Walkability Analysis with Kernel Density and Numerical Analysis

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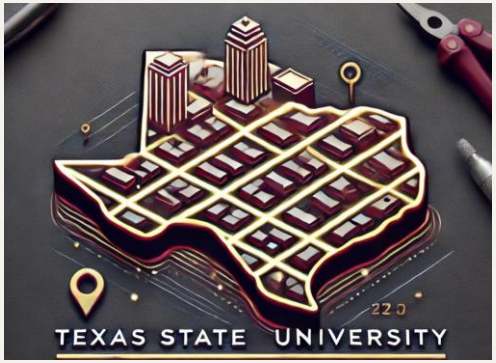


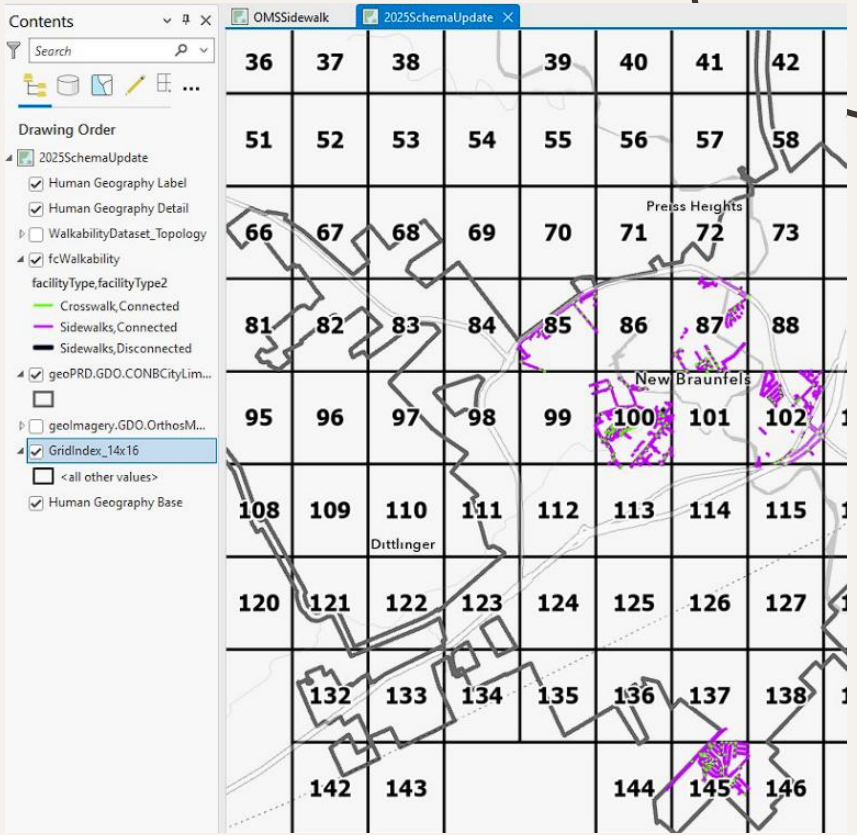
Introduction

Main outcomes of this project include-

- Inventory of-
    - sidewalks within City of New Braunfels
    - crosswalks within City of New Braunfels
- Gaps and disconnects within the database
- Kernel Analysis of gaps and disconnects
- Statistical analysis of No Transport Zones of school districts gaps and disconnects

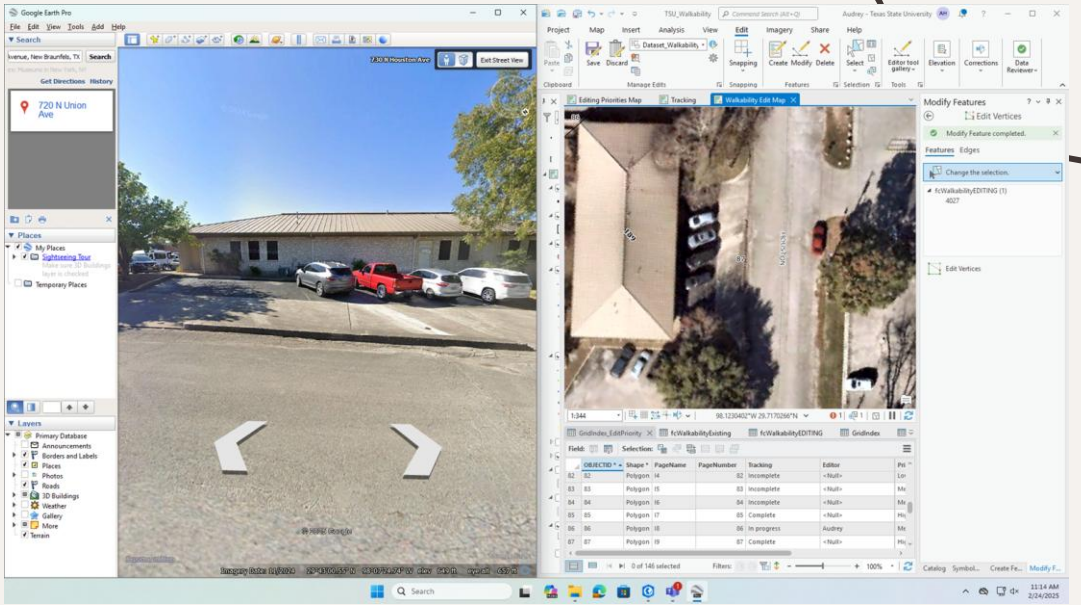
Data

- Data was provided by the City of New Braunfels
  - Aerial photography/imagery of New Braunfels
  - Datasets including:
    - school locations
    - school no-transport zones
    - an editing layer for the new sidewalk features
- The data being provided by the city has a high level of accuracy
- Google Earth had some accuracy issues



