MAPPING INCLUSION: ACCESSIBLITY ADVOCACY FOR PEOPLE WITH DISABILITIES USING GIS CROWDSOURCED DATA

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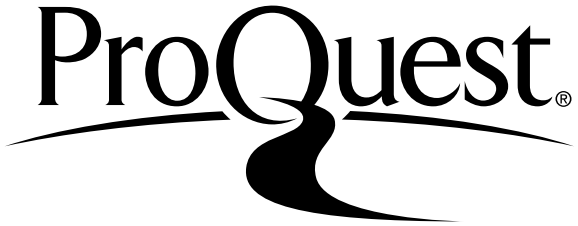

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ABSTRACT

MAPPING INCLUSION: ACCESSIBLITY ADVOCACY FOR PEOPLE WITH DISABILITIES USING GIS CROWDSOURCED DATA

DAVID FRANCIS NYKODYM

The built environment is the conduit that people utilize to access services, employment, and community engagement. To ensure accessibility in a community for people with disabilities, it is important to look at the physical aspects of the built environment. Barriers in the physical environment exclude people from full participation in their community and living to their full potential. For most of modern history people with disabilities have been excluded from public participation and by doing so have been left out of the decision-making process for how communities are constructed. The Americans with Disabilities Act is landmark civil rights legislation that requires buildings, transportation, and pedestrian routes to be accessible to people with disabilities, it is underenforced and has many exceptions to when accessible features need to be applied to construction. Through advocacy work, many people with disabilities have continued to push for change for inclusion. This research gathers and analyzes crowdsourced spatial data on accessibility for use in advocacy work. RestroomMap and Community Accessibility Reporter were developed for users to report accessibility issues in real time through online GIS services. The data collected from these applications were used for qualitative assessments of accessibility and for use in connecting narratives of people with disabilities to spatial data.

Keywords: accessibility, crowdsourcing, advocacy, social disability, GIS, pedestrian network, restrooms.

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I would like to send a shout out to Missouri Disability Empowerment (MoDE) Foundation for all their work making Missouri more inclusive, their work advocating for the disability community, and their eagerness and excitement to create this application to map restrooms.

I would like to acknowledge the hard work of those who continue to fight for inclusion and those who are marginalized. I want to acknowledge their unending strength and courage against those in power who value the status quo over treating people with dignity.

Above all I would like to thank my family, especially my wife Christina and daughter Lilly who supported me through this endeavor. They gave me inspiration to complete this project through dance parties, listening to my complaints, reminding me what matters in life, and late-night chats eating Taco Bell. Without their love and support none of this would be possible.

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Chapter 1: Introduction

In the disability community there are many stories of inaccessibility and exclusion, this is just one of mine.

In Winter of 2017 my wife and I had to take our daughter to a routine doctor's appointment in St. Louis, Missouri. It's a two-hour drive to get to the clinic from our home in Columbia, Missouri. Due to my daughter's rare genetic syndrome she is non-verbal, unable to walk without assistance, and has stomach issues due to missing most of her large intestine. Accordingly, we make a lot of stops for bathroom breaks to change dirty diapers. I'm typically the one who changes her in public since she is heavier and the only way to quickly change her is to carry and lift her onto a changing table. On the way to St. Louis we pulled over at a gas station for a restroom break. When we asked the attendant if there was a family restroom they said no. Then we asked if the men's room had a changing table, and they said no. I came back to our car in the cold and changed her in the back seat. Luckily at the time she thought this was funny so we quickly recovered.

At the specialist's office the same situation happened where we needed to change a diaper. My wife was getting paper work in order so I took Lilly to find a bathroom. I looked around for a restroom, and luckily ran into a staff person at the clinic; this time I thought, Yes! They'll get it. I asked if there was a universal changing table, or a men's or family restroom with a table, but none were available. The staff person said, "I didn't think about that." In frustration I started for the family restroom but soon found a leather couch in a secluded hallway and said to my daughter, "If they can't install a changing table, we'll use the next best thing." Begrudgingly I changed her on the couch and thought to myself, "This is the nicest changing

table I've ever used" and "why are there no accommodations at a clinic or anywhere for that matter?" I knew this could not be a solution because my daughter, like everyone else, deserves her dignity and privacy.

On the drive home I kept thinking over those instances and thought "Why can't they understand". Then I realized that most people do not know, and probably will never know, what it is to like to live in a space that is not built for them. At first I was mad about politicians stripping the Americans with Disabilities Act (ADA), past policies locking people with disabilities away in institutions, capitalism only valuing people for what they produce, movies and tv shows mocking disabled people, and people acting like their experiences are the same as ours. Then that phrase from the clinic staff member struck me: "I didn't think about that." I thought the world, for the most part, does not want to exclude people with disabilities. Rather they just do not know how to include them because they have never known about their experiences of exclusion or inaccessibility. I realized, historically speaking, when a community actively keeps people segregated it limits how spaces are designed. When these spaces are designed to only accommodate able-bodied people they limit interactions with people with disabilities and that lack of interaction restricts people's understandings about how the physical environment can segregate people with disabilities.

For most people, taking a trip to visit a friend, traveling to a doctor's appointment, going to a community event, or taking a family vacation are routine occasions for most people living in the United States. When planning these trips, there are many factors to consider such as what is the most cost-effective way to travel, deciding what clothes or amenities to pack, what are destinations to stop at while traveling along with many other variables that may be of interest. But for people with disabilities the number of factors to consider when leaving their home grows

to include situations most people do not consider. Most people with disabilities rely on public transportation and the pedestrian networks in their community for transportation (Jansuwan Christensen, and Chen 2013). By using these modes of transportation, factors such as level sidewalks, audible crossing signals, and curb cuts need to be included in trip planning but also they also need to consider seasonal and temporal aspects as well. Such temporal factors can include snow covered sidewalks in winter, water logged crosswalks after rain showers, or trash strewn sidewalks on garbage day. If property owners do not clear their sidewalks, wheelchair users or power chairs users are unable to traverse them. Not only do common issues such as cracks, heaved sidewalks, and lack of curb cuts impact accessibility, the lack of connecting sidewalks limits access for people with disabilities. If a person cannot travel from one place to another they are cut off from services, employment, and from being part of the community. For people with disabilities who are unable to access essential services in a community this can lead to a feeling of isolation and poor health (McDonald et al. 2015). Not only are considerations for transportation a factor in accessibility but also where to use the restroom.

The Americans with Disabilities Act (ADA) has regulations concerning the construction of accessible restrooms (DOJ 2010), but they only apply to buildings constructed or undergone substantial renovations after 1992, or are operated by a public entity (for example a state or local government building) (Cheek 2019). Private entities comply with ADA standards as long as the accommodations are readily achievable (ADA 2008). This is dependent on the circumstances of the entity and if the entity can afford to make the accommodations (ADA 2008; DOJ 2010; Cheek 2019). The ADA provides a basic level of accessibility that does not address all disabilities or all issues that impede accessibility. For example, for a person who needs a universal changing table and has outgrown baby changing tables, there are no ADA guidelines

for providing universal changing tables in restrooms. For a person that needs assistance from their caregiver to go to the restroom, if the caregiver identifies as the opposite gender, bringing them into a restroom can bring concerned stares and judgments from others. Additionally, there are times when competing issues of accessibility occur when addressing where to put a universal changing table. Often they are placed in accessible stalls but if placed improperly, it could prevent access to the restroom for a wheelchair user. Although the ADA mandates accessibility, usability of that space is often compromised.

Competing for accessible space has been a long theme for people with disabilities living in a world designed by able-bodied people. Not only does living in an able-bodied built environment create competition for accessibility, but it also imposes social stigmas of how physical bodies should function (Hansen and Philo 2006). These social stigmas lead to impressions that bodies that perform outside the norm should be left out of space and not included (Hansen 2006) especially when capital investment is involved for inclusion. The ADA helps to create inclusive environments where people with disabilities can interact with their communities but even though the ADA is a landmark piece of legislation for disability civil rights, in terms of creating accessible environments, it often only meets simple baseline of accessibility (McDonald et al. 2015).

Being able to share these stories of exclusion, frustration, lack of accessible places, misunderstandings, and marginalization is helpful for people to understand the difficulties people with disabilities have with accessing their environment. When sharing these stories with an able-bodied audience most people do not recognize that an issue was there in the first place. When I share my story of changing my daughter in a gas station parking lot people often times look confused. They ask “Can’t she use the bathroom?” I explain to them the circumstances and share

my story and often times it ends with them saying things like, “I never thought of that.” We live in a world of personal experience and often times those personal experiences generally overlap to form a common experience. When a personal experience falls far from the norm, it is difficult to receive empathy, let alone the amount of empathy needed to effect change. Connecting with others who have had similar experiences can be an empowering feeling that can enact change.

The applications developed, RestroomMap and Community Accessibility Reporter (CAR), allow users to add data points using either a personal computer or smart device. Not being limited by when and where a user can add this data is a powerful aspect of the application. Along with being device agnostic, these applications give users the ability to either geocode or reverse geocode a location – to add submissions by entering an address or by placing a point on a map and extracting the address. This loosens restrictions on data entry by making it as fluid as possible to support users’ needs and time. Working with the non-profit organization Missouri Disability Empowerment (MoDE) Foundation we created platforms using Geographic Information Systems (GIS) to give people a way to share their experiences. GIS was selected as a useful platform to share these stories, because GIS shares the experience of the user and also gives the user the ability to spatially think about their experiences. Giving the person the opportunity to control and share data is an empowering way to share experiences and feel part of a community of others with similar stories (Panek 2016). RestroomMap was built using crowdsourced data on a public facing platform. RestroomMap captures the locations of restrooms that are either gender neutral, family restrooms, or family restrooms with universal changing tables. The next application developed was the Community Accessibility Reporter that covers the City of Columbia, Missouri. This application captures positive and negative accessibility features in the community. The resultant map posts a point where the user

encountered the feature in the City of Columbia. This application was developed to log features on pedestrian networks, building entrances, or other outdoor accessibility issues.

Using GIS crowdsourced data helps people who need this information and achieves the goals of this project:

1. Experience Sharing: Experience sharing gives a voice to marginalized people and helps to build community of people with similar backgrounds. This community building is important for inclusion and knowing there are people with similar encounters and thoughts as them. By sharing experiences, we can help each other to either find accommodating areas that are more accessible or highlight areas that are not accessible so that attention could be brought to it and let people know areas to avoid.
2. Accessible Data Collection: Building GIS crowdsourcing applications that are flexible to work on many different devices and operating systems is important for access to share data. Limiting collection to a single type of equipment limits who can participate in the data collection process. Also, by expanding GIS data collection to public users who have varying needs, the applications help build recommendations from the user community on fixes to the applications to make them more accessible such as text to speech, integration with other apps, and other accessibility enhancing features.
3. Democratizing Data Collection: Most official data that covers accessibility is collected by government or industry entities that only collect data concerning how the built environment fits ADA standards. By giving people the ability to dictate

accessibility in more personal terms it yields a bottom-up approach of defining accessibility rather than having accessibility defined by outside entities.

4. Policy Making: This data can help with policy making by giving decision makers data that is created directly from their constituents. The use of this data can create policies to emphasize resources on creating accessible pedestrian networks, expanding public transportation, and concentrating on high problem areas that have more issues reported. The data can also use positive experiences to highlight what projects worked and how they can be used to model best practices for accessible construction and policies.
5. Advocacy Tool: By creating maps of accessibility issues we can use the data collected to ask critical questions in communities concerning accessibility for people with disabilities. Using maps, we can spatially derive questions sent to community leaders to know if there are reasons for concentrations of accessibility issues, hold businesses accountable for not being accessible, and show areas that are accessible to be models for others.

1.1 Research Statement

The goal of this research is to give a platform to people with disabilities and others in the disability community to share their personal experiences with accessibility and define what accessibility means to them. By finding areas that are defined by personal experiences rather than ADA guidelines, this research will define that accessibly is not a one-size-fits-all model and that multiple factors go into defining a place as accessible or inaccessible. At times this varies from person to person based on needs, the time of day trying to access a service, weather conditions, or access to transportation. By inventorying these experiences, it will generate data-

driven decisions on what areas need additional resources and provide the general public information on accessibly for people with disabilities that they may have not considered previously. Essentially, this research wants to reduce to the excuse of "I didn't think of that" for why an area is inaccessible.

