Increasing Street-Level Accessibility in Cuenca, Ecuador

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Table of Authorship

Table of Contents

Table of Figures

1.0 Introduction

According to the World Health Organization (2022), approximately 1.3 billion individuals across the globe “experience significant disability” (paragraph 1). People with disabilities encounter various challenges in their everyday lives, such as restricted mobility, which includes difficulty with walking and/or other movements (World Health Organization, 2022). Individuals with mobility impairments may utilize canes or wheelchairs to help them get around; however, many environments remain inaccessible, meaning they do not accommodate those with physical disabilities and their unique needs.

Accessibility issues that seem minor often have broader implications, creating a cultural divide between individuals with disabilities and those without disabilities. This occurred in Zambia, a country where residents face ongoing accessibility challenges. A study from Banda-Chalwe et al. (2014) found that people with disabilities are more often unemployed than those without disabilities (54.5% vs. 42.0%, respectively). This disparity is likely the result of people with disabilities lacking proper resources in their cities. For example, public infrastructure in Zambia is inaccessible for those with mobility impairments (Banda-Chalwe et al., 2014). Unsafe sidewalks or an inability to safely use public transportation may discourage individuals with disabilities from commuting to a job.

There are numerous factors that can impair one’s ability to navigate through a city safely. People without disabilities can also feel the first-hand effects of cities lacking accessible infrastructure. For example, a mother pushing a stroller cannot safely use stairs, and an elderly person may struggle to quickly cross the street. Street-level accessibility is a widespread issue, and cities need to prioritize developing solutions.

One city that faces significant accessibility challenges is Cuenca, Ecuador. As of 2023, Cuenca is Ecuador’s third largest city, with a population of over 600,000 people (International Living, 2021). The city quickly transitioned from a secluded community to a densely populated urban area beginning in the 1960’s (Britannica, 2012). Cuenca’s fast urbanization combined with its traditional architecture produced various accessibility challenges, including aging streets and sidewalks, a high concentration of motorized vehicles, and cramped sidewalk space due to street vendors and construction (Pal, 2016). Many elderly individuals from other parts of the world retire in Cuenca, due to the low cost of living and scenic environment (International Living, 2021). Older individuals often experience mobility issues, as do Cuenca citizens with varying disabilities (International Living, 2021). The current inaccessible infrastructure in Cuenca's streets likely makes life more difficult for these demographics.

In 2006, 82 countries, including Ecuador, signed the United Nations Convention on the Rights of Persons with Disabilities (CRPD), promising to provide accommodations for citizens with disabilities (United Nations, 2006). However, major cities like Cuenca are not updating their infrastructure to reflect the accessibility standards outlined in the CRPD (United Nations, 2015). Thus, local municipalities, like the Cuencan government, are trying to take action to increase accessibility in their city's streets for those with disabilities and impaired mobility.

The purpose of this project is to work with a local government agency, Empresa Pública de Movilidad, Tránsito y Transporte de Cuenca (EMOV EP), to address street-level accessibility in Cuenca. To carry out this project, the team researched topics such as approaches to making cities more accessible and challenges Cuenca is currently facing. Upon arriving in Cuenca, the team plans to create a visual representation of inaccessible areas in Cuenca, observe these areas, and conduct interviews to provide EMOV with recommendations regarding the feasibility of implementing accessibility solutions.

2.0 Background

Before developing a plan to increase street-level accessibility in Cuenca, the team investigated the broader concepts of accessibility and inclusivity. The United Nations (UN), an international human rights organization, defines accessibility as “the provision of flexibility to accommodate each user’s needs and preferences” (United Nations, 2015, page 3). While this definition is broad, it applies to various aspects of life. In the context of urban development, accessibility refers to designing and implementing infrastructure that all people can easily use (United Nations, 2006). In this chapter, the team discusses the importance of accessible cities, aspects that make a city inaccessible, effective approaches to accessibility, specific accessibility challenges in Cuenca, and the network of actors in Cuenca who are involved with implementing accessibility solutions.

2.1. Why Do We Need Accessible Cities?

Inclusive cities embrace individuals of varying abilities, providing necessary accommodations for those in need. All people, regardless of their disability status, have the right to participate in their communities. The UN published its Convention on the Rights of Persons with Disabilities (CRPD), and Article 9 contains specific accessibility guidelines. With regards to accessible infrastructure, the article states, “the identification and elimination of obstacles and barriers to accessibility, shall apply to buildings, roads, transportation and other indoor and outdoor facilities” (United Nations, 2006, paragraph 1). Accessible infrastructure may include ramps for individuals in wheelchairs or widened sidewalks (Elaine, 2019). The CRPD also noted that braille signage and sign-language interpreters are important to create communities that are inclusive of blind and deaf individuals– in addition to those with mobility-related impairments (United Nations, 2006). The UN developed its CRPD guidelines because it is important for people with disabilities to have equal access to everything their communities have to offer.

The UN’s CRPD guidelines challenge countries to actively protect the rights of their disabled citizens. Many nations, such as the United States, have passed specific accessibility laws. According to Malloy et al. (2017), the American with Disabilities Act (ADA) protects individuals with disabilities and includes regulations for public infrastructure. It is important for countries to ensure roads and sidewalks are accessible, as mobility impairments are common in many communities. For instance, “approximately 18–20 percent of American families have a family member with mobility impairment" (Malloy et al., 2017, page 404). The ADA established regulations for properly maintaining sidewalks, including snow-removal and pot-hole prevention (Malloy et al., 2017). Such measures are important for achieving accessible and inclusive cities– and communities across the globe can apply these frameworks.

Similar to the ADA, Mexico implemented its General Law for the Inclusion of People with Disabilities, and Article 17 specifically discusses accessible infrastructure (Estados, 2011). The law requires the use of inclusive pedestrian signage, a braille information system, and accommodations for those with service animals (Estados, 2011). These policies further promote accessibility in cities across the nation.

2.2. Factors that Contribute to Inaccessible Urban Areas

Although there has been progress made towards accessibility in different areas around the globe, there are still obstacles present in major cities. An inaccessible trait of a city is one that does not accommodate individuals who have a disability, are pushing a stroller, are elderly, or experience some other atypical mobility challenge. Physical barriers and transportation can contribute to a city's inaccessibility. The first common problem regarding urban accessibility is a lack of ramps in areas where stairs are present or in an area of boarding for public transportation. A study in Swansea city saw that 90% of individuals using wheelchairs found public transportation to be "very difficult" to use as a direct result of no ramp being present when boarding a method of transportation (Matthews & Thomas, 2007). The absence of a safe option for wheelchair users to access public transportation discourages them from using such transportation methods. Places that have adequate ramps can still yield their own set of challenges. For example, ramps that do not have rails function poorly compared to those with rails (Banda-Chalwe et al., 2014). This lack of rails encourages a fear of falling and as a result, individuals will choose not to use the ramps even though they are available.

Sidewalk design is another critical part of making cities safe for pedestrians. Sidewalks should be wide enough to accommodate multiple people walking at once, and they should allow for individuals in wheelchairs to safely get around, especially when other pedestrians are present. Areas with poor sidewalk maintenance tend to see an increase in pedestrians hit by vehicles, specifically when pedestrians are walking in the street as a method of avoiding the sidewalk. Pontiac, Michigan is a place that suffers from poor sidewalk treatment. A Pontiac study saw that 45.8% of its fatal car crashes involved pedestrians, which is substantially more than the state average of 16.5% (Rajaee et al., 2021). Observers found that this frightening disparity is a result of pedestrians preferring to walk in the street, due to the city improperly maintaining sidewalks, or the sidewalks naturally being too narrow or completely missing. Sidewalks all over the world are unsafe due to outdated policies. Many sidewalks around the world do not comply with modern standards (Rajaee et al., 2021). In America, many of the sidewalks do not follow the Americans with Disabilities Act of 1990 (Rajaee et al., 2021), because most cities constructed their sidewalks prior to 1990.

Individuals with vision impairments also experience a lack of safety considerations. For example, a city implements a curb ramp so that people in wheelchairs can maneuver between the street and the sidewalk. A vision-impaired individual uses the new ramp that the city implemented, but cannot identify where the sidewalk ends and the street begins (Lee, 2011). The problem here is that there is no indicator– auditory or tactile– that a person with vision-impairments can rely on to safely traverse between the street and the sidewalk. One example of a tactile surface indicator is a truncated dome. A truncated dome is a rectangular surface with small, circular grooves on a ramp where the sidewalk meets the street. A vision-impaired individual can feel the grooves with their shoes or a walking cane and know they are about to approach the street (Demirkan, 2013). Truncated domes notify a vision-impaired individual where they are physically located. Without them, these individuals have a much more difficult time traveling through a city (Demirkan, 2013).

Auditory cues are equally as important as tactile indicators when considering a city's level of accessibility. A group of researchers from Japan asked vision-impaired individuals where they feel the most inconvenienced by a lack of auditory cues (Bilal Salih et al., 2022). One respondent expressed that it would be helpful for a sound cue near escalators, indicating which direction is going up and which is going down (Bilal Salih et al., 2022). Cities can apply this same ideology to smaller-scale locations. For example, an auditory cue at an intersection would allow individuals to know how much time they have to cross the street (Bilal Salih et al., 2022). Without a cue like this, people with vision impairments may have no idea if they are in the way of incoming traffic (Bilal Salih et al., 2022).

