Tactile Maps for the Visually Impaired

HCI Fabrication Techniques December 11th, 2014

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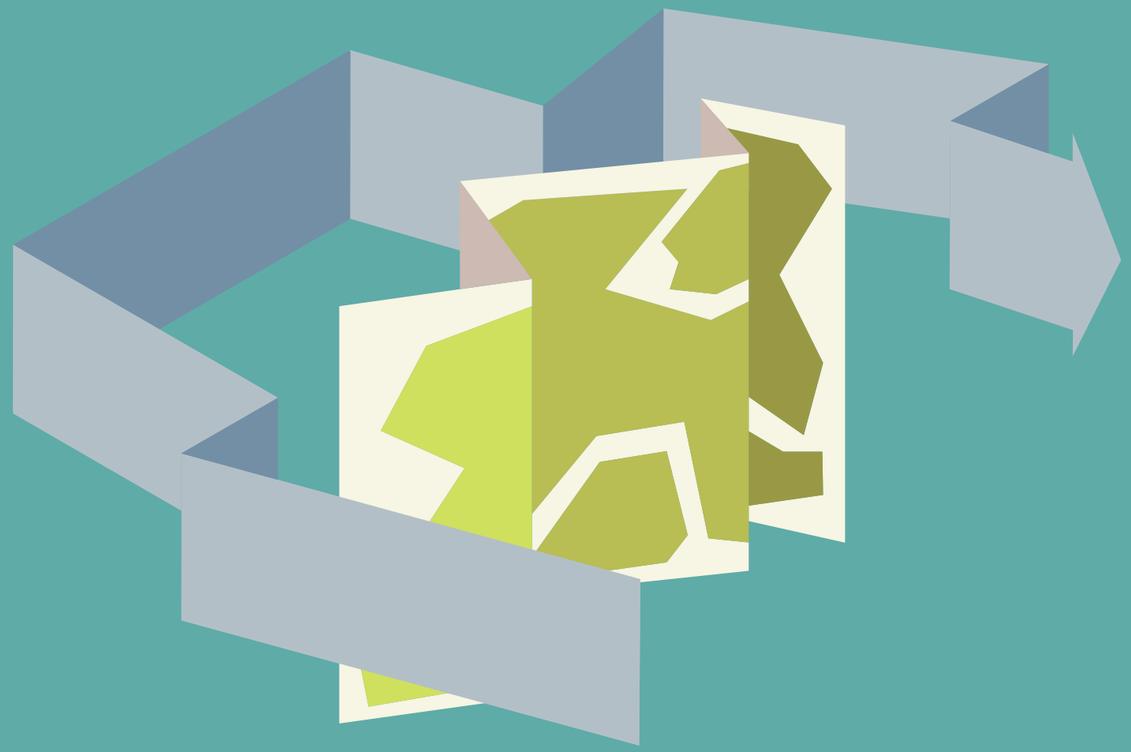
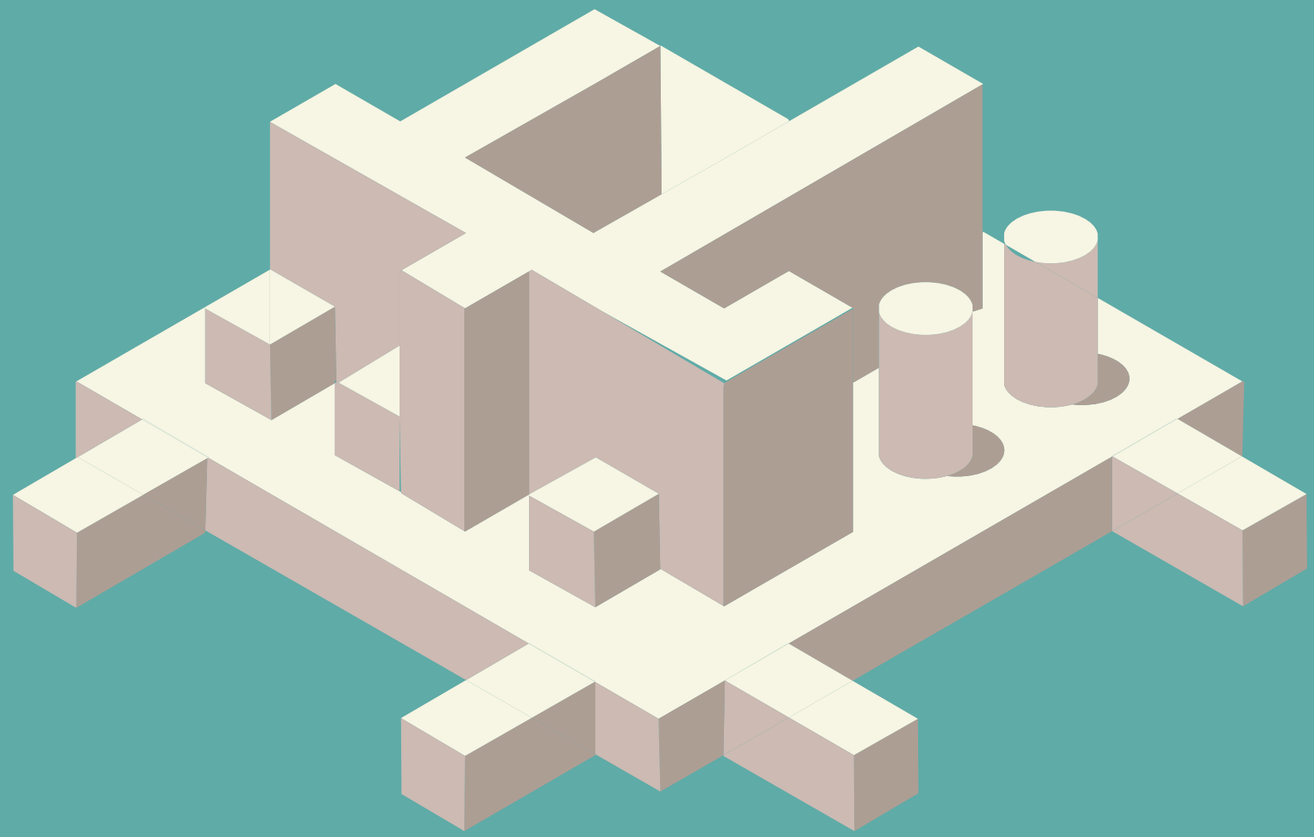
[Problem]



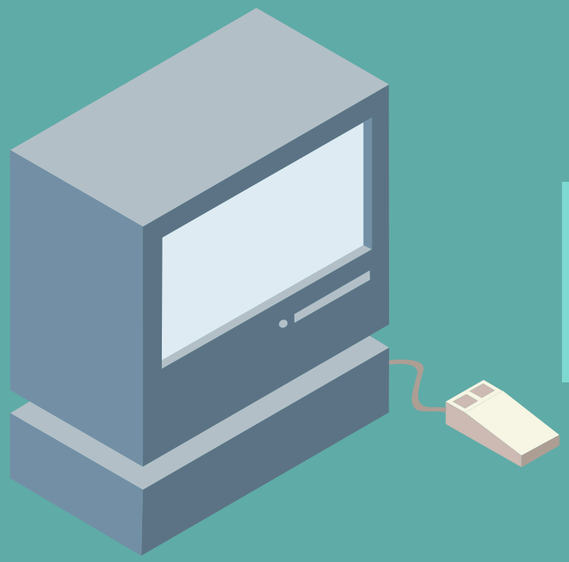
People with vision impairments need to navigate to new places but they have no way to **preview the route** that they are going to take and its **surrounding environment.**

[Proposed Solution]



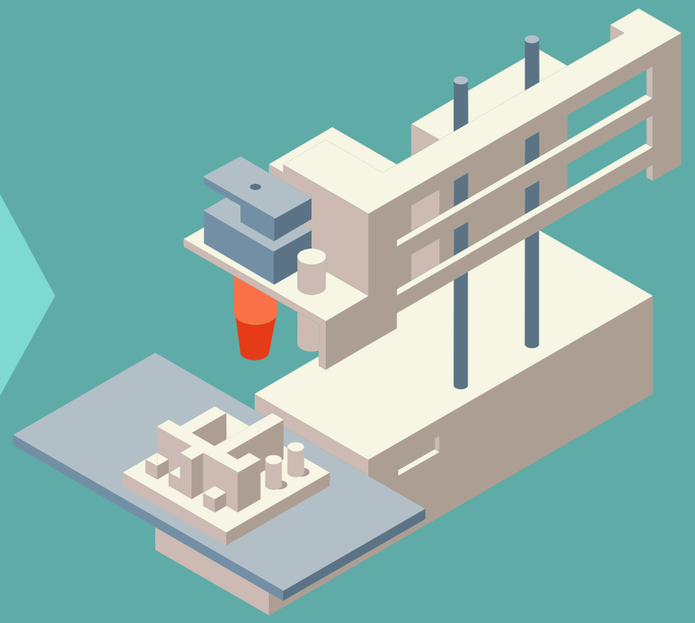
A system that allows the visually impared to quickly **convert digital maps** into 3D printed **tactile maps** that use different types of **textures, changes in elevation, and braille** to communicate the varrying geographic features of an area.