This research used crowdsourced spatial data using online GIS platforms. The data was collected from public users to locate areas that have either negative or positive accessible features. This includes issues such as finding accessible restrooms, locating accessibility problems in the City of Columbia's pedestrian network, and locating positive experiences in the City of Columbia's pedestrian network. Analyzing spatial data quantitatively found areas of common use by participants and located concentrated areas where experiences were reported. Qualitative data was collected through semi-structured interviews with targeted interviewees who were knowledgeable advocates for people with disabilities in Missouri. Analyzing interview data revealed definitions of accessibility, key methods of transportation, experiences with accessibility, and how GIS mapping could be used as a tool for advocacy to propel change in creating accessible environments.

Chapter 2: Literature Review

Understanding the historical context of community planning illuminates how people with disabilities have been incorporated or more often excluded from general society and the rational for that treatment during those times in American history. This chapter will introduce the framework of the research centered around the model of social disability. Next there will be discussion of GIS and how it has been used for creating applications for advocacy, the rise of crowdsourced data, and how GIS has been currently used in applications to assist people with disabilities.

2.1 Planning and Development in an Able-Bodied World

Planning is a dynamic practice that suggests how communities should be built and organized. Each tenet of planning stems from thinking through both local land use and social values. In the wake of the industrial revolution, planning thought revolved around establishing zones for industry, agriculture, and residences to be organized by using either the Radiant City, Broadacre City, or Garden City model (Fainstein and Defilippis 2016). Each had differences in approaching economic class and where and how each class should live. However, the function of design was similar in segregating land uses and having distinct occupations related to each land use.

Regardless the philosophy of planning, ultimately community planning is dependent on the goals and values of the community. The community's organizations, residents, businesses, and the history of their interactions shape the planning philosophy of that community (Fainstein and Defilippis 2016). The planning theory of a community can commonly be found somewhere on the planning triangle in Figure 1.

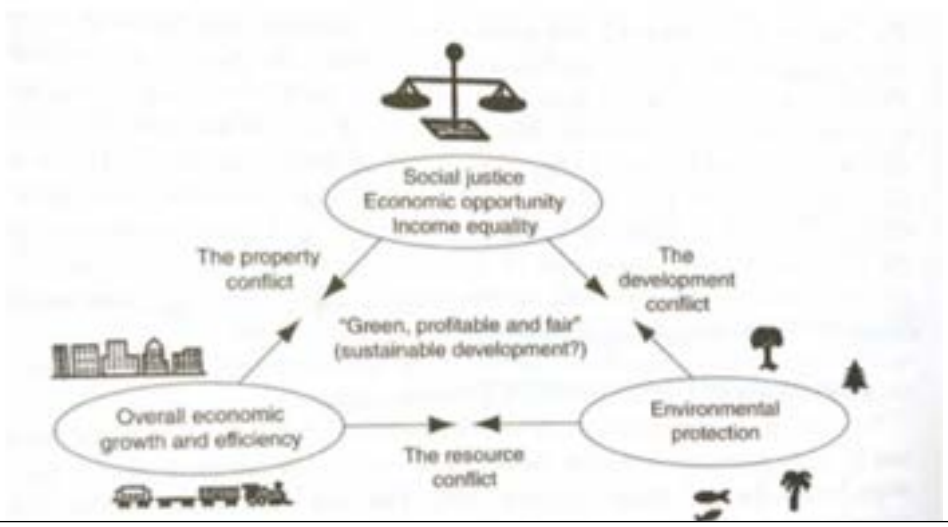

Figure 1. Community values outlined by planning triangle.. Source: Fainstein and Defilippis 2016

Each corner has a quality of a community which includes social justice, economic growth, and environmental protection. A community's values and goals help to place it somewhere on the diagram of what it values. This diagram helps to identify where a community has the strongest values and where it can expand in other areas with the ideal scenario of sustainable development in the middle (Fainstein and Defilippis 2016). Similarly, the city of Columbia, Missouri has its own planning diagram as outlined in the 2016-2019 Strategic Plan in Figure 2.

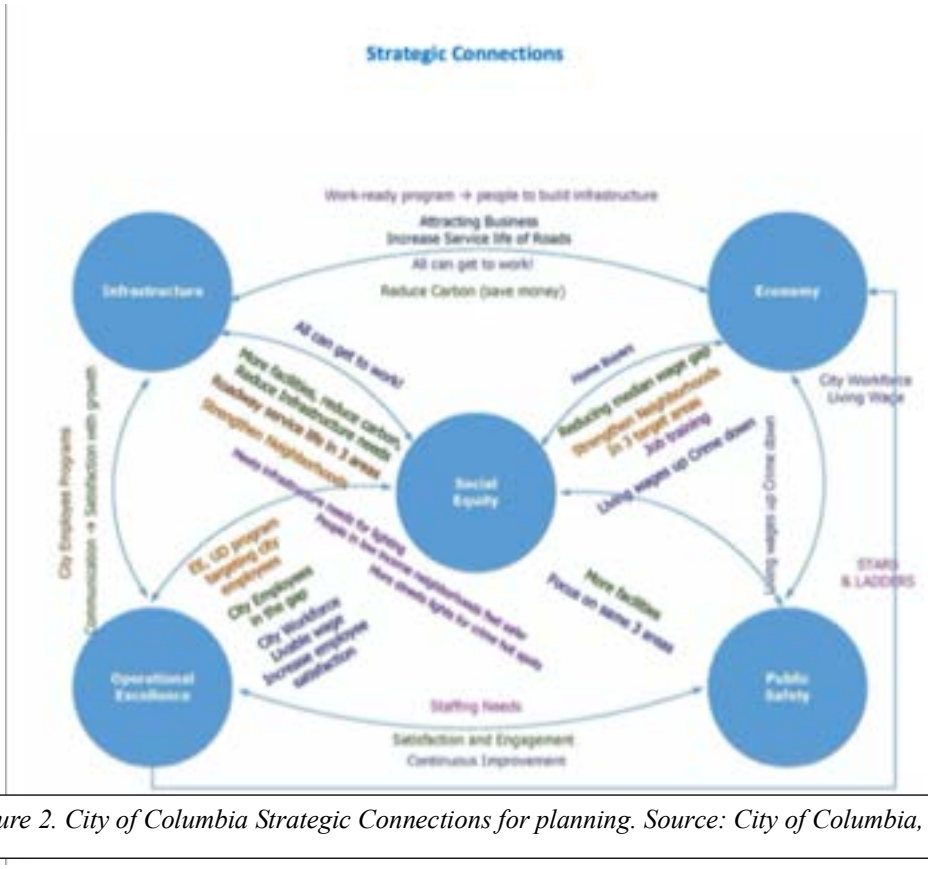

Figure 2. City of Columbia Strategic Connections for planning. Source: City of Columbia, 2015.

Each sphere represents the City of Columbia's core values, which include infrastructure, economy, social equity, operational excellence, and public safety (City of Columbia 2015). As noted previously, planning is a function of the community's values and goals, and is supposed to be dynamic to fit changing times.

One of the main tools of planning is the use of zoning. Zoning laws have evolved over time from Medieval London's fire safety concerns, which led to restricting building materials. Modern zoning practices also include classifying single family and multifamily lots (Hirt 2013). For some communities modern zoning practices limit what types of buildings can be constructed where. The Supreme court case *Euclid vs Ambler* sided with the City of Euclid, Ohio to allow zoning to prevent industrial development encroaching on residential areas (Hirt 2013). *Euclid vs Ambler* gave constitutional grounding for zoning.

Zoning was also built on simple geometry using proximity as the prime driver for land use placement. Proximity of a location has been a central foundation for urban design and accessibility (Kwan and Weber 2003). This is evidenced by making sure schools are near residences, modes of transportation are close to business, and even ensuring negative interactions are kept apart such as building homes away from landfills.

Community planning and zoning makes altruistic claims of collective goals, health, prosperity, and democracy it often prioritizes goals of the majority who were included in decision making. Often zoning was used "…as a mechanism to achieve social conformity." (Weisman 1994:132). Historically, many groups were left out of community goal building across the United States including people of color, women, and people with disabilities. People with disabilities have had a long history of exclusion from not only public decision making but from the public in general. "Ugly Laws" in American history fined people with disabilities for being out in public. According to a law in Chicago, "Any person who is diseased, maimed, mutilated, or in any way deformed so as to be an unsightly or disgusting object … shall not … expose himself or herself to public view, under penalty of a fine of $1 for each offense." (Schweik 2009: 60). This law was not Chicago-specific; it was adopted and adapted by many major American

cities. The stigmas and perceptions surrounding people with disabilities has a long history, including within the Bible, which depicts people with disabilities either as "…divinely blessed or damned" (Eisland 1994: 70). The view of the disabled person is warped into either a physical representation of sin or as a token figure to show how merciful an able-bodied person is.

These values evolved in America with the Ugly Laws in the early 20th century and the Supreme Court case of *Buck v Bell*, which deemed it constitutional to forcefully sterilize people with disabilities. In the decision Justice Oliver Wendell Holmes remarked, "It is better for all the world, if instead of waiting to execute degenerate offspring for crime, or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind" (*Buck v. Bell* 1927: 5). This decision was in lock step with the Eugenics movement that was prevalent in America in the late 19th and early 20th century. This movement that, originated in America, led to the forced sterilization of over 64,000 people with disabilities (Rivard 2014). During this time institutionalization was another system used to keep people with disabilities out of the public context and to prevent genetic mixing (Cheek 2019).

"For persons with disabilities, the body is the center for political struggle" (Eisland 1994: 49). As many American veterans returned wounded from wars in the mid-twentieth century (e.g. World War I and II, the Vietnam war), the public presence of people with disabilities became more prevalent. Many political and advocacy changes occurred due to greater representation of people with disabilities including the creation of the Disabled American Veterans advocacy group, the rise of the independent living movement, and, eventually, the campaign for the Americans with Disabilities Act (ADA). The ADA was signed in 1992 and is a landmark piece of legislation. It not only ensures civil rights for people with disabilities but also ensures accessible built environments, employment accommodations, and the ability to file

lawsuits if entities do not comply with the ADA (Cheek 2019). Even though the ADA covers many protections for inclusion, there are exemptions for places of worship, private clubs, and facilities built prior to 1992 that have not been substantially renovated (USAB 2020).

The passage of the ADA has helped bring people with disabilities into the community planning and decision-making process. Even though there have been great strides in inclusion, there are still persistent stigmas. As McDonald et al. states, "access is an elusive goal and an unkept promise" (2015: 350) mainly due to the limited enforcement of the ADA. These stigmas can influence zoning laws and the ability for community structure to be changed. Often at the request of local constituents zoning laws are passed that require group homes for people with disabilities be moved far from single-family homes, places of employment, and health services (Wiesel 2009). Due to the nature and application of zoning laws the restrict where people can live or work "Planning ideas and planning activity both express, and contribute to, the way people understand and feel about places" (Fainstein & Defilippis 2010: 143).

2.2 Defining Disability

Disability is a broad term incorporating many different conditions that are both physical, emotional, and developmental. In the book *Claiming Disability*, Simi Linton argues looking at disability only in medical terms fragments the group based on diagnosis but by looking at disability as a social construct creates a larger group of shared experience to create a constituency of political activism (1998). The distinction between medical disability and social disability is important to make for this research since these different approaches have different implications on how the physical environment is perceived. Medical disability emphasizes the diagnosis of the person with the disability as an objective medical condition that can be treated with interventions and rehabilitation (Dirth and Branscombe 2017). Medical disability also

places a strong emphasis on technology being the main way people with disabilities can navigate the world. As Anastasiou and Kauffman notes, "We can fly today because we accept our biological constraints and overcome them through technology and social action" (Anastasiou and Kauffman 2013: 452). This also brings up a criticism of medical disability. Medical disability removes disability from the social sphere and forces disabled people to behave like non-disabled people (Hansen and Philo 2006). Why do we all have to fly on the plane? There are infinite ways of moving.

