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GEOG 481

Final Project Writeup & Recommendations: Salem Walkability

PROJECT GOALS:

Overall, the goal of the Salem walkability project was to examine the existing layout, pedestrian infrastructure, and distribution of the city of Salem, using geospatial analysis to determine which areas could be deemed highly "walkable" and which areas needed improvement. "Walkability" in a certain area refers to that area's safety, comfortability, ease, and convenience for pedestrian travel. Per the Salem WalkScore website, one of the most important criteria for walkability is the accessibility (on foot) to amenities like stores, parks, businesses, and restaurants, which requires both reasonable proximity to these amenities and well-maintained pedestrian infrastructure for people to use.

My walkability project covers the Climate Friendly Mixed-Use areas in downtown Salem (shown in figure 1, below), which is a small subset of the larger Salem study area. Because of the walkability factors discussed above, I chose to focus on the strategy of designing and maintaining sidewalks so that walking is safe and easy, identifying and prioritizing sidewalk hazards in areas with high walking demand between amenities.

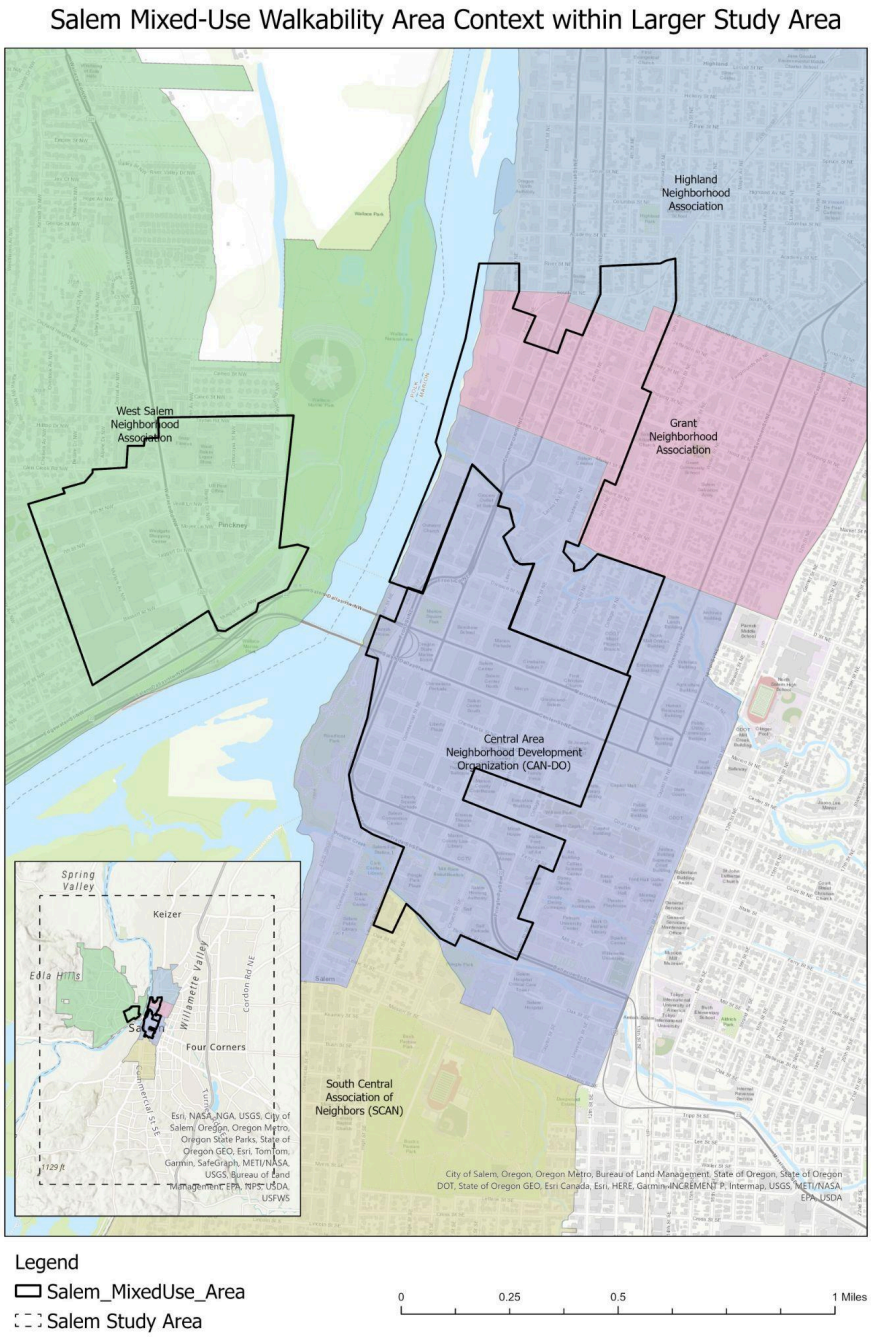

Fig. 1: Salem CFAs Focus Area outlined in black, neighborhoods color coded

RECOMMENDATIONS, ANALYSIS METHODS, & OVERALL FINDINGS:

My main goals to improve mixed-use walkability in downtown Salem are to focus on fixing the highest-priority areas of sidewalk concern. Multiple sources identify pedestrian-friendly infrastructure (such as sidewalks and crosswalks) and closeness to amenities as the two most important factors for determining walkability. From this description, we can determine that while poor pedestrian infrastructure is always an issue, it is even more problematic when these sidewalk issues arise on main pedestrian routes to and from amenity-dense areas. For example, a small, exposed sidewalk on the edge of a busy road with no crosswalks is a problem and indicates low walkability, but it is a much more pressing issue if that sidewalk were one of the main pedestrian routes between a residential neighborhood and a town center with shops, restaurants, and grocery stores. In summary, my recommendations are to focus on sidewalk concerns *near areas of high walkability demand*, or lots of amenities.