[System Overview]



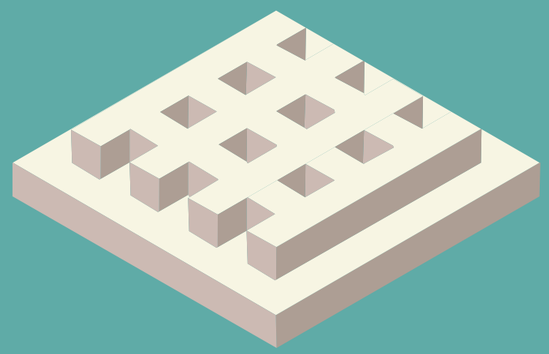
The user identifies neighborhoods and other areas of interest.

Our system parses through Google Maps and isolates the key physical features.

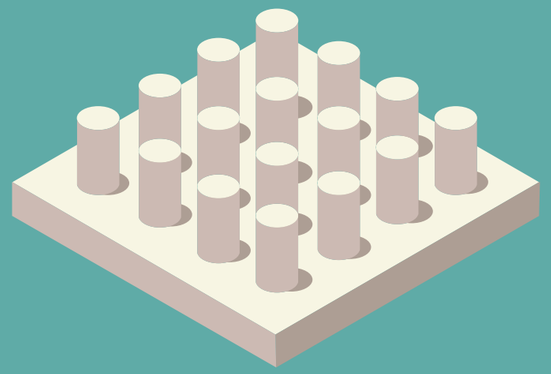


This information is converted into a 3D model and a tactile map of the selected area is 3D printed.

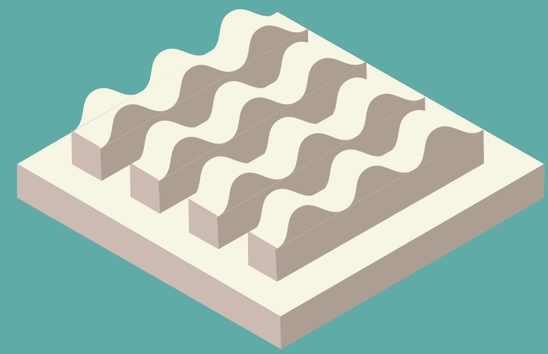
[Tactile Features]