In contrast social disability focuses on the person, not the diagnosis. Rather than perceiving disability as only a physical condition to be solved by medical experts and technology, social disability infers that societal policies and the built environment are the cause for disability. Society imposes barriers on top of the person's impairment which creates the disability (Dirth and Branscombe 2017). For the social model, impairment is the physical condition of the body that limits function, while disability is the social construct that excludes and disadvantages people with impairments (Anastasiou and Kauffman 2013; Dirth and Branscombe 2017). The way that communities are arranged, how buildings are constructed, and the policies in place for how those communities are managed creates the disability. The person is not the cause of the disability in this view. For example, a wheelchair user tries to access a building without a ramp installed; the environment creates the disability. Using this model also incorporates the impact of the environment surrounding a person, just as confederate statues placed in parks might signal to African Americans who belongs in those parks (Schindler 2015). Similarly, building Christian churches in Muslim neighborhoods in Jerusalem impacts that community's social fabric (Healey 2010). Thus, the exclusion of accessible communities and buildings signals who belongs and who is counted. Space and the environment are not agnostic;

it is important to consider the social processes that built and developed these aspects of our communities (Gleeson 1995).

2.3 Navigating with a Disability in an Able-Bodied World

Policies that govern how communities are built are skewed towards an able-bodied majority. These policies are also applied to the modes of transportation in those environments. Transportation is part of the community structure that not only connects origins and destinations but also governs the level of access people have to essential services such as health care, employment, social services, and community involvement. For many marginalized groups, including people with disabilities, transportation is one of the biggest struggles with accessing these services in their community (Aldred and Woodcock 2008; Seekins, Arnold, and Ipsen 2012; Jansuwan, Christensen, and Chen 2013; McDonald et al. 2015). This often times leads to public health issues for people with disabilities who do not have regular access to transportation. Limited access to health care providers and a feeling of isolation from the community drives a negative health impacts for those who do not have access to common modes of transportation (Frank, Engelke, and Schmid 2003; Seekins, Arnold, and Ipsen 2012; Jansuwan, Christensen, and Chen 2013).

In the United States, automobiles became the most common mode of transportation post World War II. People were pushed and pulled to the suburbs, particularly with the decreased cost of producing automobiles, planners and cities prioritized infrastructure for automobile traffic, and pushed single family homes as the ideal home for Americans (Taaffe and Gauthier 1973; Frank, Engelke, and Schmid 2003). This gave people the freedom to find better job opportunities, find roomier, more seemingly natural places to socialize, and get better health care. Even though this bettered many people's lives it has had mixed results in the disability

community. The car can "negate impairment and increase the driver's mobility" (Aldred and Woodcock 2008: 489) or it can limit the opportunities available since a person with disabilities either cannot afford a car or cannot physically operate a vehicle (Aldred and Woodcock 2008; Jansuwan, Christensen, and Chen 2013). This especially is an issue when in 2017 29.6 percent of people with disabilities lived in poverty compared to a 13.2 percent poverty rate for people without disabilities (Houtenville and Boege 2019) showing that people with disabilities live in a poverty at double the rate than people without disabilities (NCD 2017).

Alternatively, public transportation is a widely used service for people with disabilities. According to the Bureau of Transportation Statistics, 42 percent of people with disabilities use the public bus systems more frequently than non-disabled people (USBTS 2017). Public transportation offers people with disabilities an affordable option to access services that are needed. Even though a large proportion of people with disabilities use public transportation, limits still exist. Some of the main issues with public transportation usage include proximity to stops or stations, route coverage, delayed schedules, or times that do not coordinate with riders' schedules. Public transit has to comply with ADA standards but often times those are not met due to loopholes in ADA guidance, such as grandfathered buildings built prior to 1992. In New York City, for example, many subway stations do not have elevators to access subways and bus locations are inaccessible due to long distances riders have to traverse to a bus stop (Patel 2019; USBTS 2017). The main complaint by users of public transit is that the time schedules are unreliable (Patel 2019; USBTS 2017; Jansuwan, Christensen, and Chen 2013). People with disabilities often require extra time to reach destinations. Due to this increased preparation time, transportation needs to run on a reliable schedule to accommodate trip planning. Therefore, temporal accessibility also needs to be considered. Urban design hinges on the concept of

proximity to location as a measure of accessibility, and this dictates how we design our built environments (Kwan and Weber 2003; Kwan 2013). But accessibility also needs to consider temporal terms as well (Kwan and Weber 2003; Kwan 2013). When a bus line has limited times of operation or a train is not on time, accessibility is limited to an area due to hours of operation of the facility or timeliness of the appointment.

Another issue concerning public transportation for people with disabilities, mentioned by the Bureau of Transportation Statistic's Data Analysis, were "insensitive or unaware passengers" that use public transportation (USBTS 2017). In an interview with a wheelchair user they shared "Every time I get in this thing I'm aware of my limitation and the things I can't do…it becomes very apparent as soon as I set off down the street where most places are off-limits to me" (Irmie 2000: 1646). As noted earlier, the United States made policies that purposefully segregated people with disabilities, to prevent them from accessing public spaces. Now, navigating infrastructure that was made prior to the passing of the ADA becomes a reoccurring challenge. The way that spaces have been constructed "normalizes" and defines the "mobile body" in ways of movement that only apply to able-bodied people and that able-bodied people impose on people with disabilities (Eisland 1994; Linton 1998; Imrie 2000; Spagnuolo and Shanouda 2017). This disconnect on movement and abilities has had a problematic representation not only in the physical space of movement but in the perception of people with disabilities as well. The lack of visibility and representation of people with disabilities in the public sphere is part of the reason why most transportation systems only cater to able-bodied people.

Due to the lack of representation, insensitivity, and ignorance towards people with disabilities there is a disconnect of how to make spaces accessible. Some places that are accessible often apply a "one size fits all model" (Spagunuolo and Shanouda 2017) meaning that

by installing a wheelchair ramp or including braille on signs qualifies the space as accessible. By applying the one size fits all model this masks the "reality of diversity" and only permits a small population of people with disabilities to be allowed into places because it is an "unchallenged standard of normalcy" since some people with disabilities can "perform normalcy" to some degree (Spagunuolo and Shanouda 2017). Even though the space may include some accessible features, it still does not address the equity of allowing a person to use the space as they want to. The availability of accessible features in the built environment shows who is counted and who is not. This is a way that society's values and conceptions of who matters are put into action. The way a space is created reflects the ideas of normalcy as discussed concerning Social Disability. In some instances, these are values that are remnants from the past that remain today, such as physical details that include the lack of curb cuts in sidewalks, long distances to public transit access or housing (Wiesel 2009), or narrow entrances into buildings. Some values are not represented in physical terms but in our societal collective of the language we use. The use of derogatory language such as "mentally retarded" in policies (MO DMH CSR Ch 3; 7), usage of words such as "lame" to insult someone, and the use of belittling jokes regarding mental or physical development. Not all instances of spatial prejudice towards people with disabilities are in the past. More recent examples are numerous: a woman being refused service at a fast food restaurant for being deaf (Walansky 2019); wheelchair users having to pay $25,000 to use the Amtrak train to go to a disability conference (Shapiro 2020); New York City being slow to comply with installing elevators for subway stations (Patel 2019); or posting images of accessibility "fails" on the Rocky Mountain ADA Center's Facebook page to show everyday issues with accessibility (Rocky Mountain ADA Center 2020). The use of physical and social architecture signals to groups of people where they belong and where they do not belong

(Weisman 1994). Including accessible features in some places but not others sends a message to people with disabilities about where they are allowed to go. The building of infrastructure allows governments to shape our actions without us perceiving that our experience has been deliberately shaped (Schindler 2015). This disservice of maintaining normalcy affects the movements of people with disabilities. Many able-bodied people unknowingly think in prejudices that have been implanted by the limitations that are placed on movements of people with disabilities.

2.4 Advocacy using GIS

People with disabilities have had to self-advocate for decades, if not longer, to reach the level of inclusion and representation modern society is at now. Some of the groups born out of this advocacy work include Disability Rights Education and Defense Fund (DREDF), Disabled American Veterans (DAV), United Cerebral Palsy (UCB), ADAPT, Easter Seals and many more national and local groups. In their mission statements they all have common goals of promoting independent living, full inclusion in the public sphere, training and education, and providing or guiding people to services (DREDF 2020; DAV 2020; UCB 2020; ADAPT 2020; Easter Seals 2020). There are many advocacy tools that are discussed ranging from services to acquire adaptive equipment to best practices for communicating with your elected officials concerning policies. The breadth of advocacy takes many forms so that people with disabilities can achieve the goals of independence and inclusion free of discrimination (DREDF 2020).

Over time more technologies have been used to help support advocacy efforts. One such technology is Geographic Information Systems (GIS). Lo and Yeung defines GIS as "computer-based systems specially designed and implemented for … managing geospatial data and using these data to solve problems." (Lo and Yeung 2007: 2) Many challenges facing the disability community are spatially contingent. Being able to store these spatial issues in a computer system

that can help interpret data is a valuable tool. Placement of wheelchair ramps in buildings, availability of braille menus at a restaurant, cracked and broken sidewalks, presence of universal changing tables in restrooms, or availability of services near one's residence are all issues that have a spatial component to them. What makes spatial analysis of these issues so much more powerful than simply stating them in a written memo or displaying statistics in a graph is that using spatial data provides a visual representation of reality that these other forms of data representation cannot display (Kurban et al. 2008).

There have been many applications that have been developed to try and address issues of accessibility ranging from city-wide to individual building scales. One method of tracking accessibility for people with disabilities involves categorizing the relative accessibility of sidewalks and buildings. These methods apply transportation modeling to incorporate rating sidewalks and buildings using ADA standards for construction, and they include Gravity models to show how likely a person is to visit a building or area (Taaffe and Gauthier 1973; Church and Marston 2002; Asadi-Shekari, Moeinaddini, and Shah 2013). Most methods of finding best routes only focus on distance as the dominant variable (Kwan and Weber 2003). Transportation modeling for accessibility creates a path or measured area of accessibility using distance along with weighted values for accessible features such as slope of a sidewalk, condition of a sidewalk, availability of accessible parking, and other measurable values as outlined in the ADA building guidelines, along with the measured likelihood that a person will actually go to a building or area (Church and Marston 2002; Asadi-Shekari, Moeinaddini, and Shah 2013). This method brings in empirical data that outlines the accessibility of an area. Although this is a defensible method of measuring accessibility, it requires a level of detail of buildings and walking surfaces that is often times difficult and impractical to collect (Church and Marston 2002). Another method of

mapping accessibility is using networks to map out best routes to take for people with mobility issues.

Similar to transportation modeling, network modeling uses ADA guidelines to set travel paths based on accessibility level rather than shortest distance. These network models also use collected accessibility data such as slope, presence of curb cuts, presence of crosswalks, and sidewalk conditions to calculate a total accessibility rating for segments of sidewalk. Some of these models such as MAGUS (Matthews et al. 2003; Beale et al. 2006), AccessibilityMap (Laasko, Sarajakoski, and Sarajakoski 2011; Laasko et al., 2013), and the City of Seattle's Accessible Route Planner (City of Seattle, 2020) allow users to enter in their origin and destination on the map to create the most accessible path to reach the destination based on measures calculated from the pedestrian networks. Commonly these find discontinuous pedestrian networks and "isolated islands" (Vale et al., 2017) of where users can reach while not being able to reach others using pedestrian routes. Also, all of these routing methods assess accessibility only for wheelchair users and does not asses accessibility issues for those who are blind, use canes, are hearing impaired, or have other impairments.

Critical GIS brings progressive geographic thought into empirical data and computer systems (O'Sullivan 2006; Thatcher et al. 2016; Pavlovskaya 2018). More importantly it brings social realities into consideration when creating maps by asking the important question of "Who are we missing?" (Thatcher et al 2016: 4). By asking this question it brings to attention that diversity in data collection and how that data is displayed in maps has a bias by the creators and brings in concerns and contestation of the information (Jordan et al. 2011; Pavlovskaya 2018). Using a diverse set of people to collect data and to use in publicly available maps helps community members feel empowered to advocate for themselves and bring personal experiences

into empirical data so that concerns can be voiced. By decentralizing and democratizing the data collection process and letting a community guide the collection process, it allows data to portray issues that are most important to the group (Kurban et al 2008; Duval-Diop, Curtis, and Clark 2010).