To begin my analysis, I created a polygon layer for the smaller Salem CFAs area that I would be focusing on. To do this I ran a spatial join to combine the downtown mixed-use polygons of SalemCFAWest, SalemCFANorthDowntown, and SalemCFA_CB (shown in figure 1 above).

Since my walkability analysis centers around pedestrian infrastructure in between points of interest (like houses or stores), the main sub-models I used in my analysis were a residence density layer, an amenity density layer, a combination overlay of the two to determine "walkability demand", and sidewalk concern data to determine sidewalk concern density as well as specific points of hazards. My final weighted overlay uses inputs of residence density, amenity density, and sidewalk concern density.

1) <u>To create my residence density raster layer:</u> I used the geopoints.shp dataset of "business locations, groceries, etc." selected by attribute to contain the text "residences" and clipped to show only points within the joined downtown mixed-use polygon layer. I calculated a density raster surface (figure 2) using a radius of 600 feet from this points layer, and then reclassified it using 5 classes (1 to 5, with 1 being least housing-dense and 5 being most housing-dense).
2) <u>To create my amenity density raster layer:</u> I used the same geopoints.shp dataset filtered to the attribute of restaurants/fast food businesses, grocery stores, convenience stores, offices, and retail

stores (to include all relevant amenities that people might walk to). I clipped these points within the mixed-use polygon layer, calculated a density raster surface (figure 2) using a radius of 600 feet, and reclassified it using 5 classes (1 is least amenity-dense, 5 is most amenity-dense).

3) To create a combination map of both 1 & 2: I calculated a weighted overlay of both amenity density and residence density, using an equal 50% weight on each raster layer, to create a map representing walkability *demand*, or all areas that people would likely be walking to and from. I combined this map layer with the Salem sidewalk concern location points dataset, in order to visualize the areas of interest that require good pedestrian infrastructure for people to access, as well as which sidewalk concerns are in "high-demand" routes/areas and therefore should be of highest priority (Figure 2). Again, I reclassified this overlay layer into 5 classes, with 1 indicating the least walkability demand and 5 indicating the most.

