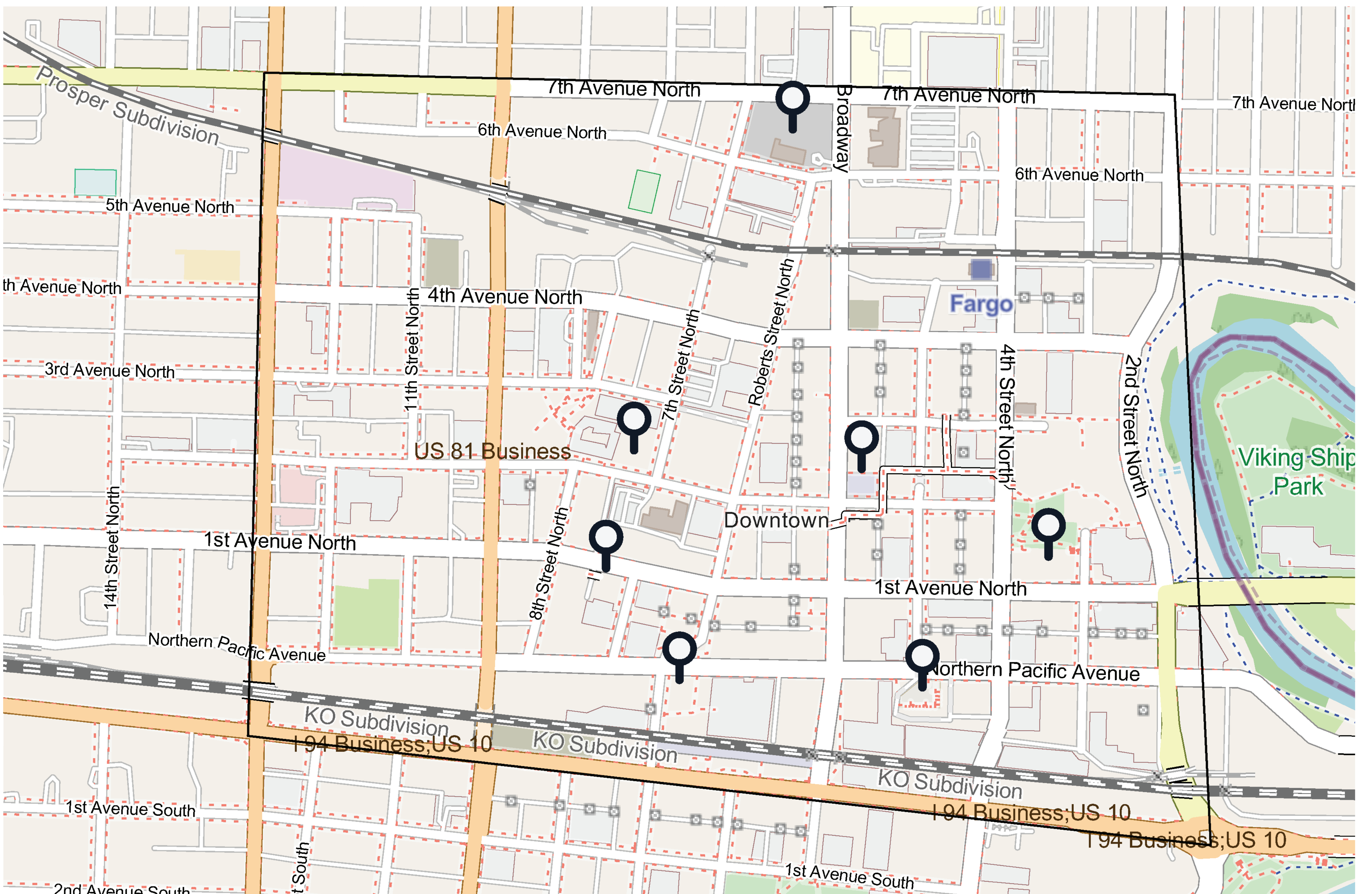




Figure-ground map highlighting buildings, green spaces, and primary and secondary roads.



Detailed map with street information and key points of interest.