The representation of spatial data in maps is never a neutral action; representation has broader power implications through the perspectives displayed (Panek 2016). Map creation used to be called the "Science of Princes" due to its use by elites with the resources to buy the equipment and specialized skills needed for map creation that could be used to alter property and national boundaries (Harley 2008). It can also be argued map creation is still a tool of elites with predominantly governments and industry being able to afford software, hardware, and human capital to produce maps (Panek 2016; Pavlovskaya 2018). Google reflects geopolitics for its own interests by portraying disputed borders including Russia's invasion of Crimea or ownership of Kashmir by either India or Pakistan depending on the user (Panek 2016; BBC 2019; Bensinger 2020). Due to more scrutiny of spatial data, the rise of free GIS software, greater availability of network connections, and community activists using GIS, the ability to democratize data, and bringing map making to a wider audience has given way to the use of crowdsourcing or citizen science data to create maps on their own terms (Heipke 2010; Jordan et al. 2011; Panek 2018). Unlike top down data collection, crowdsourced data has the benefit of pulling local knowledge into applications like rebuilding efforts after Hurricane Katrina (Duval-Diop et al. 2010) or with mapping high crime areas in neighborhoods law enforcement would not know about (Lopez 2010). As detailed in these projects, crowdsourcing data shows its real power by giving personal accounts of location and experiences additional validity by being backed by modern technologies and methodologies (Worth 2008; Liu 2014).

Crowdsourced data has been perceived as data to be heavily scrutinized due the conception that the data collectors have little training, data is collected on low quality positioning, and there is an increased likelihood of having to delete data due to quality assurance procedures (Heipke 2010; Liu 2014). Even with these challenges of crowdsourcing data, modern technologies and data collection procedures have helped to limit short falls with this form of data collection. Modern technologies that enable crowdsourcing include the ability to use GPS or mobile devices to geo-reference a location; the expansion of broad band communication; the ability to place locations on a map with just an address—known as geocoding; or the extraction of addresses from locations placed on a map—known as reverse geocoding (Heipke 2010; Roberts 2012; Liu 2014). This gives volunteers the mobility and flexibility to collect data from any location that works best with their level of access and comfort with technology. Additionally, many methodologies have evolved for quality assurance and control. For positional accuracy, the Haversine formula has been used to determine positional error between two points along with visual inspections of data collected against aerial imagery, comparing locations to coordinates collected when taking a picture if available, or validating against available text given to describe the location (FGDC, 1998; Rice et al. 2013; Rice et al. 2016). The amount of data collected is also a concern since, according to Nielsen, within open contribution systems the 90:9:1 rule is consistent; 90 percent of the users only view and use the data, 9 percent contribute occasionally, and only 1 percent are active users (Nielsen 2006; Heipke 2010). To address this, open contribution systems need to be easy to use, make participation passive when using a system, create templates for users so that data entry can be completed, use rewards, and highlight prominent users (Heipke 2010; Liu 2014).

There are several crowdsourcing GIS applications that have been used for the disability community to map personal experiences with disability. Project Sidewalk maps accessibility issues for sidewalks in several major cities including Washington D.C. (Project Sidewalk 2020). The user is given a brief tutorial on how to use the system then utilizes Google Street view to mark locations users find inaccessible in Figure 3:

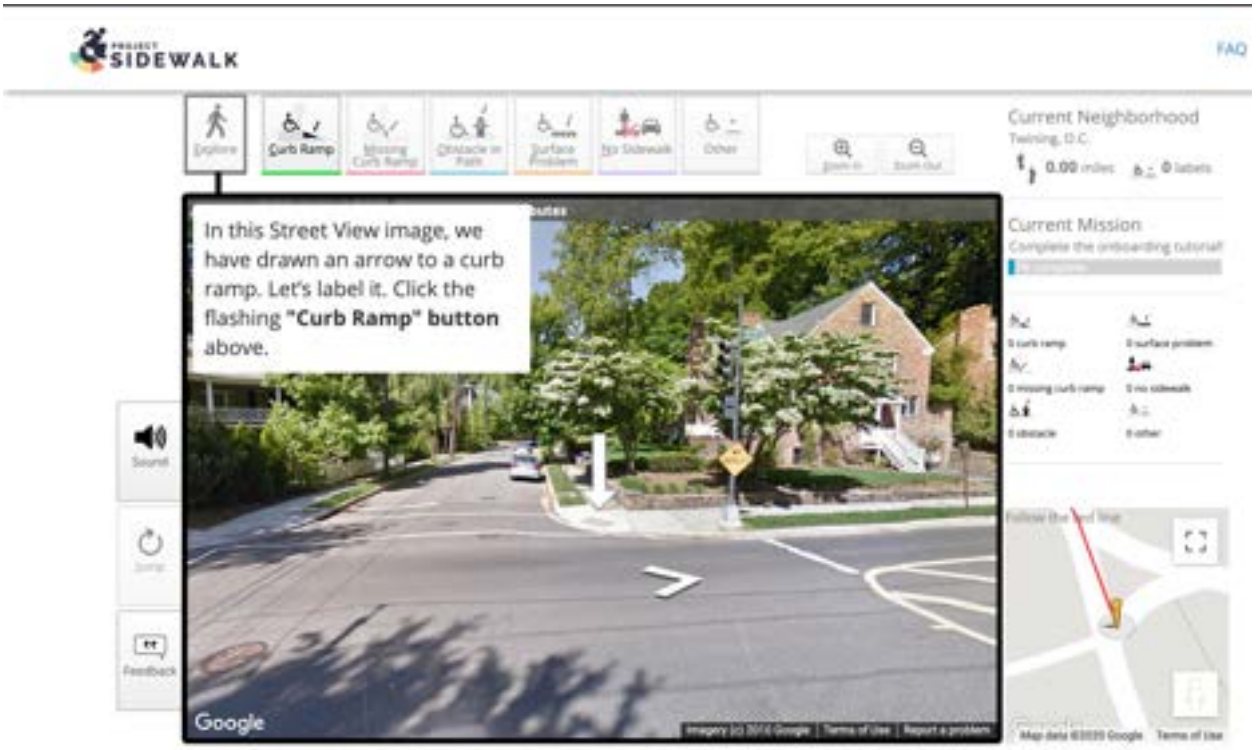

Figure 3. Layout view of data collection through Project Sidewalk application. Source: Sidewalk Project 2020.

The end result gives the amount of accessibility issues per mile and provides a count of the issues sited in the districts of the city as in Figure 4.

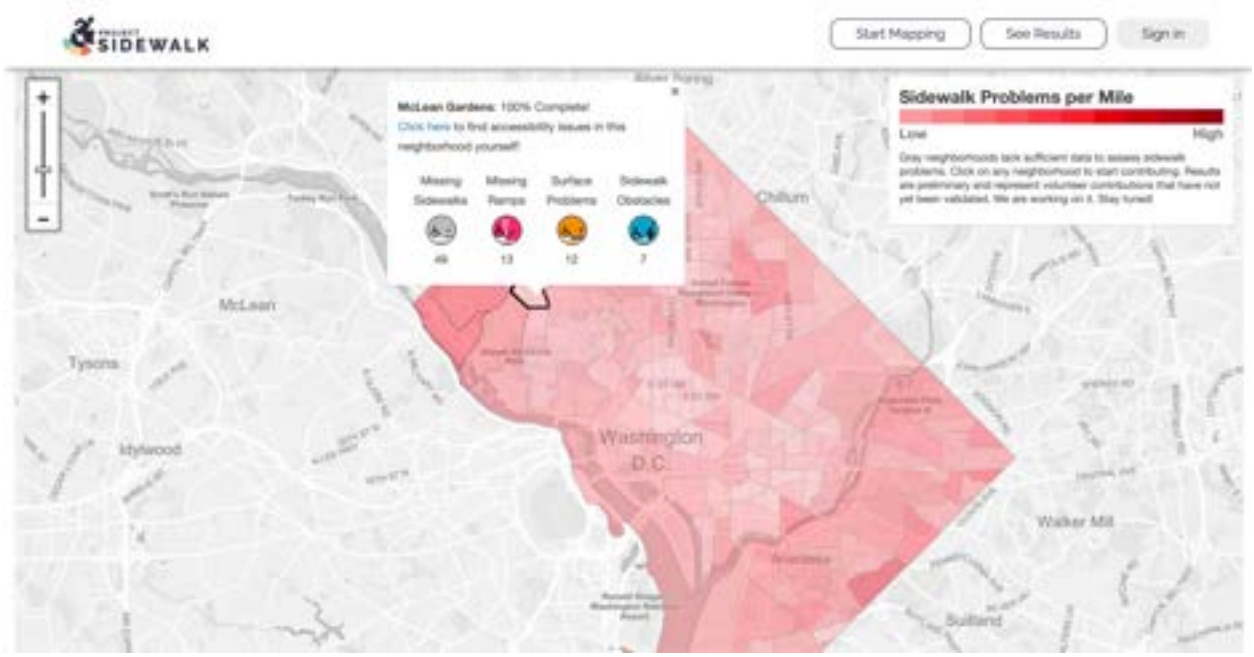

Figure 4. Result view of Project Sidewalk listing deficiencies found in each neighborhood. Source: Project Sidewalk, 2020.

This application gives users an easy experience with familiar tools and easy-to-follow tutorials that can be completed on a computer. The Sidewalk Project makes the user feel like an important team member in the process of citing locations of accessible and inaccessible features in a city, and the user can see their results are important for the creation of maps.

Another important study on the feasibility of using smart devices to capture accessibility issues encountered in people's everyday lives is *Crowdsourcing to Support Navigation for the Disabled* (Rice et al. 2013). Rice et al. collected crowdsourced data of George Mason University to find that it is feasible to use mobile devices to collect data that is spatially accurate for the study. They found that by using other crowdsourced data in similar areas, the data can be cross validated for quality assurance of the locational accuracy and subject matter of the data filled out by volunteer data collectors (Rice et al. 2013).

One of the main goals of advocacy by people with disabilities is to promote independent living. Independent living also includes the independence to express personal concerns, both

positive and negative, to others in their community. Now that issues of accessibility and inclusion are being incorporated more in the general population's knowledge, having as many platforms as possible to express those experiences is vital. By using GIS, advocates can express their personal experiences with data they create instead of being given data that only fits the loose and often minimal guidelines of the ADA. GIS gives advocates the opportunity to relate personal accessibility issues in a spatial format that others can envision and connect with.

Chapter 3: Background

3.1 Definitions and Framework

The City of Columbia's definition of accessibility is "…the ability or ease of persons to get directly to the places they need and want to go. It may also be defined as the means by which a person accomplishes some social or economic activity, and is dependent on knowledge." (City of Columbia 2013: 45). Accessibility is the goal that allows for inclusion and participation by everyone in a community regardless of ability. Even though accessibility is the lofty goal most communities, even Columbia, is aspiring for, debates emerge regarding what accessible can mean. Accessibility can be a nebulous statement and often times used as a "one size fits all" solution that does not recognize diversity of ability or background (Spagnuolo and Shanouda 2017). For example, a facility may install ramps for wheelchair users to access the building but did not install braille guides in the building, does this make the facility accessible?

Accessibility is enforced differently depending on the ownership of a facility. Public/Government entities must ensure programs and facilities are accessible to people with disabilities. This does not always mean altering the built space but can include program changes such as providing services offsite or providing a way to access resources other than physically being at the building (Cheek 2019). For private entities they are only required to accommodate

accessibility if the change is "readily available" which is determined on a case by case scenario (Cheek 2019). Buildings constructed before 1992 are exempt from ADA requirements unless they are substantially renovated. Due to limited enforcement of the ADA, many places still remain inaccessible and marginalize disabled people.