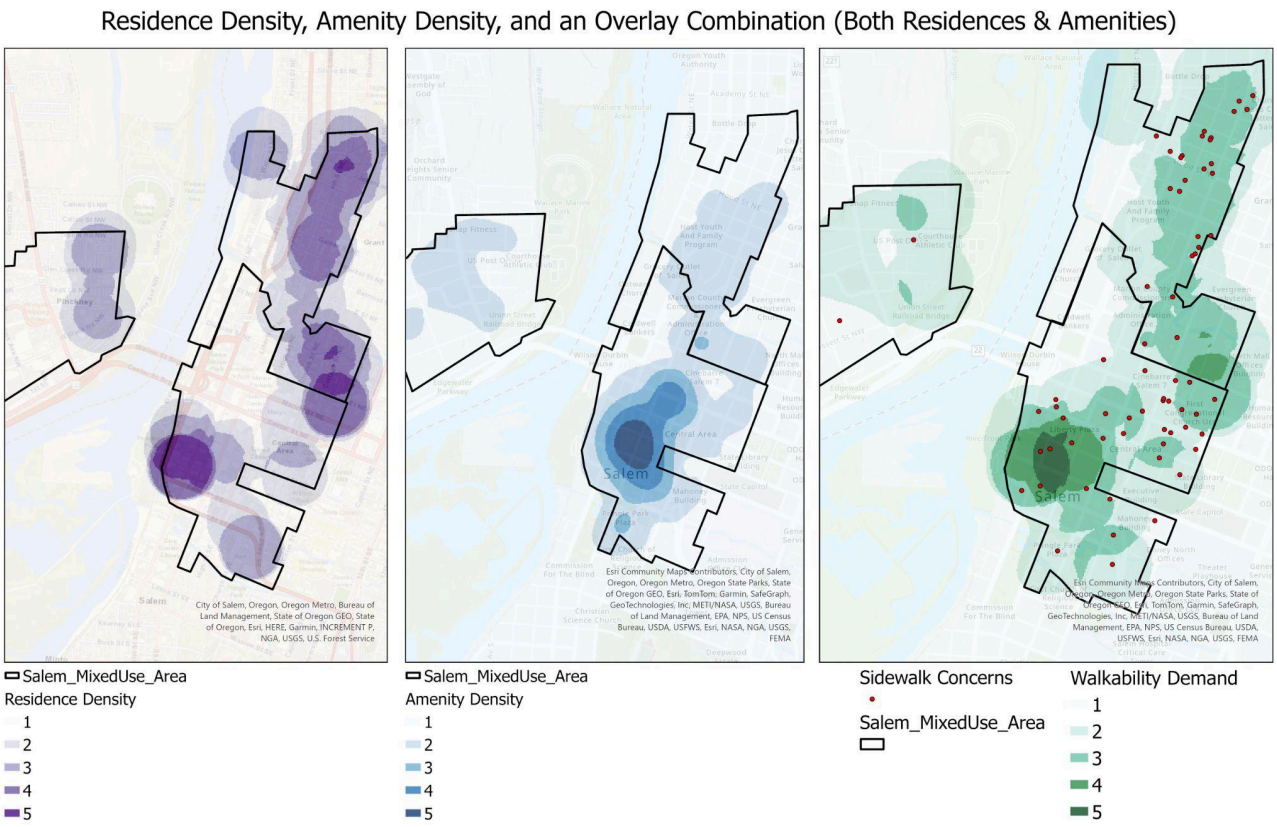

Figure 2: Residence density layer (left), amenity density layer (middle), overlay combination walkability "demand" with sidewalk concern points (right)

4) To create my sidewalk concern density layer (for use in my final weighted overlay which includes residence density, amenity density, and sidewalk concern density): I used the Salem sidewalk concern location points dataset to calculate a density raster surface using a radius of 600 feet within the downtown mixed-use polygon layer. I reclassified the density raster layer using 5 classes and reversing the symbology to indicate that denser areas are less walkable and vice versa (a scale of 1 to 5, where 1 represents least walkable/highest sidewalk concern density, and 5 represents most walkable/lowest sidewalk concern density).