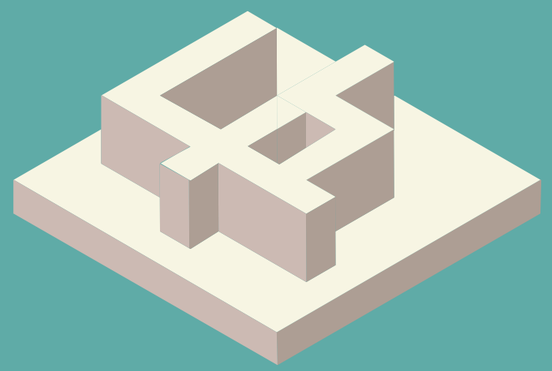
Green Spaces



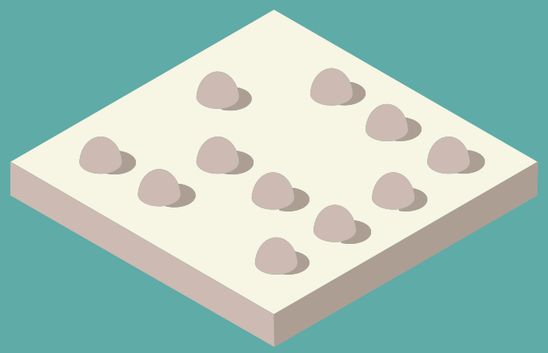
Urban Areas



Water Ways

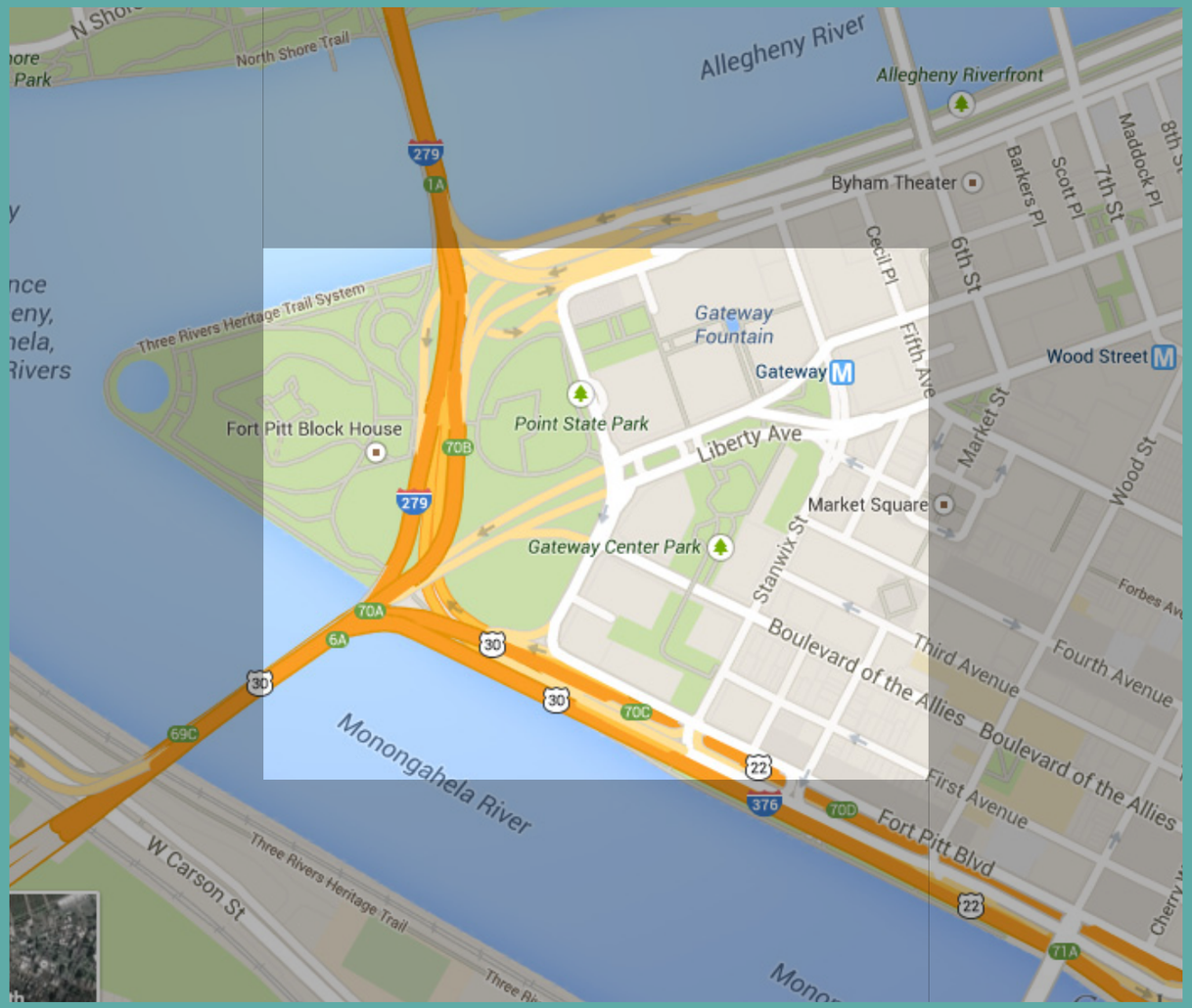


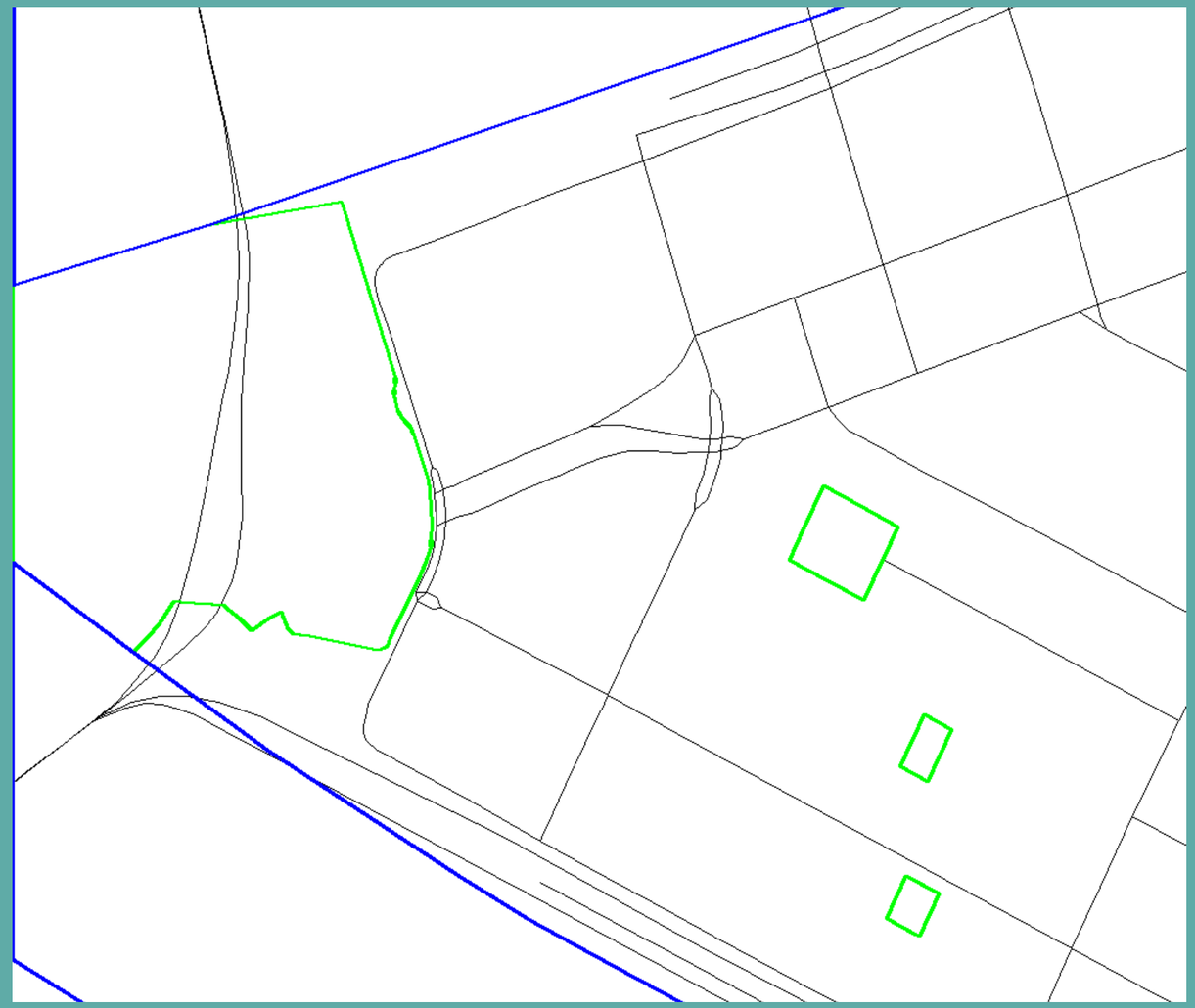
Roads



Braille

[Parsing Google Maps]

