Accessibility of Two Bus Stops in the Charlotte Area

by

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Public Transportation 637

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I. Accessibility Analysis Tool

For this accessibility analysis, I looked at two different bus stops (and surrounding streets) within Charlotte:

1. North Sharon Amity Road at Milton Road
    a. N. Sharon Amity is a major Charlotte thoroughfare. This road runs almost exclusively within majority minority areas, and on average is four lanes wide, though at intersections it contains even more lanes.
    b. Milton Road is a major cross-street that connects N. Sharon Amity and E. W.T. Harris Boulevard (NC state highway 24) with The Plaza, which is another major Charlotte thoroughfare.
    c. The census tract at this stop, 0015.04, is 91% minority, has an average household income of $36,000, and 34% of residents live below the poverty line.
2. Selwyn Avenue, north and south.
    a. Selwyn Avenue is not actually broken into a North and South, but the walkability north of my chosen stop, and the walkability south, are completely different. Despite only being 2.5 miles long, Selwyn Avenue links together several major Charlotte thoroughfares; Park Road, E. Woodlawn Road/Runnymede Lane (name changes at Selwyn), Colony Road, Queens Road West, and Queens Road.
    b. The census tract at this stop, 0027.02, is 8% minority, has an average household income of $130,000, and 4% of residents live below the poverty line.

My analysis tool consists of 10 different indicators. Each indicator has a score from 1 to 5. For each bus stop, I scored two streets. I then divided the total scores of each street by the total possible score, got a percentage, and scored the total area as the average of those two percentages. I scored it using a percentage because some indicators were not applicable, so the total scores for the streets were uneven.

The 10 indicators I used for my analysis tool are:

1. Traffic Buffering
    a. According to Adkins et al., sidewalks that had “separation from vehicle traffic” were statistically significant predictors in a street’s accessibility. It also follows logically that having something between a pedestrian and vehicles would make the pedestrian more comfortable. Traffic buffering techniques can also cause drivers to decrease speeds and use greater caution (Pleasant).
2. Traffic Speed
    a. Traffic level was used by Fan et al. as part of their research. While traffic level and traffic speed aren’t the same thing, the mention of traffic level gave me the idea for traffic speed. For this indicator, the faster the traffic, the lower the score. Pedestrians will not be comfortable if cars are whizzing by them (Pleasant).
3. Use
    a. This indicator scores whether the street is *actually being used* by pedestrians. If does not matter if a street is “objectively walkable” if no one is actually using it. I got the idea for this indicator from the Steuteville article.

4. Crosswalk
    a. Several works cited mentioned crosswalks. The American Public Transportation Association (APTA) suggests that bus stops minimize street crossings, are close to a crosswalk, that the crosswalk is behind the bus to avoid having to cross in front of the bus, that the bus should neither block the crosswalk nor obstruct pedestrian visibility of oncoming traffic, and that the crosswalk should have curb cuts. Adkins et al. mention the use of a pedestrian sign, a pedestrian signal, and a marked crosswalk. NACTO, the National Association of City Transportation Officials, states the need for safe crossings and a crossing button. Ewing also mentions safe crossings, as well as a lighted marked crosswalk. I myself know the importance of a safe crosswalk, having had to cross a four-lane street (numerous times) in a wheelchair, which further limits my ability to be seen by motorists (Pleasant).
5. Passenger and Driver Visibility
    a. Both APTA and NACTO discuss the important of passengers being able to be seen by the approaching bus driver, and to be able to see the approaching bus themselves. Being easily visible by the driver makes it so that passengers are unlikely to be missed, and being able to see the approaching bus allows passengers to get prepared to board (Pleasant).
6. Resting Spot
    a. APTA, NACTO, Fan et al., and the National Aging and Disability Transportation Center (NADTC) all discuss shelters, and all agree that shelters need to have transparent sides for visibility as well as a spot for a wheelchair. APTA states that shelters need to be strong and durable, and should have good lighting, whether that be internal or external. NADTC talks about the need for benches to have grab bars.
7. Trees/Shade
    a. APTA, NACTO, and Ewing all discuss the importance of trees or shade, some with very specific tree height recommendations. Trees and shade improve pedestrian comfort, cooling down the path from the heat of the sun (Pleasant).
8. Universal Design
    a. This indicator measures whether someone with a mobility, hearing, or seeing impairment could safely and effectively move along the sidewalk. The majority of information about this indicator came from NADTC. Sidewalks should allow ease of movement for all users. For mobility and seeing impaired, it is important that the walking environment be firm, stable, and level (NADTC). For the visually impaired, sidewalks and crosswalks should have tactile cues (such as small bumps when you reach a curb cut for a crosswalk), as well as color contrast and audible warnings. For the hearing impaired, there is a need for visual cues.
9. Lighting
    a. Lighting is mentioned by APTA, NACTO, and Ewing. NACTO states that shelters should be lit, and lighting should be at a pedestrian scale, and NADTC suggests that bus stops be places near existing streetlights, when possible. The better pedestrians can see, the more comfortable they are using the sidewalk (Pleasant).
10. Nearby Mix of Uses
    a. My idea to use a nearby mix of uses as one of my indicators came from the Tallmadge document outlining the requirements of this assignment.

