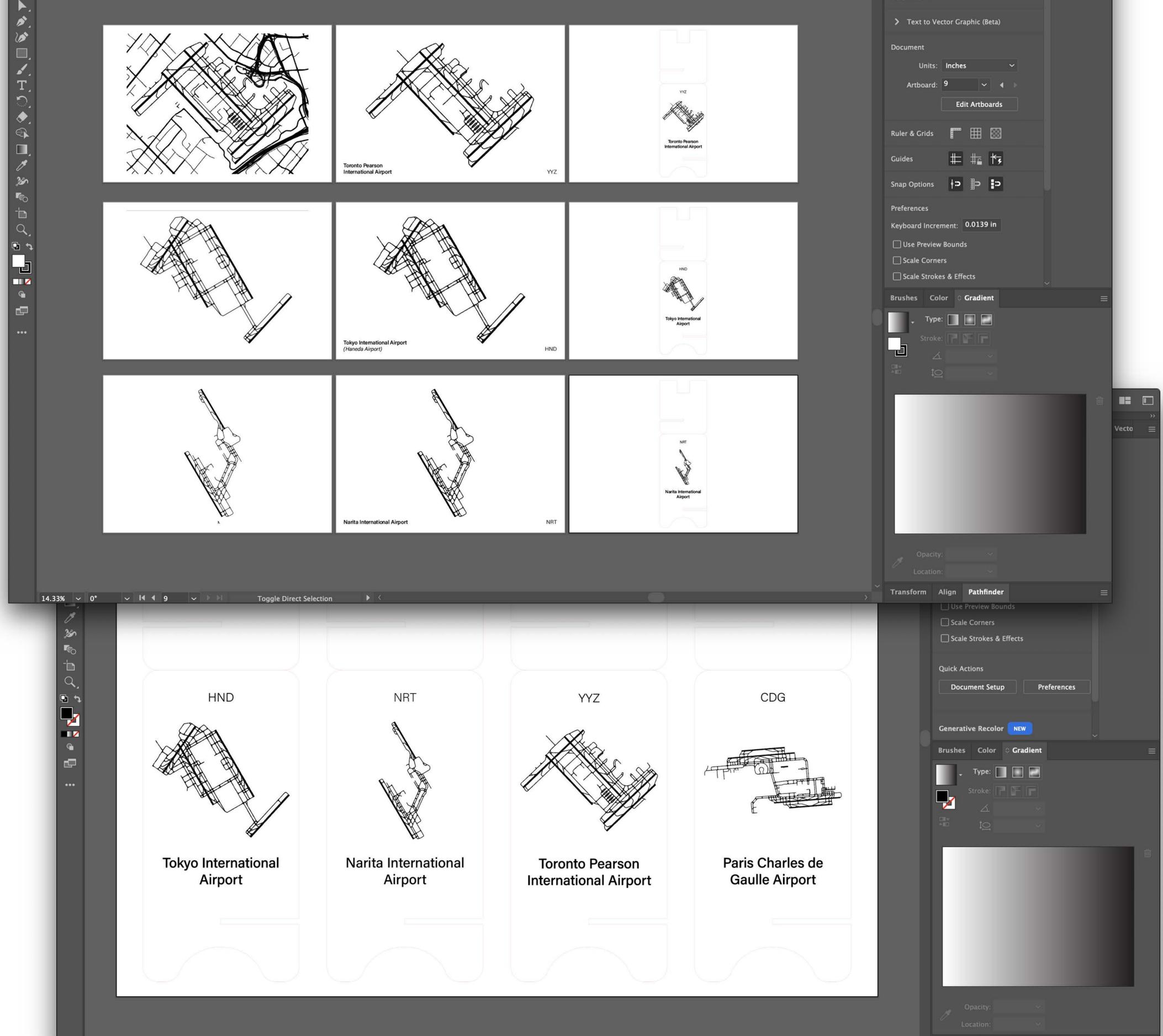
The design I decided to create was that of an outline of various airports around the world. I looked for interesting looking airports online using Google Maps.

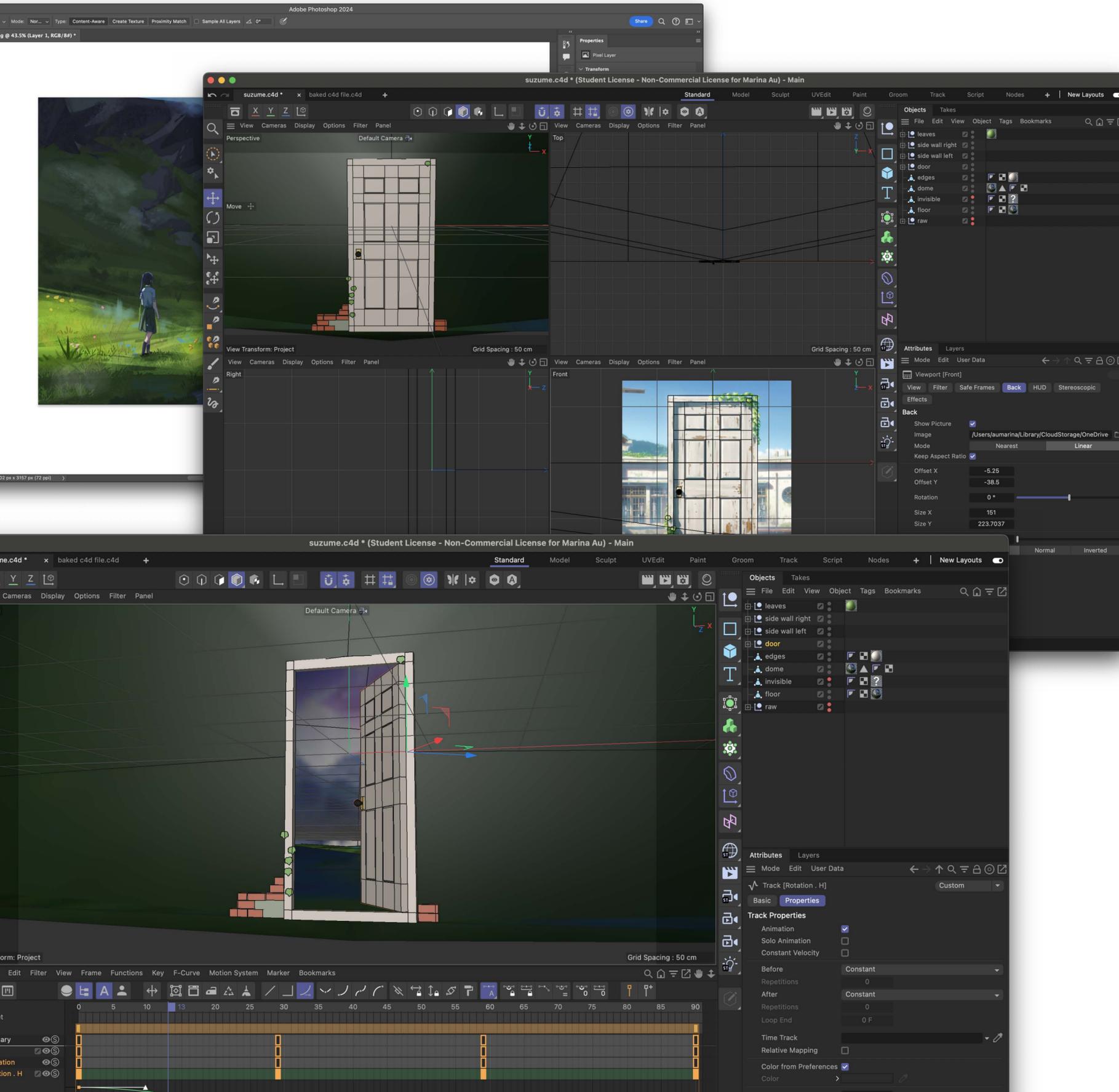


Process / Exploring / Laser cutting /

# Phone stand

After **exporting** the images of the airports as PNGs into Illustrator, I converted them to **vectors** and added them onto the phone stand layout, as well as the name of each airport.





Process / Exploring / Geospatial AR /

# Creating a portal

To explore a bit of spatial Augmented Reality, I created an AR experience of a scene from Suzume, a Japanese anime film. Using Cinema 4D, I created the door from the movie that, when animated, opens and reveals a **portal** to the Ever After, which is another dimension.

Although this is not geospatial AR, creating this helped me visualize what the process as well as the amount of time needed would look like if I continued with this medium. I also created this portal partly for fun, because I personally find AR portals rather fascinating, and wanted to create one on my own.