Accessibility of Public Transportation

Accessibility of Amenities

Accessibility of Amenities (cont)

Bus Stops to GTC

sourceWRestaurantsAndBars - Source

Name: Show name Ignore

Arrivals defined by:

Arrival rate:

Set agent parameters from DB:

Multiple agents per arrival:

Limited number of arrivals:

Location of arrival:

Node:

Speed:

Agent

Advanced

Custom time of start:

Add agents to: default population custom population

Forced pushing:

Actions

On before arrival:

On at exit:

On exit:

```
if ( regionClosedArea.isVisible() )
  agent.moveToNearestAgent(collectionRestaurantsAndBars1);
else
  agent.moveToNearestAgent(collectionRestaurantsAndBars)
```

Advanced

Agent type:

Transportation

Downtown Gas Station

Downtown Bus Stations

Education / Work

Downtown University

Downtown Misc Commercial Private

Downtown Misc Commercial Public

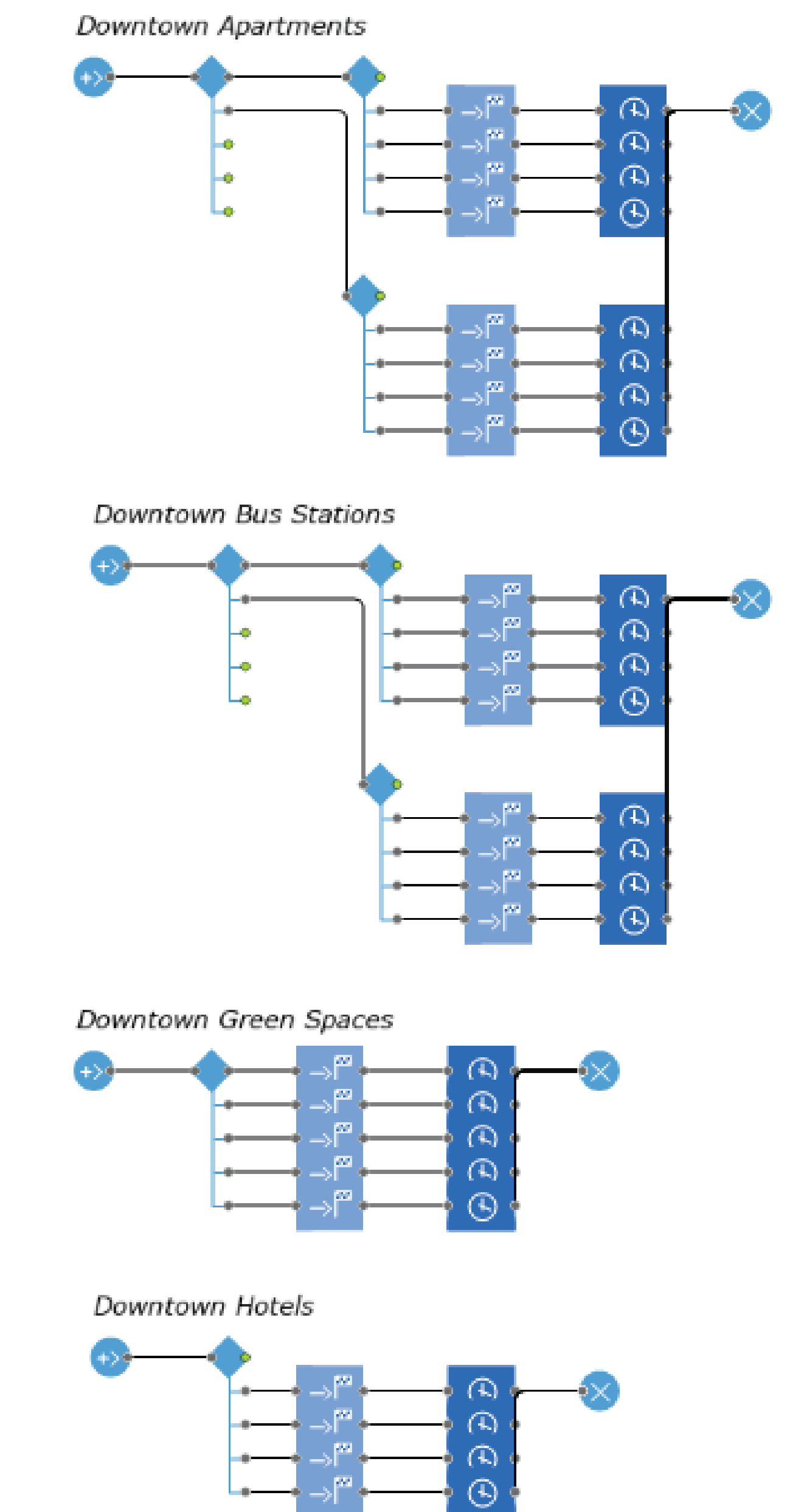
Housing

Downtown Apartments

Downtown Hotels

Stores / Dining

Downtown Restaurants and Bars



In AnyLogic, blocks are used to define where the pedestrian starts, moves, waits, and stays. The Source Block, for example, defines where the pedestrian begins in the simulation. They can start from a certain point of the map (building) or in a defined area (downtown area). In the Source Block, we can set parameters that define how the pedestrian acts or moves, such as arrival rate and speed. Altogether, these blocks can be connected to simulate pedestrian movement. Additional coding is used to simulate pedestrian movement to the nearest destination.

Walkability of Urban Environment

Alternate Means of Travel (Car)

Alternate Means of Travel (Bike)