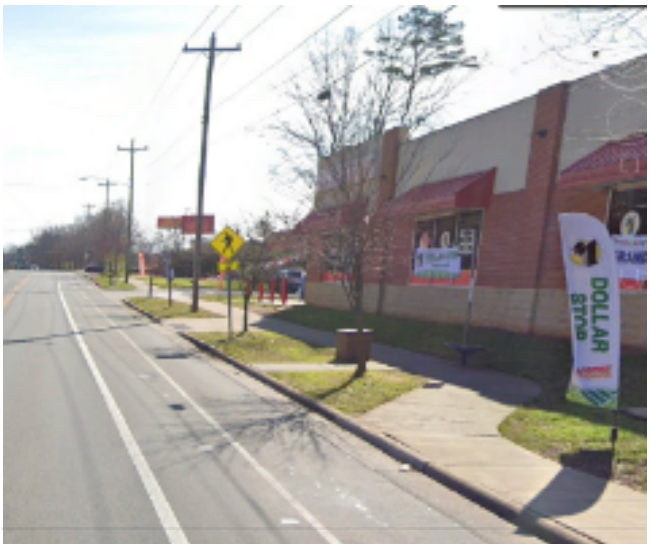
II. Accessibility Assessment

Indicator	Milton Road	N. Sharon Amity Road
Traffic Buffering (What is protecting pedestrians from traffic?)	1.5	1
Traffic Speed (Higher speed = lower score)	2	2
Use (Is the area actually used for walking?)	4	4
Crosswalk (Quality/safety)	3.5	3.5
Passenger and Driver Visibility (Can passengers see approaching bus, and can driver see passengers upon approach)	4	N/A
Resting Spot (Is there a shelter, bench, or other place for people to comfortably wait for the bus? Is it contextually appropriate?)	5	N/A
Trees/Shade (Are there trees or other sources of shade?)	4	3
Universal Design (Can someone mobility, sight, or hearing impaired safely use the sidewalk?)	3	3
Lighting (Is the area sufficiently lit? Lights at bus stop, along sidewalk, at crosswalk?)	3	3
Nearby Mix of Uses (Is there a mix of uses? Or is this spot tailored to one specifically, i.e. offices?)	4	4
Total	34/50 = 68%	23.5/40 = 58.75%
Average	63.34%	

As you can see below, Table 1 shows the accessibility scores for Milton Road at N. Sharon Amity Road. Milton Road received a score of 68%, while N. Sharon Amity received a score of 58.75%, leading to an average score of 63.34%.

Table 1. Accessibility Assessment of Milton Road at N. Sharon Amity Road. Source: Jordan Pleasant

For traffic buffering and traffic speed, both streets score low. Milton and Sharon Amity have essentially zero traffic buffering, as you can see in Figures 2 and 3. There is a 40-foot span on Milton (Figure 1) that has grass between the sidewalk and the street, which is the only reason it scored a 1.5. For traffic speed, both streets have a 45-mph speed limit, realistically meaning that vehicles are going at least 50 mph. This is not a survivable speed for a pedestrian to be struck at (Sadik-Khan).