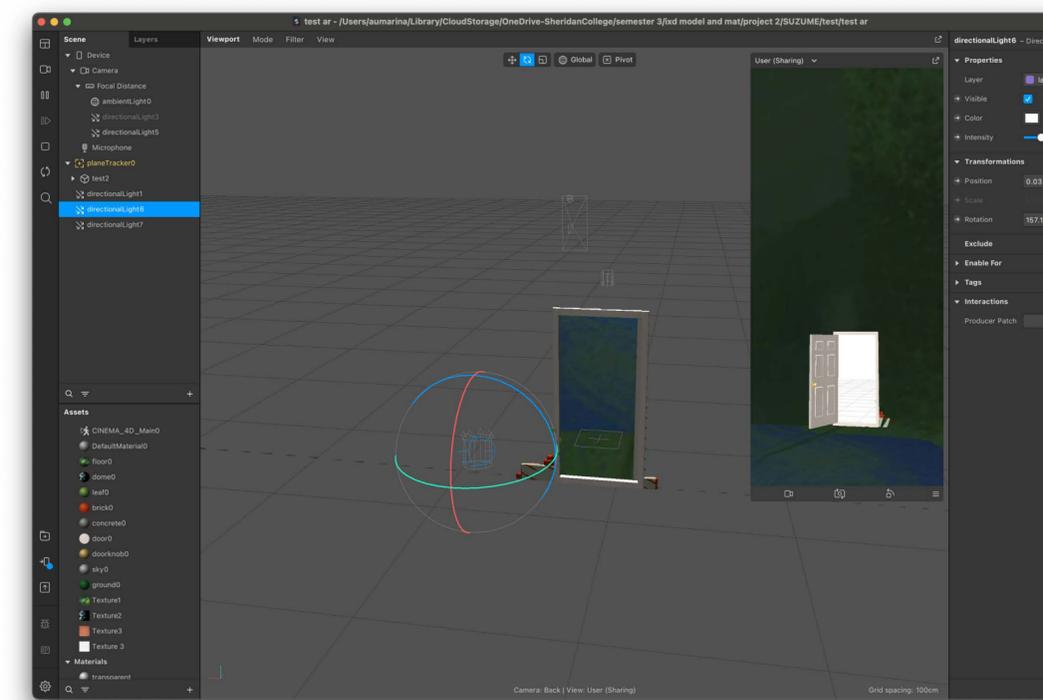
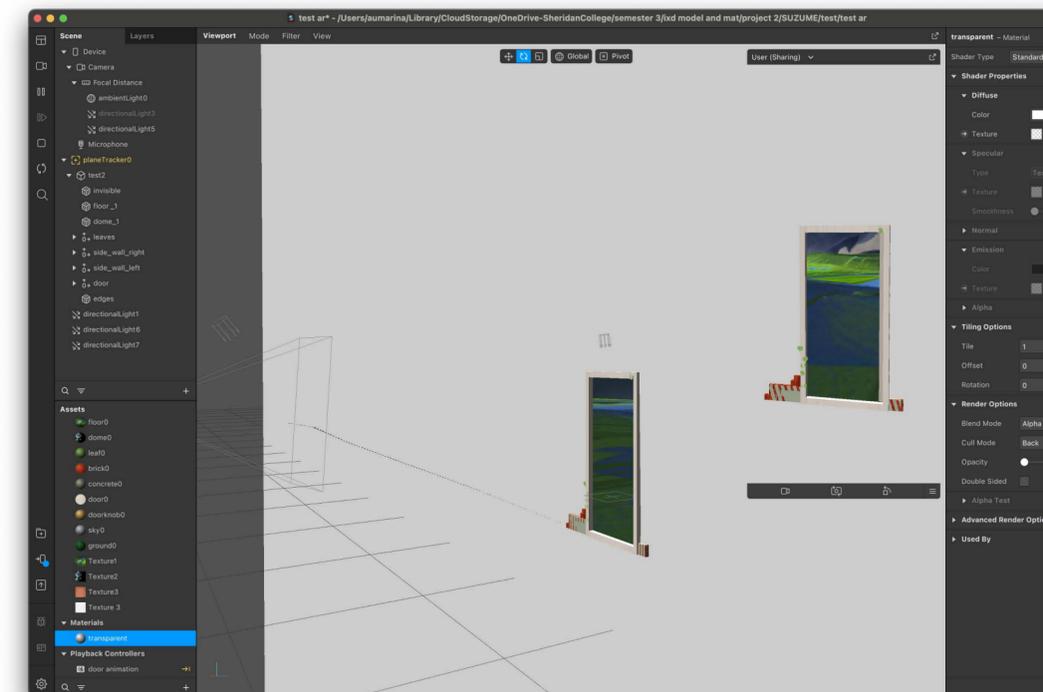
Process / Exploring /

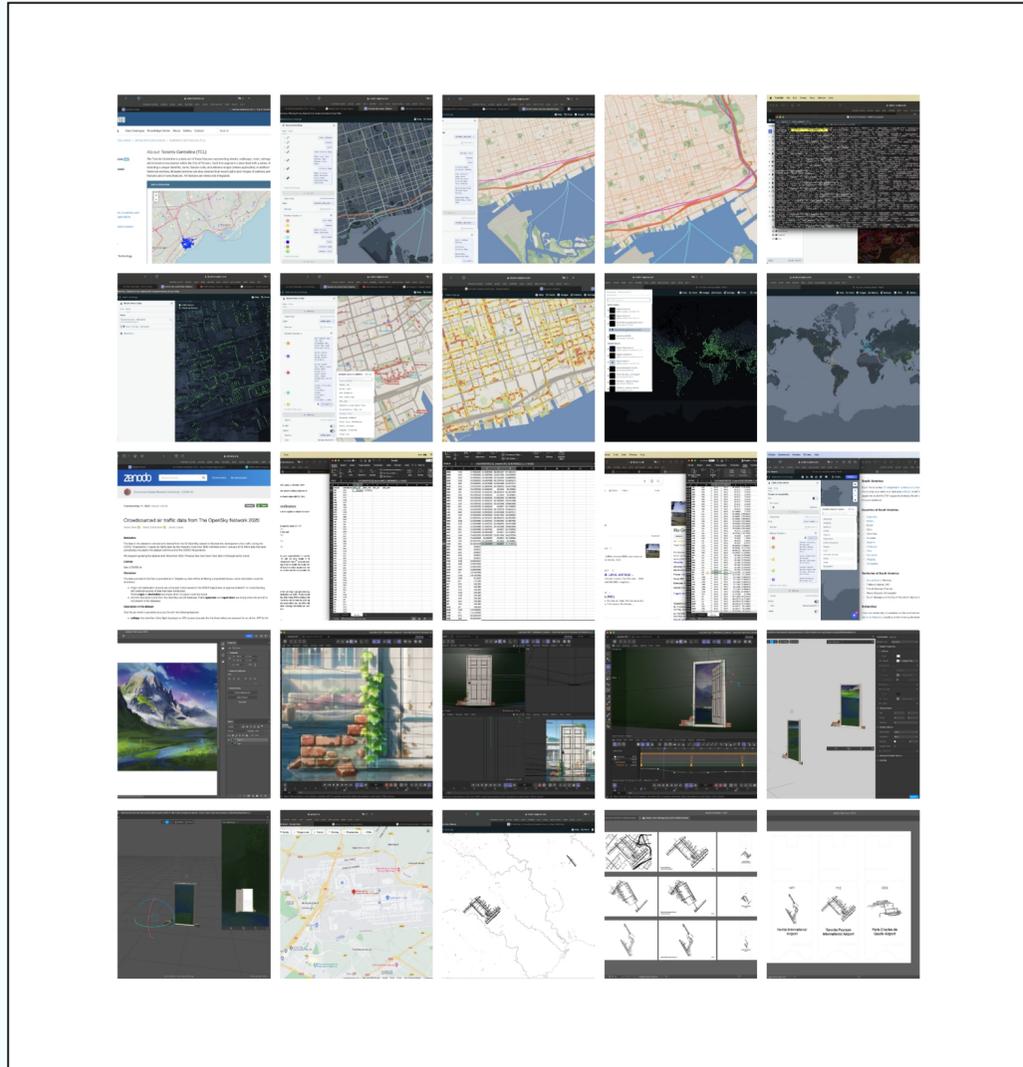
# Exporting and editing in Spark AR

After modelling the door and creating the animation in Cinema 4D, I exported the file as an .fbx to **Spark AR** to preview the effect. I changed the material of the plane that covers the portal world from the viewer's perspective to **transparent**, so that the user would be able to see their background space behind wherever the door is placed.

Here is a link to a video that showcases what the portal looks like:

[https://youtube.com/shorts/2yRTqA9D4AE?si=iBn\\_A-DCvDZgfFm5](https://youtube.com/shorts/2yRTqA9D4AE?si=iBn_A-DCvDZgfFm5)





Process / Exploring /

## Formstorming #2

This is a collage of the images I gathered for Formstorming Activity #2.

Here, I explored the different medium options available for this project.

### 3D spatial design workshop 2

- j-wing hallway
- coffee loft
  - plants
  - paintings
  - board games
  - beanbags
  - books? (library?!)
  - VINYL PLAYERSSS (music playing in background)
  - books

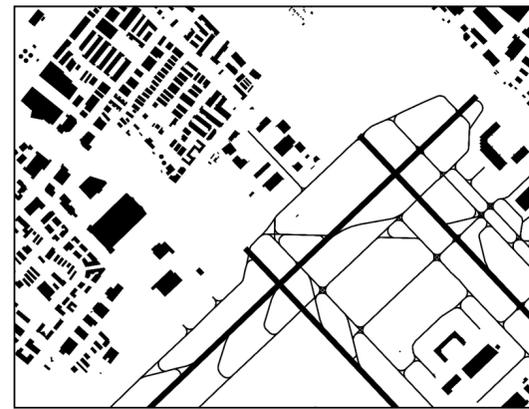
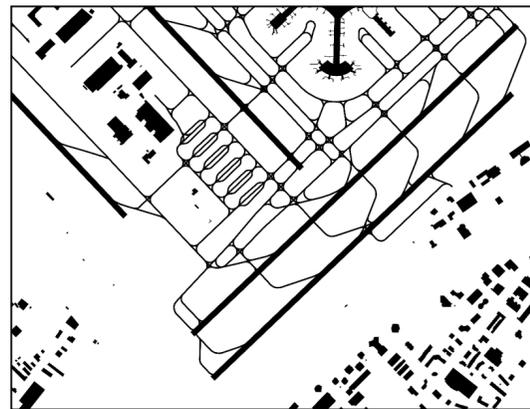
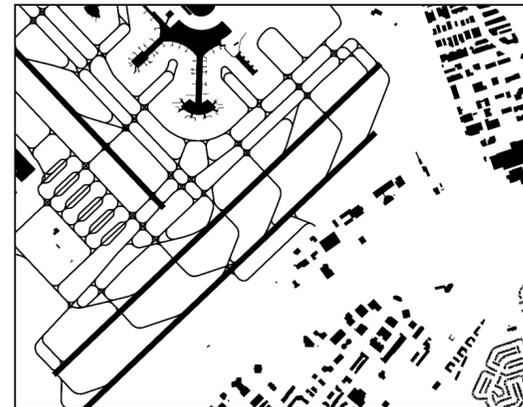
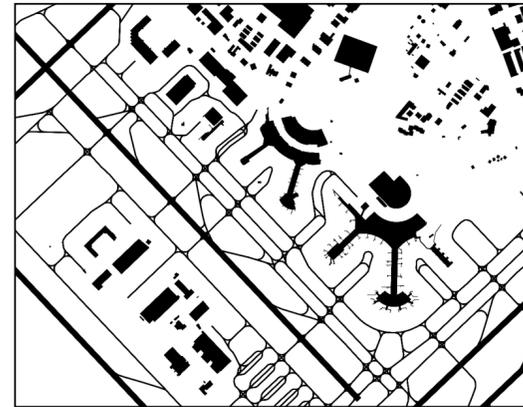


Process / Exploring /

## Spatial workshop #2

These are the images I gathered for Spatial Workshop #2.