Cities trying to implement accessibility measures realized that it can be difficult to accommodate multiple types of disabilities at once. Because accessibility encompasses inclusivity for everyone, many cities continue to face accessibility challenges due to hardships with balancing all the different accommodations that a diverse community requires.

2.3. Strategies that Promote Accessibility

The need for accessible cities in our society is clear, and it is easy to identify inaccessible aspects of a city, but what methods do cities implement to address inaccessible infrastructure? Street-level accessibility enables inhabitants, regardless of their incapabilities, to travel within their city without the need of a motorized vehicle. To achieve this, cities are trying to practice “Complete Streets” policies, which encourage transportation planners to consider roadways from the perspective of all users, including bicyclists, public transportation vehicles, and pedestrians of all ages and abilities (Fitzgerald, 2014). “Complete Streets" policies focus not just on individual roads, but on changing the decision-making and design process such that city planners routinely consider all users during the planning, designing, building, and operating of all roadways. Inclusive cities have to use different strategies to ensure that the city's urban planning represents all people with disabilities.

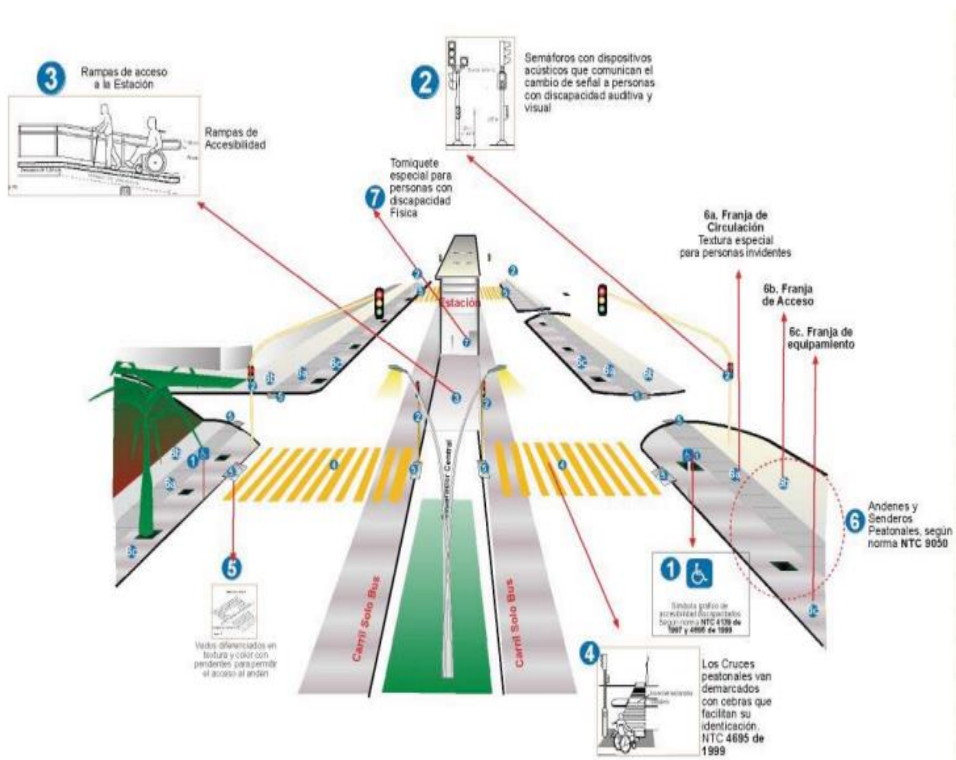
2.3.1 Bus Rapid Transit System

Cities around the world are implementing bus rapid transit systems (BRT). The Federal Transit Administration defines BRT as a mode of public transportation that combines the quality of rail transit with the flexibility of bus transit (Bitterman, 2008). Through its iconic street-level stations, wide delineated lanes for buses, and large fleet of high capacity buses, the BRT is able to move high volumes of people efficiently (Wood, 2015). The BRT’s integration with non-motorized zones, such as cycle routes and car free zones, are mutually beneficial to all transport options. The busway stations provide infrastructure for bicycle parking in order to merge public transport and non-motorized modes (Wright, 2001). Features that distinguish BRT systems from regular bus services include: fewer stops, level or zero step passenger boarding that meets or exceeds American with Disabilities Act (ADA) recommendations, frequent all day services, and more comfortable and spacious vehicles (Bitterman, 2008). All of these aspects of the BRT create a system that enables universal access for people with disabilities, allowing them to stay active in their communities.

One city that successfully implemented the BRT system is Bogota, Colombia, through El TransMilieno. Bogota is one of the densest cities in the world, with 8 million people and approximately 414 square kilometers of urban area (Guzman, 2017). City residents praise El TransMilieno because of the extensive guidelines that the government follows to ensure people with disabilities have access to it (Guzman, 2017). The guidelines focus on all types of disabilities, and they discuss pedestrian use of public space to access BRT stations and feeder bus lines. Figure 2.1 details accessibility features in Avenue Simon Bolivar. The features include a universal symbol of accessibility, traffic lights with acoustic signals to assist those with sensory impairments, access ramps for passengers with mobility impairments, well-marked pedestrian crossings, curb ramps with color and texture differentiation, accessible pedestrian walkways, and wide fare gates for people in wheelchairs (World Bank, 2007). There are standards for intersections and crosswalks that enable people with disabilities to traverse easier throughout the city. Figure 2.2 depicts the standards for intersections and crosswalks, which emphasize certain parameters for curb ramps, layouts of crosswalks and push buttons, and the use of tactile warnings such as truncated domes, maximum gradient on sides, and general level space in the sidewalks (World Bank, 2007). All these parameters give people with disabilities equal access to the BRT, allowing them to easily travel through the city.

Figure 2.1

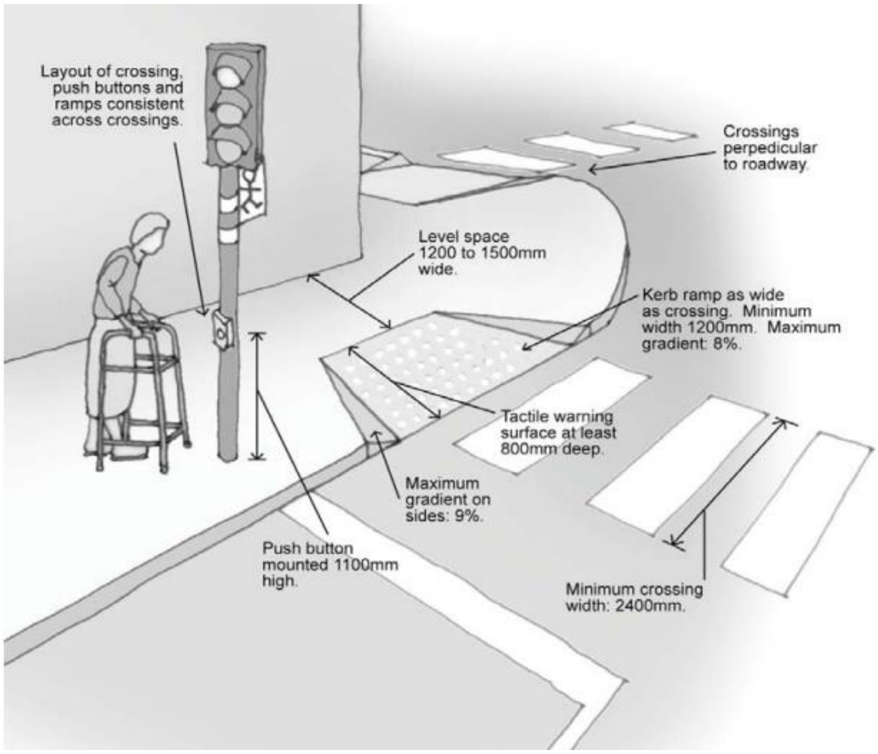
Diagram of Accessibility Features for Avenue Simon Bolivar



Note. This diagram was produced by the city Pereira, Columbia. From “Bus Rapid Transit Accessibility Guidelines” by Tom Rickert, 2016.