This project will define accessibility as "…the extent to which a setting can be approached, entered, and used safely and with dignity regardless of an individual's functioning" (McDonald et al. 2015: 349). This definition is useful because it goes beyond simply describing the ability to get from an origin to a destination but also factors in the safety and dignity of the person to arrive at and use the facility. Through this understanding, a person's personal experience is valued when addressing their accessibility needs by also making a space usable and accessibility equitable. Most accessible entrances are in the back of buildings. This is commonly referred to as the "back door treatment" (Imrie 2000: 1651). Not being able to enter a building through the main entrance can inadvertently signal that a person can be in this space but only in a limited function since they do not use the space according to able-bodied norms (Hansen and Philo 2006). Even though a space may be accessible, it does not mean that it is equitable. By dictating how a person can use a space, it removes their agency of how they want to engage a space. Each application was developed with this definition of accessibility in mind. These applications provide a way for people with disabilities to advocate for themselves by creating data to show where positive and negative issues occur with accessibility.

3.2 Changing Tables and the ADA

Although the ADA covers a wide spectrum of requirements to make spaces more accessible, there are some areas where requirements are lacking. In the ADA Accessibility Guidelines (ADAAG) the only mention for changing tables applies to how baby changing tables

can be installed without limiting the accessibility of the restroom to others (ADAAG 2010; ADA 2010). This is typically an issue since changing tables are commonly installed in accessible restroom stalls since there is more room to accommodate the table and to give the user privacy. A changing table could act as an extra boundary for wheelchair users, blind or vision impaired people, or anyone with mobility issues who needs to use the accessible stall. However, the absence of a table to accommodate anyone larger than a child can become a boundary for some people to be included in their communities. Some people with disabilities relies on assistance from caregivers to use the restroom and often times this includes the use of an adult size changing table. So, when a person with a disability, with or without their caregiver, wants to go to a health care provider, visit a restaurant, or go to a community function, planning on where to use the restroom becomes another factor to consider.

Another hinderance for people with disabilities who rely on caregivers to use a restroom is the lack of gender neutral or family restrooms. When a person needs to assist their spouse using the restroom or a parent needs to take their older child into a restroom it can create an awkward environment to take them into a restroom of a gender they do not identify with. By creating spaces that allow for inclusive use of a space that is as common as using a restroom this promotes the full inclusion of everyone.

In collaboration with the Missouri Disability Empowerment Foundation, we set out to provide a digital space for people with disabilities, non-gender conforming persons, or single parents to mark locations on a map to show where bathrooms are located that accommodate their needs. This gives people a platform to share with others where accessible bathrooms are located and to also advocate in areas where there might be a lack of accessible bathrooms.

3.3 Pedestrian Networks in Columbia, MO

The city of Columbia is located in state of Missouri in the United States at the juncture of the Ozark Plateau and the Great Plains which gives the city variable topography with flat landscapes to the north and undulating hills in the southern part of the city (MU Library 2020). The city was founded in 1819 and became the county seat of Boone County in 1821 (MU Library 2020). Over the years the city has grown to a population of 123,195 people with 6.9 percent of the population under 65 having a disability (USCB 2020). Not only has the population increased but also the size of Columbia as in Figure 5 with most of the city being annexed between 1961 through 1977.

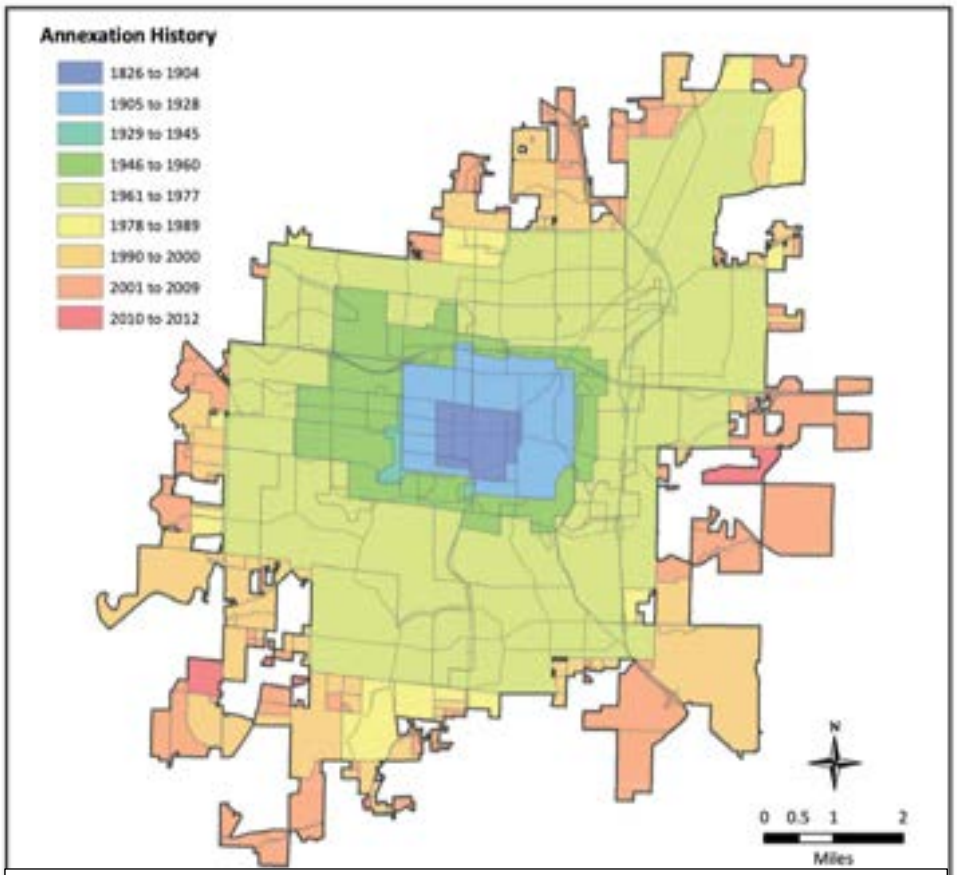

Figure 5. City of Columbia MO Annexation History. Source: City of Columbia 2013

This also marked the time in American history after World War II when the automobile was the prevalent mode of transportation and designing cities was centered around private transportation (City of Columbia 2013), so the inclusion of sidewalks was rare during this time. The infrastructure built over the years has endured for most of Columbia like many other American cities due to need and high cost of maintenance or replacement of infrastructure. With the passage of the ADA in 1992 this included requirements for how sidewalks had to be constructed so they are accessible for people with disabilities which includes allowable slope of sidewalks, the width of the sidewalks (Figure 6), presence and placement of curb cuts, and detectable warnings on curb cuts that enter a street (Figure 7).

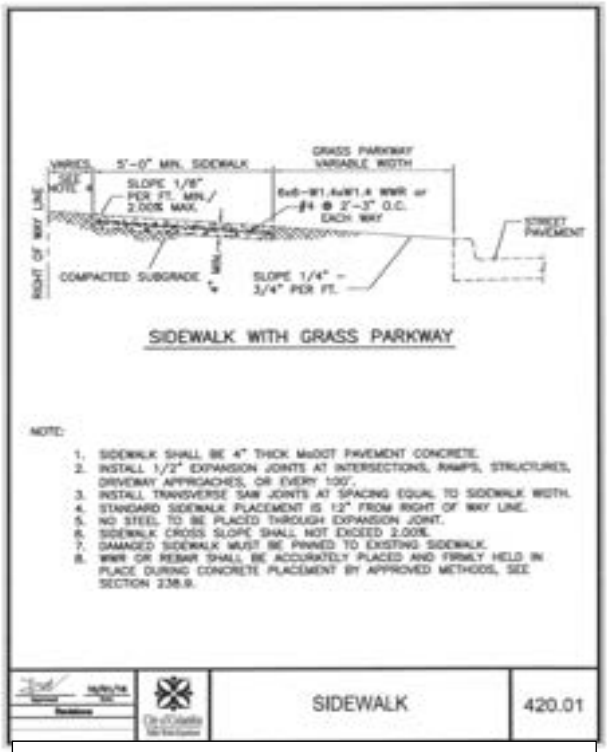

Figure 6. Width of Sidewalk Design. Source: City of Columbia, 2018.

Figure 7. Curb cut specifications. Source: City of Columbia, 2018.

Most of the city was incorporated prior to 1992, so there are many areas where ADA guidelines have not been implemented or have been integrated into the pedestrian network that includes sidewalks, crosswalks, curb cuts, and signage.

Columbia has made accessibility as one of the goals for the community in the city's strategic plan in 2013 (City of Columbia 2013). To address many of the disparities in the pedestrian network Columbia began the Sidewalk Master Plan in 2013. This plan was created to prioritize sidewalk projects by ranking prospective projects based on a needs matrix that includes proximity to pedestrian attractors, fills gaps in the sidewalk network, traffic volume, if the sidewalk is on a main or arterial street, or if there is no sidewalk on either side of the street (City of Columbia 2013). In 2018 Columbia also included the ADA Sidewalk Transition Plan to work in conjunction with the Sidewalk Master Plan to help determine which sidewalk projects met higher needs by addressing sidewalks that did not meet ADA standards (City of Columbia 2018). The Sidewalk Transition Plan also included mapping three main areas in Columbia where pedestrian traffic occurred to find where ADA infractions occurred.

According to the City's report of sidewalks assessed in 2018, 3 percent needed corrections, 60.2 percent were substantially compliant, and 36.8 percent complied as in Figure 8.

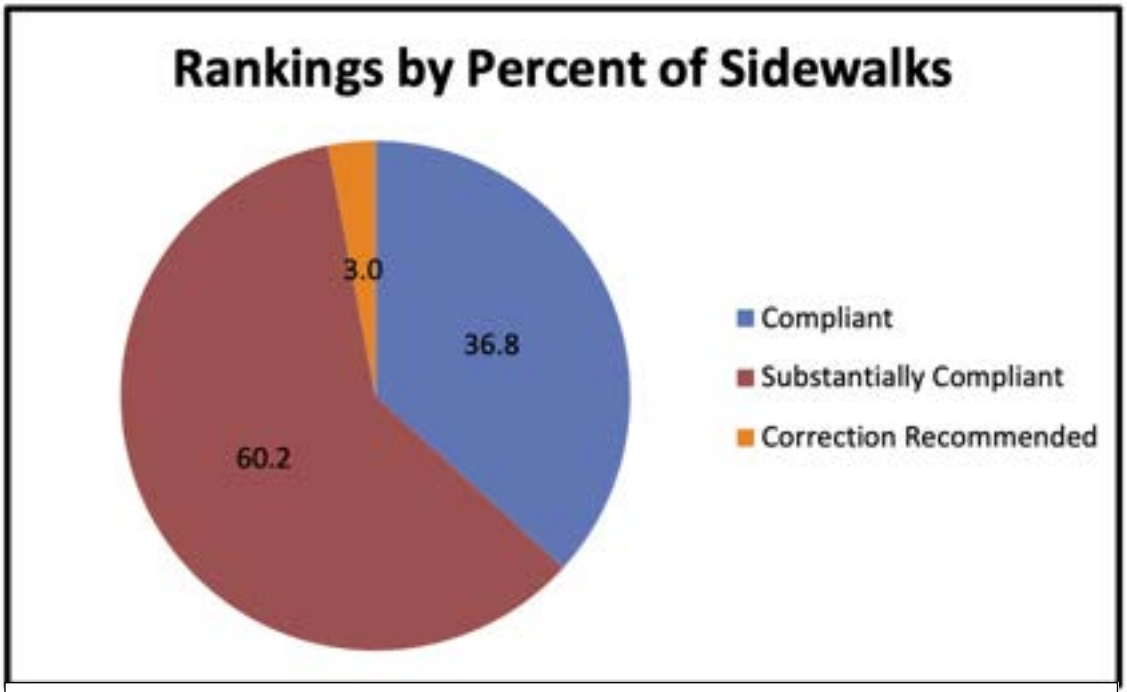

Figure 8. ADA Transition Plan, Sidewalk compliance evaluation results. Source: City of Columbia,2018

Out of the curb ramps assessed in the 3 areas 57.4 percent needed correction, 28.8 percent were substantially compliant, and 13.8 percent complied as in Figure 9.