Downtown University

Downtown Gas Station

Downtown Green Spaces

Downtown Misc Commercial Private

Downtown Bus Stations

Downtown Bike Parking

Downtown Parking

Downtown Hotels

Downtown Church

Downtown Stoplight Intersections

Downtown Restaurants and Bars

Downtown Apartments

Downtown Misc Federal State

Downtown Misc Commercial Public

Travel by Car

Downtown University

Downtown Gas Station

Downtown Misc Commercial Private

Downtown Parking

Downtown Hotels

Downtown Church

Downtown Stoplight Intersections

Downtown Restaurants and Bars

Downtown Apartments

Downtown Misc Federal State

Downtown Misc Commercial Public

Travel by Bike

Downtown University

Downtown Gas Station

Downtown Green Spaces

Downtown Misc Commercial Private

Downtown Bike Parking

Downtown Hotels

Downtown Church

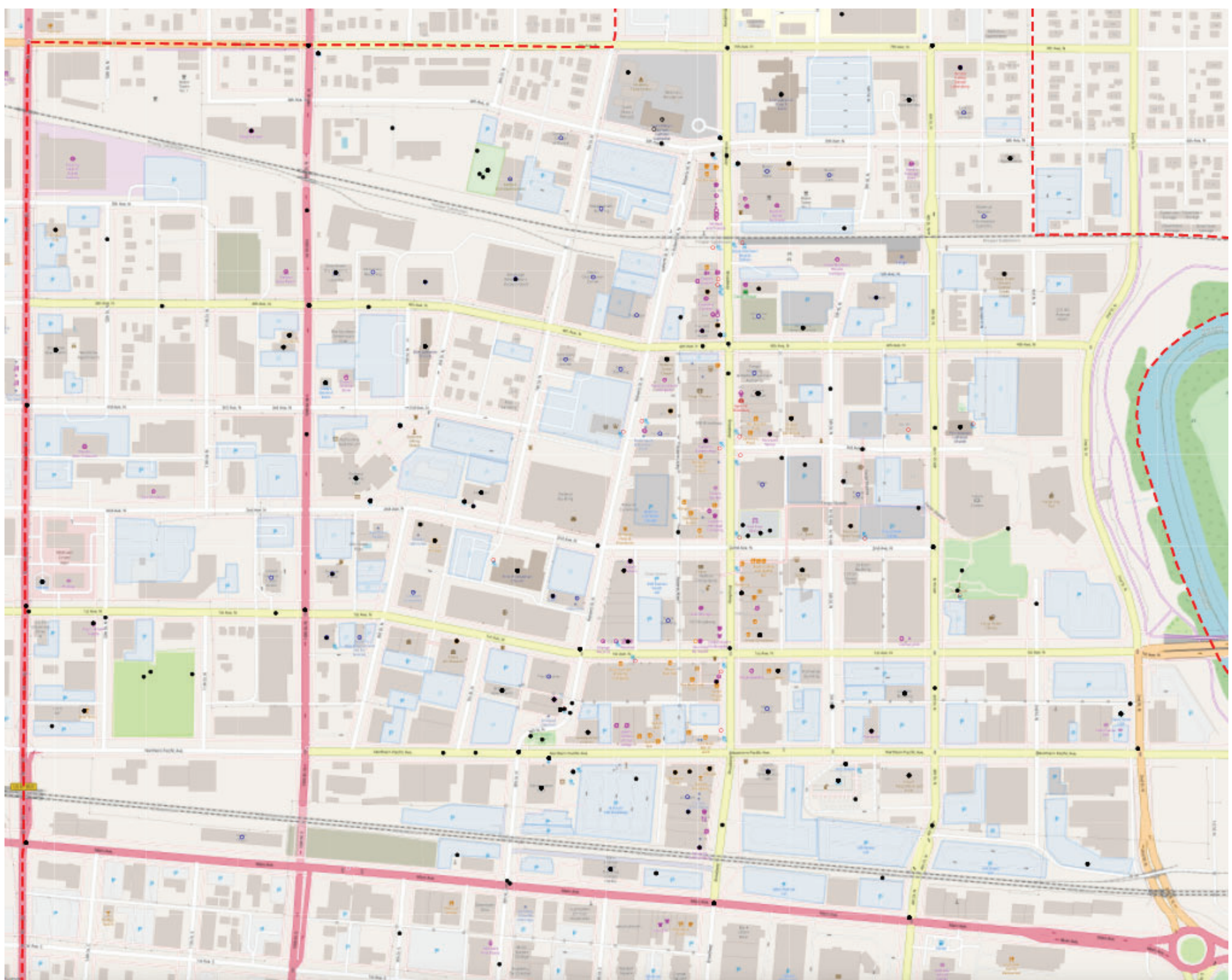
Downtown Stoplight Intersections

Downtown Restaurants and Bars

Downtown Apartments

Downtown Misc Federal State

Downtown Misc Commercial Public



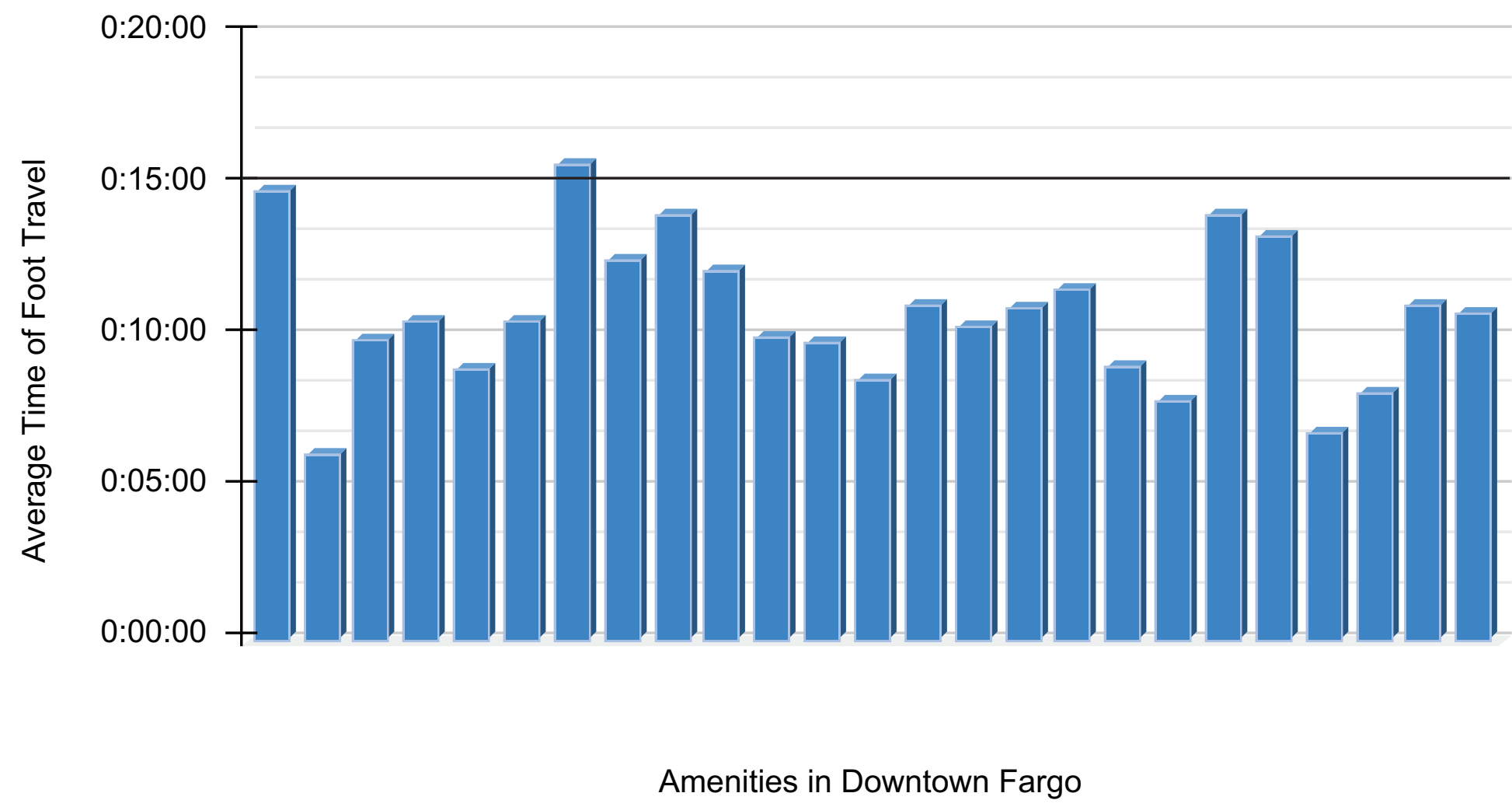
GIS map of model in the process of simulation (black dots indicate moving pedestrians).