Figure 2.2

Design for Intersections and Crosswalks

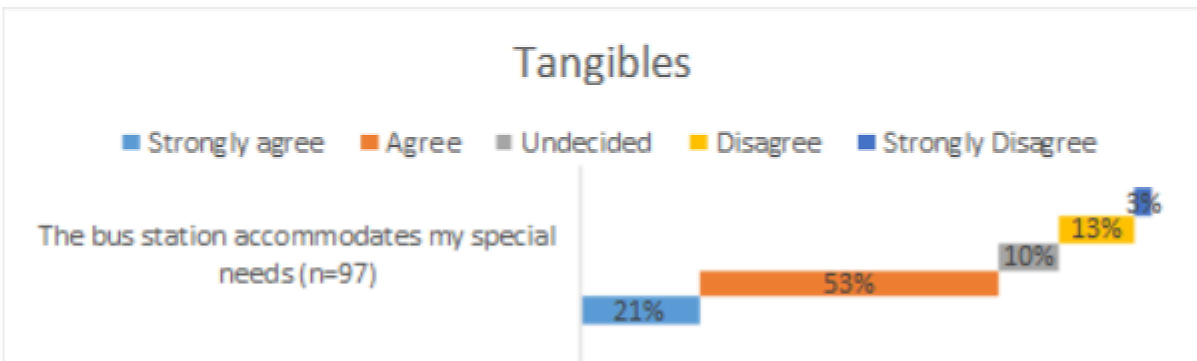


Note. This diagram was produced by the city Pereira, Columbia. From “Bus Rapid Transit Accessibility Guidelines” by Tom Rickert, 2016.

Many cities around the world are replicating the BRT system. Another city that utilizes this system is Johannesburg, South Africa, through the Rea Vaya. The success of El TransMilieno inspired the Rea Vaya, and Johannesburg implemented it to combat the city's severe traffic congestion (Wood, 2015). As a result, the Rea Vaya has many similarities to El TransMilieno with regards to policies for people with disabilities. In order to understand these similarities, researchers from Durban University of Technology conducted on-site assessments of the Rea Vaya. They recorded aspects of the system that increased access for people with disabilities. They found that the Rea Vaya supports people of varying mobility through station amenities and convenient access to transit facilities. For station amenities, Rea Vaya demonstrates its accessibility for people with disabilities through wheelchair accessible elevators, automatic doors, and wheelchair accessible stations. For convenient access to transit facilities, the system has universally accessible bus stops and wheelchair ramp access to the street at crosswalks (Adewumi, 2013). All of these aspects support people with disabilities in the overall community of Johannesburg. This is further demonstrated through surveys conducted by the Department of Transport and Supply Chain Management from the University of Johannesburg, which show how people with disabilities react to Rea Vaya's accessible traits. This study had a sample size of 97 people with mobility impairments (Tsotetsi, 2018). Figure 2.3 indicates that out of those 97 people, 53% agree and 21% strongly agree with the statement that the bus station accommodates their special needs (Tsotetsi, 2018). This demonstrates that the Rea Vaya is successfully accommodating for people with disabilities through the implementation of BRT guidelines for universal access.

Figure 2.3

Service Quality Tangibles for People with Disabilities



Note: Shows how people positively responded to bus station accommodations. From "Rea Vaya BRT System Progress and Service Delivery to Commuters Since Implementation" by Mpho Kenny Tsotetsi, Nomathemba Resego Letlhogile, Thandeka Sithole, Sebonkile Thaba, 2018.

Overall, the BRT systems implemented in population-dense cities such as Bogota and Johannesburg solved many accessibility issues that people with disabilities experienced. The success of the BRT systems in these cities are inspiring more cities to implement similar systems because they enable people with disabilities to equally participate in their communities, improving their everyday lives.

2.3.2 Superblocks

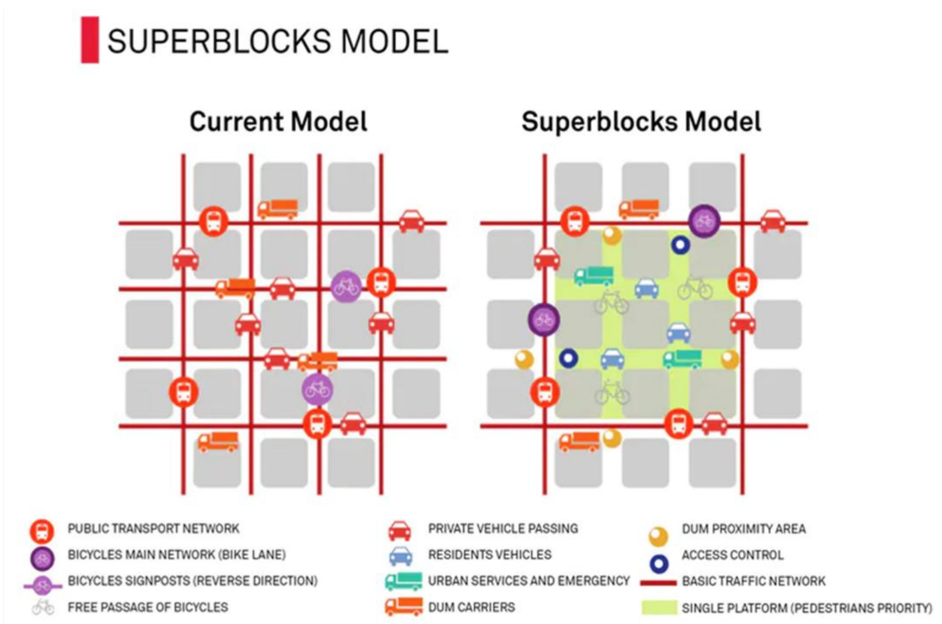
Superblocks are a type of city block that are much larger than traditional blocks. The original idea, proposed by Spanish architect Ildefons Cerdà in the 1840s, received a lot of criticism and pushback. However, in 2016, Barcelona's city council decided to implement

Superblocks in the Poblenou, Sant Antoni, and Gracia neighborhoods to decrease traffic (Duchene, 2019). Located in the northeastern part of Spain with a population of more than 1.6 million people and a metro population of approximately 5 million (Ajuntament de Barcelona, 2017), Barcelona is one of the most densely populated cities in Europe. Superblocks decrease greenhouse gas emissions in big cities by reducing traffic. Barcelona is using Superblocks to create new uses of space, more green areas, and a reduced road network (Lopez, Ortega, & Pardo, 2020).

In Barcelona, urban planners created a 400m by 400m Superblock with a residential capacity of approximately 5,000-6,000 people (Lopez, Ortega, & Pardo 2020). The surrounding city secludes the Superblock, as it prohibits non-residential traffic. As seen in Figure 2.4, designers combined a 3x3 grid of nine traditional city blocks into one Superblock. Only emergency and residential vehicles enter the Superblock, and many people bike and walk throughout the block. As shown below, “typical” city blocks (left) clearly differ from Superblocks (right), which prioritize pedestrians and increase walkability.

Figure 2.4

Superblocks Model



Note. Shows current transportation model in comparison with superblocks model. From “Mobility Infrastructures in Cities and Climate Change: An Analysis Through the Superblocks in Barcelona” by Ivan Lopez, Jordi Ortega, Mercedes Pardo, 2020.

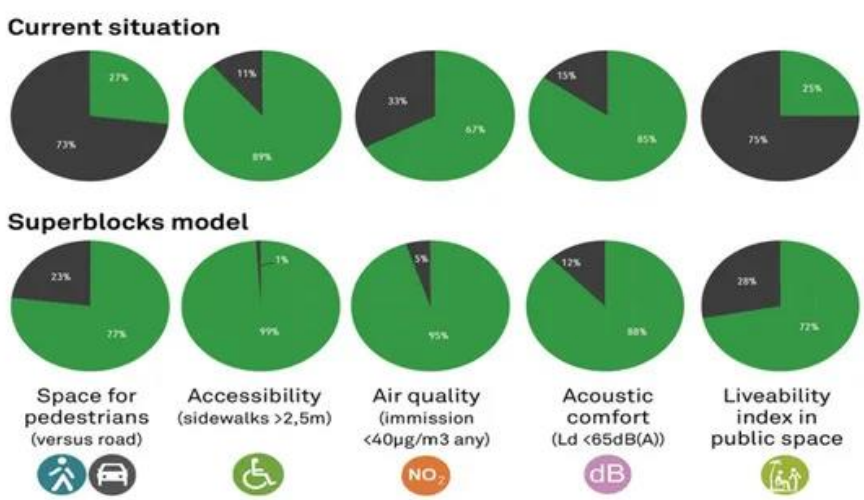
To sustain this massive change in urban planning, Barcelona improved its public transportation network (Lopez, Ortega, & Pardo 2020). Because superblocks decreased vehicle use, public transportation needed to become more efficient. Previously, Barcelona's buses were very slow, operating on the inherited tracks of old streetcars whose radial layout made transportation less efficient. After Superblocks, buses began traveling simpler routes along the newly developed grids, increasing transportation efficiency (Lopez, Ortega, & Pardo 2020).

In implementing this design concept, Barcelona did not have to tear down existing buildings and invest in making new hard infrastructure, but rather change how to section off the existing city blocks. However, Superblocks are only feasible in areas of high-population density, where public transportation is popular (Eggimann, 2022). Limiting access to vehicles in lower-density areas would be counterproductive.

Upon the creation of the Superblocks in Barcelona, sidewalk accessibility increased by 10%, and space for pedestrians increased by 50% (Lopez, Ortega, & Pardo 2020). As seen in Figure 2.5, the livability index in public spaces also increased by 47%. By prioritizing pedestrians in these areas, accessibility and quality of life increased.

Figure 2.5

Current Situation vs. Superblocks Mode



Note. Shows different variables' effects with and without superblocks. From "Mobility Infrastructures in Cities and Climate Change: An Analysis Through the Superblocks in Barcelona'' by Ivan Lopez, Jordi Ortega, Mercedes Pardo, 2020.