For the Use category, the streets both score high. When scrolling through the streets via Google Street View, there are pedestrians walking roughly every 100 feet. While there is high speed traffic and minimum buffering, the sidewalks are still heavily traveled.

For crosswalks (Figure 4) the streets get relatively high marks. While it is a very wide intersection, the crosswalks are well marked, have crossing buttons, and all have pedestrian signals.

As for Passenger and Drive Visibility, I gave the bus stop

on Milton Road (Figure 6) a 4, and for Resting Spot, I gave the bus stop a 5. The stop scores a 4 for visibility because the side of the shelter are translucent instead of fully transparent. Resting spot scores a 5 because there is a nice shelter, with separated bench seats, a lean bar, and a spot for a wheelchair user to rest. I considered these indicators to be not applicable for N. Sharon Amity.

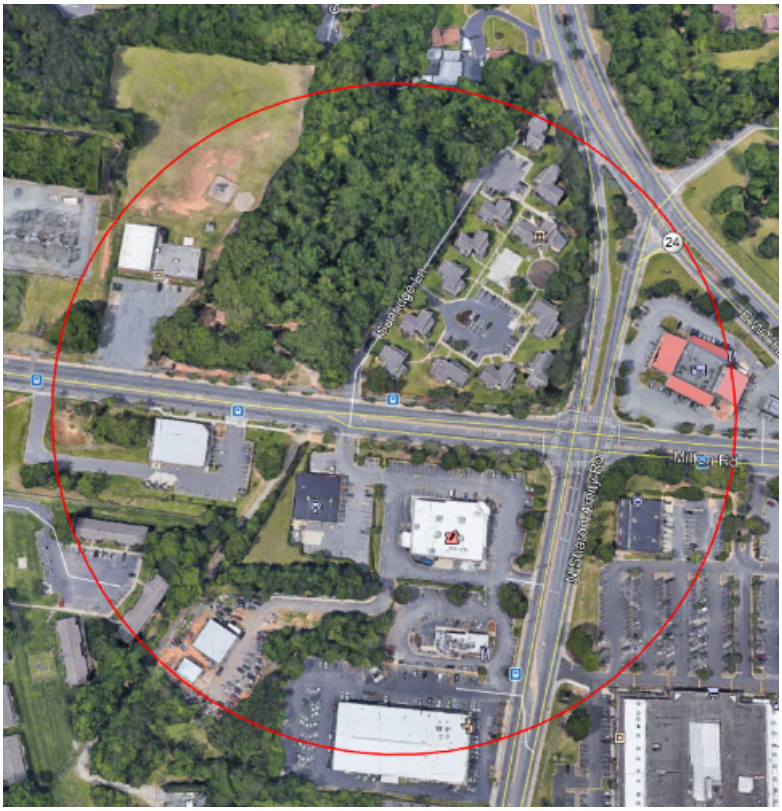
Both streets also score well for trees/shade. These Street View photos appear to be taken in Autumn, as most pictured trees are void of leaves. But the trees are spaced at fairly regular intervals (Figures 1-5). N. Sharon Amity has less tree cover than Milton, which is why it scores lower.

For Universal Design, both streets get average scores. The crosswalks are well marked and have visual (and I believe audio cues based on the crossing buttons) and tactile markers. The sidewalks are reasonably wide and are flat and level. However, the fact that there is no traffic buffering is dangerous for the visually impaired.

Both streets also score average for lighting. The streetlights are roughly every 100 feet, and the shelter is 50 feet from the nearest streetlight. Lighting is not awful, but it could certainly be a lot better, thus the 3 scores.

Both streets receive high marks for mix of use. There is a large shopping center within 200 feet of the bus stop. This shopping center has a grocery, laundromat, beauty styling, a tax accountant, a bank, and one or two medical offices. There are very few errands that cannot be accomplished at this shopping center.

Figure 5 shows a satellite view of the entire area, and the red circle is 400 feet across, with the bus stop located in the center.