For this workshop activity, my group chose the Coffee Loft, and decided to add plants as its new feature. After creating a rough sketch, a digital model was also created.



Process / Laser cutting /

# Exporting images

After completing the second Formstorming activity, I decided to continue with the [laser cutting medium](#) for this project.

First, using the Mapbox files from the class lectures as a template, I began [exporting](#) images of the airport. Due to the fact that Mapbox only renders buildings at a certain zoom point, I also had to export [multiple](#) images of different areas of the airport, to be able to capture the place's buildings.

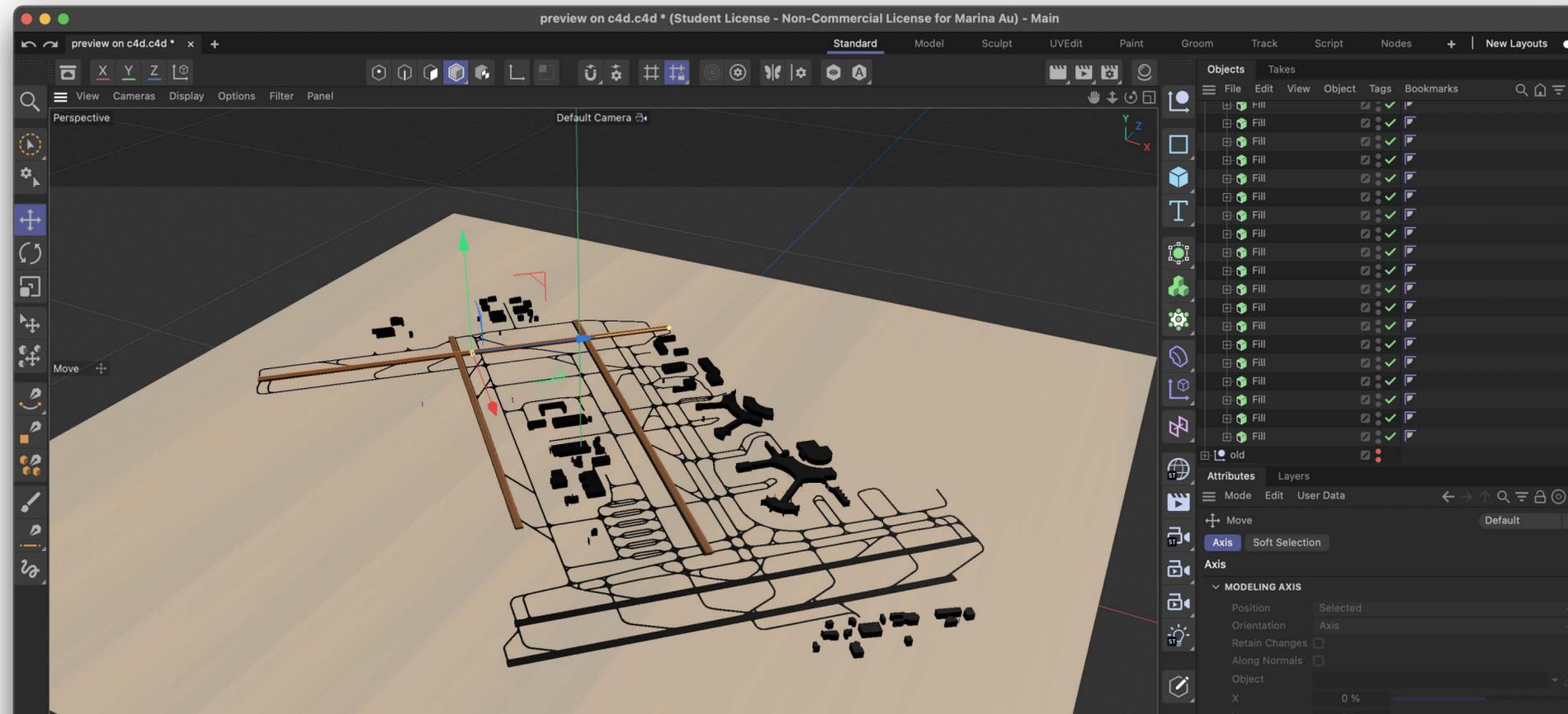
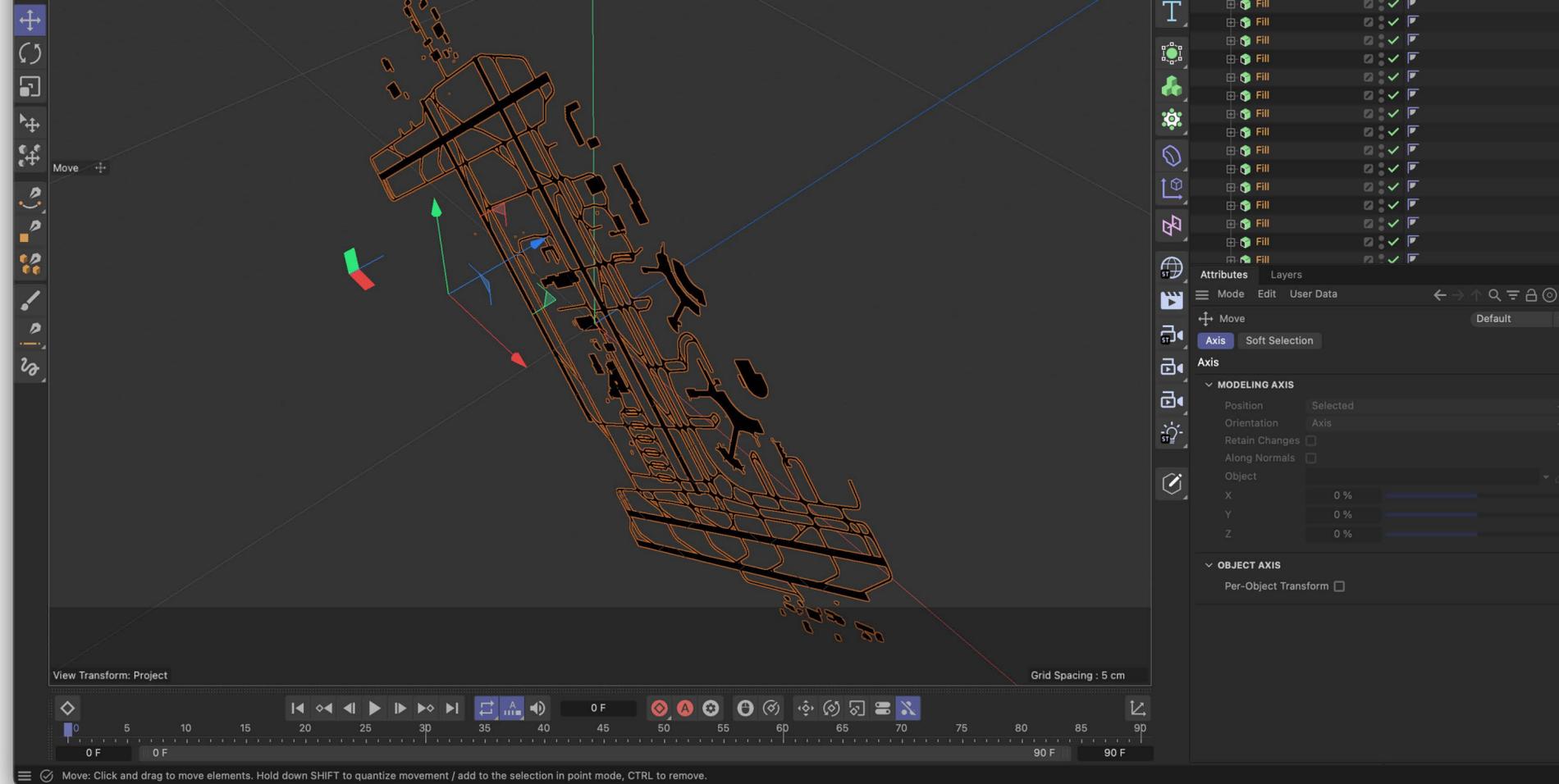
This is a collage of all the images I used to create the Illustrator file for my laser cut.