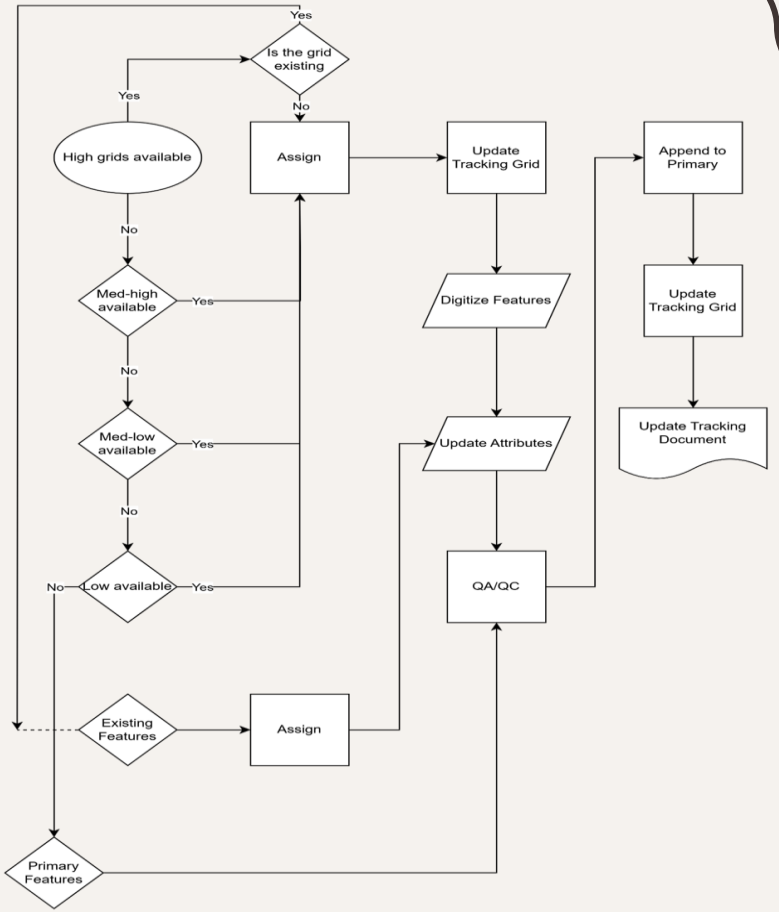
Data

- We greatly extended the network of sidewalks
- Added all gaps and disconnects
- Attributes provided in the fcWalkabilityEDITING dataset were the basis of later analysis and classification
    - MSAGName to classify street names
    - Featuretype and featuretype2 to classify as sidewalks/crosswalks or connects/disconnects/gaps



Flow Chart

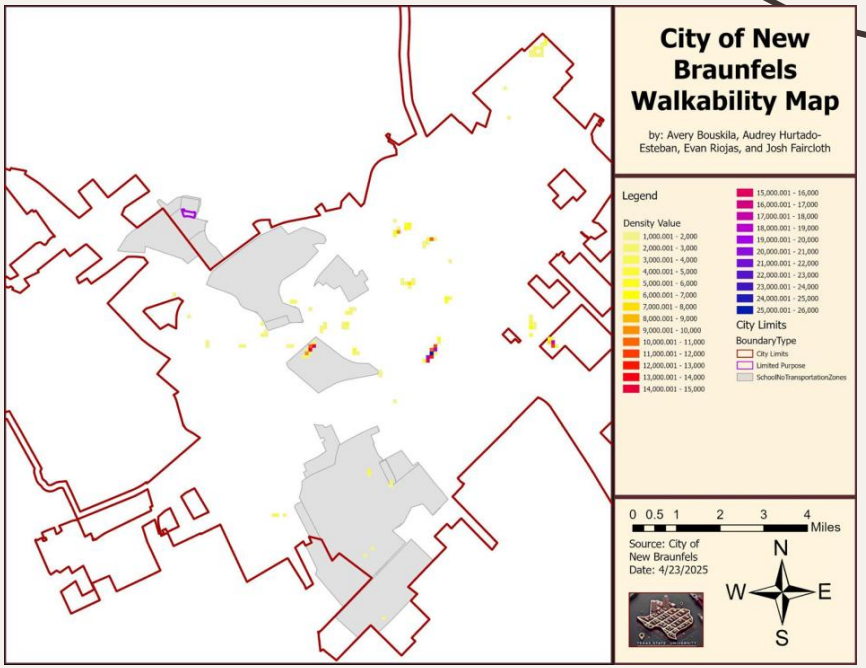
- This is also subject to change as we work, certain tracking documents have been updated multiple times
- Grids have been re-updated multiple times
- Digitization has happened multiple times



Methods

Kernel Density estimation is a spatial analysis

- Each point has a "kernel" – a 3D shape (often resembling a small hill or a Gaussian curve) centered on it.
- Where many kernels overlap, the surface is higher, indicating a higher density of points.
- The result is a density map where darker or warmer colors usually represent areas with more concentrated features (the "hot spots").
- Kernel Density (Hot Spot) refers to using this technique to identify areas with a high concentration of sidewalk gaps and disconnects. **These hot spots would be the areas where pedestrian connectivity is most problematic.**