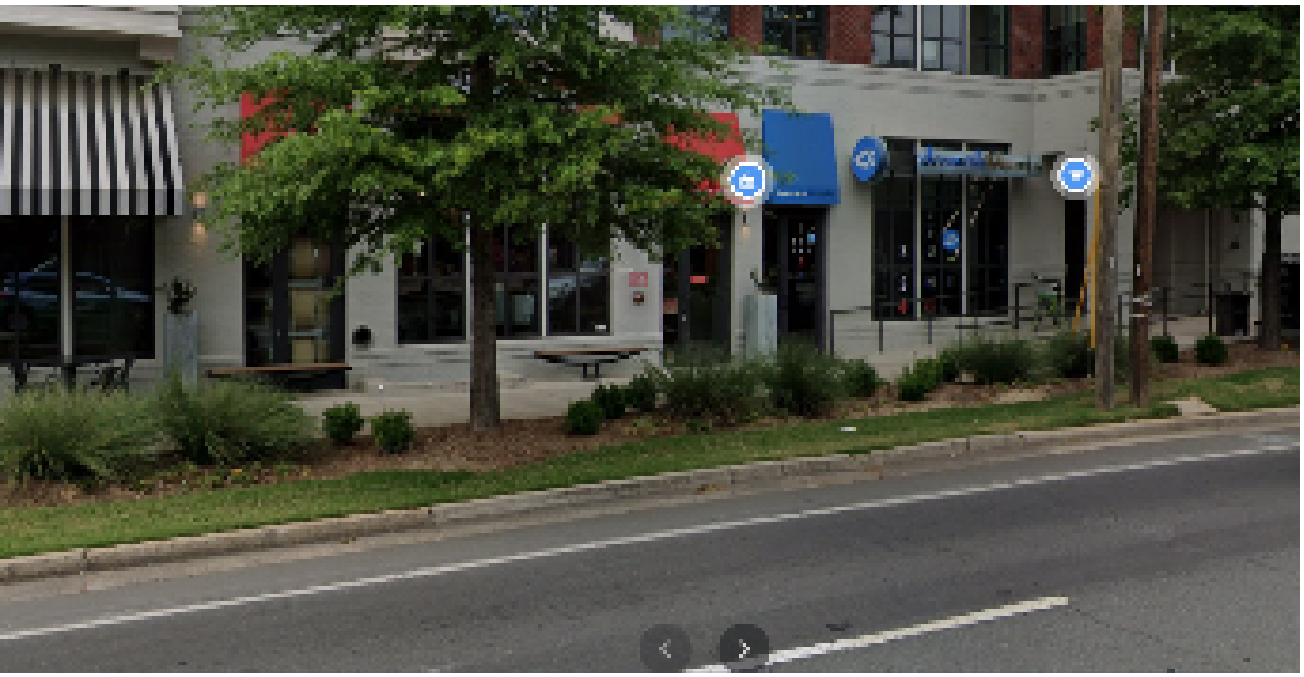
. Table 2 shows the accessibility scores for Selwyn Avenue, and Figure 7 shows you the satellite image of the area.