By examining multiple pedestrian simulations, the model during simulation exhibits plenty of movement in the downtown area. In addition, these studies were documented through a dataset that could record the pedestrians' movement and travel distance. Through this data, diagrams can be created to dictate the walkability or efficiency of the urban area. In this case, downtown Fargo meets expectations of a walkable urban environment while also providing accessible alternate means of transportation.

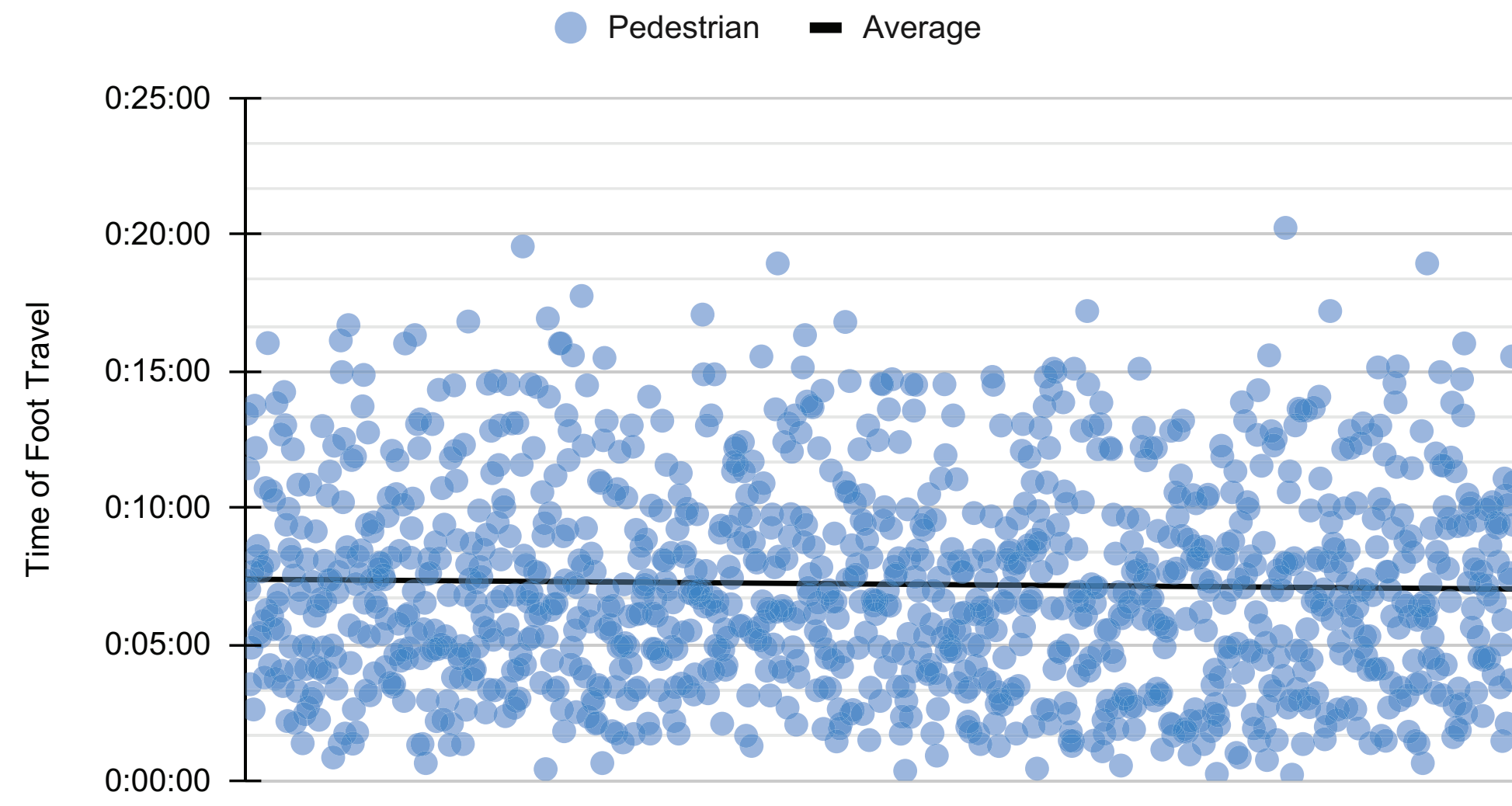
Real world uses such as showing the distance to necessary or common building types are important to show the walkability of urban environments. While the models only simulate the downtown Fargo area, future models could perhaps simulate an entire city. This would result in a more advanced and accurate model.