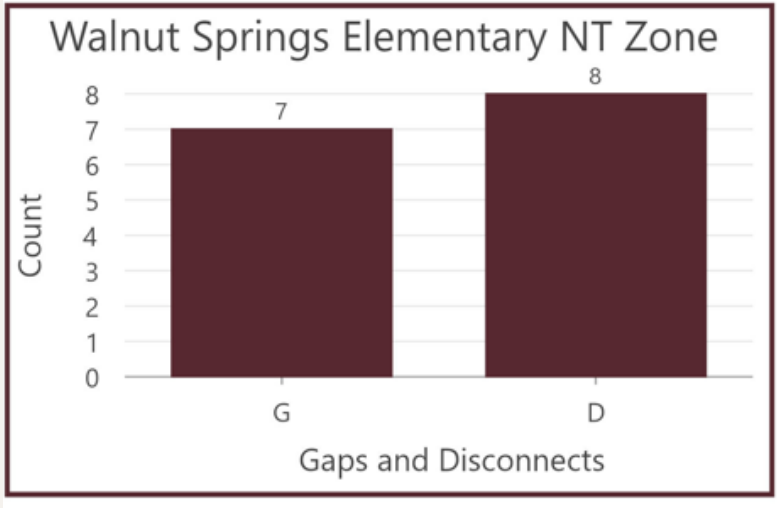


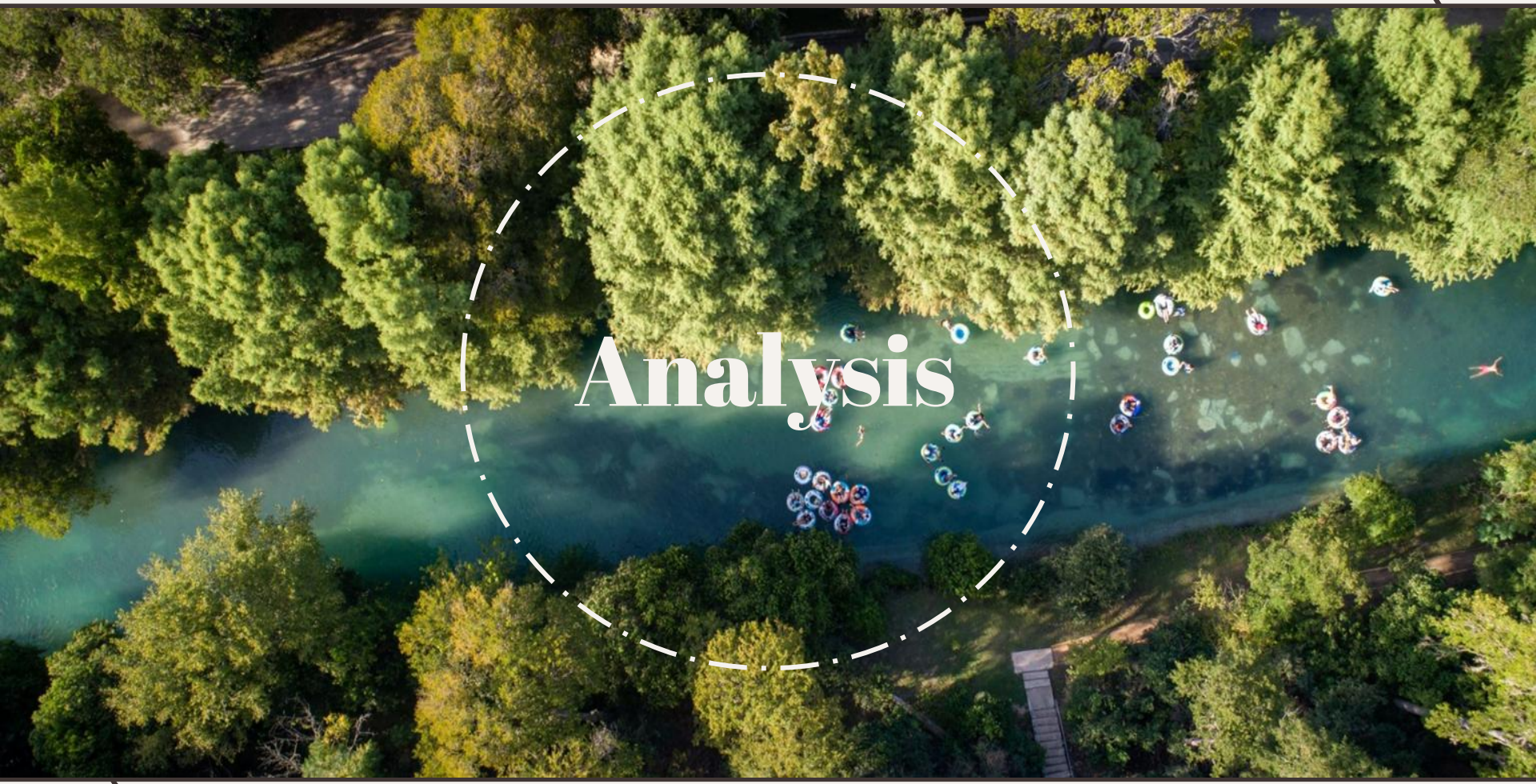
Methods

Numerical Analysis

- It *transforms spatial data* (the locations and attributes of sidewalks) into quantifiable information ie. numbers and statistics.

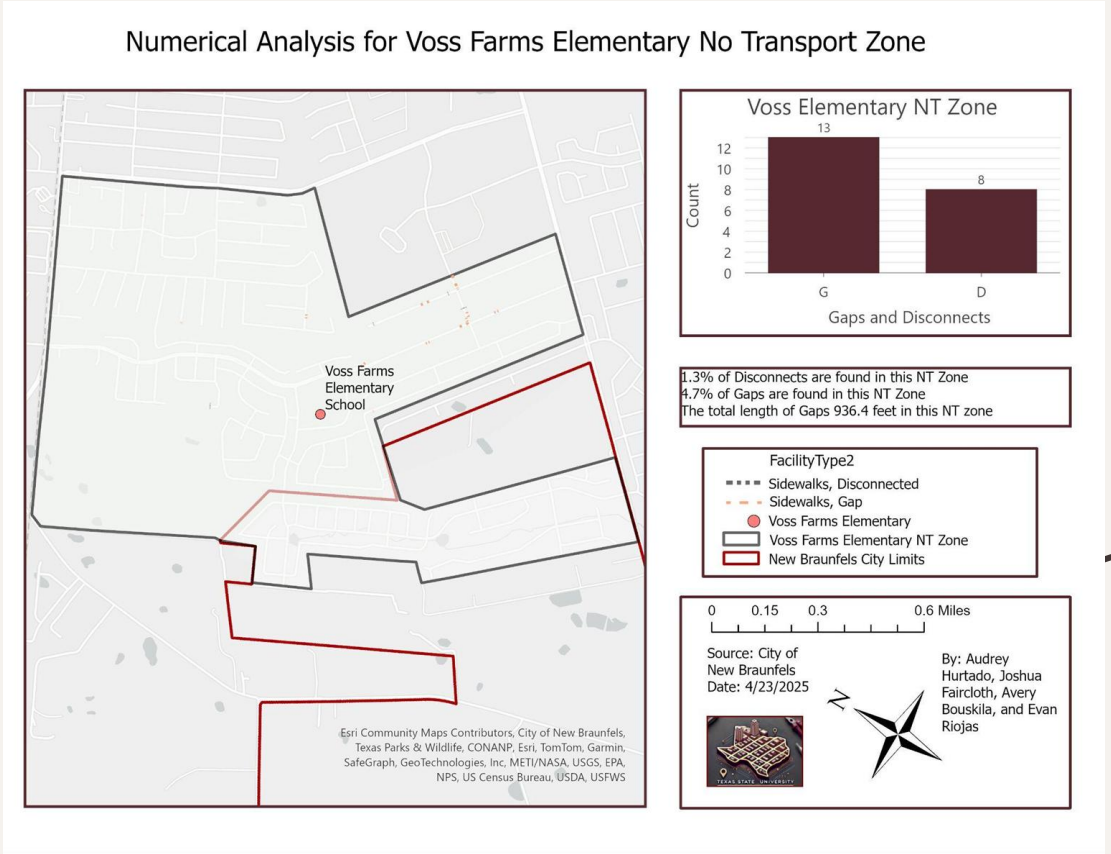
- Such tools include select by attribute, calculate field, and statistics.