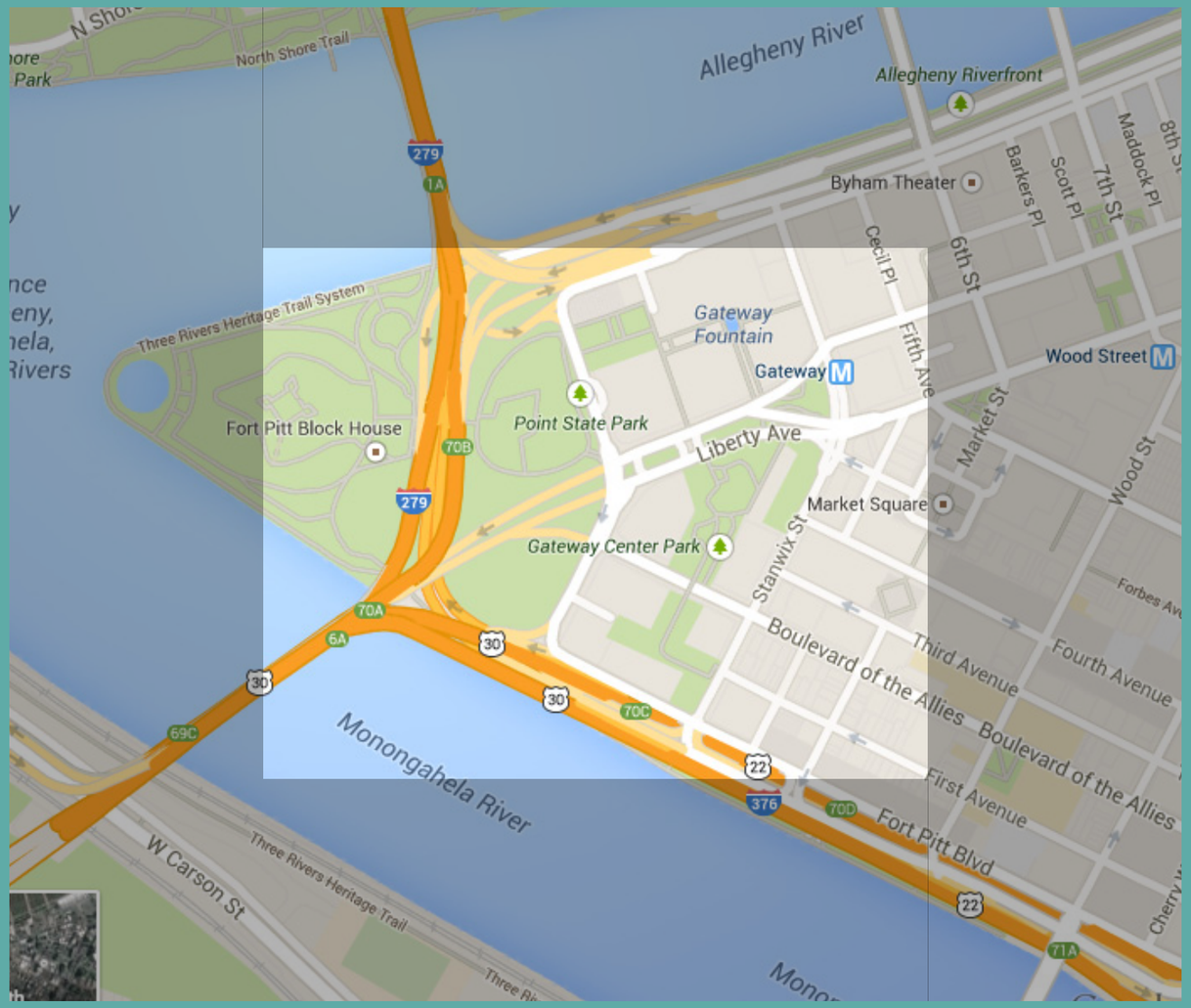


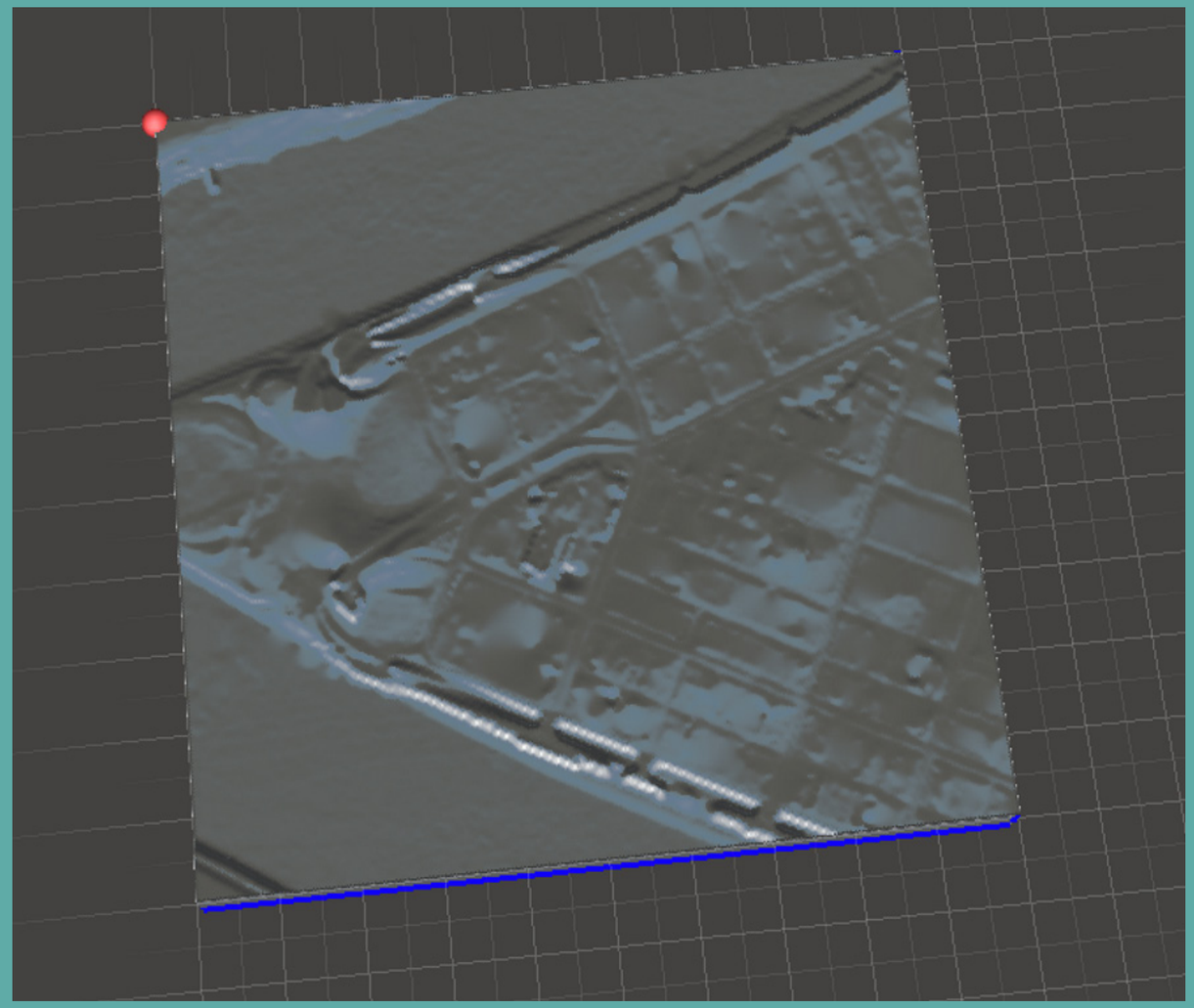


The user selects a location or region to map and our script pulls data from Google Maps.

Our script parses roads, waterways, and parks from the data then exports them in a format easily extruded in Rhino.

[Parsing Google Maps]

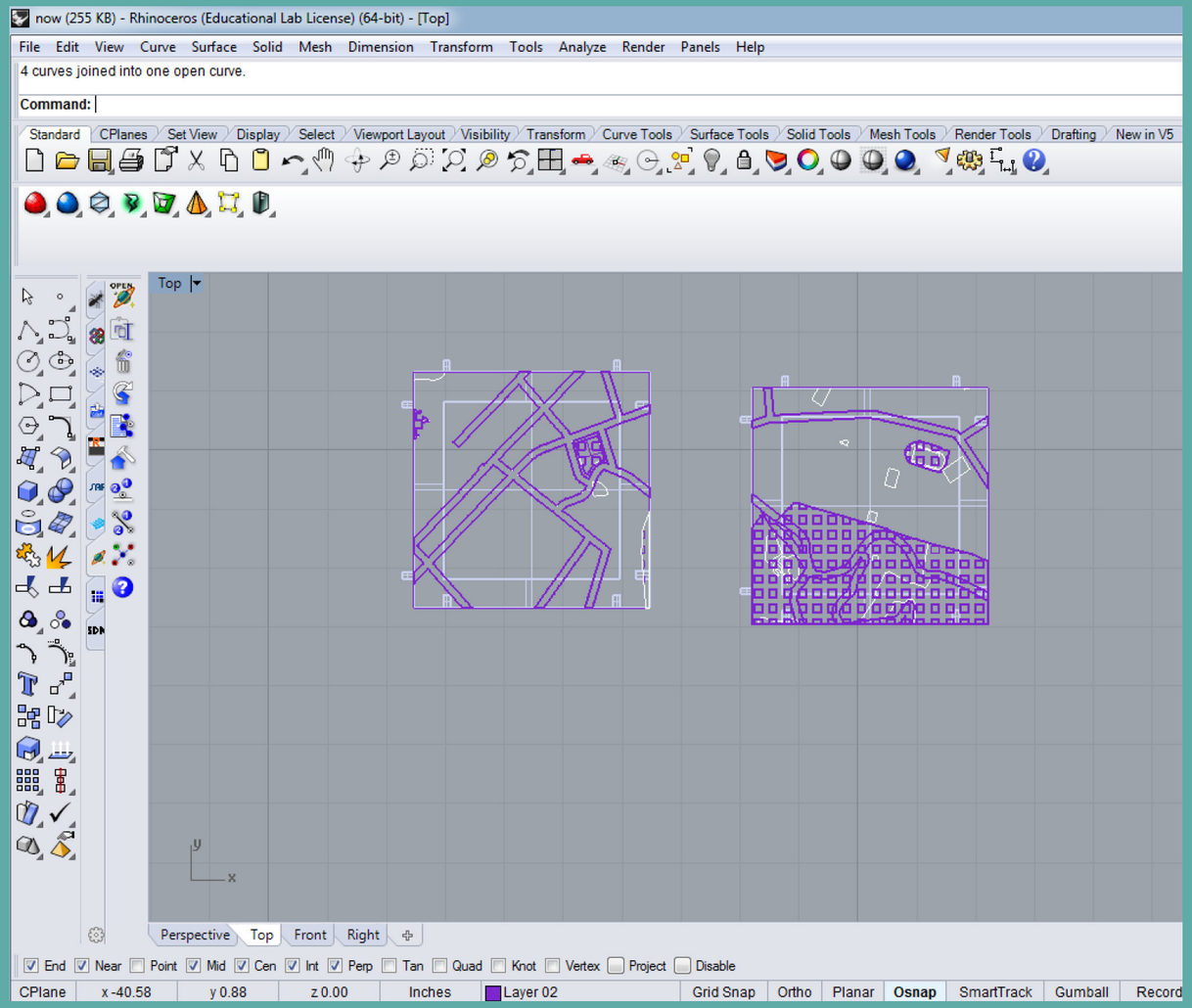


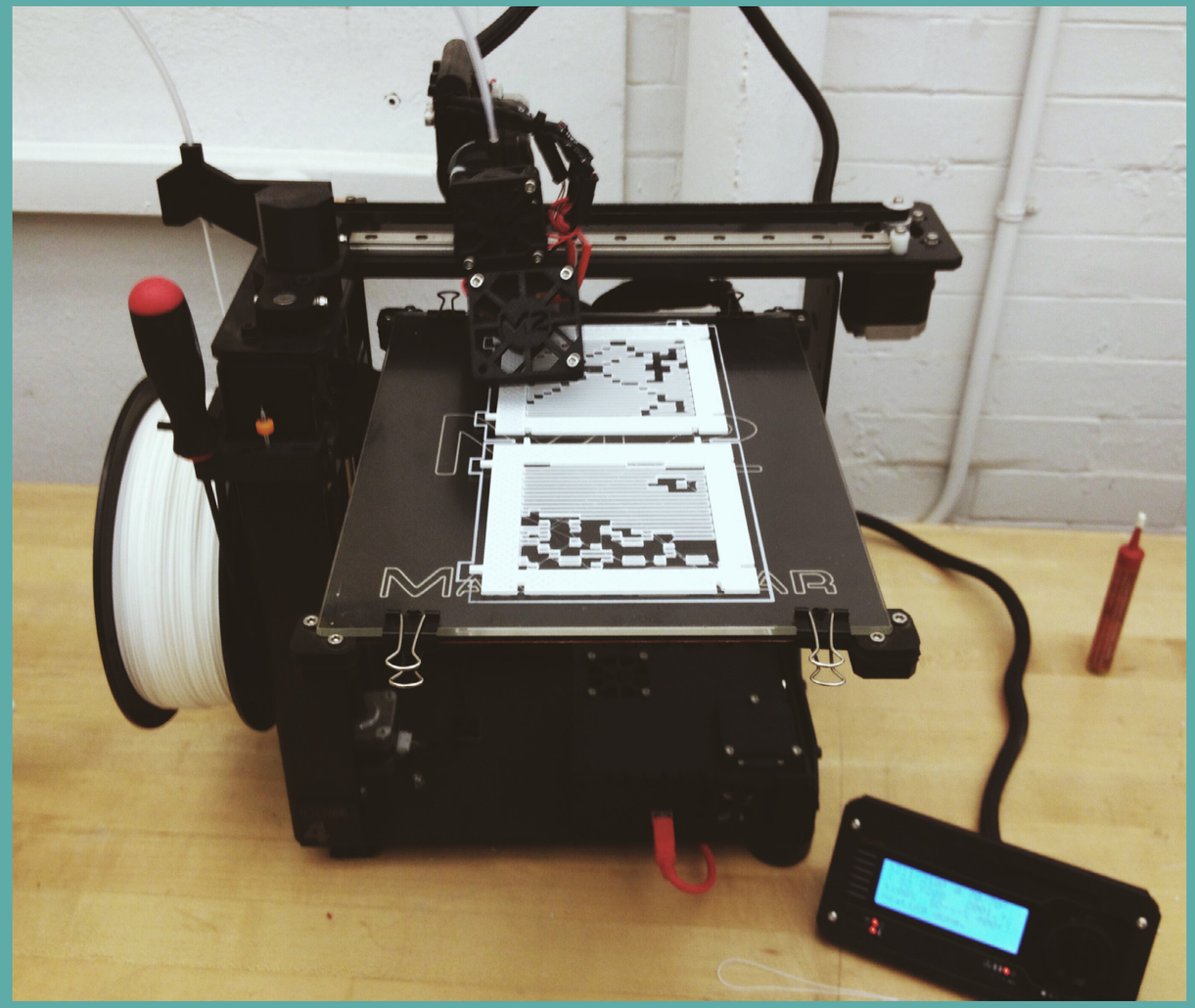


Google APIs are used to download elevation data for the same region.