Superblocks in Barcelona are inspiring other cities around the globe to follow suit. As of 2020, citizens in Germany have been campaigning for the implementation of Kiezblocks, a combination of Barcelona's Superblocks and the Dutch compartments (Janssen, 2023). In Casco Viejo, Panama, researchers are looking to implement Superblocks to open up space for pedestrians in public spaces to ensure that they can move in a free and accessible way, regardless of their physical condition (Caballero, Hidalgo, & Quijada-Alarcon 2022). In 2019, Cuenca, Ecuador started their planning efforts to implement Superblocks around Parque Calderon to limit traffic and create more inclusive streets for those with disabilities (Morill & Chalhoub, 2019). These cities are exploring this solution due to the potential long-term benefits that Superblocks provide.

2.3.3 Access Mapping

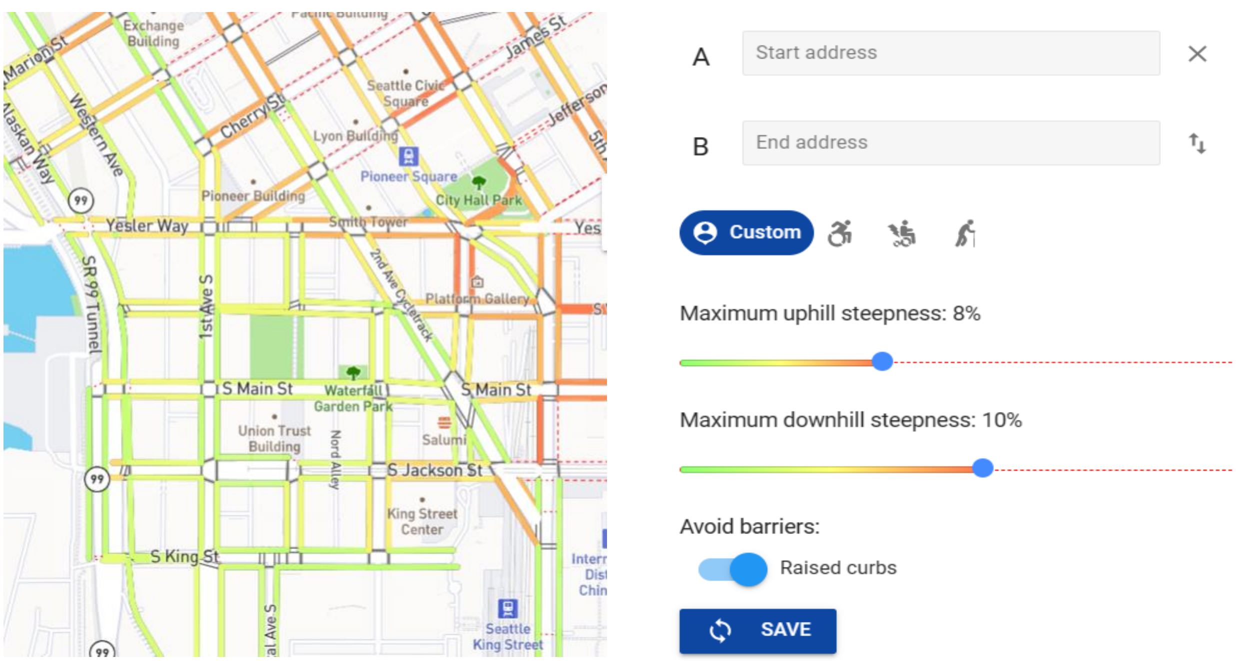
Everyone faces challenges when navigating through city streets, but these obstacles vary depending on each person's mobility constraints. Through the implementation of access maps, cities are enabling people to find the safest, most accessible routes from point A to point B given their mobility constraints. Access mapping is a digital tool that provides information about the accessibility of a certain area, such as a city, neighborhood, or building, for people with mobility challenges. It can include information about accessible transportation routes, sidewalks, buildings, public spaces, and other features (Miller, 2006). Access maps use crowdsourcing, user-generated content, or official data sources to determine the most suitable route for each user. This tool is gaining more traction with the advancement of technology, and it aims to provide users with mobility challenges the most up-to-date information needed to plan their journey and navigate their surroundings.

Seattle, Washington is currently implementing access mapping to help people with mobility impairments navigate through the city. Seattle has been dealing with accessibility issues for a long time. Its hilly roads and lack of infrastructure make traversing through the streets very difficult for those with mobility challenges. In 2017, city officials settled a lawsuit in the U.S. District Court agreeing to fix or install 22,500 curb ramps by 2035 (Langsten, 2017). In the short term, people still have to deal with the poor infrastructure present in Seattle (Langsten, 2017). Through the implementation of the app, "AccessMap," Seattle residents can traverse the city along the most accessible routes.

Developed by the University of Washington, the app is an online travel planner that offers customizable suggestions for people who need accessible or pedestrian-friendly routes when traveling from point A to point B in Seattle. For example, while Google Maps sends pedestrians from University Street Station to City Hall via Seneca Street, with its steep 10% grade, AccessMap sends them via Pike Street instead– a slope of less than 2% (Langsten, 2017). For a person with limited mobility, using sidewalks or paths in an unfamiliar area can be like driving without directions. The app allows users to obtain the safest route possible by avoiding hills that may be insurmountable for a wheelchair user and construction sites that may block sidewalks. Figure 2.6 demonstrates how the app shows the user the best route. The green stands for streets with a flat surface, easily accessible to those in wheelchairs, yellow is for slopes of 2-5%, orange represents slopes of 6-9%, while the red stands for streets with slopes of 10% or more. The user can input what type of mobility constraint they have, which may change the route that the app suggests for them. Using this technology, Seattle is opening new doors for inhabitants with mobility constraints to navigate through their city with as much ease as possible.

Figure 2.6

Access Map Diagram



Note: Shows accessible and inaccessible streets and how to input certain constraints. Screenshot taken from the app “AccessMap”.

As mentioned earlier, access maps use crowdsourcing, user generated content, or official data to route the user. An application called Project Sidewalks can collect this data. Project Sidewalks is a web-based tool that enables online crowd workers to remotely label pedestrian-related accessibility problems by virtually walking through city streets using Google Street View. Anyone with internet access can use the application, and it enables users to audit any given street in a city. There are five primary categories that users can identify: curb ramps, no curb ramps, obstacles, surface problem, and no sidewalk (Saha, 2019). The end goal of utilizing Project Sidewalks in a city is to build an overall accessibility rating map of the city, which accessibility-aware mapping tools, such as AccessMap in Seattle, can then use.

Project Sidewalks started in Washington D.C. and has since spread to other cities such as Seattle, Columbus, Pittsburgh, and even cities outside the U.S. like Mexico City and Amsterdam. In early 2020, researchers from the University of Washington conducted case studies in Mexico City where they collected 10,313 sidewalk accessibility labels across 72 miles in Azcapotzalco, a municipality in Mexico City (Froehlich, 2020). The researchers mapped 59.4% of the target area, covering 266.3 miles and placing 57,109 labels. In Mexico, 43% of the population uses a computer and 66% have smartphones, so the speed of labeling and mapping out cities can vary (Froehlich, 2020). With Spanish-based versions becoming more prevalent due to Project Sidewalks expanding to Mexico, it is possible for other Latin American cities with limited accessibility to implement this low-cost solution to address inaccessibility.