Analysis

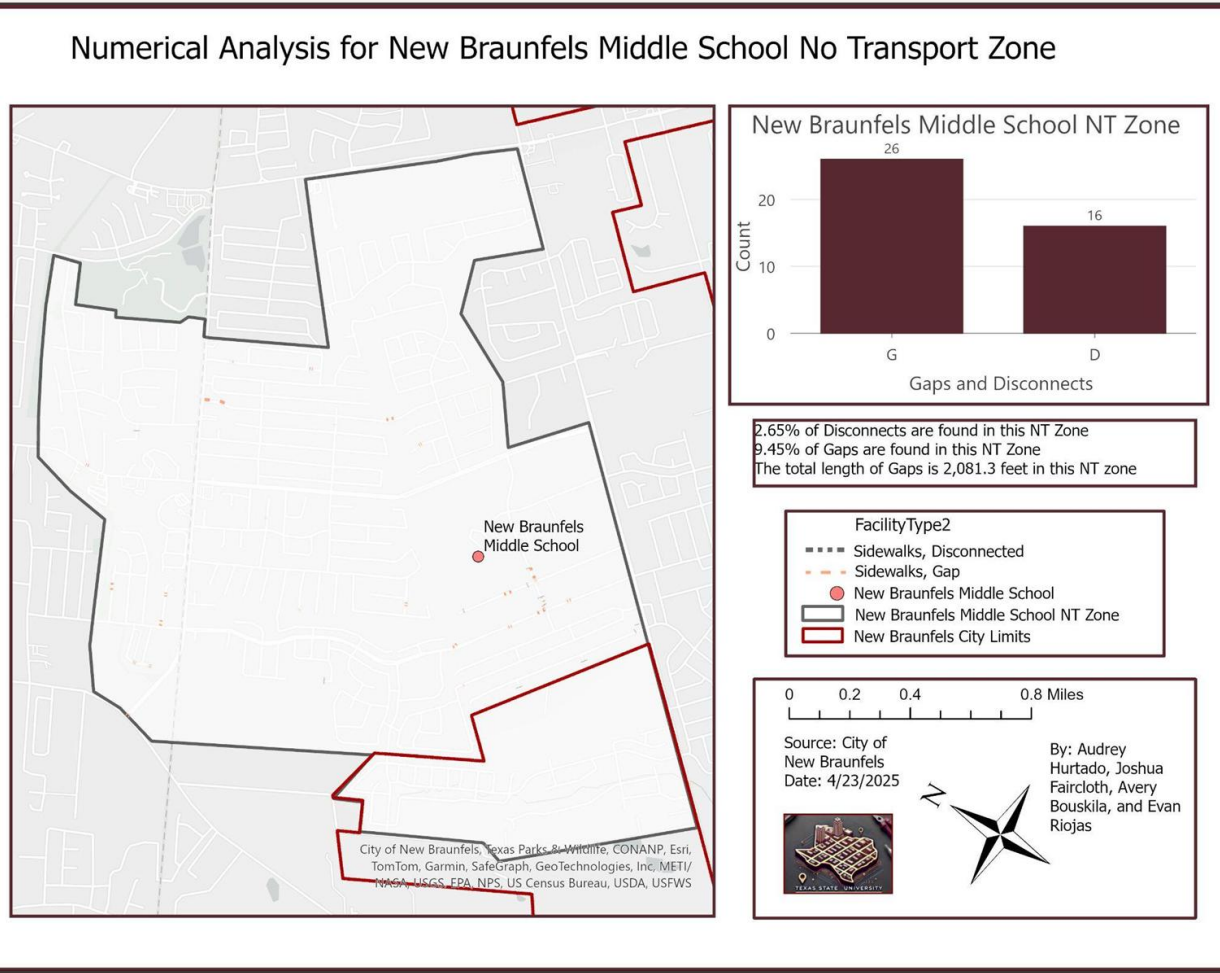
Elementary School

Numerical Analysis



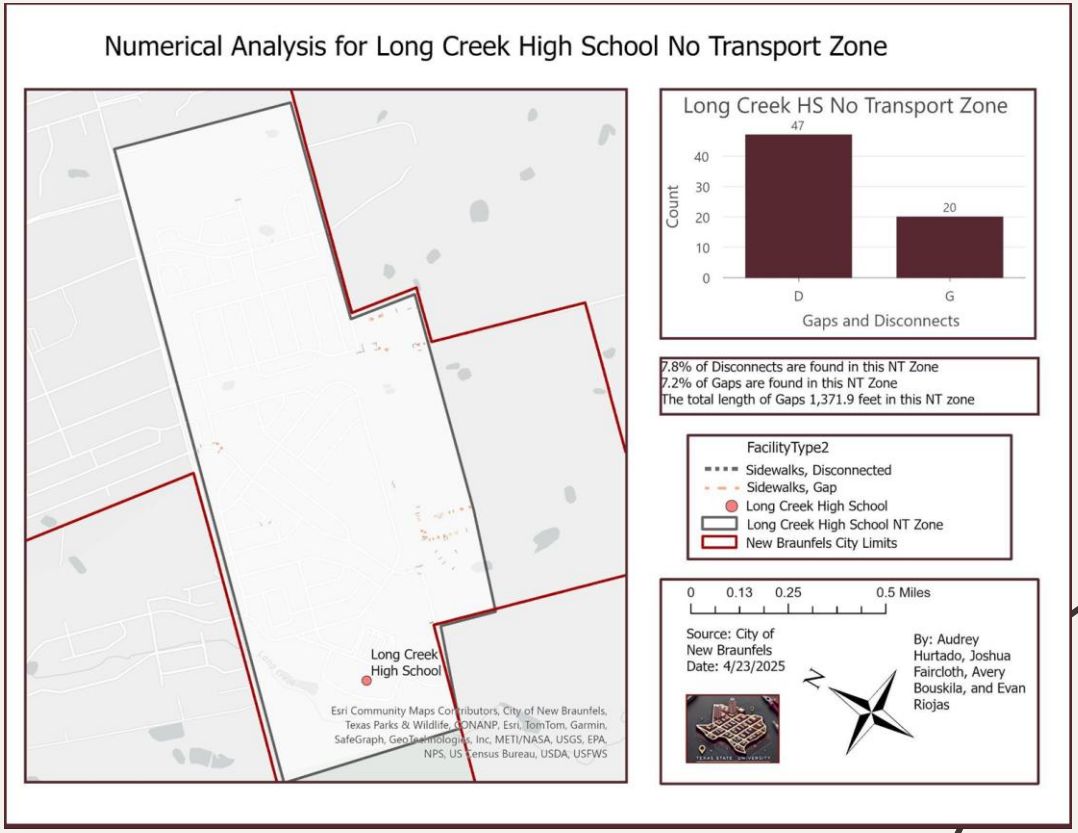
Middle School

Numerical Analysis

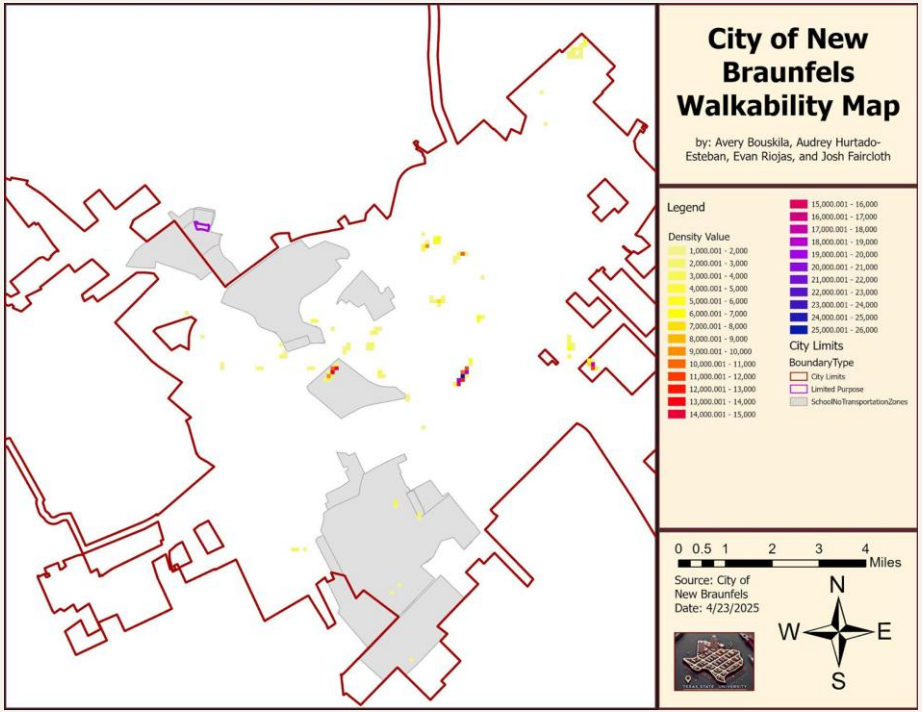


High School

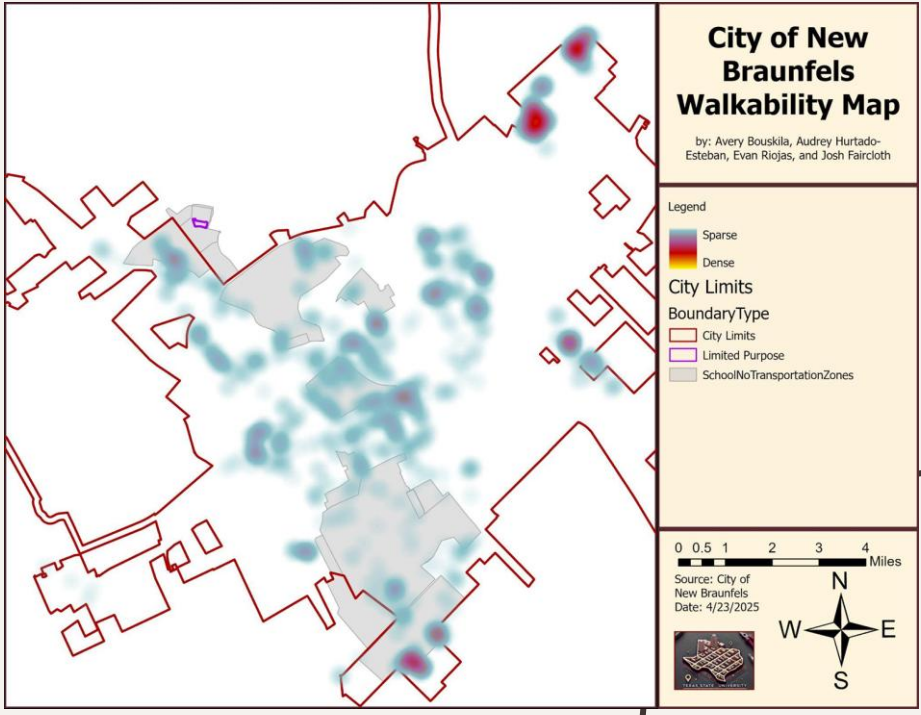
Numerical Analysis