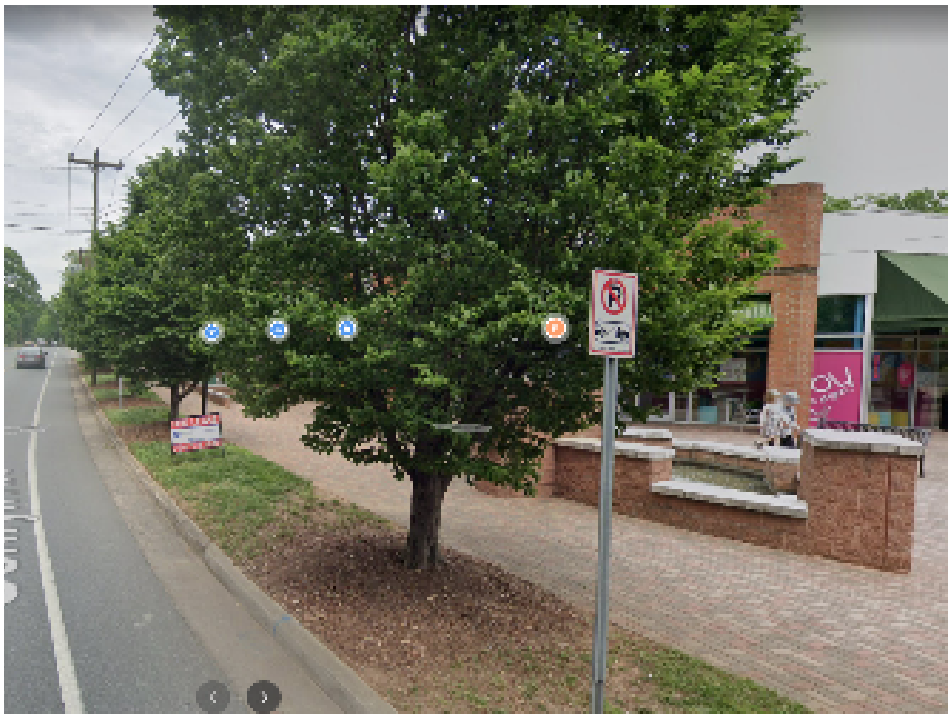
Indicator	Selwyn Avenue (South)	Selwyn Avenue (North)
Traffic Buffering (What is protecting pedestrians from traffic?)	1.5	4.5
Traffic Speed (Higher speed = lower score)	3	3
Use (Is the area actually used for walking?)	1.5	4.5
Crosswalk (Quality/safety)	2	N/A
Passenger and Driver Visibility (Can passengers see approaching bus, and can driver see passengers upon approach)	N/A	4
Resting Spot (Is there a shelter, bench, or other place for people to comfortably wait for the bus? Is it contextually appropriate?)	3	3
Trees/Shade (Are there trees or other sources of shade?)	2	4
Universal Design (Can someone mobility, sight, or hearing impaired safely use the sidewalk?)	1	4
Lighting (Is the area sufficiently lit? Lights at bus stop, along sidewalk, at crosswalk?)	2	4.5
Nearby Mix of Uses (Is there a mix of uses? Or is this spot tailored to one specifically, i.e. offices?)	3	3
Total	19/45 = 42.22%	34.5/45 = 76.67%
Average	26.75/45 = 59.44%	