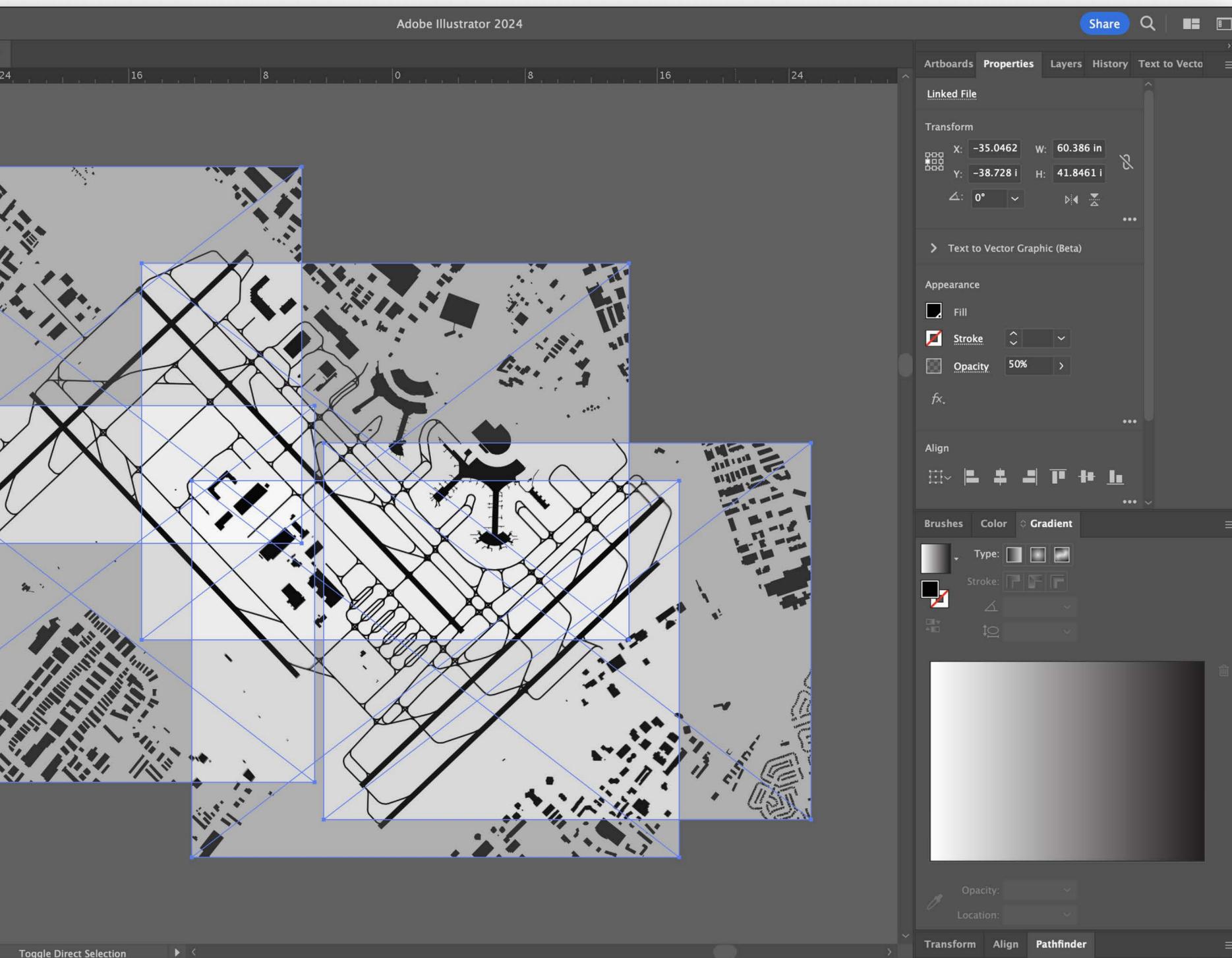
Process / Laser cutting / Exporting images /

# Cinema4D preview

Before continuing with my file preparation in Illustrator, I imported the SVG of the airport into Cinema 4D and extruded the paths to help me **visualize** what data I wanted to have cut, marked and/or engraved.

It was after completing this activity that I decided that the buildings and runways would be **cut**, while the taxiways and labels would be **engraved**. The buildings would also be **outlined** on the board, so that I would know where to place the buildings after they are cut out.





Process / Laser cutting /

# Preparing the file

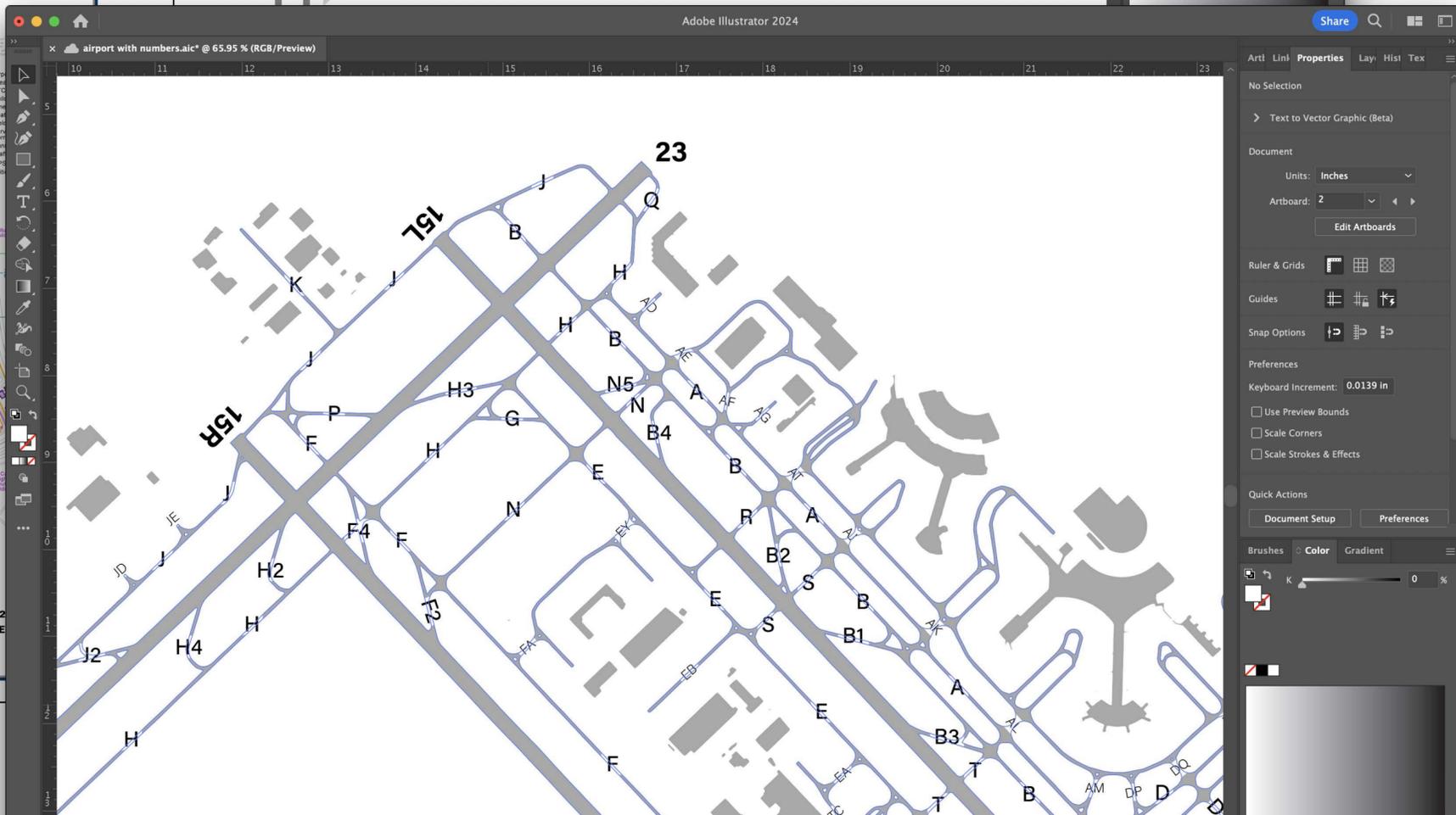
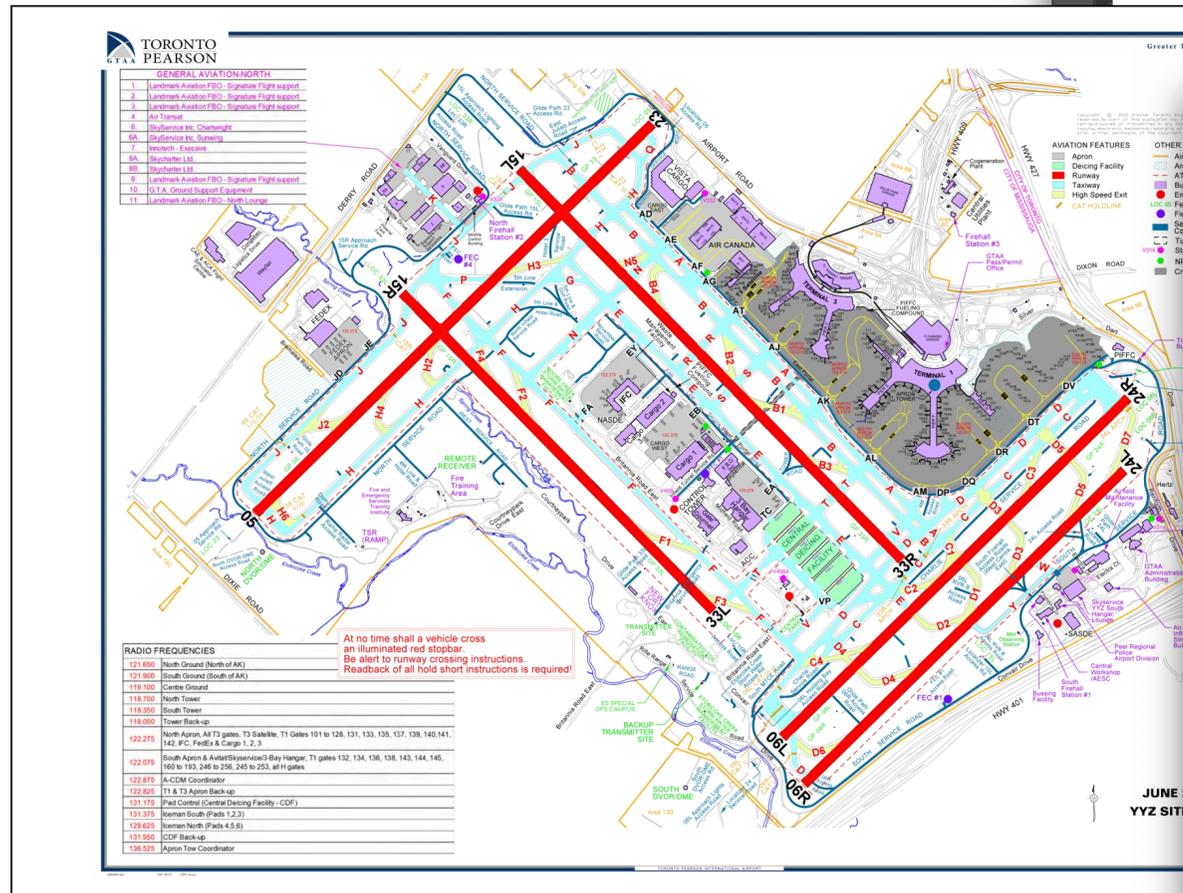
Once I imported my PNG images into Illustrator, I lowered the opacity of each image and **overlapped** the images with each other, so that the buildings would be properly positioned in the correct place.