Using GIS integration with AnyLogic provided accurate locations and distances which helped with overall organization and efficiency. However, new city designs can still use this workflow, but sidewalks, roads, and buildings would have to be modeled from the ground up.

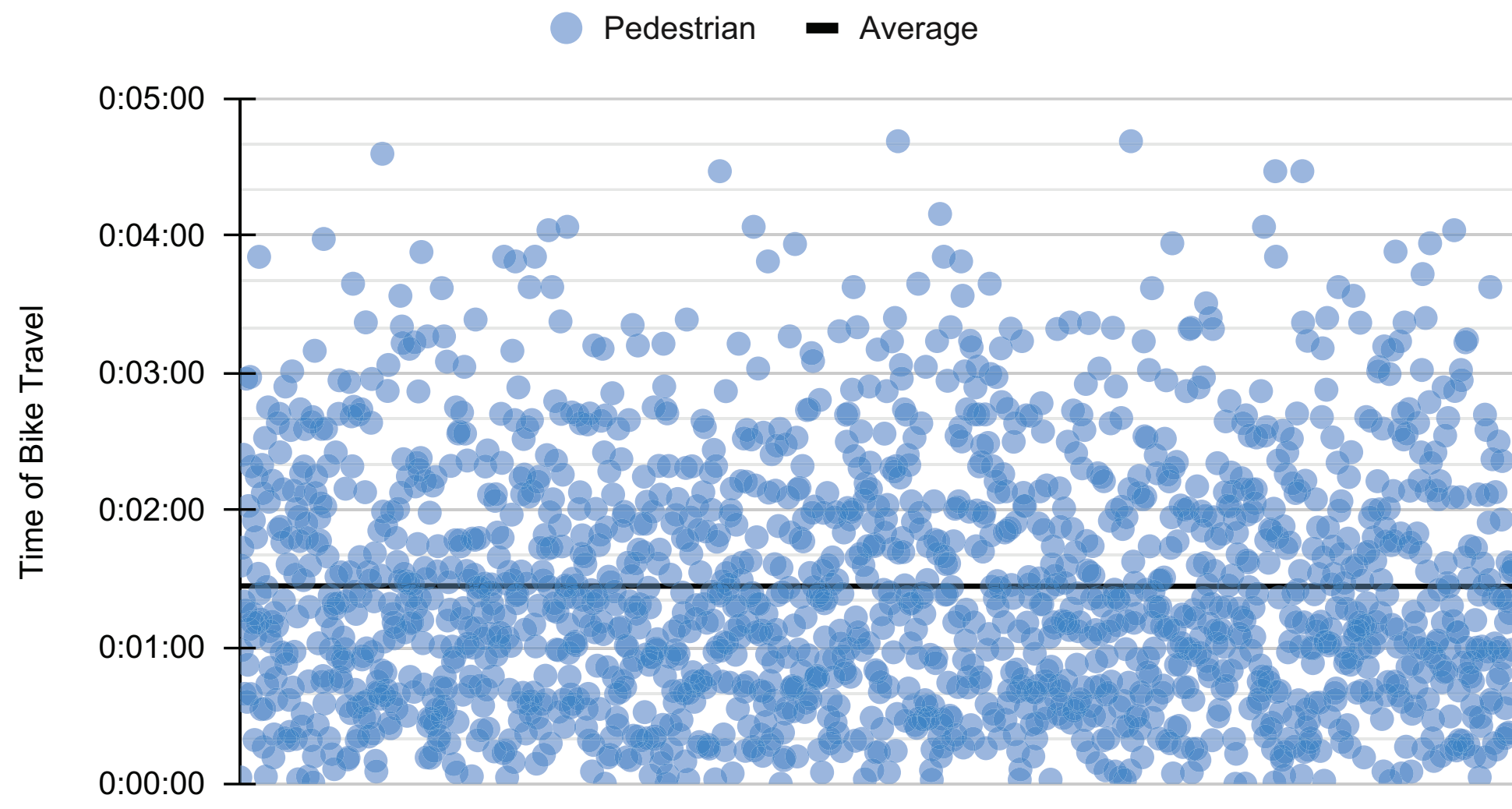
Accessibility of Amenities in Downtown Fargo