Table 2. Accessibility Assessment of Selwyn Avenue. Source: Jordan Pleasant

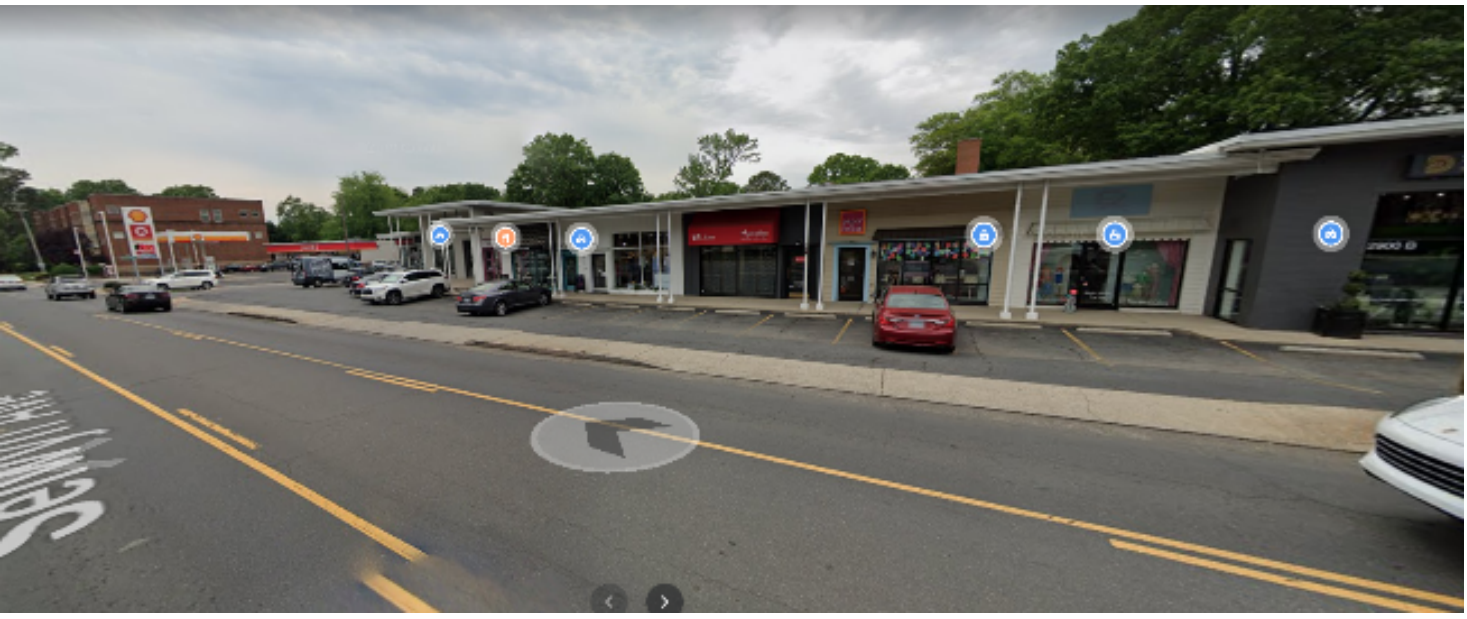

Tranquil Ave
Wales Ave
Hillsdale Ave
Dellwood Ave
Colony Rd
Glendale Rd
Arcadia Ave
Brandywine Rd

Selwyn north was scored as a 4.5 for Traffic Buffering. Figure 8 shows that the sidewalk is several feet from the roadway, with planted trees, shrubs, and the occasional power pole in between pedestrians and vehicles. Similarly, Figure 9 shows a lot of trees and a grass strip to protect pedestrians. The only reason it does not score a 5 is because of Figure 10. There's zero buffering, and half of the "sidewalk" is just a driveway apron for cars.