Kernel Analysis



Kernel Density Raster

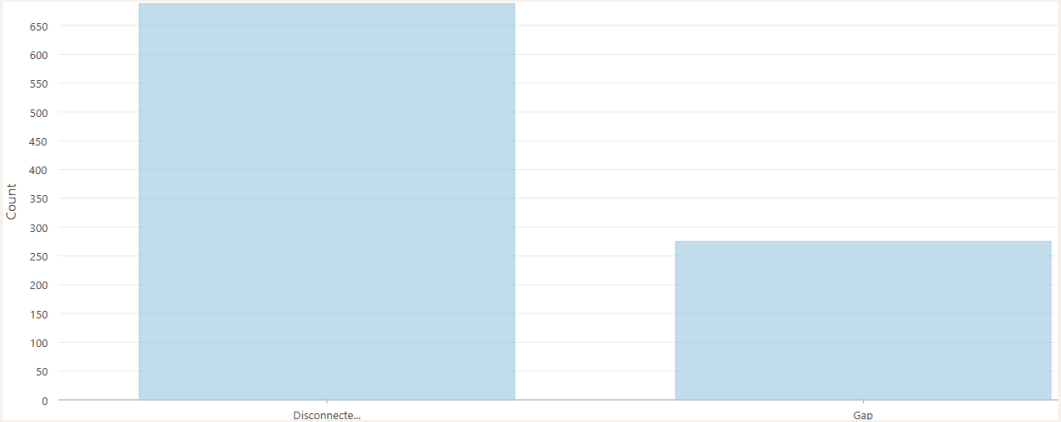


Point Hotspot

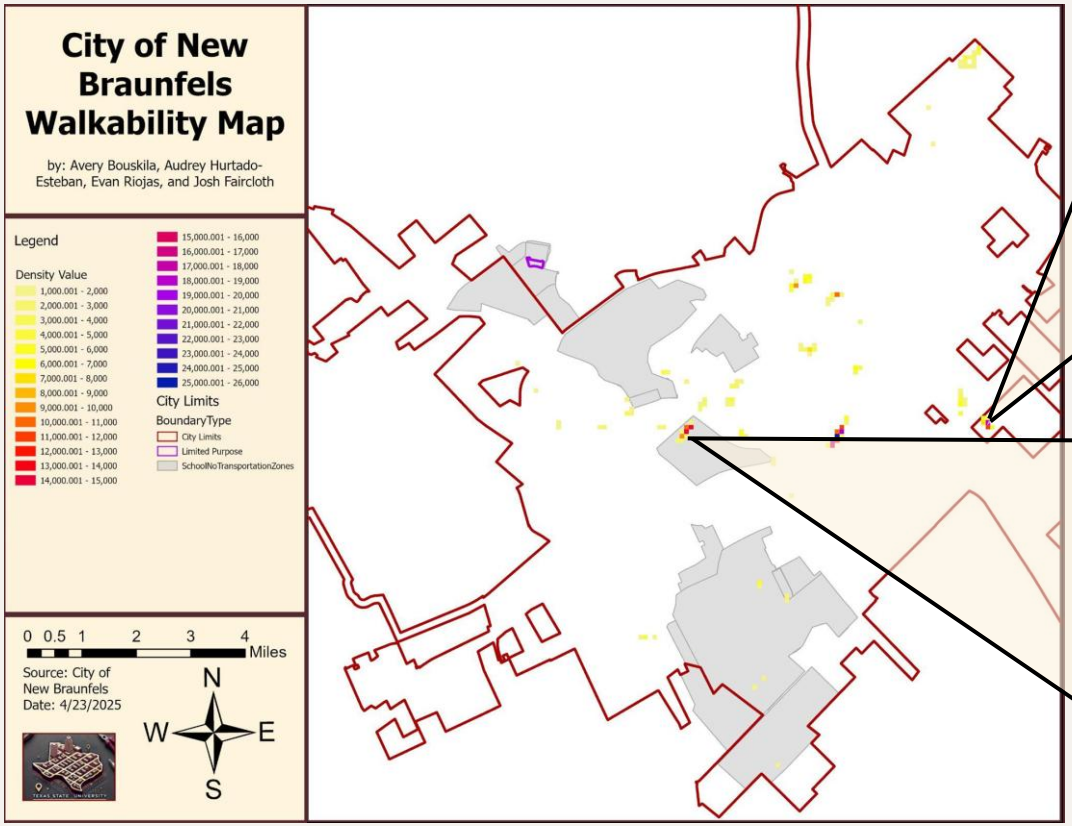
Results

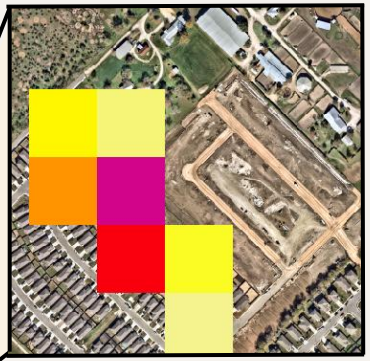
Gaps vs. Disconnects

- Disconnects occurred disproportionally more than gaps.
    - 688 Disconnects vs 275 Gaps
- Total lengths of gaps disproportionally were higher than all gaps combined.
    - 34,076 feet in Gaps
- Larger percentage of gaps and disconnects centered in old town New Braunfels.
- Higher density areas often coincided with developing suburban communities.