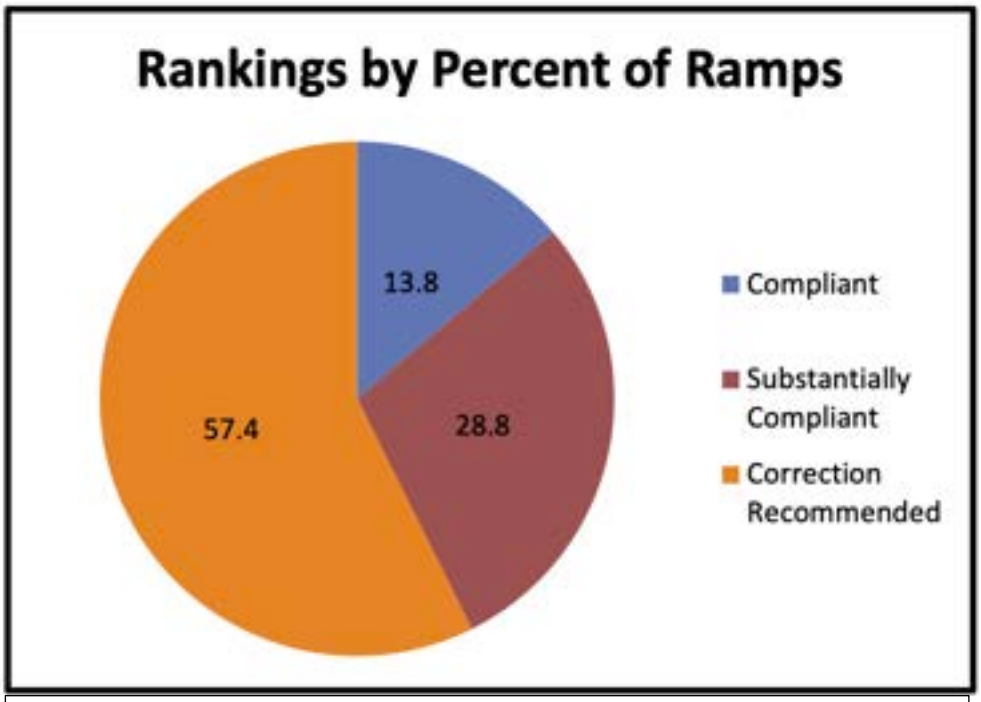

Figure 9. City of Columbia, ADA Transition Plan, Curb cut/ramp compliance evaluation results. Source: City of Columbia, 2018

The main issues that caused sidewalks or curb ramps to be out of compliance included trip hazard and gap/crack hazards as in Figure 10.

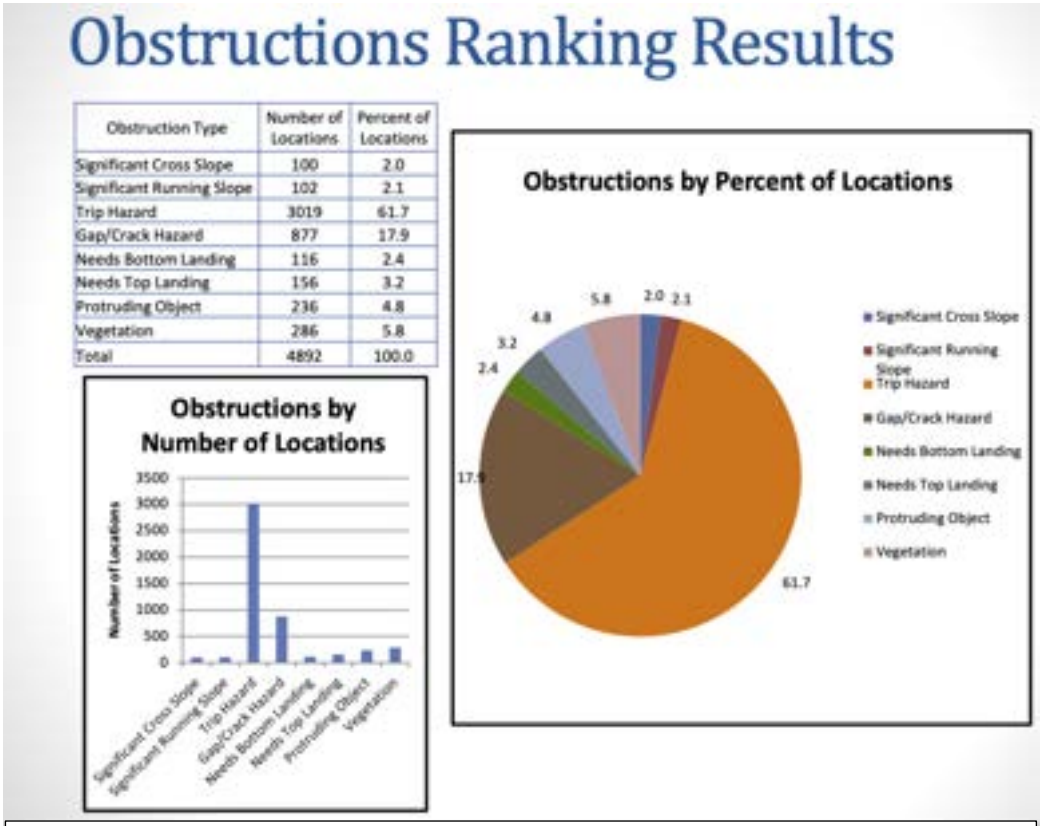

Figure 10. ADA Transition Plan, Sidewalk obstruction ranking results. Source: City of Columbia 2018.

Even though a lot of data was collected concerning the state of accessibility for the pedestrian network, this only represents a small fraction of the community and only reports on accessibility issues that are noted by the ADA. The infractions mentioned only pertain to certain impairments and implies the "one size fits all" model of accessibility that predominantly centers around wheel chair accessibility (Spagnuolo and Shanouda 2017). A common issue noted in the reports concerns the connectiveness of the sidewalks to one another. Connectivity is not addressed by the ADA so this gives a much narrower scope of what accessibility means. This means that if someone reports an issue that is not covered by the ADA it is not considered an enforceable complaint. By involving the public in data collection, my project works to remedy these gaps by covering more areas of the city, highlighting areas with multiple infractions, and giving those who use the pedestrian network opportunities to advocate for the changes they need.

Chapter 4: Methods

This project uses a multimethod approach. The first part of the project was to capture GIS crowdsourced submissions with the Community Accessibility Reporter (CAR) and the RestroomMap applications. The crowdsourced data was accompanied with interviews conducted with users that added data to one of the applications. In-depth interviews were conducted with a purposeful sample of people involved in advocacy work for disability rights locally in Columbia, Missouri and in Missouri. Questions focused on accessibility, advocacy, and personal views of community response to providing an accessible environment.

4.1 Overview of Application Creation

For both applications, RestroomMap and Community Accessibility Reporter (CAR), the software created by Environmental Systems Research Institute (ESRI) was utilized to create, manage, analyze, and share the data. Online services provided by ESRI, called ArcOnline, were used to create similar processes to collect the data using the Crowdsource Reporter solution provided as an out of the box configurable application. ArcPro software versions 2.3 through 2.6 were used to create the geodatabases and features classes used in the applications. The feature classes were created in ArcPro and published as on online hosted feature service to the ArcOnline cloud. A hosted feature service is a feature layer that can be accessed and edited by multiple users using either online platforms or GIS software that has internet connection (ESRI 2020). The hosted feature services were then added to a web map and configured so that field names were adjusted to read for general audiences and fields were ordered for data collection. Symbology was created by using a combination of color-blind safe colors and utilizing different shapes along with the colors to represent features. The web map and data were then shared to a group that allowed the public to edit and access certain portions of the data. The group was

granted permissions to add and update data but they are not allowed to delete data. The user group contains the web map and hosted feature services that were used in the Crowdsource Reporter solution to create the public end user application that was configured to be used on a personal computer or a mobile smart device. One of the main aspects of this application is the ability to flexibly collect data either by manually entering an address, placing a point on a map using local roads and buildings as reference, or using a smart device's internal GPS service to capture the feature while a user is at the location. The ability to reverse geocode in the Crowdsource Reporter is also important to give the users the ability to report locations if they do not know the address of the feature and to give additional information to the developer so that addresses can be used for reporting or routing purposes.

4.2 RestroomMap

For the RestroomMap geodatabase a feature class was created named RestroomReport. The design of the geodatabase is in Table 1.

RestroomMap Geodatabase Design

RestroomReport						
Field Name	Data Type	Editable	Allow Nulls	Default Value	Domain	Length
SiteName	String	Yes	No	None		100
SiteAddress	String	Yes	No	None		500
AccessType	String	Yes	No	None	AccessType	100
ReporterName	String	Yes	Yes	None		50
ReporterEmail	String	Yes	Yes	None		50
ReporterDate	Date	No	No	None		8
ReviewStatus	String	Yes	No	No	yes_no	50
Votes	Small integer	Yes	Yes	None		None
Comments	String	Yes	Yes	None		500
created_user	String	No	Yes	None		255
created_date	Date	No	Yes	None		8
last_edited_user	String	No	Yes	None		255
last_edited_date	Date	No	Yes	None		8
X_Coord	Double	Yes	Yes	None		None
Y_Coord	Double	Yes	Yes	None		None

Access Type	
Code	Description
Unisex	Unisex Bathroom
Family	Family Bathroom
FamilyTable	Family Bathroom with Universal Changing Table
Other	Other (Please Describe in Comments)

yes_no	
Code	Description
Yes	Yes
No	No

Table 1. RestroomMap Geodatabase design. Source: David Nykodym 2020.

The fields that are collected were made to gather as much information about the facility while also making it an easy experience for the user. The required features that a user must enter are marked in the Allow Nulls column as equal to no. These are the fields that were necessary to provide relevant information for users and to give data for the quality control portion. Those features include the site name, site address, access type, reported date, and the review status. The site name had to be manually filled in by the user to give information on the name of the building or facility so that the facility could be contacted using the location from the map and internet

searches to find contact information. The site address and reported date are automatically filled in when a point is created on the map. ESRI Geocoding services write the address from the placed point in the address field when it is dropped on the map. The address field was also open to be filled in manually if the geocoding service provided a ranged address for larger facilities such as malls, if a point is placed in between buildings, or if the address provided was not detailed enough such as filling in a city or business name. The other required fields utilized domain values to give the user a set of options to select. The only domain field used by the end user is describing the accessibility level of the bathroom. This was used to give a set criterion of the restrooms that were in line with the scope of this project. Since most buildings require bathroom stalls that are accessible according to ADA standards this project wanted to find bathrooms that went beyond ADA specifications to include universal changing tables and family or unisex bathrooms. The "Other" option for the domain value was included if there was a restroom type that included other accessible or universal designs that were not mentioned in the domain values such as if a bathroom included wet wipes for people with prosthetics. The review status field is used on the back end of the project to show points on the public facing map that have been certified as having the features a reporter claims it has. The default status for the values are set to no so that points submitted will not be visible to end users due to a filter on the map that sets the visible points to those that have a review status of yes. Other fields included in the reporter are not required and are optional for the end user to fill in. Those include building contact information, the reporter's name, and the reporter's email address. These are used for quality assurance reasons and are not displayed on the public facing map. Since an end user may not know immediately the contact information of the facility and they may not feel comfortable sharing their name or email address these were left optional so as not to add a barrier for users to

submit points. Created user, created date, last edit user, and last edit date are fields automatically created and populated in the feature class. The X and Y coordinate fields are calculated decimal degree coordinates in WGS84 projection. This is to be able to provide tabular data to entities that request to use this data. When this happens the user name and email address fields are deleted from the data set provided.

Once a point is submitted on the RestroomMap reporter it is not instantly available for use to the public. This was designed so that data that cannot be verified or data that did not fit the scope of the map would not be visible to the end users. Using the information that was submitted concerning a facility included location, facility name, and facility contact information was used to contact that facility directly and verify that the information that was submitted is correct. If a submitted point can be verified, the review status is changed to yes and then is visible on the map with the corresponding symbology based on the type of accessibility of the restroom as in Figure 11.