Our script then generates a 3D topography of the selected region.

[Converting into Rhino]

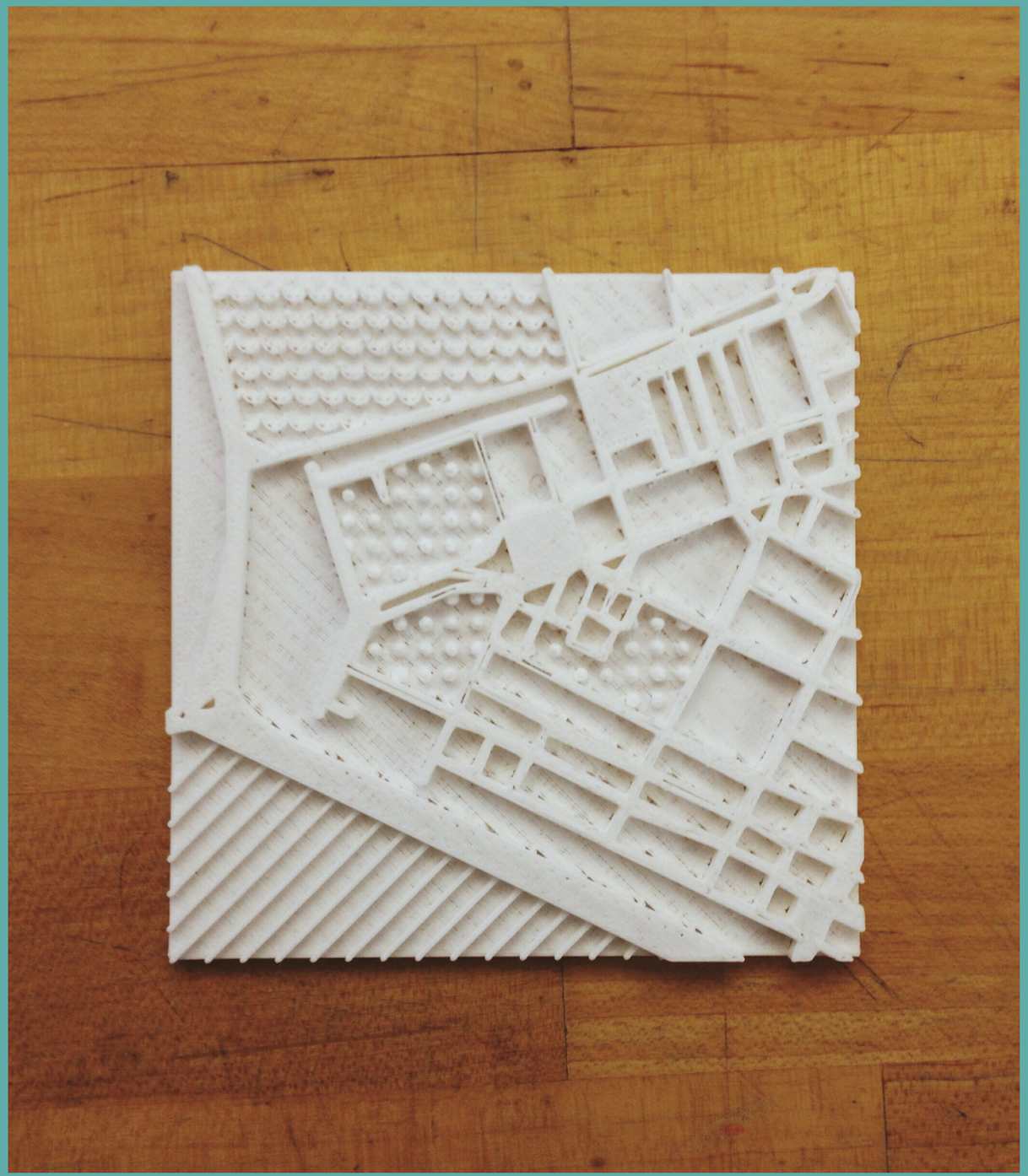


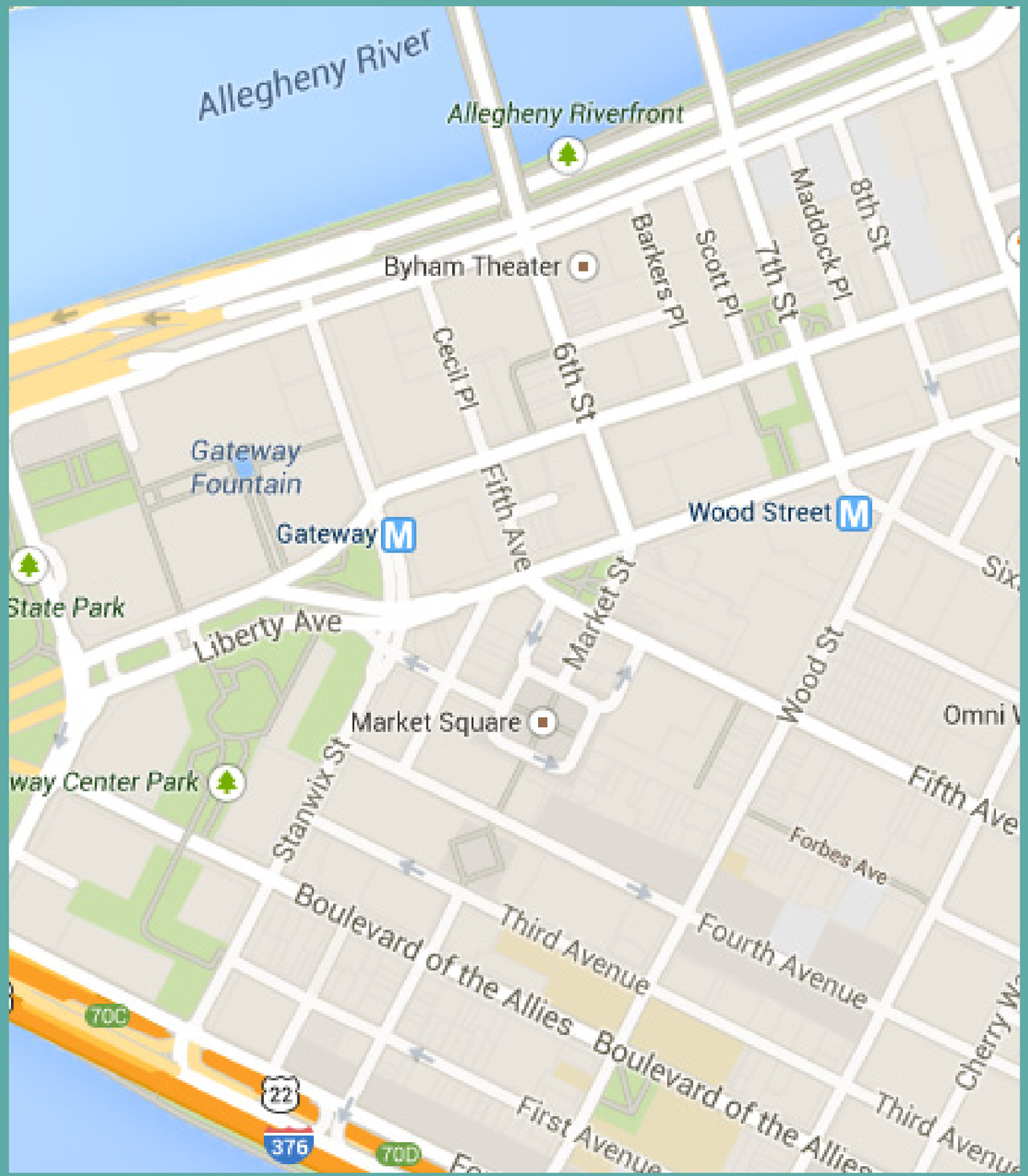


We used Rhino scripts to extrude the roads, and to apply different textures based on the color regions we exported.