Lastly, I created a final weighted overlay layer to represent overall walkability, using the residence density raster, the amenity density raster, and the sidewalk concern density raster (figure 3). I used a 40% weight on both the residence and amenity layers, due to the idea that areas with more points of interest are more "pedestrian-friendly" in the first place, and I used a 20% weight on the sidewalk concerns layer. I also included the sidewalk concerns data points layer for a more specific visualization of where the main sidewalk hazards are located.

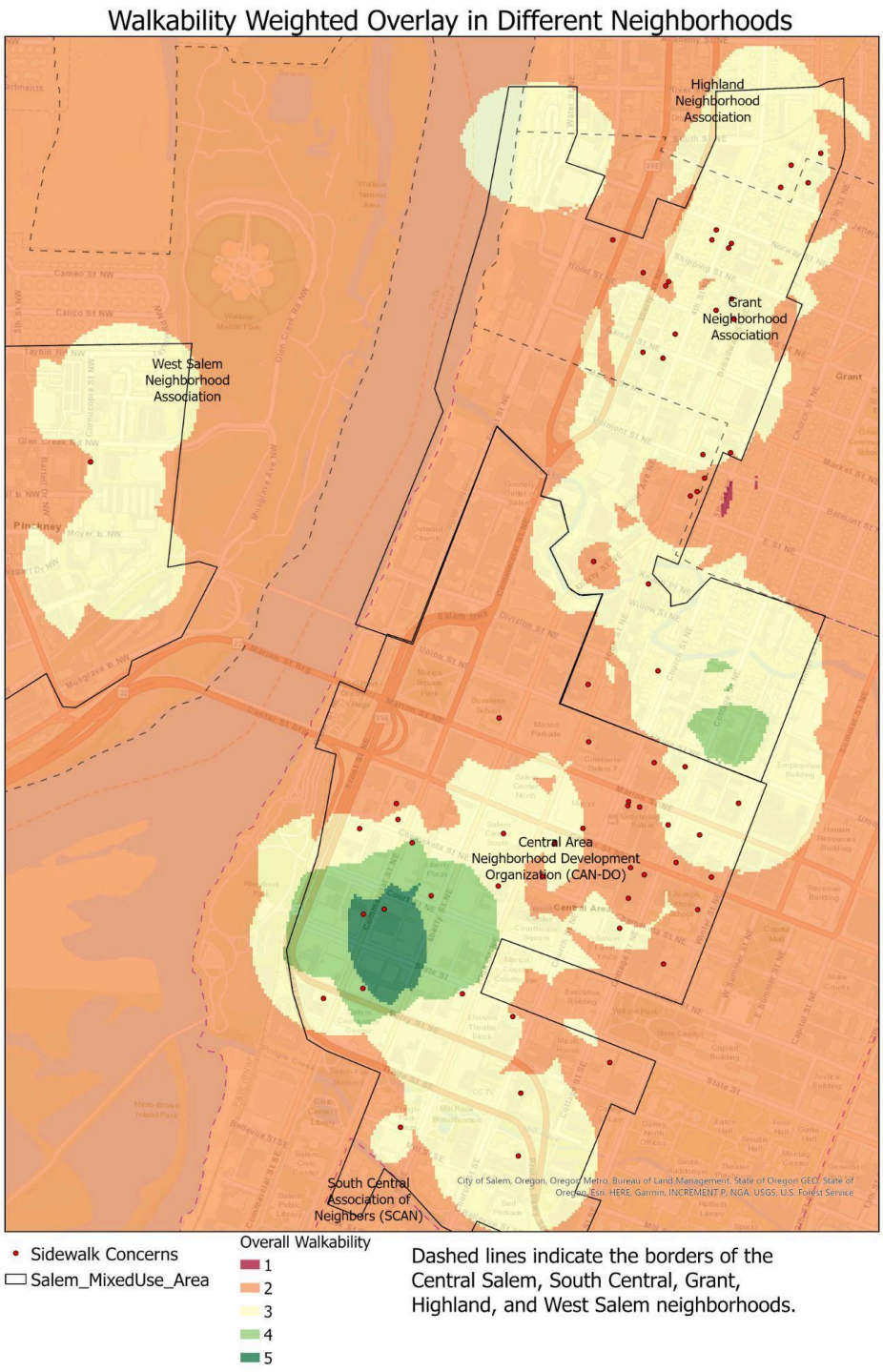

Figure 3: Final walkability weighted overlay on a scale of 1-5, with red/orange areas indicating low walkability (1) and green areas indicating high walkability (5). Sidewalk concern data points are included in red.

After analyzing the weighted overlays illustrating walkability demand and overall walkability, as well as the sidewalk concern data points and their specific locations, I have determined that the the locations with the most pressing sidewalk concerns affecting walkability are:

1) Central Salem: in the eastern areas of Center Street and Marion Street,
2) Along Belmont Street: on the border of the Central Salem and Grant neighborhood districts (in the North CFA),