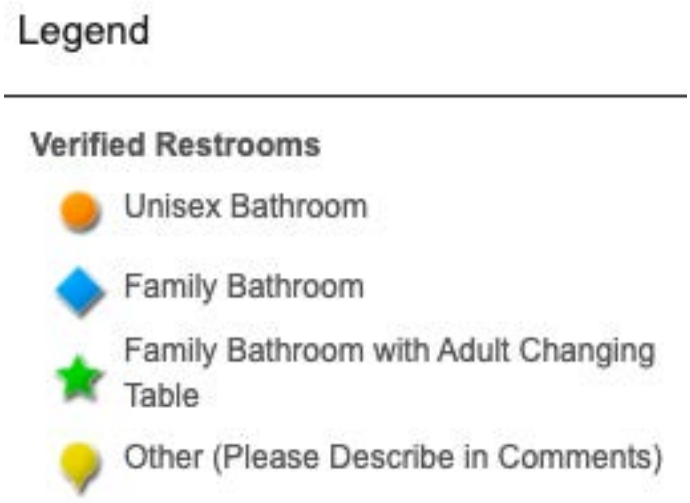

Figure 11. RestroomMap Symbology of verified submissions. Source: David Nykodym 2020.

4.3 Community Accessibility Reporter

For the Community Accessibility Reporter (CAR), the methods for data collection and quality assurance are modeled off of the crowdsource data collection process performed by Rice et al. in *Crowdsourcing to Support Navigation for the Disabled* (Rice et al., 2013) and by the City of Columbia Public Works Sidewalk Transition Plan (City of Columbia 2019). Rice et al. developed a collection methodology that collected features based on the users experience on the George Mason University campus. The application used is similar to the Waze navigation app to collect various features that included permanent features like trip hazards and lack of curb cuts but they also included temporary features like construction projects, weather, pop up stands, and crowds. Rice et al. required users to sign in with an ID to track frequency of use and to gauge if there were preferences for areas that users preferred to report on campus. Once a report was generated in their built application the points were field verified for accuracy and validity. Rice et al. notes that positional accuracy for crowdsource data is difficult to determine since national standards such as National Map Accuracy Standards and National Standard for Spatial Data Accuracy does not fully apply with crowdsource dynamic data and is more geared towards static map data. One study was conducted comparing open street map crowdsourced data compared to authoritative datasets and found that the difference typically is 6 meters (Haklay 2010). This is an appropriate metric to use since modern mobile smart devices typically have an accuracy of 4.9 meters (GPS.gov 2020). This is also dependent on having an unobstructed path to the sky and the quality of the cell service.

CAR uses two feature classes called Community_Accessibility_Report_Issues and Community_Accessibility_Positive_Experiences. Table 2 and Table 3 outlines the geodatabase design for CAR. It was important to have the ability to capture both positive and negative

experiences. This is so areas that had exceptional accessibility accounts could be recognized and used as a model for other areas of the community while negative experiences could be highlighted for people who want to avoid those barriers and they can be highlighted to bring attention to local government officials.

Community Accessibility Reporter Geodatabase Design

Community_Accessibility_Report_Issues						
Field Name	Data Type	Editable	Allow Nulls	Default Value	Domain	Length
barrier	String	Yes	No	None	BarrierType	50
barrier_description	String	Yes	Yes	None		500
name_reporter	String	Yes	Yes	None		250
email_reporter	String	Yes	Yes	None		250
phone_reporter	String	Yes	Yes	None		50
date_reported	Date	Yes	Yes	None		8
verified	String	Yes	Yes	None	yes_no	50
other_barrier	String	Yes	Yes	None		500
building_name	String	Yes	Yes	None		500
address	String	Yes	No	None		500
GlobalID	GlobalID	No	No	None		38
temp_feature	String	Yes	Yes	None	temp_feat	256

BarrierType	
Code	Description
Physical_Environmental	Physical Environment/Facilities
Parking_Transport	Parking/Transportation
Entry_Building	Entry Way to Building
Sidewalk	Sidewalk
Crosswalk	Crosswalk
Other	Other
Signage	Signage

yes_no	
Code	Description
Yes	Yes
No	No

temp_feat	
Code	Description
Temporary	Temporary
Permanent	Permanent

Image_Attachments						
Field Name	Data Type	Editable	Allow Nulls	Default Value	Domain	Length
GlobalID	GlobalID	No	No	None		38

Table 2. Community Accessibility Reporter Issues layer design in geodatabase. Source: David Nykodym 2020

Community_Accessibility_Positive_Experiences						
Field Name	Data Type	Editable	Allow Nulls	Default Value	Domain	Length
barrier	String	Yes	No	None	BarrierType	50
barrier_description	String	Yes	Yes	None		500
name_reporter	String	Yes	Yes	None		250
email_reporter	String	Yes	Yes	None		250
phone_reporter	String	Yes	Yes	None		50
date_reported	Date	Yes	Yes	None		8
verified	String	Yes	Yes	None	yes_no	50
other_barrier	String	Yes	Yes	None		500
building_name	String	Yes	Yes	None		500
address	String	Yes	No	None		500
GlobalID	GlobalID	No	No	None		38
temp_feature	String	Yes	Yes	None	temp_feat	256

BarrierType	
Code	Description
Physical_Environmental	Physical Environment/Facilities
Parking_Transport	Parking/Transportation
Entry_Building	Entry Way to Building
Sidewalk	Sidewalk
Crosswalk	Crosswalk
Other	Other
Signage	Signage

yes_no	
Code	Description
Yes	Yes
No	No

temp_feat	
Code	Description
Temporary	Temporary
Permanent	Permanent

Image_Attachments						
Field Name	Data Type	Editable	Allow Nulls	Default Value	Domain	Length
GlobalID	GlobalID	No	No	None		38

Table 3. Community Accessibility Reporter Positive Experiences layer design in geodatabase. Source: David Nykodym 2020.

Similar to the RestroomMap geodatabase, the CAR uses domain values and reverse geocoding to standardize the data that can be entered for a report. The barrier field uses domain values to standardize the types of barriers types that may be encountered. Choices are available in both Table 2 and Table 3 under BarrierTypes.

The barrier_description field option is available for users to describe a scenario they found that is not included in the domain values. Some fields have also been designed to be required to fill out by the user. The only fields that are required to be filled out are the barrier type and the address of the feature. The address is automatically collected when a point is placed on the map by reverse geocoding incorporated in the Crowdsource Reporter. This gives the freedom for a user to submit points quickly and anonymously as to remove barriers for people to use this app since according to the 90:9:1 Rule, only 10 percent of users will contribute either infrequently or at higher rates (Nielsen 2006).

The ability to add attachments to reported features gives the opportunity for users to submit photos of the features into CAR so that they can be shared with other users and give more detail about the feature they are reporting on. The image can either be loaded by using a smart devices internal camera or by uploading an image that is stored locally on a device. This option was not done for the RestroomReporter since the scope for that application was to make it more streamlined and internal conversations were had with MoDE about regulating images that may be invading privacy or may be inappropriate.

CAR was developed to collect information concerning pedestrian networks up to the entry way of a building and its parking lots. It was designed this way because pedestrian routes and the areas that transition between pedestrian networks and buildings are widely used and in part belong to the public since they are maintained by the City of Columbia. Extending this to include private businesses, schools, and other buildings was not included in this version due to the scope of the project and liability of portraying businesses negatively. Future updates and research may include having a wider scope of issues to collect.

Language has been built into the disclaimer and in the application to guide users on the purpose of this project, what types of features to collect, how this data will be used and shared, and how to fill out fields that are required. The disclaimer can be found in the appendices with the Internal Review Board (IRB) documentation found in Appendix A.

Features that are submitted will go through a quality assurance and quality control procedure to be included in the final dataset. The data submitted that will be counted must meet these criteria:

1. Be located in the study area of Columbia, MO
2. Report must concern a feature that is either on the pedestrian network, entry way to a building, or in a parking lot.
3. Points entered will be verified to be less than or equal to 5-meter horizontal accuracy. This will be done by field verification or address matching. If a picture is included that will be used to help verify the location.

If a point does not meet these criteria, it will not be included in the final dataset and moved to an archived file.

After a final dataset is established with finalized data, it will be compared to the City of Columbia's Sidewalk Transition Plan data. These datasets will be compared to find areas where there is agreement or disagreement in how the pedestrian network is perceived as accessible.

4.4 Demonstrations and Presentations of Applications

For both RestroomMap and CAR, presentations and demonstrations for these applications were given to disability advocacy groups in the community such as MoDE, City of Columbia's Disability Commission, University of Missouri's Chancellor's Committee for Persons with Disabilities, PedNet, occupational and physical therapy professional groups, and

University of Missouri's Disabilities Committee. Nationally, RestroomMap was showcased in several major news and industry outlets that advertised its usage. For demonstrations to these groups, sample submissions were entered during the meetings to show the functionality of the applications and how they worked. A link to the website was provided to the group moderator to disperse to members to test prior to the meetings. After the presentations, questions were fielded from attendees and discussion was encouraged. This was also a time to field critiques of the applications so that group members could offer suggestions on how the applications could be improved, what group members liked about the applications, and to acknowledge some of the limitations of the applications.

Questions from the groups typically involved asking about functionality, wording clarification in the applications, integration with other applications such as word-to-speech or screen enhancers, and if talk-to-text was present so users with vision impairments or hand motoric impairments could speak addresses or comments into the fields. Indeed, the applications include the ability to be used on multiple device types, integrate with other applications, provide symbols that are easily identified, provide clear wording, and provide instructions on how to use the applications within the applications. I also provided my email and phone contact information if someone wanted to discuss these applications further or if they wanted to send me information to submit points for them.

These group sessions were invaluable for getting input from users on what works and what does not work in terms of the applications' ability to collect submissions. Many changes in the functions and wording resulted from these meetings to create as accessible a user experience as possible. However, it should be noted that although these applications were developed to be as accessible as possible, there are and will remain limitations in terms of accessibility. One

limitation is from the technological side where my abilities in programming are limited. To accommodate needs such as creating voice-to-text speech for describing attributes of submitted points, for example, I was unable to design for that. Another limitation within the apps is the availability of reliable cellular networks that are used to submit points from a mobile smart phone. If an unreliable connection exists for mobile smart phones, submissions can fail and the work done to create a submission is lost. Another limitation is that although I welcomed as much feedback as possible and have researched best practices to improve these applications, there are some accessible features missing due to unknown needs of potential users.

4.5 In-Depth Interviews

For this project a purposeful and self-selecting sampling strategy has been used to collect data via in-depth interviews (Laerd Disertation 2018). This sampling type is appropriate since the focus is on the experiences of people with disabilities and accessibility of the pedestrian network in Columbia, Missouri. This sampling strategy also helps to pinpoint people who are knowledgeable about the area since they have daily interactions with accessibility and advocate for people with disabilities' rights and inclusion (Palinkas et al. 2016). Also, this strategy will attract people who are interested and eager to participate. Participants may have a wide range of experiences and beliefs about accessibility. The participants for this research will be contacted by email via local disability advocacy and support groups and their respective email lists. Email and letter scripts are available in the IRB Documentation in the Appendix A. For this research the interview questions were set up with fixed questions for qualitative analysis that were asked for each participant as well as open ended questions that were used for narrative analysis (Gomez and Jones 2010). Interview questions focused on definitions of accessibility of pedestrian networks in Columbia, MO, their interpretation of advocacy, and free form questions concerning

disability awareness and inclusion. The minimum sample size for interviews will be governed as a matter of judgement by the researcher (de Vaus 2001). Since this research is looking for commonalities and differences of experiences reports will be collected until the researcher and the advisor determine that enough data has been collected to find a common narrative is being expressed. Through reaching out to interested groups five participants were interviewed. Dawn is a self-advocate who is active in promoting accessibility in public transit and sidewalks in Columbia, MO and throughout Missouri. The other four participants, Robin, Christina, Michelle, and Sarah, are members of MoDE Foundation and are active in local and statewide advocacy projects concerning disability law, advocating for changes in inclusion in schools, public transits, and expanding restroom accessibility. Redacted transcripts of the interviews can be found in Appendix F.