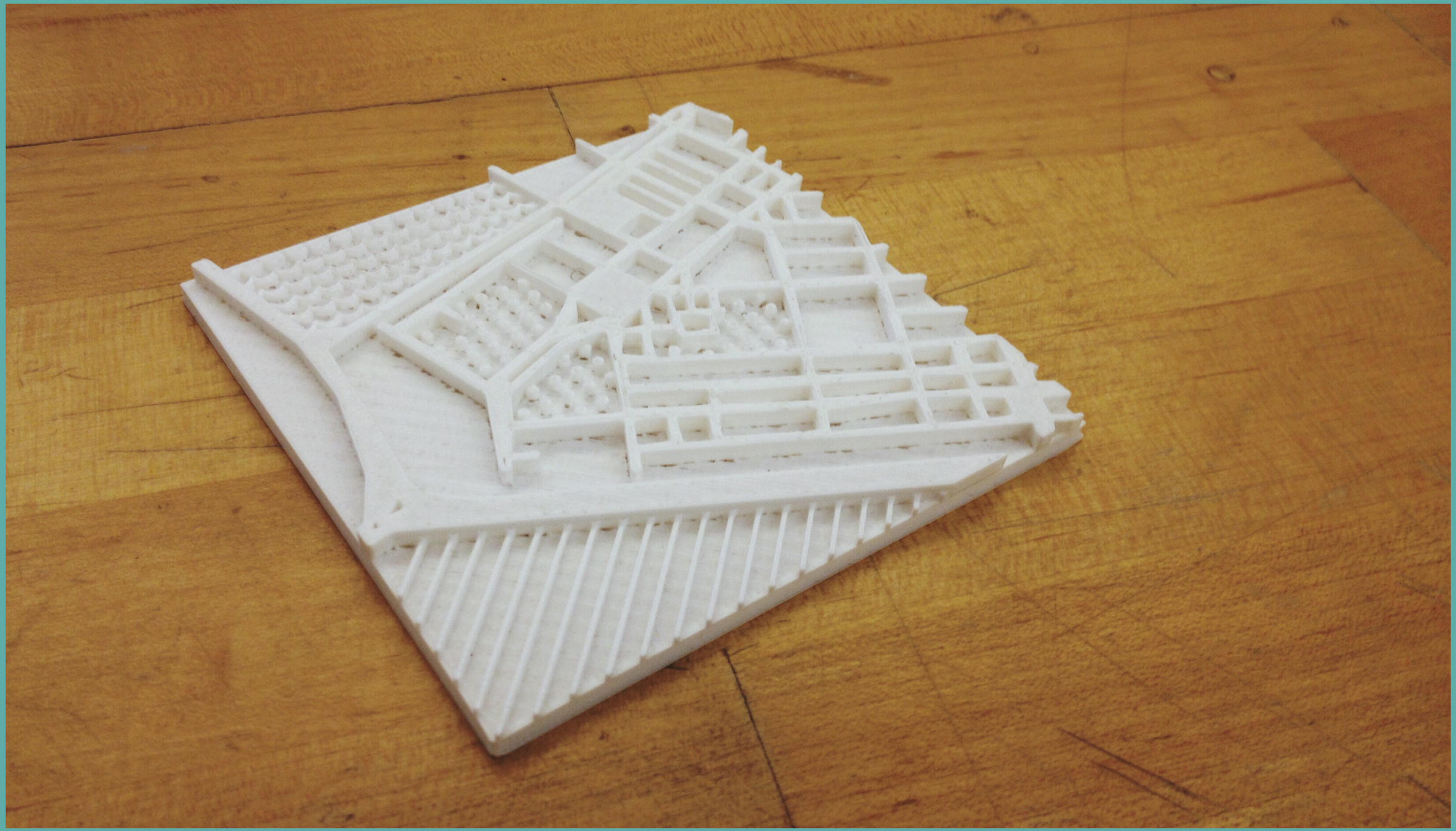
The 3D maps were then exported as .STLs and sent to the 3D printers for production.

[Final Deliverables: Front]