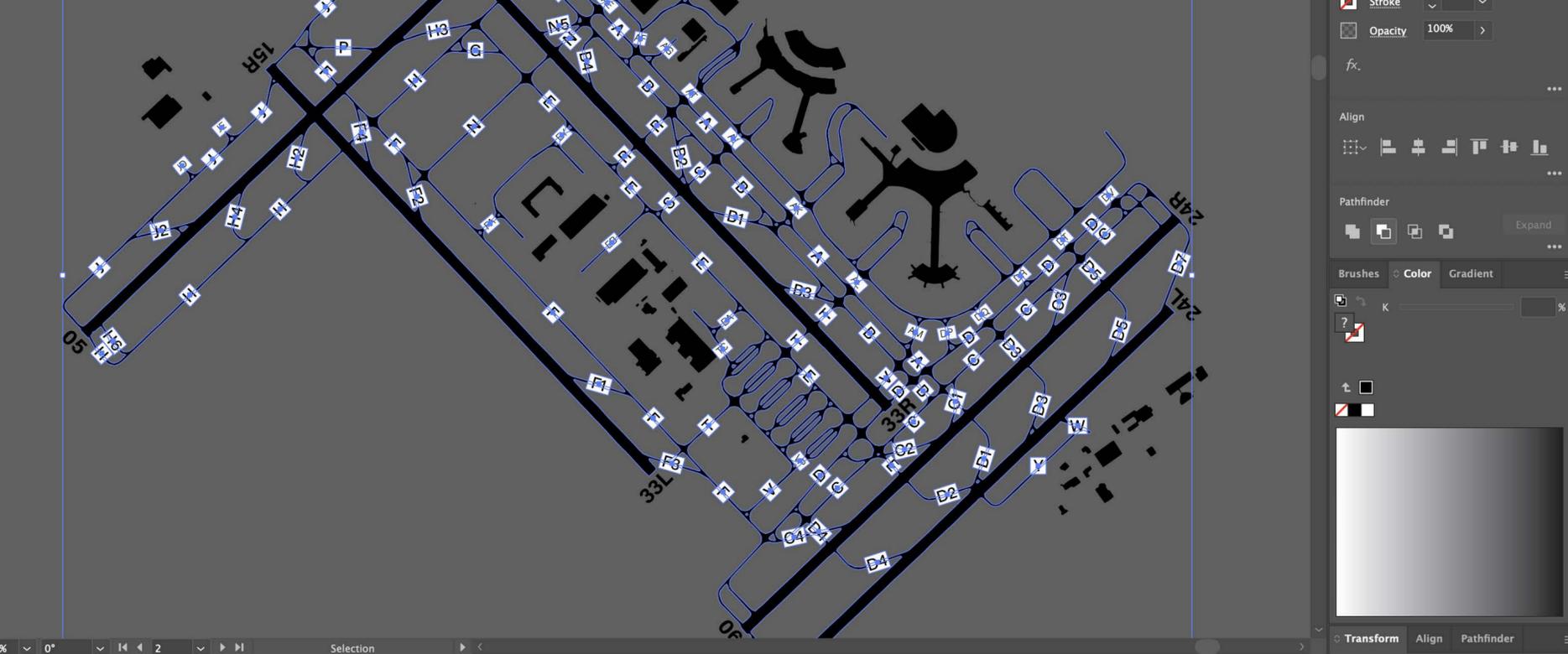
Process / Laser cutting / Preparing the file /

# Adding the labels

Once I changed the images to vector paths, I added the **labels**, using the image of the runway map below as a reference.

I also added a white rectangle behind each label to subtract it from the paths later.



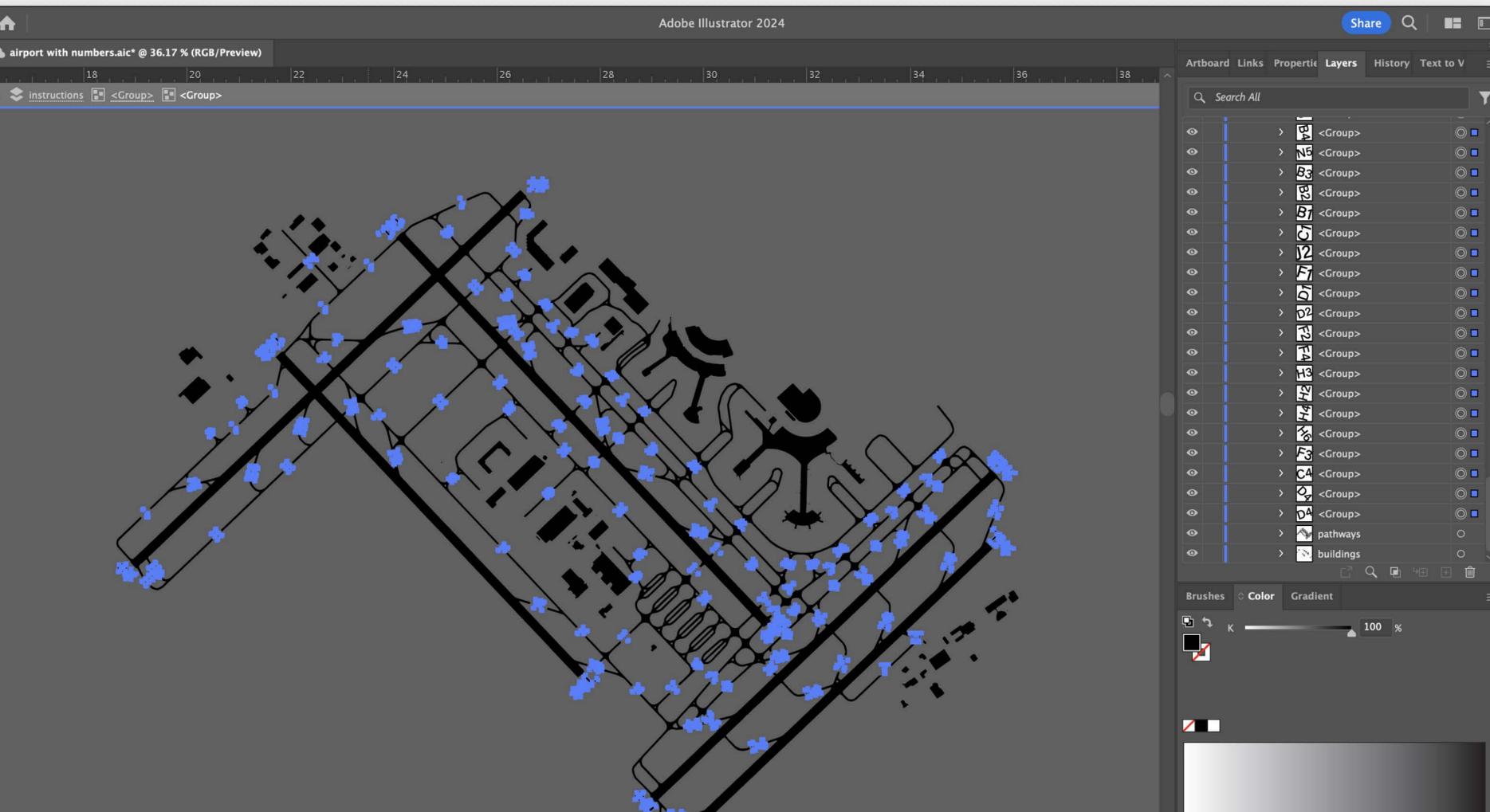


Process / Laser cutting / Preparing the file /

# Editing the layers and vectors

Once I added all the information I needed for the laser cut map, I organized the layers in Illustrator, **grouping** the rectangles, text, and vector paths (buildings and paths) together. I then subtracted the rectangles from the paths to create empty space for the letters.

Finally, I used the Create Outline feature to turn the text in the text boxes into vectors.