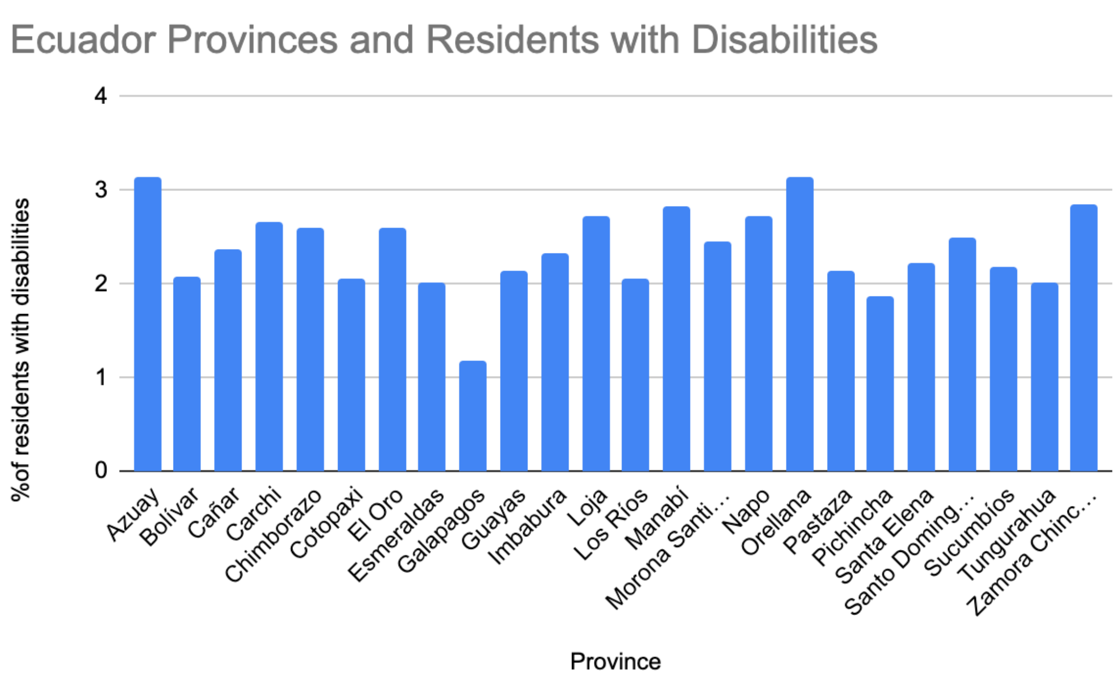
2.4. Accessibility Challenges in Cuenca

In 2014, the United Nations (UN) issued a press release, describing the treatment of people with disabilities in Ecuador. The UN's Committee on the Rights of Persons with Disabilities evaluated Ecuador's laws and determined that the policies did not adequately protect people with disabilities– particularly when it came to accessibility. In 2008, with the adoption of a new constitution, Ecuador's government began to implement more inclusive laws, which led to an improved quality of life for many people with disabilities (United Nations, 2014). However, many of these progressive policies, while steps in the right direction, failed to meet the UN's accessibility standards (as outlined in its Convention on the Rights of Persons with Disabilities (CRPD)) (United Nations, 2014). In 2012, Ecuador passed its Organic Law on Disability along with other governmental initiatives; however, experts noted that those efforts fell short (United Nations, 2014). For instance, as stated in the UN's press release, the "Convention provisions were not fully transposed into Ecuador's legislation. Ecuador needed to apply the concept of reasonable accommodation, introduce appropriate anti-discrimination legislation, promote a positive image of persons with disabilities, [and] guarantee their access to justice," among other things (United Nations, 2014, paragraph 14). Therefore, despite efforts to increase protections for persons with disabilities in Ecuador, accessibility challenges remain evident throughout the nation. Many individuals with disabilities continue to experience obstacles in their daily lives– particularly while navigating city streets.

One of Ecuador's biggest cities is Cuenca, with a population of approximately 650,000 people– many of whom experience a disability (United Nations, 2014). As seen in Figure 2.7, adapted from Ministerio de Salud Público (2015) and Brinkhoff (2020), the Azuay province, which includes the city of Cuenca, has the highest per-capita percentage of residents with disabilities in the nation. Therefore, issues concerning accessibility are of great importance in this area. It is important that the city's streets are accessible and inclusive for all its residents, particularly those with disabilities.

Figure 2.7

Ecuador Provinces and Residents with Disabilities



Note: The city of Cuenca is located in the Azuay Province.

In 2020, faculty at the University of Cuenca conducted a study that analyzed street-level accessibility throughout the city. Researchers audited a total of 214 street segments, assessing levels of compliance with Ecuador’s national standards of accessibility (Orellana et al., 2020). The researchers concluded that 0 of the 214 street segments fully complied with the standards (Orellana et al., 2020). Additionally, the research team enlisted participants from three different mobility categories to further audit the city’s streets. Participants with (1) unrestricted mobility, (2) restricted mobility (pushing a stroller), and (3) impaired mobility (using a wheelchair) traveled throughout Cuenca and reported their abilities to overcome various obstacles (Orellana et al., 2020). They assigned scores to each obstacle ranging from 0 (impossible to overcome) to 1 (easy to overcome) (Orellana et al., 2020). Ultimately, participants from all groups experienced difficulties overcoming street-level obstacles, and those with impaired mobility suffered the most. Mean scores were 0.4 for the unrestricted group, 0.29 for the restricted group, and 0.12 for the impaired mobility group (Orellana et al., 2020). Since these average scores were close to 0 (which indicates the obstacle was impossible to overcome), the researchers concluded that the streets are extremely inaccessible. Wheelchair users were rarely able to overcome obstacles, as their mean score of 0.12 indicates. Some of the most disruptive obstacles were manhole covers, curb ramps, driveway ramps, inconsistent pavement, and poles (Orellana et al., 2020). Other literature has reported additional walking-hazards in Cuenca’s streets. For instance, Elaine (2019) reported cases of pop-up stores (small stands set up by street-vendors) and construction scaffolding blocking the sidewalks. These obstacles, while hindrances to accessibility, may be signs of community improvement. Thus, one must be mindful of all implications when considering solutions.

2.5. Cuenca’s Network of Actors

Addressing the accessibility challenges in Cuenca involves taking into account a variety of different stakeholders. These stakeholders are part of the network of actors in Cuenca who are capable of implementing changes to the city's infrastructure. Developing an actor-network theory is a method to map the constantly changing network of relationships within a system, noting issues between any actors (Cazorla, 2021). A network of actors can include those with administrative power, organizations that advocate for a change, or those who protest a change from happening.

Starting in the 1990’s, the decentralization movement in Ecuador has been shifting power from a national level to a local level, giving municipal(canton-level) governments more authority (Keese, 2006). The Law of Social Participation and Decentralisation of the State gives the authority of previous national responsibilities to the local governments (Keese, 2006). As of 2008, article 264 in the Ecuadorian Constitution outlines the exclusive jurisdictions that municipal governments have. Specifically, the article states that municipal governments have the ability, “To plan canton development and draw up the respective land use development and management plans in coordination with national, regional, provincial and parish planning, with the aim of regulating the urban and rural land use and occupation.” (Asamblea Nacional de Ecuador, 2008). Municipalities have the right to implement changes to their city’s infrastructure.

The municipality of Cuenca has the right to make changes to the city’s infrastructure. The network of government actors required to implement an infrastructure project in Cuenca include the Mayor of Cuenca, the Mobility Department (DMT), the Public mobility company (EMOV EP), and the Urban Planning Department (SEGEPLAN) (Cazorla, 2021). The network of actors can also include the National Transit Agency (ANT) who receives funds from a national level (Cazorla, 2021).

Aside from governmental actors, another relevant actor to improve accessibility in Cuenca is CONADIS, which is the National Council for Disability Equality in Ecuador. The mission of CONADIS is to “Formulate, mainstream, observe, monitor and evaluate public policies on disabilities” (CONADIS, 2016). CONADIS is the leading entity to focus on rights for people with disabilities in the country (Godoy Padilla, 2017). They have legal mandates to dictate policies, coordinate public and private actions, and promote research on disabilities throughout the country (Godoy Padilla, 2017). Since this organization advocates for public policy changes regarding people with disabilities, they are one of the stakeholders involved with implementing a solution to improve street-level accessibility in Cuenca.

To implement changes to the infrastructure, the relevant actors need to work in a holistic framework, meaning municipal agencies must coordinate with one another to manage an infrastructure project. An obstacle will arise when the relevant actors do not cooperate well with each other. In a study to implement green infrastructure in Cuenca, researchers encountered the issue of “siloed agencies” or the relevant agencies to implement changes that have difficulty working with each other (Serra-Llobet, 2017). Additionally, the article describes the disconnect between planning efforts between the area inside Cuenca and the area just outside the city, called the peri-urban area (Serra-Llobet, 2017). Obstacles like these endanger successful implementation of a project to address Cuenca’s accessibility.

2.6. Summary

Taking into consideration the accessible and inaccessible traits of cities, strategies that promote accessibility, and issues that Cuenca is currently facing, the team will recommend ways to address Cuenca's street-level accessibility challenges. Accessibility is important because it represents inclusion for individuals of all mobility levels and assures them that government officials are taking their needs into consideration. In order to execute change, it is important to reflect on where past attempts at improvement went wrong. EMOV EP will serve as the project's sponsor and will provide connections to data that the team can analyze as well as expert insight. Based on the literature collected on low-cost solutions, the team believes access mapping is the most feasible and low-cost solution to address inaccessibility in the city. The team will utilize EMOV EP's records to identify, categorize, and map areas in the city that are inaccessible for people with impaired mobility. Then, they will systematically observe some of those areas to better understand community interaction with inaccessible infrastructure. In conjunction with the observational phase, the team will interview community members and experts to gauge their perspectives on accessibility challenges and to help understand social and technical barriers to implementing access mapping. In the end, the researchers will propose a low-cost solution to EMOV EP, in hopes that it will be implemented in the coming years.

