# Austin's Walkability: Tree Canopy Cover of Downtown Austin's Sidewalks

Zoey Suasnovar, Department of Environmental and Sustainability Sciences; Faculty Advisors: Brendan Lavy and Esayas Gebremichael

## Introduction

As the Capital of Texas, Austin has been a great exemplar in the protection and preservation of trees within their city limits. Austin has had a commitment to these trees for decades, but what do the trees do for the city of Austin? This poster focuses on the sidewalks of downtown Austin, and what percentage of them are covered by the canopy of these trees. Using Geographic Information Systems (GIS) we calculate the percentage of the canopy cover overlaying the sidewalks. Understanding the canopy cover allows us to also find the walkability score of downtown Austin. A tree's canopy provides shade, and when placed over a sidewalk, it provides an escape from the omnipresent heat in Austin in the Texas summers. People in areas of lower-socioeconomic status tend to have reduced trees (and greenspace in general) compared to those of a higher-socioeconomic status. By determining an area's walkability score, we can also find areas of desire where greenspaces and trees can benefit the people living there.

## Question

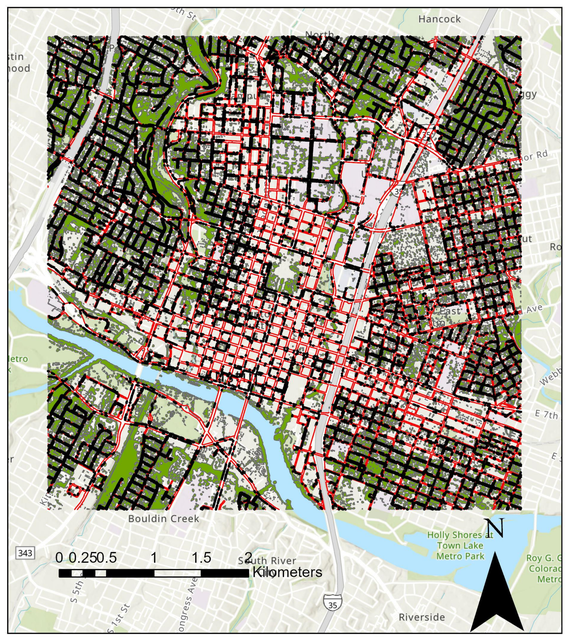
What is the percentage of shaded sidewalks in downtown Austin and how is it correlated to the walkability score?

## Methods

Austin provides GIS data through their open-source data website. From this website the canopy, sidewalk, and jurisdiction data could be sourced. Each piece of data was added to a new project in GIS so that they would all be visible at the same time. However the data is for all of Austin, and we just need the area around downtown Austin for this study. The information can be cut into the pieces that we need through the GIS tool 'Clip Tool.' A point was placed at the center of the Capitol with a square barrier 2.5 km away from each side. The square was used as the input layer in the clip tool so that the canopy and sidewalk data would be clipped to just the downtown area that was needed. These two new layers showing the downtown canopy and sidewalk have information attached to them that we can view in the attribute table. Using these two layers the tool 'Select Layer by Location' is used to create a new output layer that will display just the pieces of sidewalk that are overlapped by the canopy. All layers come with an attribute table that can be used to see any information within the downloaded data; for the sidewalk data it included nonspatial data like the sidewalk names for any additional information. In this attribute table we can add a field to calculate the length of all the sidewalks and for the length of the sidewalks that are shaded by the canopy using the 'Calculate Geometry Attributes' Tool. With these fields included, we can export the table to Excel and perform the necessary calculations to find the total amount of sidewalk in the study zone and the shaded amount. Using these percentages, we are then able to discuss the correlation between the canopy cover and the walk score of Austin.

## Results

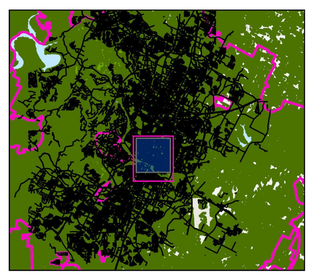
| **Example Table** | This is an example of what the attribute table looked like in GIS. The type of sidewalk, its name, as well as the lengths | | | |
|---|---|---|---|---|
| | that were found are on it. Then it could be transported to excel for additional math. | | | |
| **Street Name** | **Sidewalk Type** | **Length of Sidewalk (ft)** | **Length of Shaded Sidewalk (ft)** | **Percent Shaded (%)** |
| E CESAR CHAVEZ ST | DRIVEWAY | 14.79013112 | 14.79068294 | 100% |
| E 22ND ST | POTENTIAL_SIDEWALK | 261.2710302 | 115.7628225 | 44% |
| WINDSOR RD | EXISTING_SIDEWALK | 145.8550469 | 17.52004083 | 12% |
| SPEEDWAY | EXISTING_SIDEWALK | 27.90022429 | 27.90148216 | 100% |
| LAFAYETTE AVE | EXISTING_SIDEWALK | 96.59528314 | 17.13869435 | 18% |
| FOREST TRL | PLANNED_SIDEWALK | 41.19608496 | 41.19752271 | 100% |
| | PLANNED_SIDEWALK | 91.30103988 | 0.649610376 | 1% |




Study Area Results

**Downtown Austin**

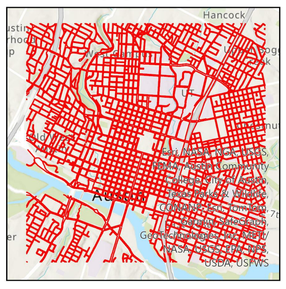
- Shaded Sidewalks
- Unshaded Sidewalks
- Tree Canopy



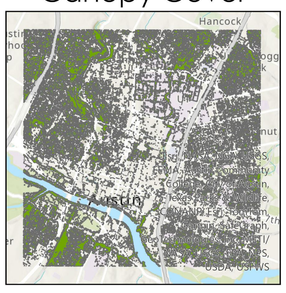
| **Results Table** | This is the table holding the resulting calculations performed on the lengths found from the sidewalks in feet. |
|---|---|
| **Sum of all sidewalks:** | 1293759.093 |
| **Sum of shaded sidewalks:** | 616693.4911 |
| | |
| **Total Amount of Unshaded Sidewalks:** | 677065.6016 |
| **Percentage of Shaded Sidewalks:** | 48% |

## Downtown Austin's Layers

All Sidewalks




Canopy Cover




Shaded Sidewalks


N

0 0.5 1 2 3 4 Kilometers

## Discussion and Conclusion

The results show that in downtown Austin there are 394 kilometers of sidewalks (1293759 ft). Out of these sidewalks about 188 kilometers (616693 ft) are covered by tree canopy. This means that 48% of all sidewalks in the downtown area are covered in a tree canopy that will provide shade to the sidewalks. Austin in general has a low walk score of 42, meaning it is a car dependent city and that most of the errands a person would need to run are going to require a car. The downtown area is a different story however, the area surrounding the capitol building has a walk score of 99 making it a 'walker's paradise.' This is different than what was expected because the area directly touching the capitol building has the least amount of canopy cover. Another example of this seemingly inverted relationship is in the neighborhoods in the North-East corner of the study area. These neighborhoods have the lowest walk score of the study area but have the most shaded sidewalks. While it was believed that shaded sidewalks would be an aspect of the walk score that would make it increase, canopy cover seemed to have an inverse relationship to the walk score.

## Acknowledgments

Thank you to TCU's College of Science and Engineering for the opportunity to look further into this area. Many thanks to both advisors on the project, Dr. Brendan Lavy and Dr. Esayas Gebremichael, as without their assistance the project would not have been possible.