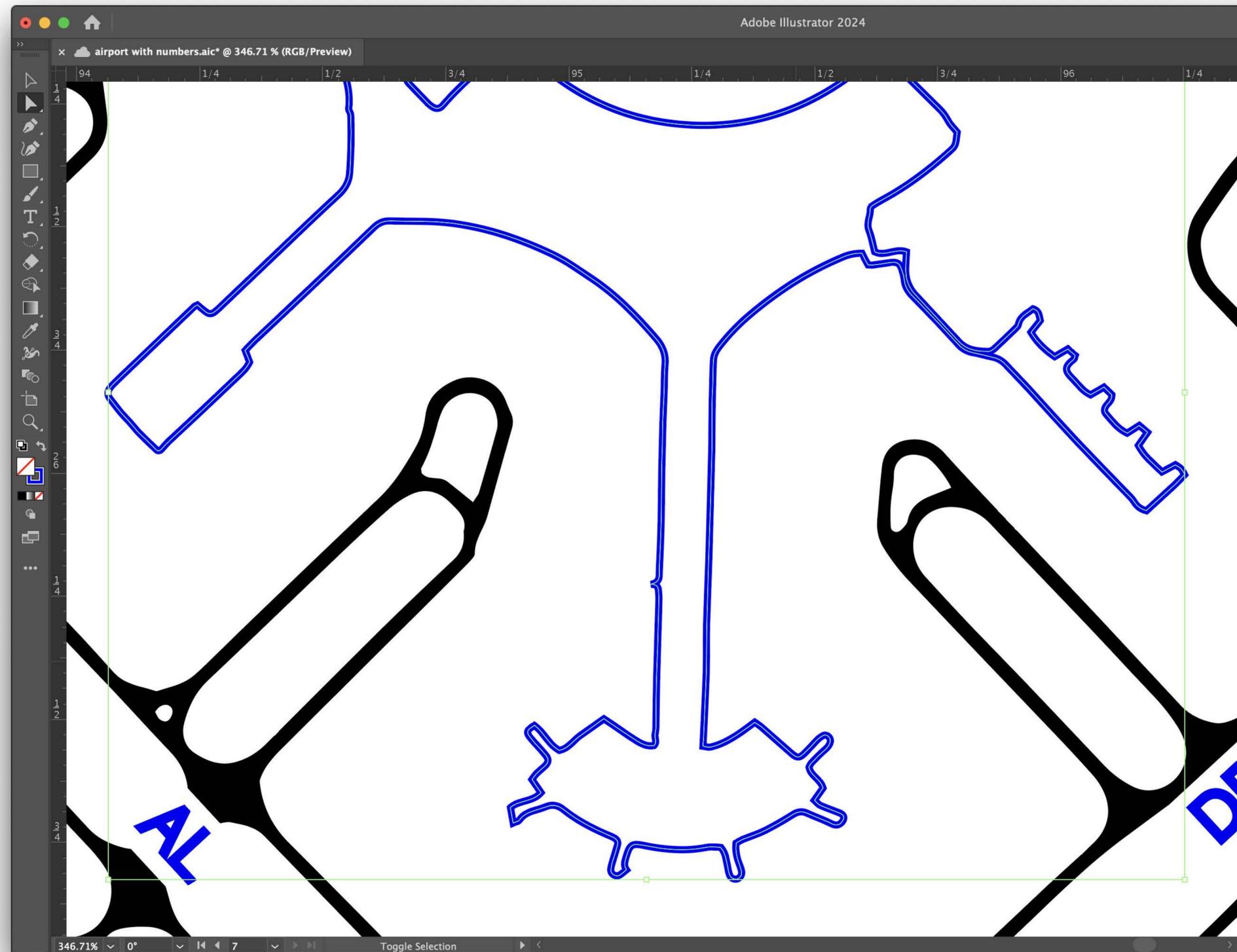


Process / Laser cutting / Preparing the file /

## Refining the vectors

As a final step, I **refined** the vectors to remove unnecessary points and awkward curves.

I also colour coded my paths (red for cut, black for engrave, and blue for mark) for laser cutting.

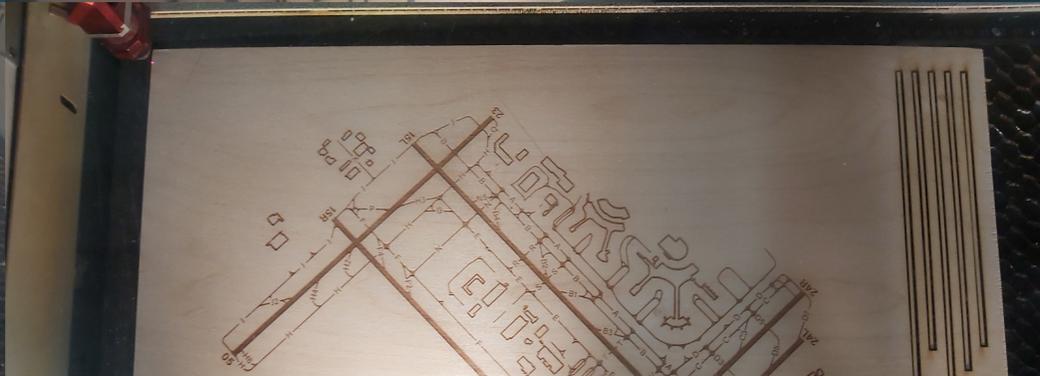
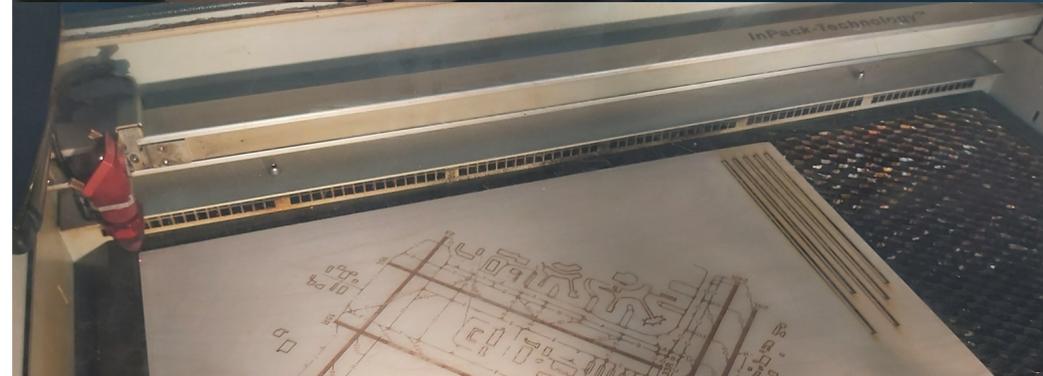
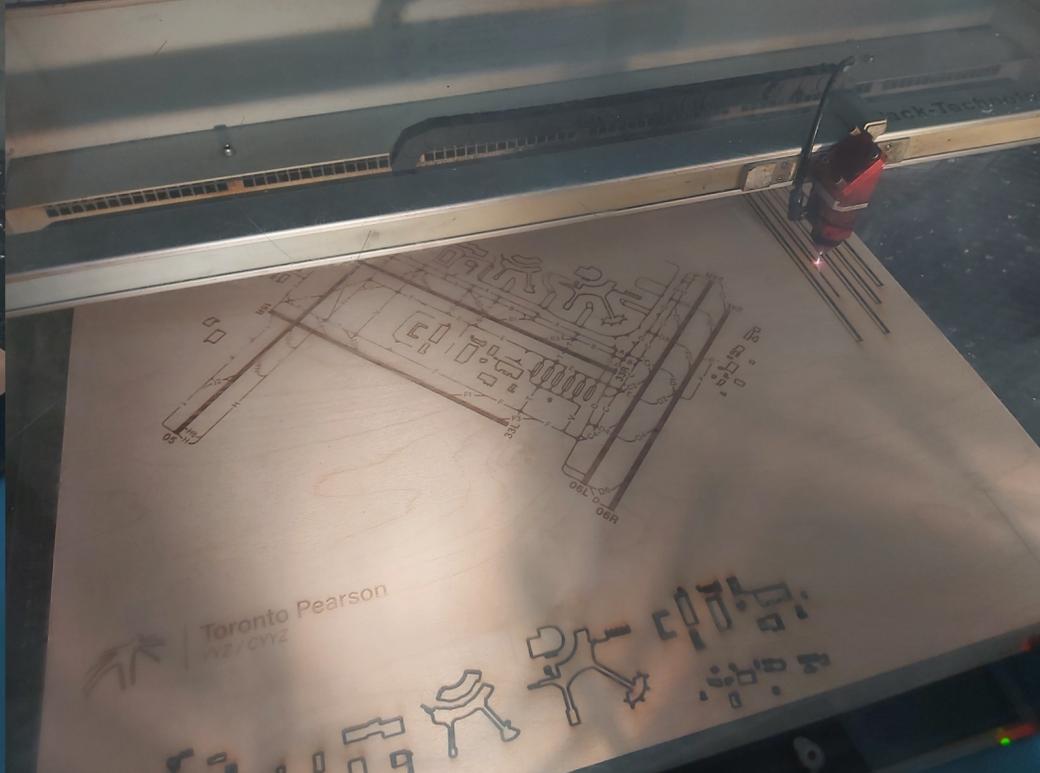
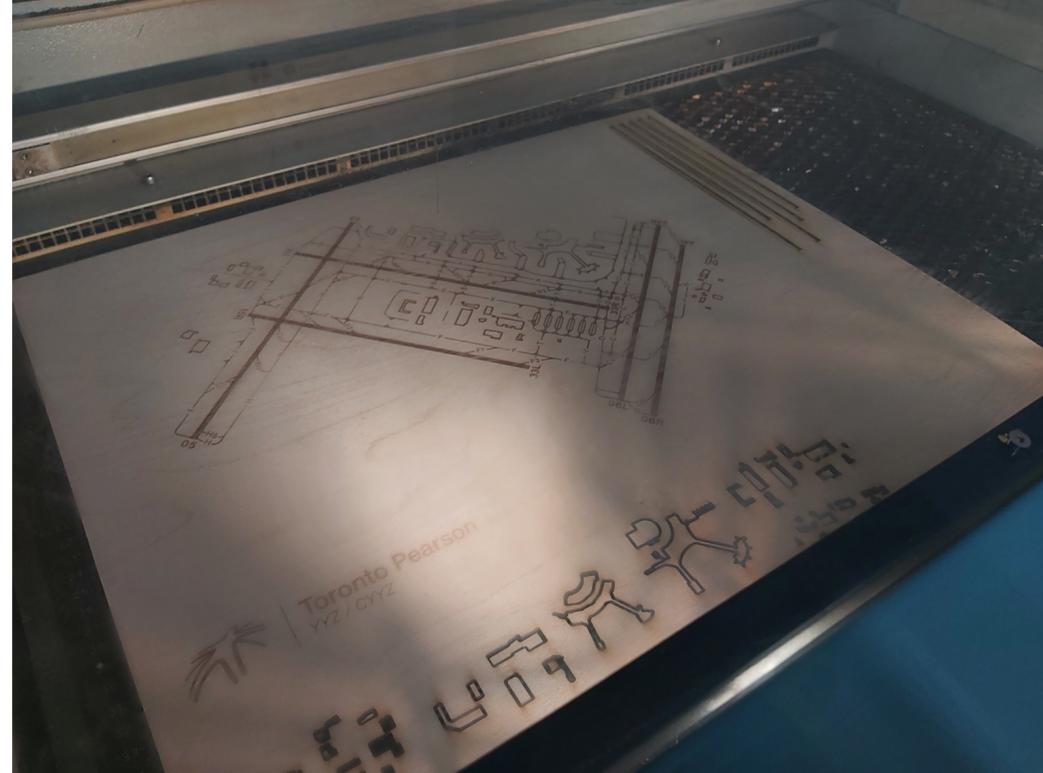
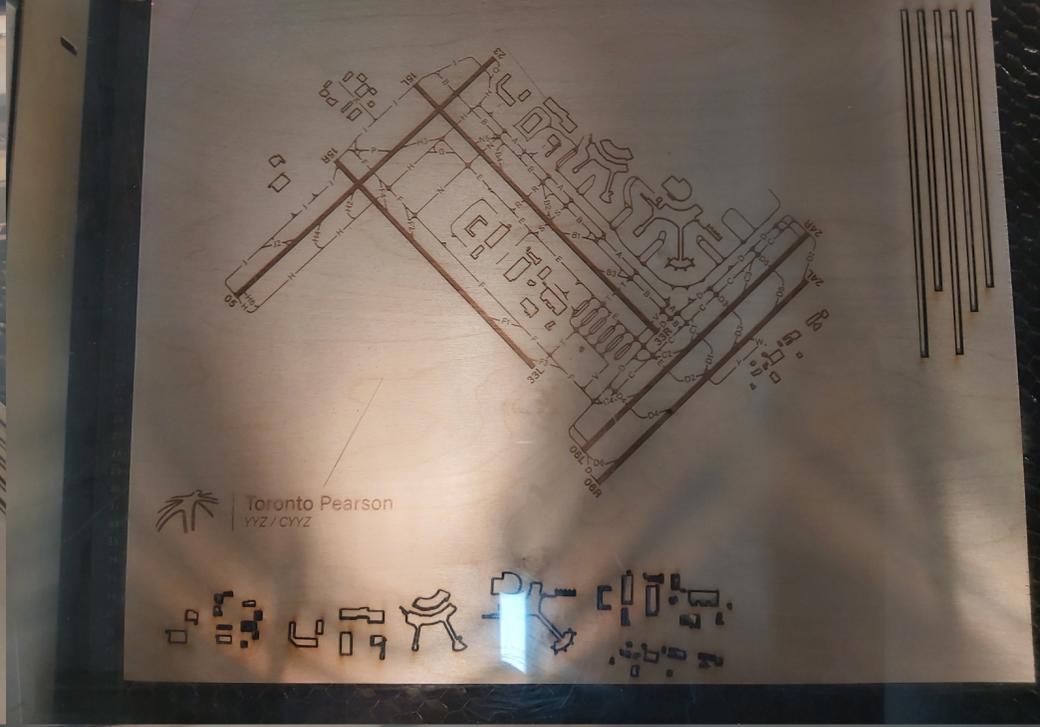
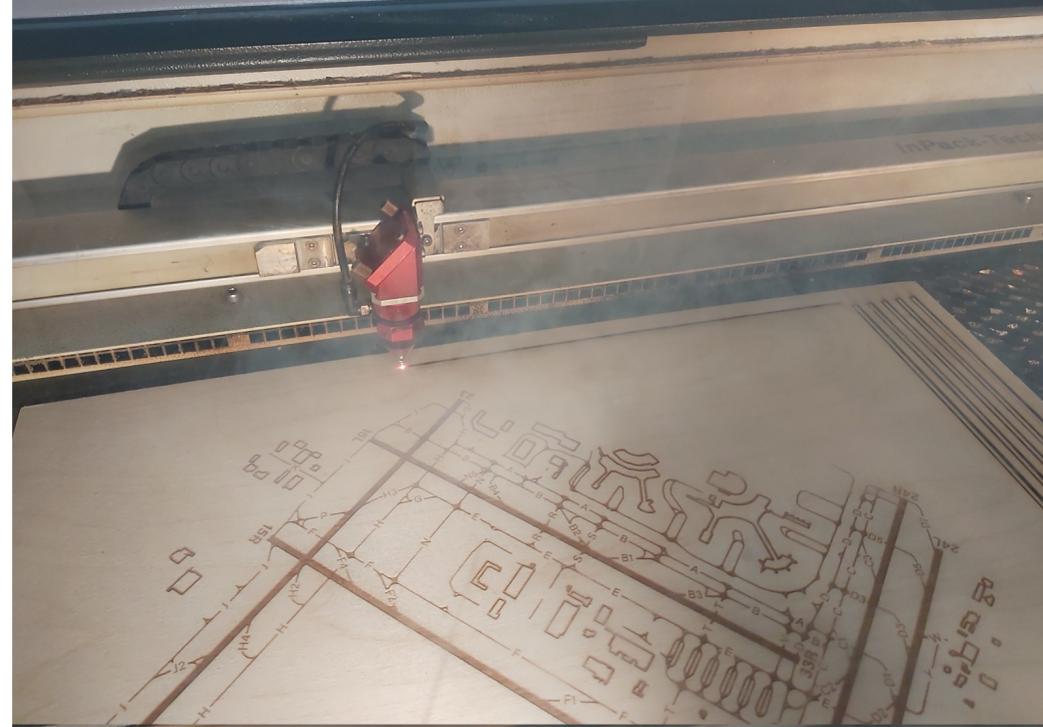