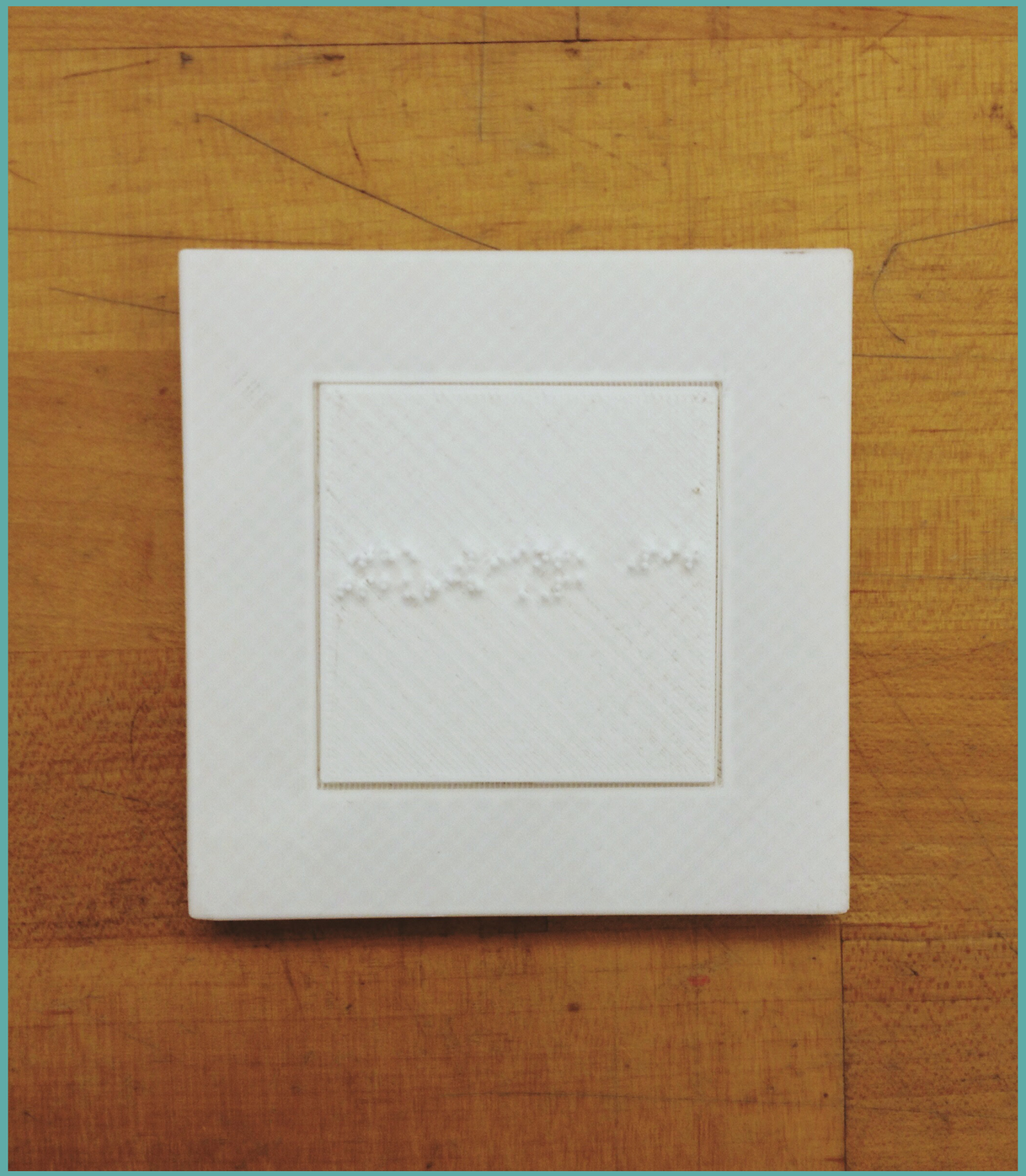


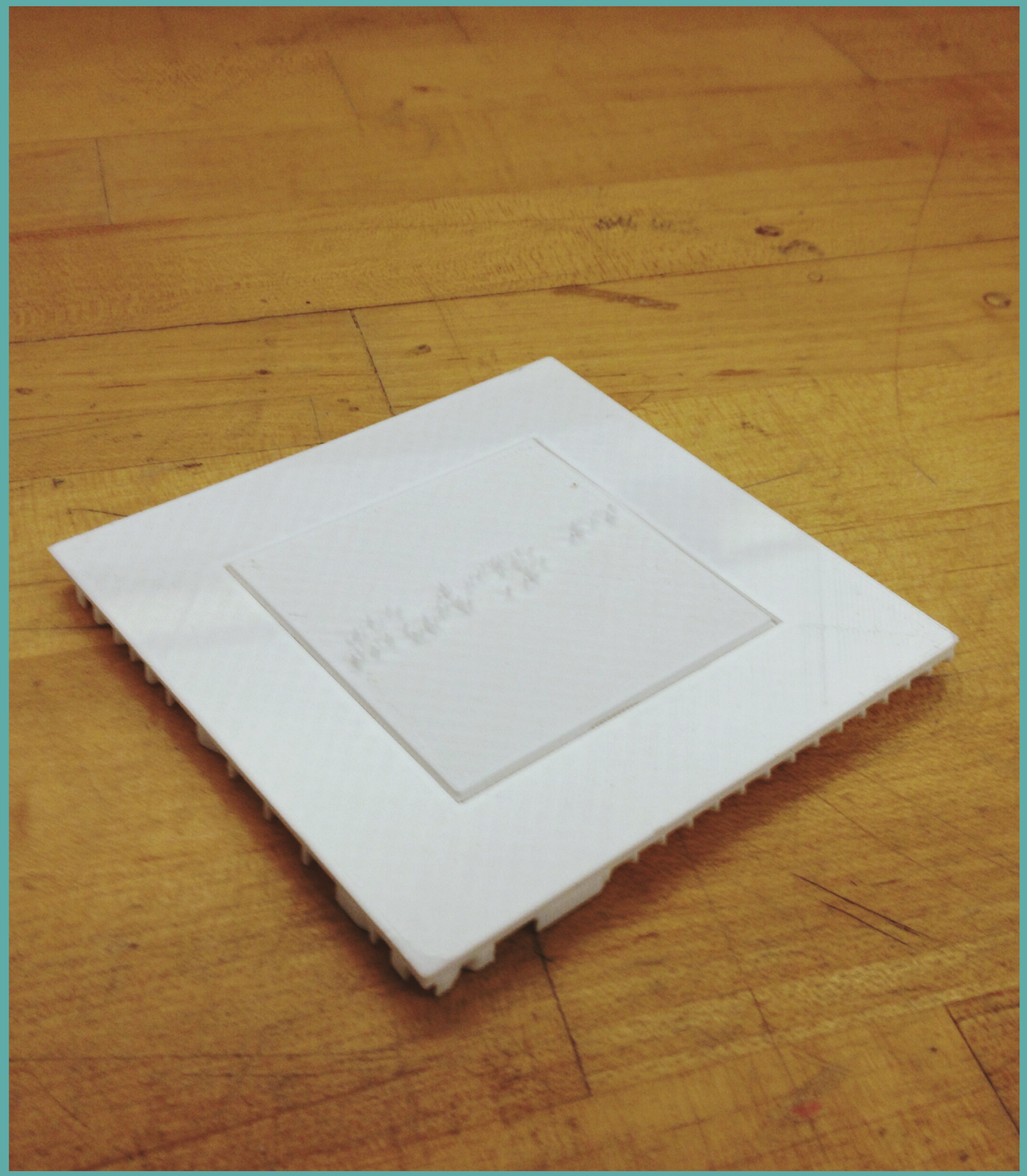


[Final Deliverables: Front]

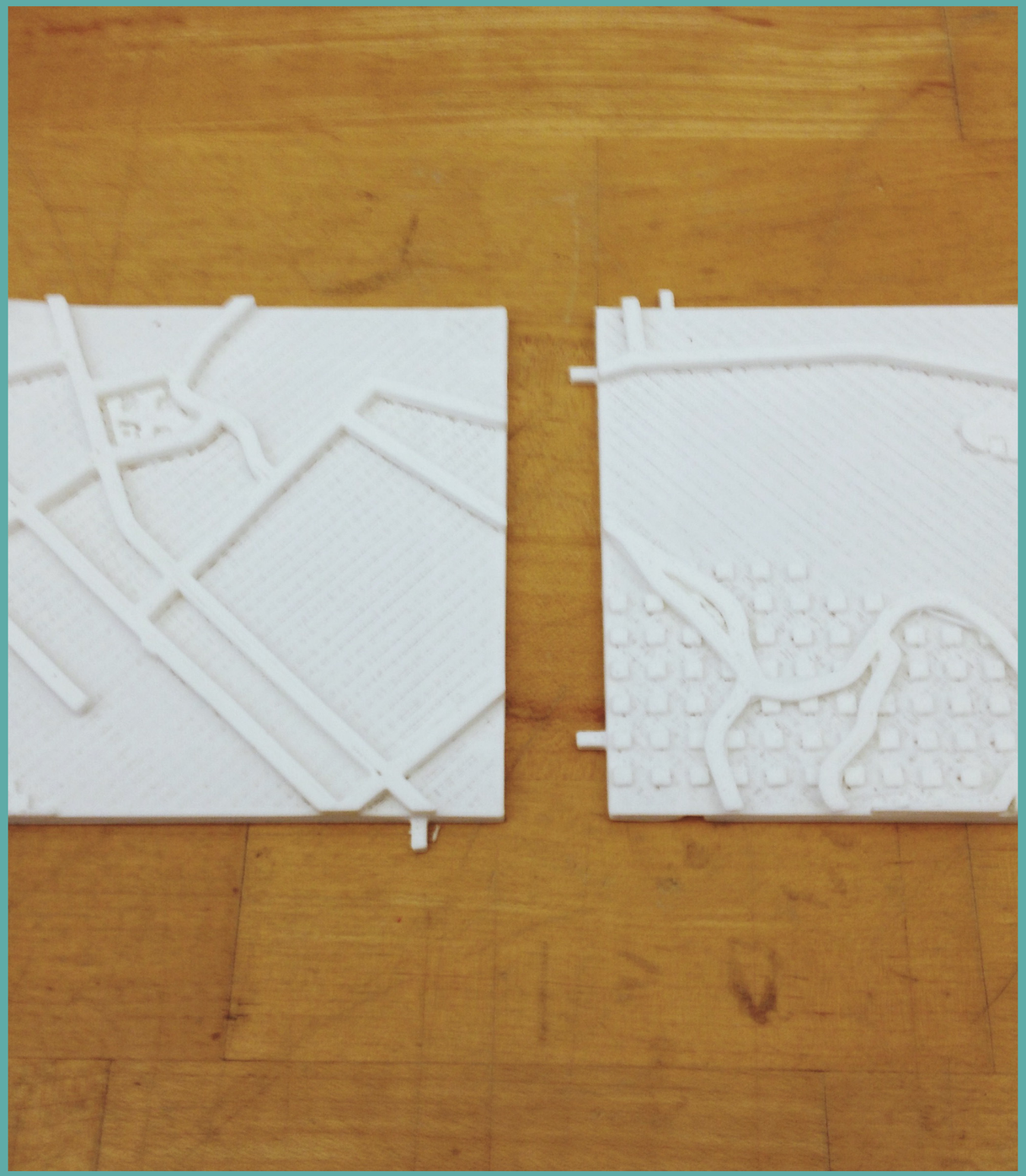


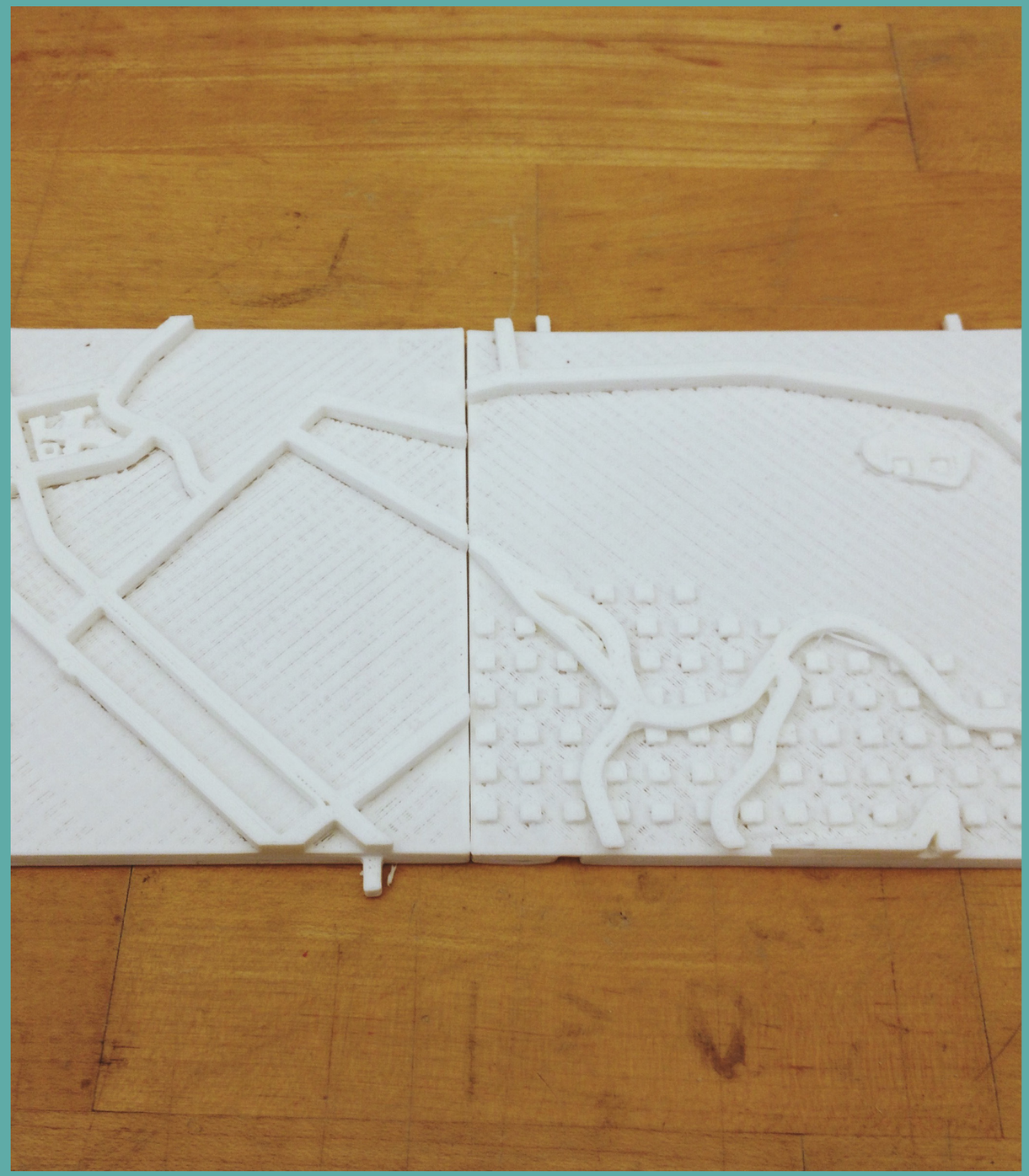
[Final Deliverables: Back]