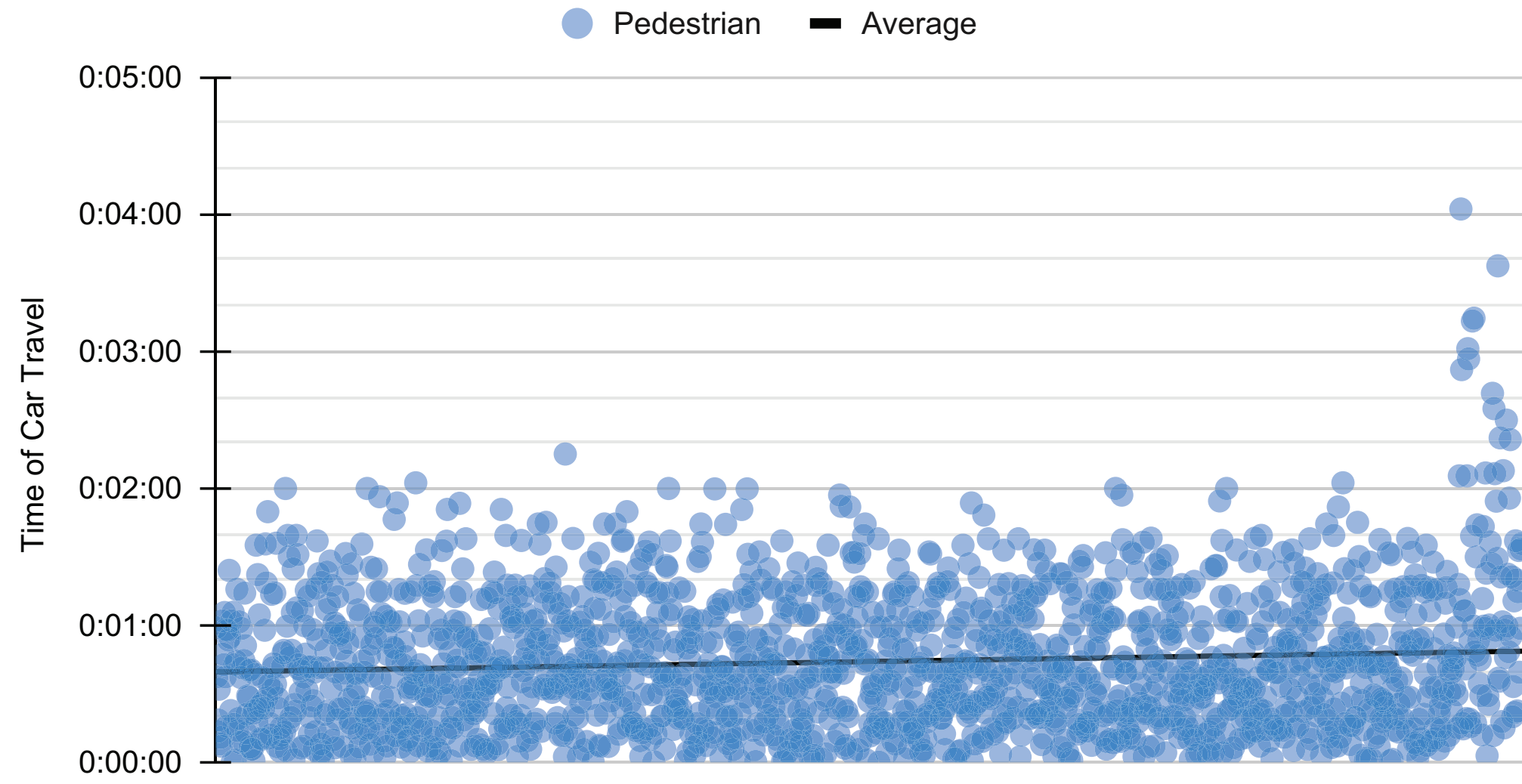
Accessibility of Amenities in Downtown Fargo