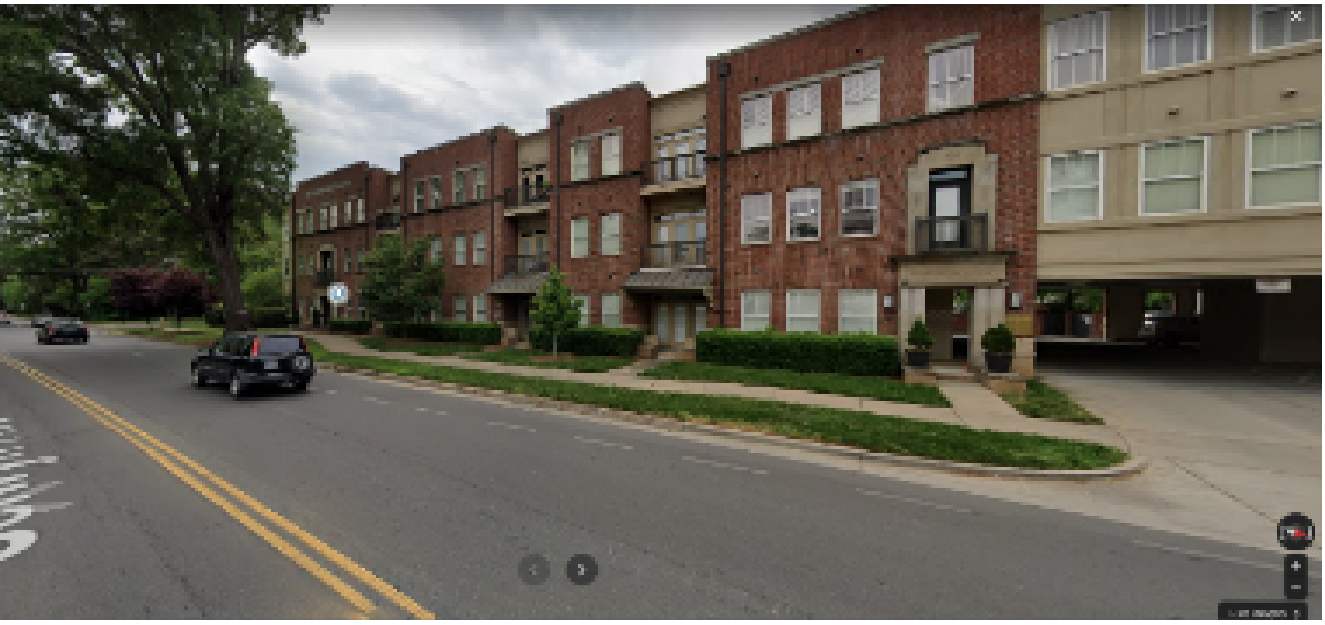





Selwyn Ave

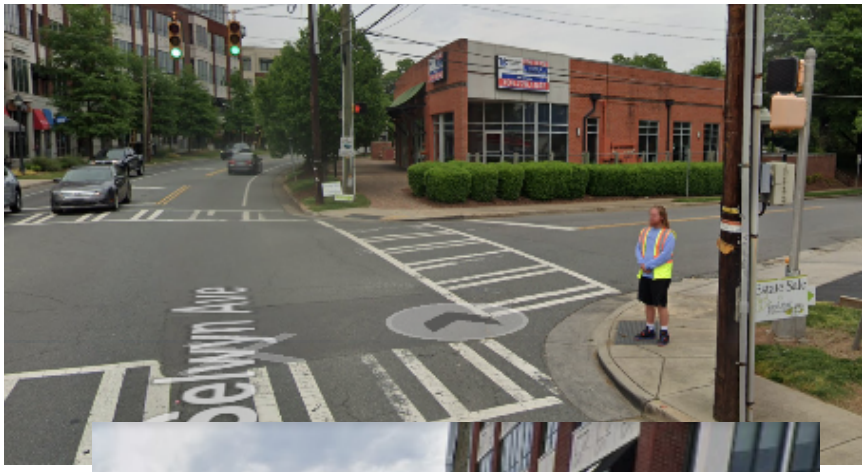



elwyn Ave



Selwyn south scores a 1.5 for buffering. Figures 11, 12, and 15 are why it scores so low. In Figure 11, Similar to Figure 10, those 3 Figures show how there is zero buffering, and half of the sidewalk tilts towards the street. These are extremely unsafe conditions for pedestrians. Figures 13 and 15 save the street from getting a zero score. Figure 13 at least has some grass, and Figure 14 is well set back. Selwyn north and south both receive a score of 3 for traffic speed. The speed limit is 35, which is fairly moderate, and there is a traffic light which further slows it down.

The two directions of Selwyn have very different Use scores. North gets a 4.5, because it is an area highly patronized by pedestrians. It does not get a 5 because of Figure 10, where very few people walk. South gets a 1.5 because it is rarely in use by pedestrians, except in front of the apartments in Figure 15.



The crosswalk for Selwyn south scores a 2. If you look at Figure 16 near the center, the crossing button is essentially in a parking spot. However, the crosswalk at least has a tactile edge as well as buttons and signals. Just to the left of Figure 16, off screen, is another crosswalk. It is located on the sidewalk at least, but said sidewalk is right beside where cars pull in and out of the shopping center. In Figure 17, on the opposite side of the street, the crosswalks are in significantly safer locations.