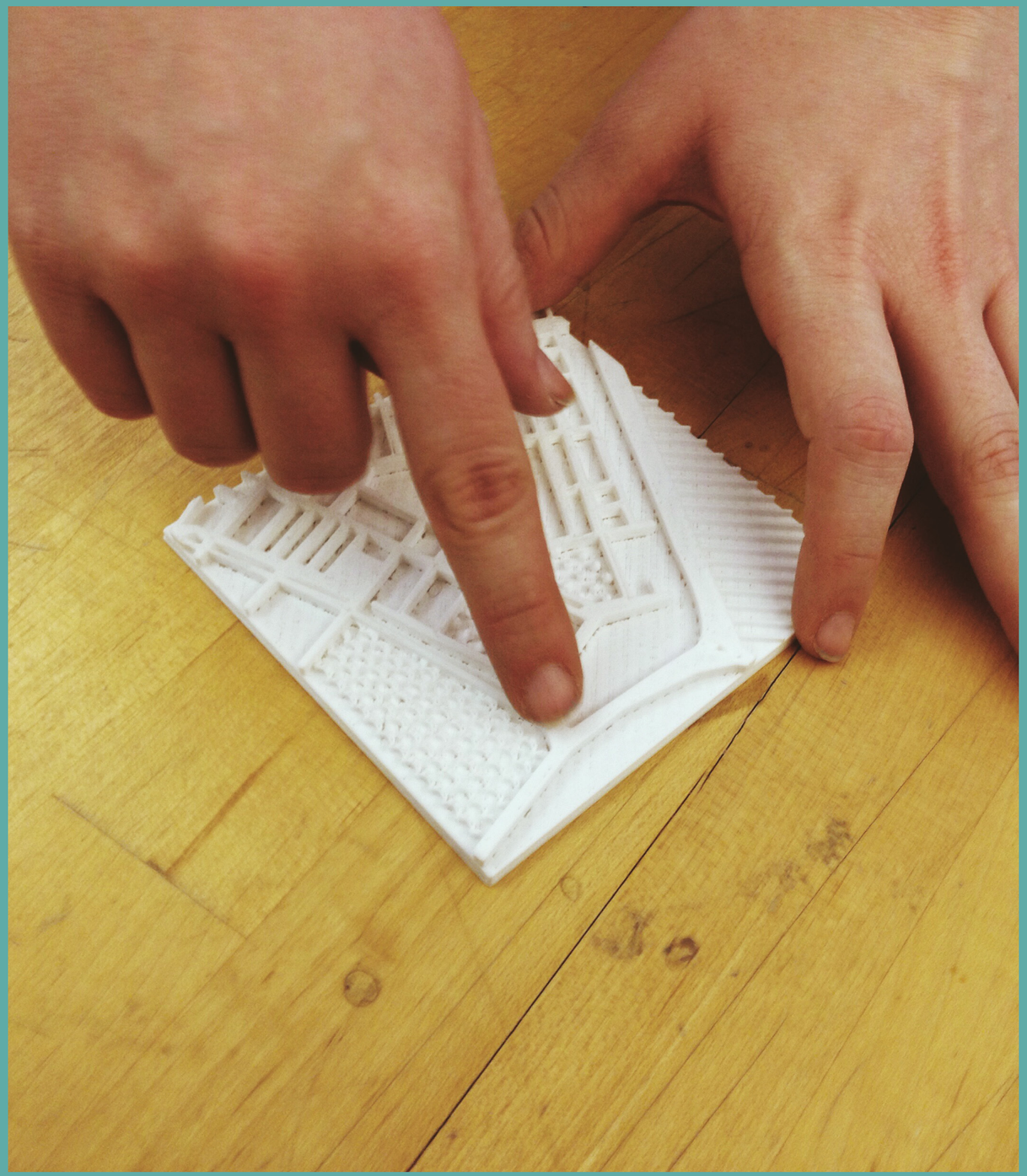


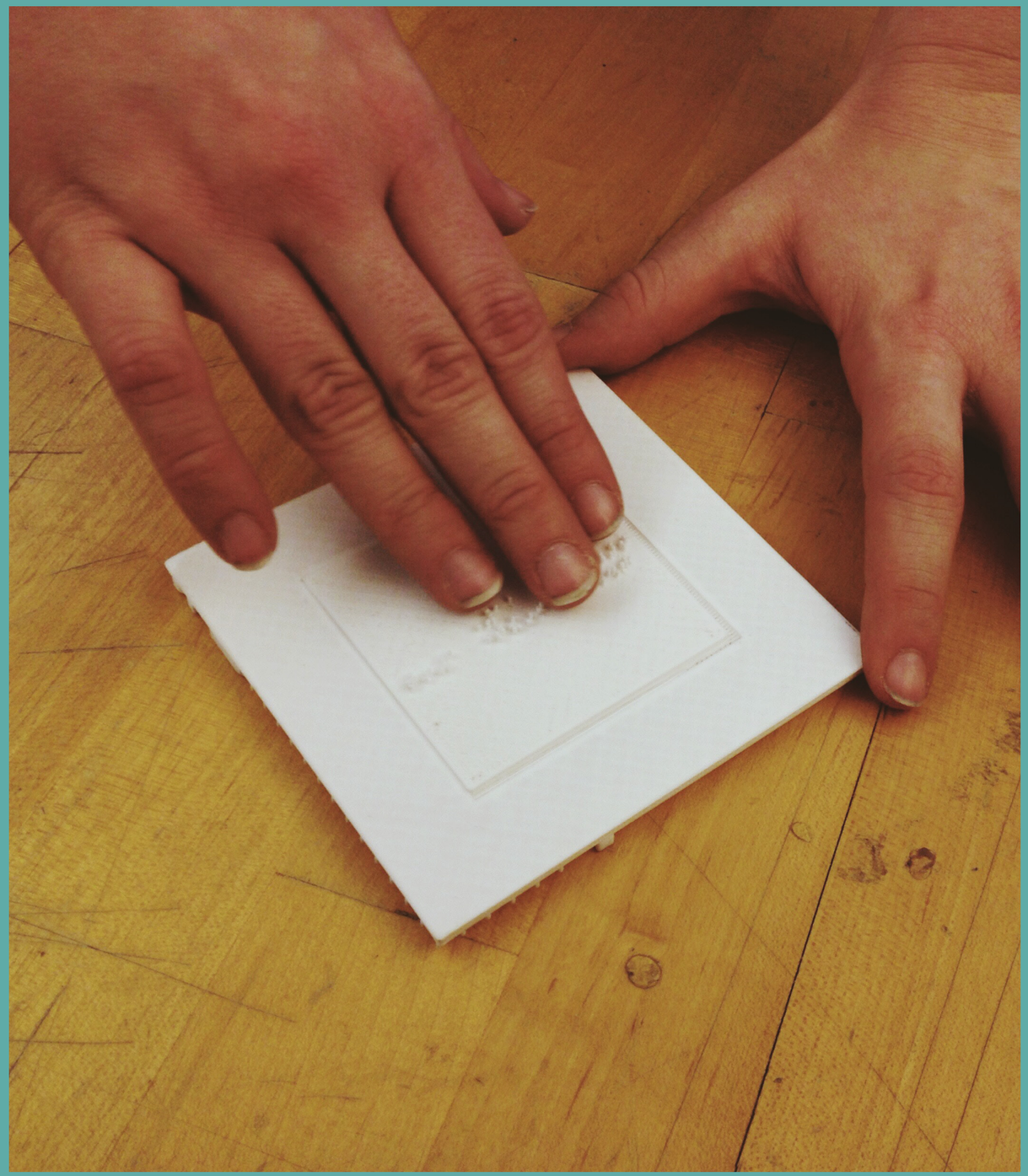
[Final Deliverables: Slotting Together]





[Final Deliverables: In Use]





[Next Steps / Future Work]

- A fully automated end-to-end system

- Web hosted front end or browser plug-in for easier map creation

- User testing to validate level of zoom and utility of features

- Allow public transportation routes to be overlayed on the map

- Allow map dimensions to be customized to account for individual's 3D printer bed size and capabilities

Thank you!