3.0 Methodology

The goal of this project is to assist EMOV EP in their efforts to address street-level accessibility in Cuenca by exploring low-cost solutions and assessing their feasibility. Three objectives will help to accomplish this goal:

Objective 1: Identify, categorize, and map hotspots of inaccessibility

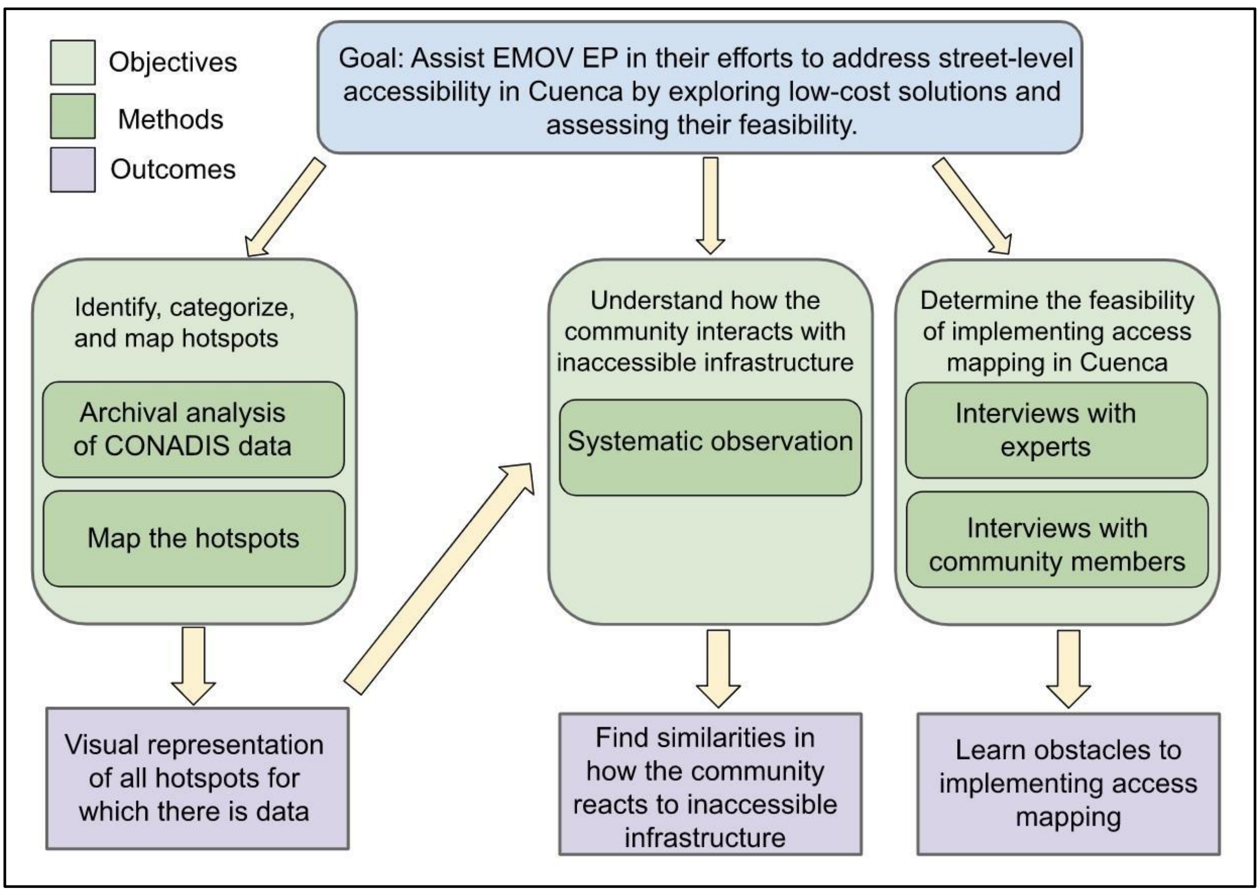
Objective 2: Understand how the community interacts with inaccessible infrastructure

Objective 3: Determine the feasibility of implementing access mapping in Cuenca

Figure 3.1 outlines the project's goal, objectives, methods, and outcomes.

Figure 3.1

Project Goal, Objectives, Methods, and Outcomes



b3.1. Identify, Categorize, and Map Hotspots of Inaccessibility

The first objective of this project is to identify, categorize, and map hotspots of inaccessibility on the streets of Cuenca. For the purpose of this project, a hotspot of inaccessibility is a section of sidewalk that causes difficulty or prevents an individual from passing through. The first phase of the project involves the execution of two methods: archival analysis of the data that CONADIS provides and the use of a Geographic Information System (GIS software) to map the hotspots that the team identifies. The outcome of these methods is a visual representation of the hotspots in Cuenca for which there is data. The team will use this to systematically observe the hotspots in the second objective.

CONADIS has raw data about locations of inaccessibility in Cuenca. By analyzing the data, the team can learn valuable information about the hotspots in Cuenca such as their location, most frequent injuries caused, and common solutions put in place by EMOV EP. Archival analysis is a method to consult and sort the raw data from archives to extract the information of interest (Harris, 2017). The information that interests the team the most is locations of hotspots of inaccessibility and the physical characteristics that deem them inaccessible.

The team will look through the locations of hotspots provided by CONADIS and organize them into a list. Using all the current data that CONADIS has, the team will categorize each hotspot in the list based on themes that describe what deem that hotspot inaccessible (Jaeger & Hale, 2022; Demirkan, 2013). The team will input each hotspot location, theme, and other information about the hotspot's surroundings into a worksheet (see Appendix A). One hotspot corresponds to one row in the worksheet. If a hotspot qualifies under more than one theme, the team will enter all relevant themes. The team plans to categorize hotspots in a similar way to past literature, but they will finalize the themes as they see fit. If the number of hotspots CONADIS provides is too large (more than fifty) for the team to input into the worksheet, the team will instead focus on only the fifty hotspots that CONADIS deems highest priority.

Based on the results of the first method, the team will use an open software GIS to create a visual representation of all the hotspots of inaccessibility in Cuenca that they identify. GIS is a tool used to display all forms of geographically related information. It allows users to view, understand, question, interpret, and visualize data in various ways, revealing trends in the form of maps, globes, reports, and charts (Chrisman, 1999). GIS is better suited for this project than other mapping software because its main objectives are to maximize efficiency of data handling, eradicate duplicate data, and update data easily (Pandey, 2013). EMOV EP uses GIS, as well. The team will color code the hotspots based on the type of inaccessible theme. Once the team documents the hotspots for which CONADIS has locations, they can move on to the project's next objective, where they will systematically observe these hotspots.

3.2. Understand how the Community Interacts with Inaccessible Infrastructure

Once the research group maps the hotspots, the second objective is to understand how the community interacts with inaccessible infrastructure. The group will systematically observe several hotspots from the first objective. Systematic observation is a method of close examination of some phenomena to obtain reliable unbiased data from the observer (Beebe, 2014). The researchers will be physically present, but unobtrusively gathering information using written notes on a worksheet. Similar to the “Fly on the Wall” observation technique, the researchers are in the area observing what they see and hear without interfering with the population (Hanington, B., & Martin, B., 2022). Applying this method will yield data on human-object interaction (between community members and inaccessible infrastructure). Analysis will focus on peoples’ common responses to sidewalk obstacles (such a re-routing, slowing down, or needing assistance, among others).

To give the team's observations meaning, the researchers prepared a worksheet (see Appendix B). To maintain consistency, every site uses a copy of the same worksheet as part of the observation protocol. The worksheet has several questions that focus on human-street interactions, specifically how the current condition of the area affects our population and their response. The researchers will categorize the population they observe by the type of mobility impairment in order to see if there is any correlation between that physical characteristic and their response. The other questions mainly ask about the specific surroundings that may directly contribute to an area being inaccessible. For example, are there pedestrian traffic signals in the area and are the vehicles on the road being driven in a safe manner? This will give insight on how outside factors might be eliciting certain responses.

In order to choose the specific hotspots to systematically observe, the team will utilize stratified random sampling. After categorizing the hotspots by type of accessibility challenge (as seen in the first objective), the team will randomly select two hotspots from each category for observation. Stratified random sampling is an ideal sampling method because it will allow team members to obtain a comprehensive view of the different types of accessibility challenge, and the randomness ensures that all hotspots have an equal chance of selection (which makes the sample more reliable/representative) (Beebe, 2014).

The researchers will conduct observations on a weekday, during 30-minute intervals around the same time as “rush hour.” The researchers will observe each hotspot once, on different days of the week, and will be standing in the area. Three members will be present during each observation, with observants taking written notes on the observation worksheet. All observations will be conducted within a 10 day span. In the case of inclement weather, the team will reschedule the observation to a later date. The other members of the team will be conducting interviews as part of the third objective.

The researchers will analyze the data collected via a frequency count in order to identify trends and patterns between the areas of inaccessibility. The goal is to calculate the frequency of specific responses and the number of times an inaccessible characteristic occurs in the data set. From this, the researchers will compare the responses of the different types of mobility from different hotspots in order to examine the possibility of a trend.

3.3. Determine the Feasibility of Implementing Access Mapping in Cuenca

The third objective of this project is to determine the feasibility of implementing access mapping in Cuenca. Based on the team’s research, access mapping is the most effective low-cost solution to address street-level inaccessibility in Cuenca. It involves the use of a smart-phone application to report obstacles caused by inadequate sidewalks and other infrastructure (Langsten, 2017). Using these reports, the app suggests alternate walking routes that are safer and more accessible (Langsten, 2017). Since this strategy requires community participation through a smartphone app, the researchers need to gauge if community members will use the app. The team also needs to understand local experts’ perspectives on inaccessibility improvements and whether access mapping is a feasible low-cost solution for the city.