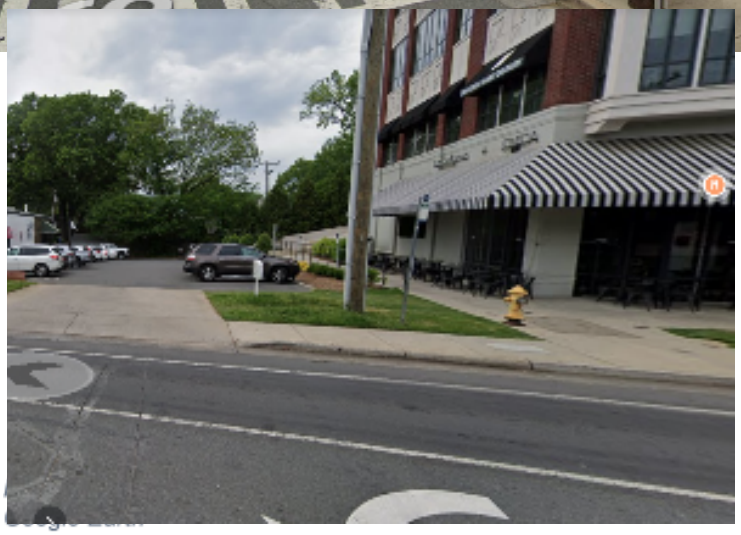


Figure 18 shows the reason that Passenger and Driver Visibility was scored as a 4 on Selwyn north. The bus stop is very open, and both passenger and driver can easily see the other. Selwyn south was not scored, because that stop only serves buses coming from the north.

Selwyn north and south both get a 3 for resting spot. While there is no resting spot, this stop does not need one. This bus stop is very rarely used, and there are

nearby benches about 20 feet north of the bus stop. Because of that, I gave the streets average scores.

Selwyn north has trees and buildings to provide shade. It scores a 4 because of Figure 10, where there are no trees. Selwyn south scores a 2 for Trees/Shade. Figures 11, 12, and 15 have no trees. However, there is slight tree coverage in Figures 14 and 13, saving the street from a score of 1.

For Universal Design, Selwyn south scores a 1. Figures 11 and 12 could easily spell disaster for someone in a wheelchair, who could potentially slide into the street or tip over. Figure 12 has power poles in the center of the sidewalk, as well as a USPS drop box and a pile of rocks. A wheelchair does not have sufficient space to get around the power poles, drop box, and rock pile. Someone with visual impairments could walk into several of these obstacles shown. The crosswalk button in a parking spot is also highly dangerous for the mobility and visually impaired. Selwyn north, however, scores a 4. There are wide sidewalks and they are well lit. Someone mobility impaired can easily use these sidewalks. The only reason north does not score a 5 is because of Figure 10.

For lighting, Selwyn north scores a 4.5. There are pedestrian scale street lamps, exterior lights on the buildings, and the stores inside all light up the space well, allowing excellent visibility. Figure 10 once again prevents Selwyn north from a score of 5. Selwyn south has zero streetlights, but there are at least some businesses to shed a little light on the path, and the apartment complex in Figure 14 is well lit.

Selwyn Avenue scores a 3 for mix of uses. Within this small area are apartment residences, restaurants, retail, offices, commercial use. There are many different things that can be done in this area.

III. Recommendations

I have a few simple recommendations for the Milton Road/N. Sharon Amity Road area. In Figures 2 and 3, there is a wide stretch of flat grass beside the sidewalk. In these figures, I would recommend repaving the sidewalk further away from the road and replacing the former sidewalk with grass and trees. This creates traffic buffering and would greatly improve pedestrian comfort. You could do something similar for the side of the street represented in Figure 6, but it would require a good deal of grading and would be more costly than the recommendations for Figures 2 and 3.

For the shelter in Figure 6, I would recommend adding some solar-powered lights within the shelter. The shelter is 50 feet away from the nearest streetlight and greatly needs interior lighting.

For the Selwyn area, I have numerous recommendations:

- In Figure 16, the crossing button needs to be moved to the corner of the bricking. This takes it out of the parking spot and improves safety.
- In Figures 10 and 12, the power poles need to be taken out of the sidewalk. The USPS drop box also needs to be moved, and the small rubble pile needs to be cleared.
- Figure 12 has plenty of space to move the sidewalk further away from the street, and replace the former sidewalk with at least grass and perhaps trees.

IV. Reflection of Assessment Tool

My assessment tool has a lot of room for improvement. The fact that I had numerous indicators that had scores of “not applicable” makes it difficult to even assess different kinds of streets, For most of my indicators, the measures were highly subjective, and it is hard to objectively grade several principles, such as lighting, crosswalks, visibility, and universal design.

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