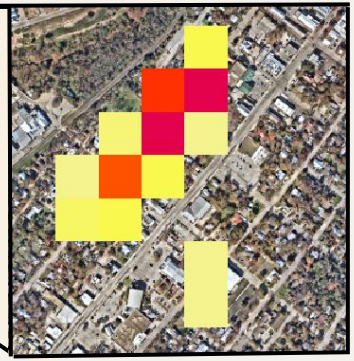


Results





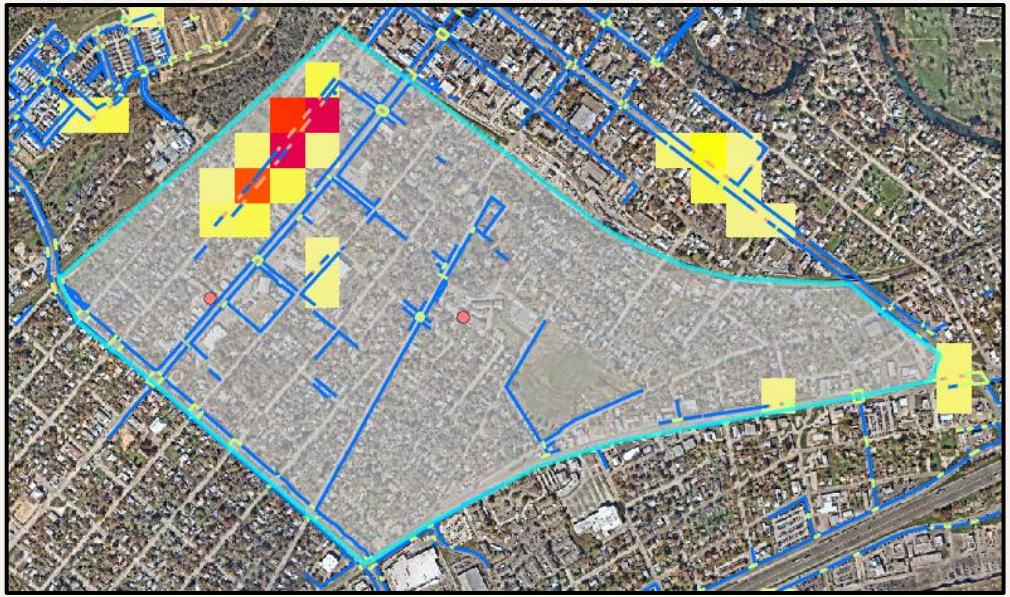
Developing Community Snapshot



Old New Braunfels Snapshot

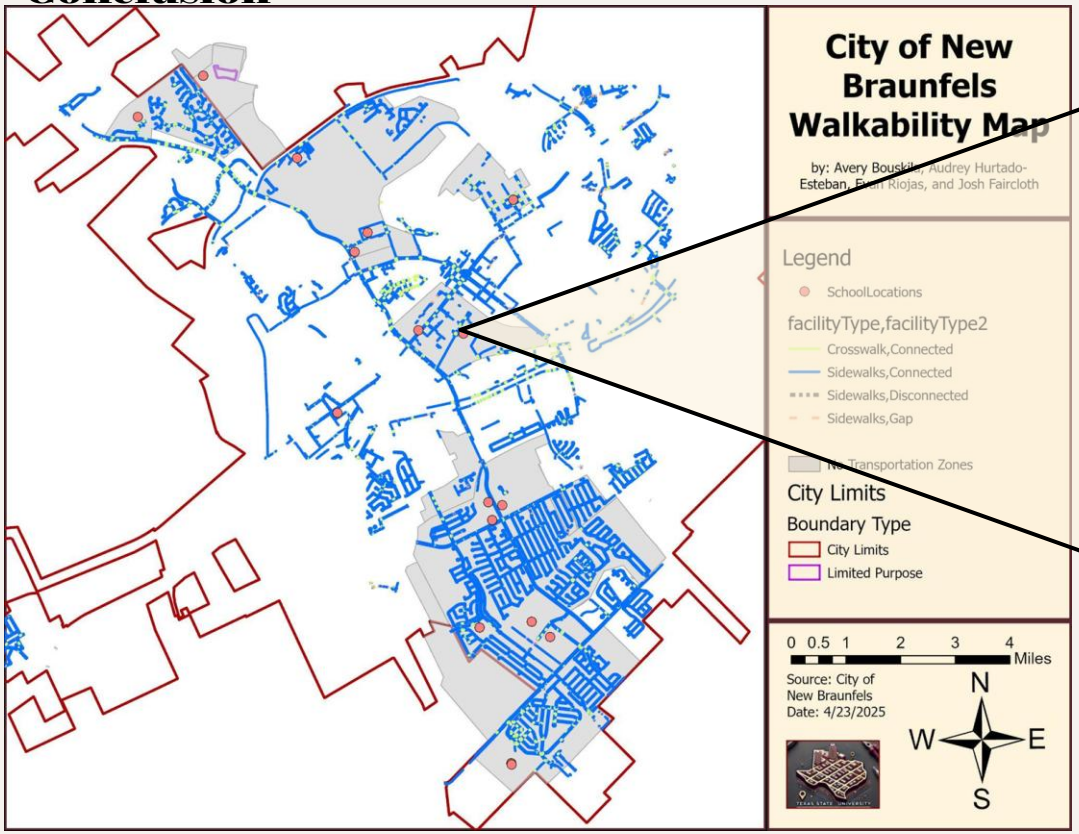
Conclusion

- Old New Braunfels which at the time of development didn't,
  - have sidewalk and accessibility mandates proves to be the area with the highest levels of disconnection.
- Based on surrounding gaps and disconnects and assessed results the school to be **prioritized is the Carl Schurz Elementary School**
- Old New Braunfels where there are few connected sidewalks as well as many gaps
- Compared to other school no transportation zones this one has the highest levels of disconnectivity