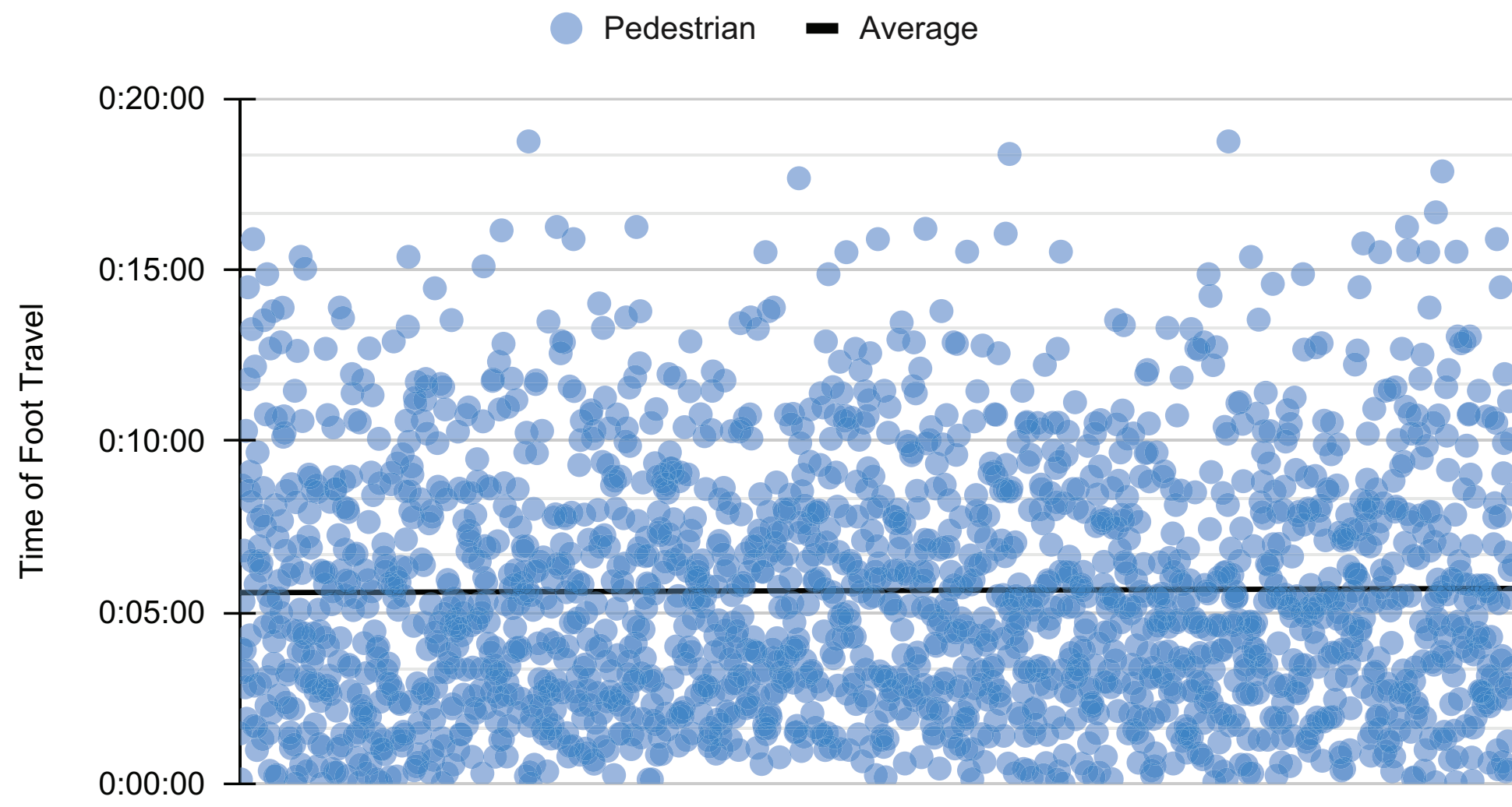
Bike Travel in Downtown Fargo



Car Travel in Downtown Fargo



Foot Travel in Downtown Fargo



Foot Travel to a Bus Station in Downtown Fargo