3) as well as the general waterfront area of the western Grant district and northwestern Central district (indicated by orange areas nearer to the waterfront in figure 3).

Looking on Google Street View to find some visual examples of low-walkability sidewalk areas, we can see that some of the main issues are a lack of crosswalks, sidewalks positioned very close to the edge of busy streets, and a lack of cover for pedestrians (such as spatial buffers away from cars, tree canopy covering the sidewalks, etc.). Some sidewalks and crosswalks have been closed, as well, limiting the routes people can walk.

Figure 4: An unsignalized crosswalk next to a main road, close to residences and stores in the Grant neighborhood near the waterfront (a lot of the areas near Belmont Street are similar to this, with sidewalks right next to busy roads and places to cross that are not signalized).

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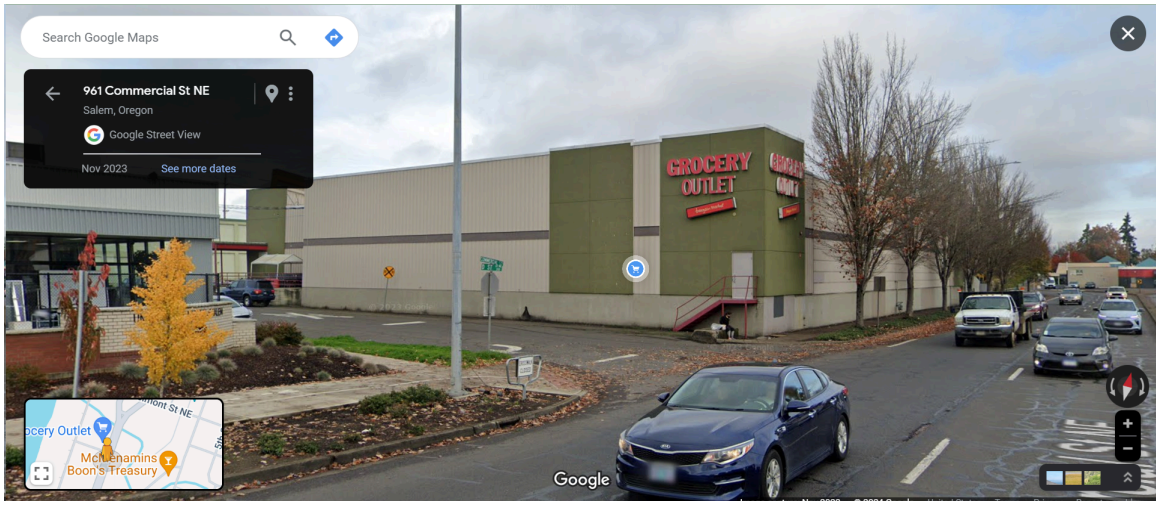

Figure 5: Exposed sidewalks next to a busy road and closed/unusable crosswalks next to stores in north Central Salem, near the waterfront. Many areas near the waterfront (near Commercial Street & D Street NE, in the northwestern part of Central Salem) are similar to this in terms of walkability and exposed sidewalks.