Process / Laser cutting / Creating the piece /

# Cutting the map

I submitted my file to the Fabrication lab to have it printed on my wood piece.

Unfortunately, one part of the map that didn't print were the labels of the taxiway exits.



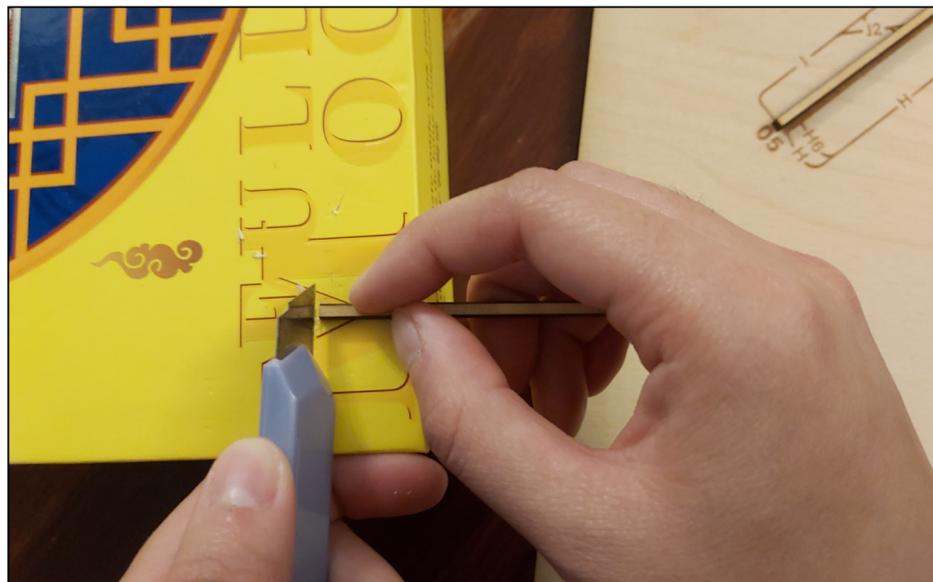


Process / Laser cutting / Creating the piece /

## Preparing the pieces

I used razor knives to cut out the smaller buildings, and cut one of the runways into three pieces to have it cross each other horizontally.

Some of the buildings were lost in the laser cutting process, and thus were not including in the overall piece.



Process / Laser cutting / Creating the piece /

# Layering the wood

Finally, I used a hot glue gun to connect all of the pieces together.

Although the glue dried quick and it was difficult to position the building pieces quickly, the pieces generally stuck well to the board.



# Reflection

What I learned / Challenges / Conclusion



# What I learned

In this project, I learned how to **display geographical data** using **multiple mediums**, including digital maps, laser cut maps, and geospatial AR. I learned how to prepare datasets for bivariate data mapping, as well as laser cutting. Additionally, I utilized the fundamental skills that I learned from the previous project to complete specific activities in this project— for example, for the Spatial Workshop #2 and the Formstorming Activity #2.

# Challenges

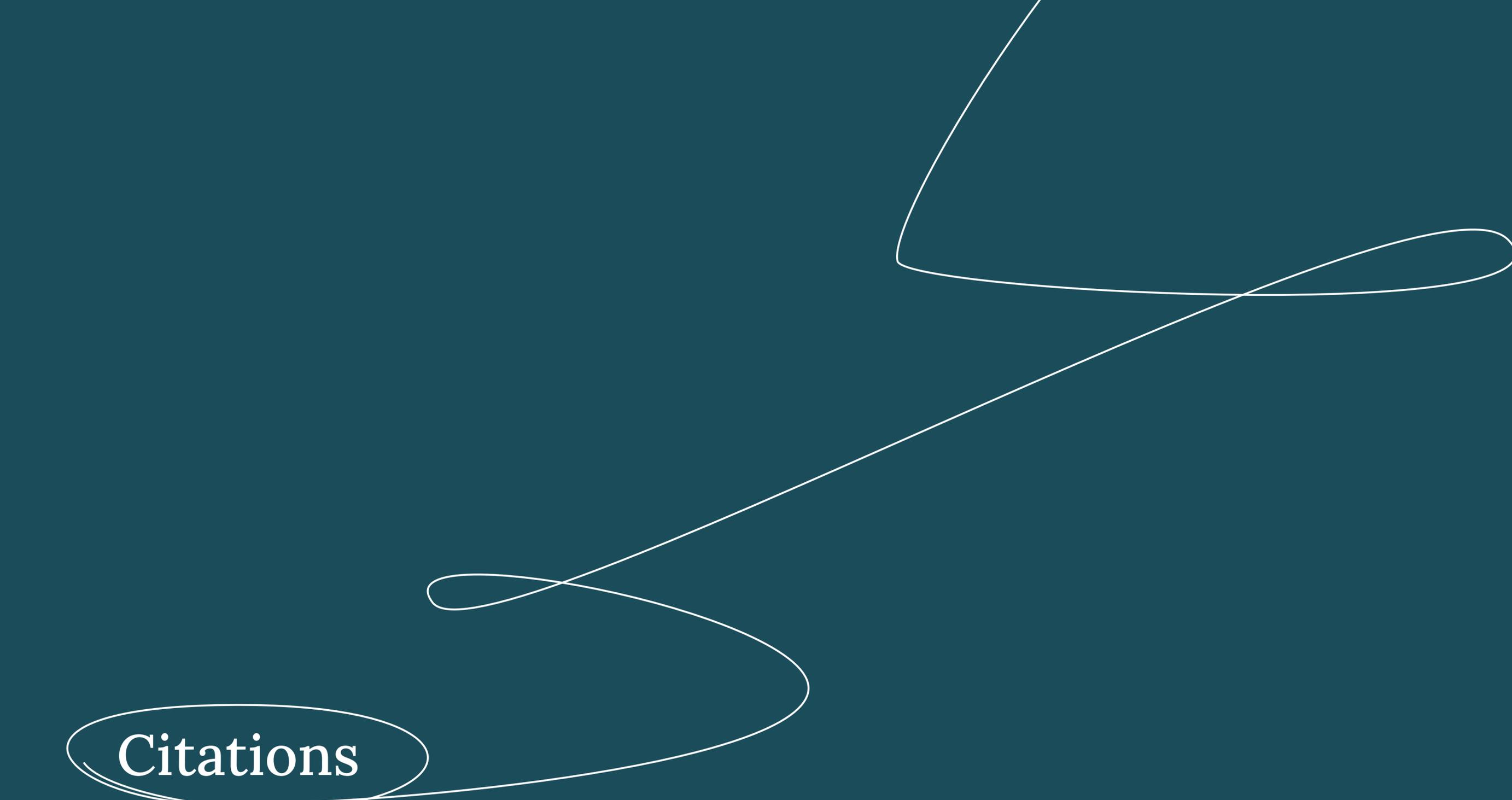
Most of the challenges that I encountered throughout this project stemmed from the **limitations** that each medium had within itself. For example, the data visualization feature in Mapbox has a limit of 7 colours or line widths for displaying its data. While it is ideal to limit the colours used when displaying data in a map, it was not suitable enough for the types of data that I chose. Also, buildings only render at a certain zoom level in Mapbox.