To obtain answers to these questions, the team will conduct a series of semi-structured interviews. Semi-structured interviews will enable the researchers to gain some consistent data, as all members of a group will be asked the same basic questions (Beebe, 2014). They also grant the researcher the opportunity to ask follow-up questions and clarifications, which can encourage participants to share their unique perspectives and experiences in greater detail (Beebe, 2014). The researchers will administer interviews to two separate groups: “experts” (government officials who work at EMOV EP and University of Cuenca faculty) and “community members” (individuals who live in Cuenca, with a range of ages and mobility levels). The team will ask experts about past and current accessibility initiatives and their opinions on implementing access mapping in Cuenca. The team will ask community members about issues they encounter and how they will receive/react to access mapping (i.e., will they use the app?). A full set of interview questions can be found in Appendices C and D.

Each interview will take approximately 45 minutes, but time may vary depending on the length of participant responses. The interviews will take place in an agreed upon location (decided by the interviewer and interviewee on a case-by-case basis). The team will obtain informed consent from all participants (given orally), and the interviews will be recorded with participant permission. The researchers will use both expert and snowball sampling to obtain participants for the first set of interviews (experts) (Gill, 2020). The team will employ these methods of sampling in order to talk to specialists in the urban development field– who may be able to recommend additional experts in their network for further interviews. For the second set of interviews (community members), the team will use a combination of convenience and snowball sampling. Convenience sampling will allow the team to interview community members that we meet throughout the city. Snowball sampling will point the researchers in the direction of additional participants who are passionate about developing changes in their community or who these changes affect the most, i.e. those with mobility impairments.

The researchers will conduct approximately six interviews within each group. While this is the plan for now, the team may find that a smaller sample-size is sufficient to obtain data saturation, which occurs when participants are no longer providing new answers or information (Gill, 2020). Once the researchers obtain data saturation in each group of interviewees, they will stop the interview process. According to Gill (2020), in social science research, “most often, authors justified sample size using the principle of data saturation” (page 580). The team will follow this framework while finalizing the sample size for each group.

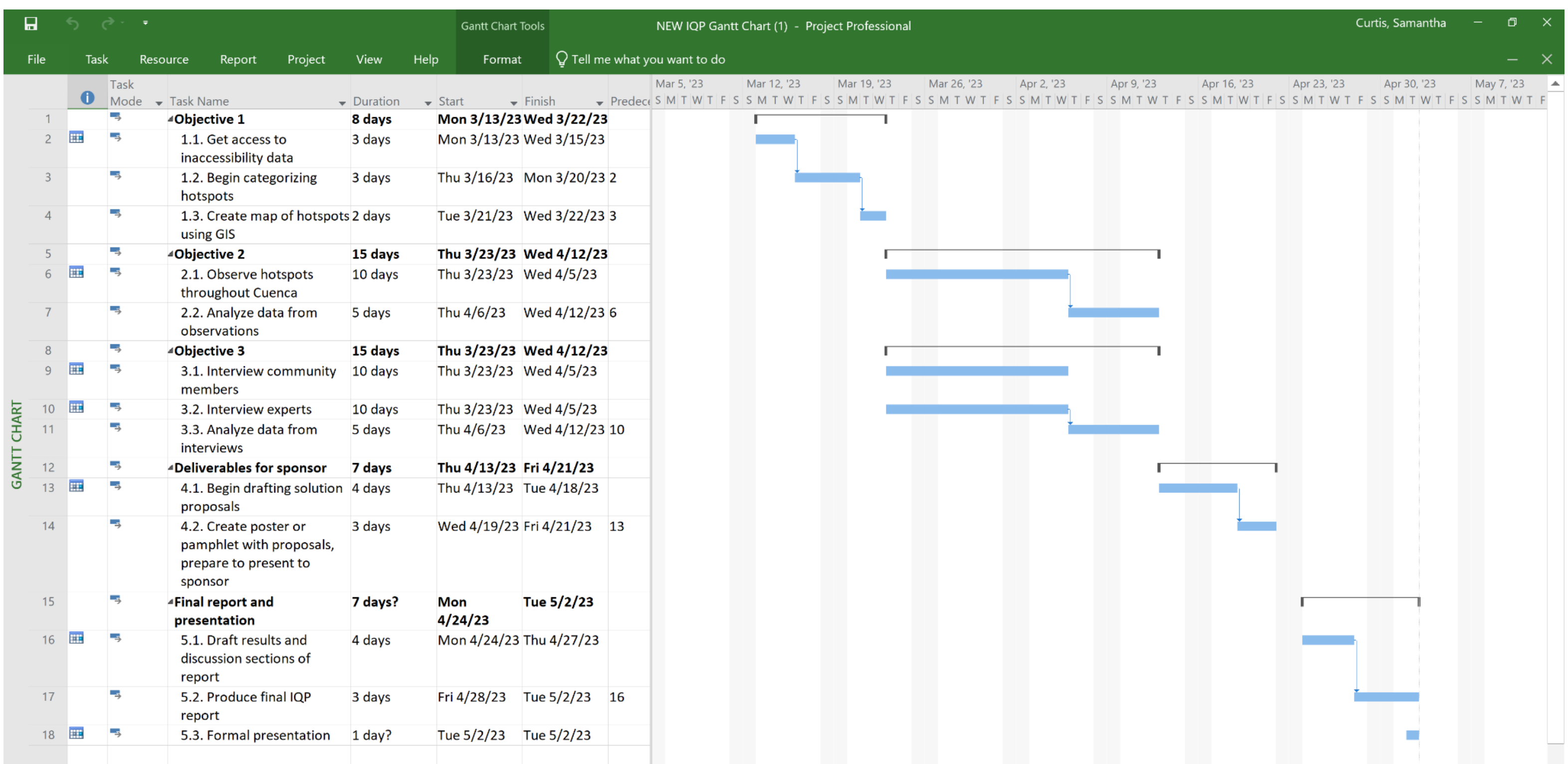
During each interview, one team member will take notes, providing a detailed summary of the participant’s responses. After each interview, the researchers will review the audio recording, transcribing specific sections that are content-rich. As the number of interviews increases, the team will be able to identify themes across participants’ responses (Gill, 2020). The team will then look over the notes and transcriptions, coding for the common themes. For instance, “social good (sg)” may be a common reason that experts enjoy their work (see Appendix B, question 2). The researchers will produce a data display with the findings (common themes) from their coding/content analysis.

3.4. Summary

In order to successfully carry out each objective, the team needs to be on track for the entirety of the project. Figure 3.2 depicts the current team Gantt Chart, which the team will likely modify and change throughout D-term. It describes the timeline for each objective and also states when the proposal and final reports will occur. The team will perform an archival analysis on the data provided by their sponsor and find local hotspots of inaccessibility in the city. They will use this data to perform systematic observations on the hotspots and learn how individuals react to the presence of the hotspots. The team will interview infrastructure experts and Cuenca locals to gain an understanding of more perspectives. Finally, they will code the results from the interviews and identify several main ideas. These objectives will help the team assess the feasibility of implementing access mapping in Cuenca's community. The team will then present their findings to EMOV EP and request feedback.

Figure 3.2

Project Gantt Chart



Note. Shows the schedule that the team will follow.

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Appendix A

Appendix A is the worksheet the team will use for Objective One. The team will fill out one row per hotspot.

Hotspot information:						Check all below categories that apply:						
Street name	Nearsest address	Near intersection?	Near public facility? (school, hospital, etc.)	Residential or public?	Heavy foot traffic?	Too narrow	Uneven surface	blocked	non-existent	no auditory cues	no truncated domes	no data

Appendix B

Appendix B is the worksheet the team will use to input their observations for Objective Two. The team uses one sheet per hotspot.

Type of hotspot (and brief description of the scene)	category 1								
Day of the week									
Time of observation									
# of people that encountered the hotspot (by type of mobility impairment)	wheelchair users- ###	pushing a stroller-	visual impairment-	cane users-	walker users-	elderly (not otherwise impaired)-	young children-	Other mobility impairment (please specify)-	No impairment-
How did they respond to the obstacle? (re-route (rr), noticeably slow down (sd), sustain injury (in), ignore (ig), say something about it (ss), other (please specify)	e.g., rr- ##, ss- ##								
Did they use the road instead of the sidewalk?	Y- ##, N- ##								
Are vehicles driving on the road causing a safety hazard to pedestrians trying to cross hotspot? (Y/N)									
Are there pedestrian traffic signals in the area? (lights, signs etc.)									
Is this hotspot near any public services, eg school, hospital? (Y/N, speficiy which public service)									
Insert picture of hotspot here									

Appendix C

Cuenca Expert Interviews

Appendix C is the interview protocol for speaking with infrastructure experts in Cuenca (government officials, University of Cuenca professors, and EMOV EP employees). The protocol includes an introduction to the team and project, a confidentiality statement, and the list of questions that will be asked during the interview.