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These particular areas should be of the highest priority and focus when it comes to increasing walkability, because we see frequent and high-hazard sidewalk issues occurring on routes *between* residence-dense and/or amenity-dense areas. In other words, the main pedestrian paths from people's homes to amenities like shops and restaurants are compromised, and walkability of the overall area would be greatly increased if the sidewalk infrastructure were improved.

SUMMARY:

The main issue when trying to improve pedestrian infrastructure is ensuring that walking is safe, convenient, easy, and pleasant for pedestrians trying to get to points of interest (houses, amenities). The most important points of high sidewalk concern highlighted above are places where walking is not safe, easy, or pleasant, usually due to sidewalk quality, number and safety of crosswalks, as well as sidewalk proximity to busy roads which can be noisy, dangerous, and overall unpleasant to walk next to (thus deterring people from walking those routes).

My main recommendation is that the city of Salem focuses on improving walkability in those highlighted locations *first*, due to their higher importance from being on high-demand walking routes. In these locations, I recommend the implementation of more signalized crosswalks if the sidewalks are near busy streets, making sure pedestrians have alternate routes if sidewalks or crosswalks are closed, as well as repairing any sidewalk breakage or potholes. Another recommendation I have is creating more cover for pedestrians, both from things like tree canopy cover and separation from busy roads (perhaps using buffers like curbs, bike lanes, or trees/plants). All of these solutions will improve walkability for pedestrians by making their walk safer, easier, more convenient, and more pleasant.

It is unreasonable to expect the city to work on fixing sidewalks, implementing crosswalks, etc. at *every single point of sidewalk concern* in the downtown area. This is why my main recommendation is to focus on those of highest priority and location, as this smaller focus makes the problem a bit more manageable. It will also yield better results in the long run, since good pedestrian infrastructure near concentrated neighborhoods will positively affect all of those populations living there.

FUTURE DIRECTIONS AND IMPROVEMENTS FOR THIS PROJECT:

For future analysis, it would be interesting to have data that shows which amenities are actually most frequently accessed by the surrounding populations. Since I did not have that data for my project, I chose to indicate “walkability demand” by just the *density* of these amenities (like stores, restaurants, etc.), but this may not be accurate to what people are actually interested in walking to all the time.

In addition, during the Salem project presentations it came to light that some of the sidewalk and concern data was not fully accurate and all-encompassing: for example, the footbridge across the river from East to West was not included. I would have liked to incorporate that into my analysis.

CITATIONS:

- Walk Score. "Salem Neighborhoods on Walk Score." Walk Score, www.walkscore.com/OR/Salem. Accessed 11 Mar. 2024.
- "Using GIS to Analyze Pedestrian Accessibility." Geography Realm, 24 Jan. 2019, www.geographyrealm.com/using-gis-to-analyze-pedestrian-accessibility/. Accessed 11 Mar. 2024.
- Kohler, Nicholas. "Walkability in Salem, Oregon." ArcGIS Online, storymaps.arcgis.com/stories/a9b18e06dfaa473cbe736212118034c9. Accessed 19 Mar. 2024.

DATA LAYERS AND SYMBOLOGY:

Folder location: R:\GEOG482_582_22260_Winter2024\Student_Data\hsiegel\FinalFinal

Files:

- OverallWalkabilityOverlay
- ResidenceDensity
- Salem_MixedUseArea
- SidewalkConcernDensity
- SidewalkConcernPoints
- WalkabilityDemand
- AmenityDensity
- AmenityPoints