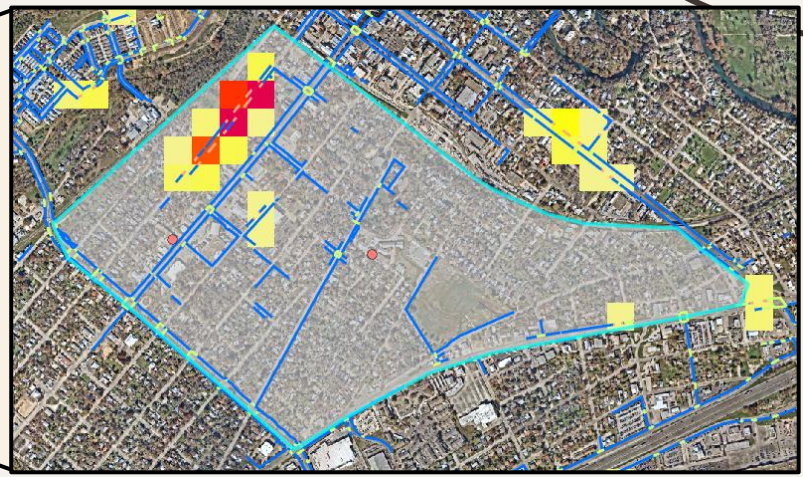


Carl Schurz Elementary School Snapshot

Conclusion



Sidewalk Connectivity Map



Carl Schurz Elementary School Snapshot

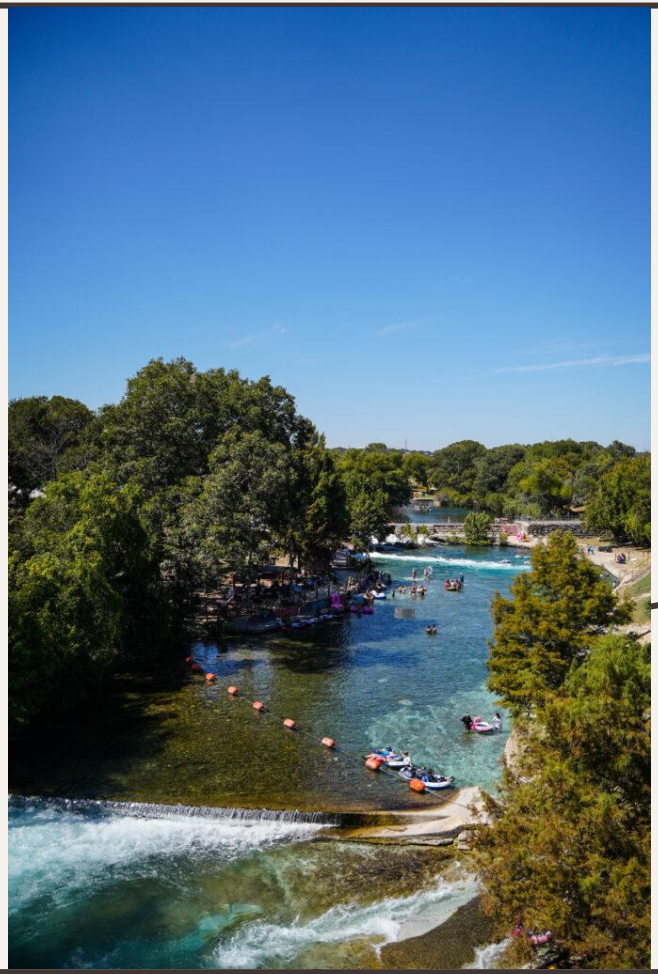
Concluding thoughts

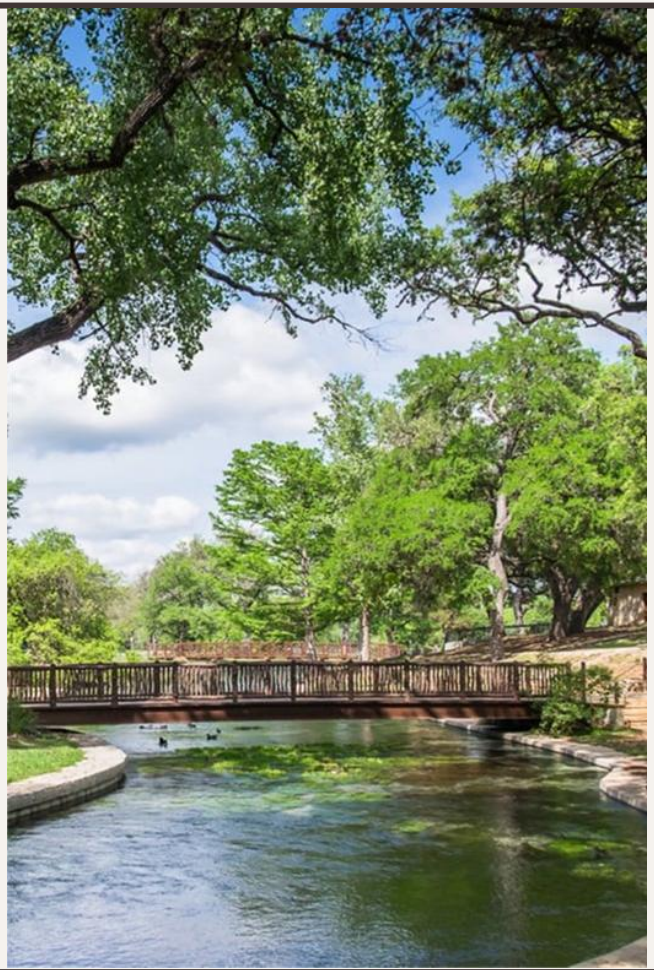
- This GIS project successfully
  - Digitized New Braunfels' pedestrian infrastructure
  - Creating a crucial database for the city's five-year accessibility plan
  - Particularly for students in non-transport zones.

- Supporting the City of New Braunfels in its commitment to enhancing student mobility and creating more walkable environments

- In the future keeping this database updated with **frequent updates** and using the most up to date imagery would help keep this data relevant

Thank you to the City of New Braunfels' GIS team for their dedicated support, thank you to Dr. Yuan and Arup Acharjee for their help and assistance throughout the project!





Questions?