Hello, we are a group of college students from Worcester Polytechnic Institute in MA, USA working with EMOV EP, or Empresa Pública de Movilidad, Tránsito y Transporte de la Municipalidad de Cuenca, to assist in their efforts to increase street-level accessibility in Cuenca by determining low-cost solutions. We would like to ask you a series of interview questions regarding constraints with improving street-level accessibility in Cuenca. We hope to learn about the feasibility of implementing potential solutions. The interview will take approximately 30 minutes, but time may vary depending on the flow of conversation. There are no anticipated risks to you and no direct benefits to you for participating in this interview. Your responses will help us better understand the accessibility problem and identify potential solutions.

The interview will be audio-recorded, but you have the right to decline the recording. Your name and job title may be associated with your responses in our project report, but you also have the option to remain anonymous. Your participation in this interview is completely voluntary, and you have the right not to respond to any interview question. You should inform the interviewer if you would like to end the conversation at any time.

The goal of this interview is to gain expert insight about accessibility challenges in Cuenca and the feasibility of implementing low-cost solutions. Specifically, we would like feedback about access mapping as a potential solution. Access mapping involves the use of a smart-phone application to report sidewalk obstacles. Based on these reports, the app suggests alternate walking routes that are safer and more accessible.

Interview Questions:

1. What is your job title and experience with infrastructure and/or accessibility?
2. What excites you the most about working in your current role for this organization?
3. Currently, what is the city of Cuenca doing well to address accessibility concerns?
4. In what ways could the city improve its approach to accessibility?
    a. What are the most pressing accessibility challenges in Cuenca?

5. What kind of resources are available and most important for addressing these challenges?
6. Were there previous attempts to improve Cuenca's accessibility in the past? If so, what were they? What was the outcome? Were the attempts successful?
7. Are you familiar with access mapping as a solution for inaccessible streets/sidewalks?
8. Based on the brief overview we provided and/or your prior knowledge, do you think access mapping would be a feasible and effective solution to implement in Cuenca? Why or why not?
9. Do you think your organization will be able to encourage Cuenca's citizens to use access mapping? If so, how would you go about this?
10. Is there anything else the team should keep in mind when proposing a solution– related to access mapping or in general?

Spanish Translation

Hola, somos un grupo de estudiantes universitarios del Worcester Polytechnic Institute en MA, EE. UU., trabajando con EMOV EP, o Empresa Pública de Movilidad, Tránsito y Transporte de la Municipalidad de Cuenca, para ayudar en sus esfuerzos para aumentar la accesibilidad a nivel de calle en Cuenca mediante la determinación de soluciones de bajo costo. Nos gustaría hacerle una serie de preguntas de entrevista sobre las limitaciones para mejorar la accesibilidad a nivel de calle en Cuenca. Esperamos aprender sobre la viabilidad de implementar soluciones potenciales. La entrevista durará aproximadamente 30 minutos, pero el tiempo puede variar según el flujo de la conversación. No se anticipan riesgos para usted y no hay beneficios directos para usted por participar en esta entrevista. Sus respuestas nos ayudarán a comprender mejor el problema de accesibilidad e identificar posibles soluciones.

La entrevista será grabada en audio, pero tiene derecho a rechazar la grabación. Su nombre y cargo pueden estar asociados con sus respuestas en nuestro informe de proyecto, pero también tiene la opción de permanecer en el anonimato. Su participación en esta entrevista es completamente voluntaria y tiene derecho a no responder ninguna pregunta de la entrevista. Debe informar al entrevistador si desea finalizar la conversación en cualquier momento.

El objetivo de esta entrevista es obtener una perspectiva experta sobre los desafíos de accesibilidad en Cuenca y la viabilidad de implementar soluciones de bajo costo. Específicamente, nos gustaría recibir comentarios sobre el mapeo de accesibilidad como solución potencial. El mapeo de accesibilidad implica el uso de una aplicación de teléfono inteligente para informar obstáculos en las aceras. Según estos informes, la aplicación sugiere rutas alternativas para caminar que son más seguras y accesibles.

Preguntas de la entrevista:

1. ¿Cuál es su cargo y experiencia en infraestructura y / o accesibilidad?
2. ¿Qué es lo que más le entusiasma de trabajar en su rol actual para esta organización?
3. ¿Qué está haciendo bien actualmente la ciudad de Cuenca para abordar las preocupaciones de accesibilidad?
4. ¿De qué manera podría la ciudad mejorar su enfoque en la accesibilidad?
5. ¿Cuáles son los desafíos de accesibilidad más urgentes en Cuenca?
6. ¿Qué tipo de recursos están disponibles y son más importantes para abordar estos desafíos?
7. ¿Hubo intentos anteriores para mejorar la accesibilidad en Cuenca en el pasado? Si es así, ¿cuáles fueron? ¿Cuál fue el resultado? ¿Fueron exitosos los intentos?
8. ¿Está familiarizado con el mapeo de accesibilidad como solución para calles / aceras inaccesibles?
9. Basado en la breve descripción que proporcionamos y / o su conocimiento previo, ¿cree que el mapeo de accesibilidad sería una solución factible y efectiva para implementar en Cuenca

Appendix D

Cuenca Community Member Interviews

Appendix D is the interview protocol for speaking with community members in Cuenca. The protocol includes an introduction to the team and project, a confidentiality statement, and the list of questions that will be asked during the interview.

Hello, we are a group of college students working with EMOV EP, or Empresa Pública de Movilidad, Tránsito y Transporte de la Municipalidad de Cuenca, to assist in their efforts to increase street-level accessibility in Cuenca by determining low-cost solutions. We would like to ask you a series of interview questions regarding your experience with infrastructure and sidewalks in Cuenca. The interview will take approximately 30 minutes, but time may vary depending on the flow of conversation. There are no anticipated risks to you and no direct benefits to you for participating in this interview. Your responses will help us better understand the accessibility problem and identify potential solutions.

The interview will be audio-recorded, but you have the right to decline the recording. Your name will not be associated with your responses in our project report. Your participation in this interview is completely voluntary. You have the right not to respond to any interview question and should inform the interviewer if you would like to end the conversation at any time.

The goal of this interview is to speak with individuals with a range of mobility statuses and to hear if these community members have had personal encounters with Cuenca's infrastructure that led to inconvenience or injury. We are also looking to gain feedback about access mapping as a potential low-cost solution. Access mapping involves the use of a smart-phone application to report sidewalk obstacles. Based on these reports, the app suggests alternate walking routes that are safer and more accessible.

Interview Questions:

1. How often do you walk around Cuenca? Is walking your main mode of transportation?
2. Have you ever had problems with sidewalk evenness, holes in the sidewalk, obstructions, or the width of the sidewalks? Can you give me an example of what happened?
    a. Do you know someone else who has experienced something like this?

3. Has a lack of auditory cues near intersections ever impaired your ability to move safely?
4. (If individual is vision impaired, ask about truncated domes)
5. At traffic lights, do you feel you have enough time to cross the street safely? Do you wish the pedestrian light lasted longer?'
6. Do you have a smartphone? Are you comfortable downloading and using apps on your phone?
7. Would you be willing to utilize an app on your phone to report sidewalk hazards throughout Cuenca?
8. Would you or someone you know follow the safer, more accessible walking routes suggested by this app (which might take more time)?

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La entrevista se grabará en audio, pero tiene derecho a declinar la grabación. Su nombre no se asociará con sus respuestas en nuestro informe del proyecto. Su participación en esta entrevista es completamente voluntaria. Tiene derecho a no responder a ninguna pregunta de la entrevista y debe informar al entrevistador si desea terminar la conversación en cualquier momento.

El objetivo de esta entrevista es hablar con personas con diferentes niveles de movilidad y saber si estos miembros de la comunidad han tenido encuentros personales con la infraestructura de Cuenca que hayan llevado a inconvenientes o lesiones. También estamos buscando obtener comentarios sobre el mapeo de acceso como una solución potencial de bajo costo. El mapeo de acceso implica el uso de una aplicación de teléfono inteligente para informar obstáculos en las aceras. Basándose en estos informes, la aplicación sugiere rutas alternativas para caminar que son más seguras y accesibles.

Preguntas de entrevista:

1. ¿Con qué frecuencia camina por Cuenca? ¿Caminar es su principal modo de transporte?
2. ¿Alguna vez ha tenido problemas con la irregularidad de las aceras, agujeros en las aceras, obstrucciones o el ancho de las aceras? ¿Puede darme un ejemplo de lo que sucedió?
3. ¿Conoce a alguien más que haya experimentado algo así?
4. ¿La falta de señales auditivas cerca de las intersecciones ha afectado alguna vez su capacidad para moverse con seguridad?
   (Si la persona tiene discapacidad visual, preguntar sobre los domos táctiles).
5. En los semáforos, ¿siente que tiene suficiente tiempo para cruzar la calle de manera segura? ¿Desearía que el semáforo para peatones durara más?
6. ¿Tiene un teléfono inteligente? ¿Se siente cómodo descargando y usando aplicaciones en su teléfono?
7. ¿Estaría dispuesto a utilizar una aplicación en su teléfono para informar sobre peligros en las aceras en toda Cuenca?
8. ¿Usted o alguien que conoce seguiría las rutas de caminata más seguras y accesibles sugeridas por esta aplicación (que podrían tomar más tiempo)?