In terms of laser cutting, one of the biggest issues I had that ended up actually affecting the final laser cut was **size**.

Because some of my letters and buildings were too small, some of them were lost in the laser cutting process.

# Conclusion

Throughout the duration of this project I learned about **maps** and its powerful capability to visualize information, tell stories, and, above all, shape one's identity. Maps are **dynamic**, **eloquent** ways to tell a narrative and display information, and this project granted me the opportunity to do so. In the future, I hope to incorporate the use of spatial data in my work as a designer.



# Citations

Document / Data & images

# Document

Below is a list of all the images (not produced by me) that were used in this document, cited in MLA format. This list also includes all the lectures that were mentioned in this document.

BlessedArch. "Portal to a Virtual Shop on a Beach." *YouTube*, 12 Feb. 2023, [www.youtube.com/watch?v=sL2timO9Eew](http://www.youtube.com/watch?v=sL2timO9Eew).



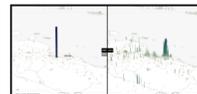
Boss Laser. "Easy DIY Laser Cut Multi-Layered Map | Bosslaser." *YouTube*, 25 Aug. 2022, [www.youtube.com/watch?v=KSgRd2AJgXA](http://www.youtube.com/watch?v=KSgRd2AJgXA).



"Data Is Beautiful: 10 of the Best Data Visualization Examples From History and Today." *Tableau*, [www.tableau.com/learn/articles/best-beautiful-data-visualization-examples](http://www.tableau.com/learn/articles/best-beautiful-data-visualization-examples).



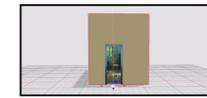
"Human Terrain." *The Pudding*, [pudding.cool/2018/10/city\\_3d](http://pudding.cool/2018/10/city_3d).



"Laser-Cut Map - Square." *Me Laser Engraved Gifts & More*, [createdforme.ca/products/custom-map](http://createdforme.ca/products/custom-map).



Onirix. "Create Your Augmented Reality Portal." *YouTube*, 4 May 2023, [www.youtube.com/watch?v=gOclMHumfol](http://www.youtube.com/watch?v=gOclMHumfol).



"24 Hours in an Invisible Epidemic." *The Pudding*, [pudding.cool/2023/09/invisible-epidemic](http://pudding.cool/2023/09/invisible-epidemic).



RINKI Group. "Augmented Reality Portal to Emolina." *YouTube*, 11 Mar. 2021, [www.youtube.com/watch?v=Qxilx0YVIWk](http://www.youtube.com/watch?v=Qxilx0YVIWk).



SafeGraph. "12 Methods for Visualizing Geospatial Data on a Map." *SafeGraph*, [www.safegraph.com/guides/visualizing-geospatial-data](http://www.safegraph.com/guides/visualizing-geospatial-data).



# Document

Below is a list of all the images (not produced by me) that were used in this document, cited in MLA format. This list also includes all the lectures that were mentioned in this document.

Hudak, Steve. "Week 7." DESN27425, 8 Sept. 2023, Sheridan College. Class lecture.



—. "Week 7." DESN27425, 8 Sept. 2023, Sheridan College. Class lecture.



—. "Week 7." DESN27425, 8 Sept. 2023, Sheridan College. Class lecture.



—. "Week 9." DESN27425, 8 Sept. 2023, Sheridan College. Class lecture.



—. "Week 9." DESN27425, 8 Sept. 2023, Sheridan College. Class lecture.



—. "Week 9." DESN27425, 8 Sept. 2023, Sheridan College. Class lecture.



# Data & images

Below is a list of all the data files, images that were used in part of my exploration process, as well as my final project, cited in MLA format.

## Bivariate data map

### Data sources

“Global Airports.” *The World Bank*, datacatalog.worldbank.org/search/dataset/0038117/Global-Airports.

Information & Technology. “Toronto Centreline (TCL).” *City of Toronto Open Data Portal*, 16 Nov. 2023, open.toronto.ca/dataset/toronto-centreline-tcl.

Parks, Forestry & Recreation. “Street Tree Data.” *City of Toronto Open Data Portal*, 4 Nov. 2023, open.toronto.ca/dataset/street-tree-data.

## Geospatial AR

### Texture materials

A-Naen. “Anime Suzume No Tojimari 4k Ultra HD Wallpaper by A-naen-.” *Wallpaper Abyss*, Apr. 2023, wall.alphacoders.com/big.php?i=1310787.

Mesamong. “White Wood Texture Background.” *Adobe Stock*, stock.adobe.com/ca/images/white-wood-texture-background/166544573?prev\_url=detail.

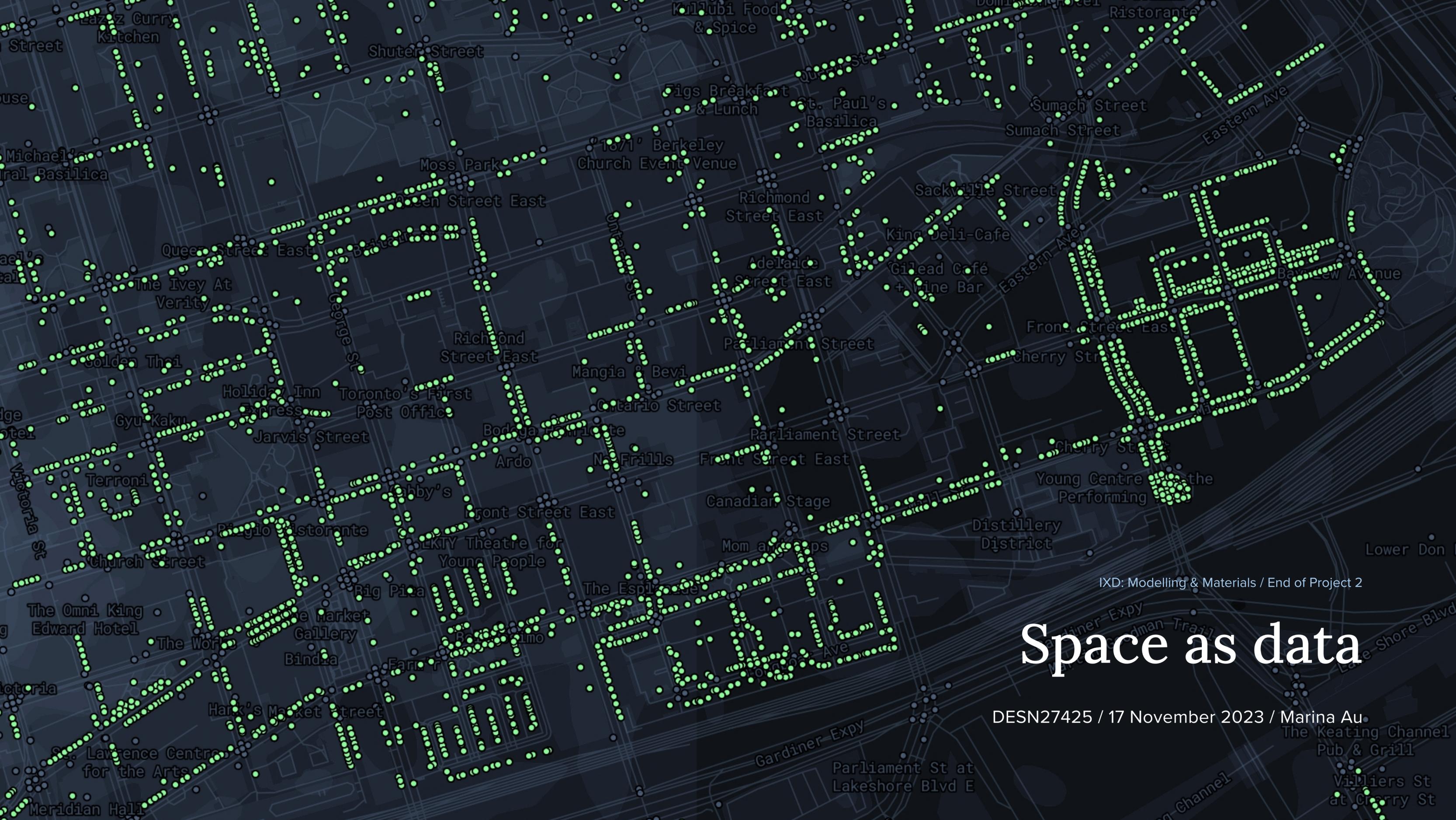
### Reference images

Powster. “Suzume Door.” *Suzume*, www.suzume-movie.com/home.

## Laser cutting

### Images

“Toronto Pearson Airport Logo.” *Pearson Airport*, www.torontopearson.com/en.



IXD: Modelling & Materials / End of Project 2

# Space as data

DESN27425 / 17 November 2023 / Marina Au

The Keating Channel  
Pub & Grill

Villiers St  
at Cherry St