Chapter 5: Results and Discussion

During the course of the project five people were interviewed on their thoughts concerning accessibility, transportation in Columbia, MO, their thoughts on advocacy, and using maps to advocate for changes concerning people with disabilities. All the people interviewed are adults who live in Columbia, MO and either have a disability or are caregivers for people with disabilities. Excerpts from their interviews will be incorporated with the results from the mapping projects which will include interview responses to particular areas in the community in relation to data collected through GIS, narrative similarities between the GIS data and interviewees answers,

5.1 RestroomMap Results

RestroomMap was created to share and find accessible restrooms for people with disabilities and caregivers. The application was promoted through social media, presentations to

disability advocacy, LGBTQ+, and occupational and physical therapy groups. The map was showcased by several news outlets including KOMU, The Columbia Missourian, AP Press, and ESRI's ArcUser Magazine (Mackay 2018; Quach 2018; AP 2018; Ingoglia 2018). MoDE Foundation's RestroomMap Reporter was published for public use on July 31, 2018. The project initially started collecting accessible restroom information just for the state of Missouri. Even though the initial scope of the study was to capture data in Missouri the application was configured to scale and to be used anywhere in the world. Though promotion on social media, speaking about the app at conferences and other events with disability and LGBTQ+ advocacy groups, and news coverage from regional and national media coverage (Mackay 2018; Quach 2018; AP 2018; Ingoglia 2018) the usage began to increase and the points being submitted were coming from across the country. Additionally, RestroomMap was able to reach a group of caregivers for people with disabilities in Canada who were also interested in mapping accessible restrooms. Through collaboration with that party in Canada it extended the use of the map internationally.

In total 508 points were submitted through the RestroomMap Reporter. Out of those points 16 of them had to be deleted for not meeting the requirements that were outlined for the use of this map. After contacting the facilities, the majority of the points were excluded due to users reporting gender specific restrooms with accessible stalls. Other reasons submissions were excluded include not providing adequate information to contact the facility or the facilities' accessible restroom classification was incorrectly submitted. This was mainly from confusion of the distinction between a child changing table and a universal changing table.

In total 492 accessible restrooms met the criteria previously outlined as in Figure 12. Of those submissions 64 are in Canada and 428 are in the United States.

Figure 12. RestroomMap all accessible restroom reports that were verified. Source: David Nykodym, 2020.

A breakdown of the accessibility types reported are in Figure 13. The most common accessibility type reported was Family Bathrooms with 310 submissions and the next type with the most submissions was Family Bathroom with Universal Changing table at 113 submissions.

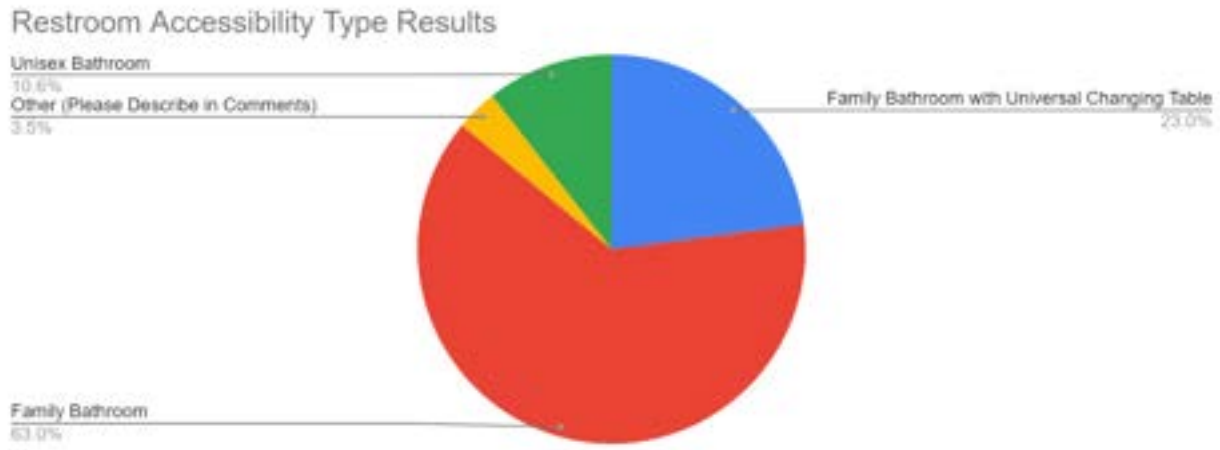

Figure 13. RestroomMap breakdown of accessible bathroom types that were verified. Source: David Nykodym, 2020.

These two accessibility types were the most reported due to the audiences that were targeted and the interests and locations of the main data contributors. There are four areas where there are high areas of concentrations as appeared in Figure 14.

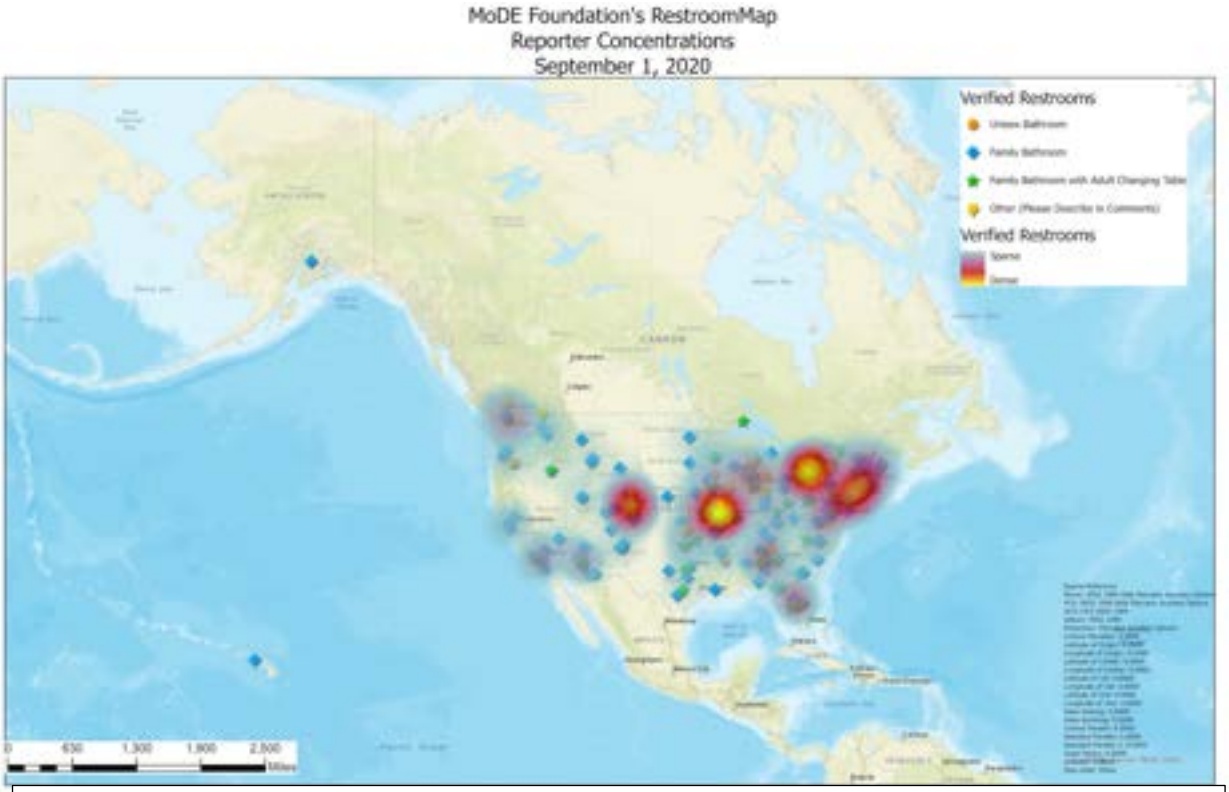

Figure 14. RestroomMap heat map of concentrations for restroom submissions. Source: David Nykodym, 2020.

Those areas include Missouri, the Denver Metropolitan Area, Toronto, Canada, and the Northeast Megalopolis area that includes Philadelphia, New York City, Hartford, and Boston.

This data distribution highlights several aspects of crowdsourced data as pointed out by 90:9:1 Rule (Nielsen 2006) of data collection and Rice et al.'s *Crowdsourcing to Support Navigation for the Disabled*. According to the Nielsen Rule 90 percent use the data, 9 percent occasionally report, and 1 percent are active reporters. In those 4 areas there was a small contingency of users who were very committed to mapping their areas. In total there were 78 unique data collectors. When contact information for the data submitter was entered 117 restrooms were reported by 6 people. The majority of submissions, totaling 265, did not have submitter information associated with it. The remaining 110 submissions were entered by users who submitted 1 to 6 restrooms. Over the course of 2 years that this application has been publicly available it has been accessed 12,890 times. Comparing the amount of uses to the number of restrooms submitted to the map the assumption that crowdsourced data is fueled by a small group of dedicated volunteers holds some validity.

The data highlights what Rice et al. classified as "voids" in a study area. (Rice et al. 2013) Crowdsource reporters collect data along common or popular routes and typically where the most people congregate. Not only were the main data collectors from these areas but the restrooms submitted are close to major cities and along highways and interstates including Missouri (Figure 15), Denver Metropolitan Area (Figure 16), Toronto, Canada (Figure 17), and the Northeast Megalopolis (Figure 18). These areas have more data collection likely due to the

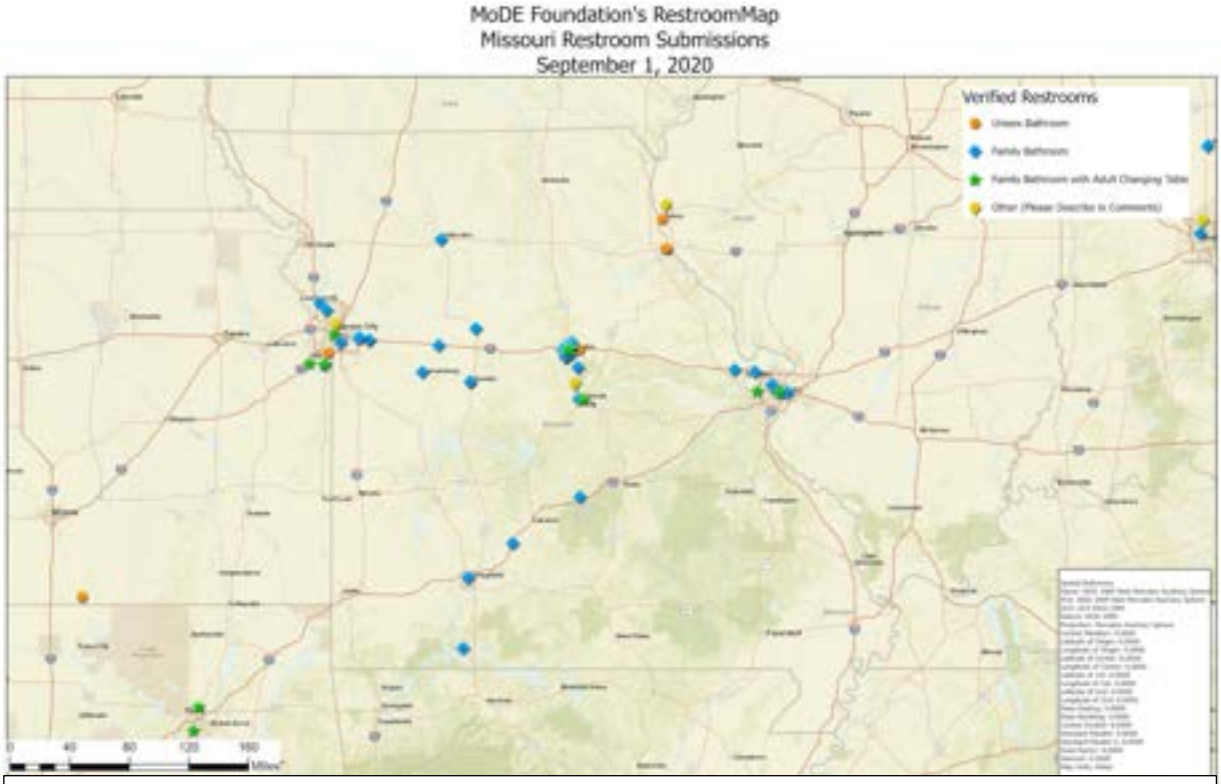

Figure 15. RestroomMap view of submissions in Missouri, USA. Source: David Nykodym, 2020.

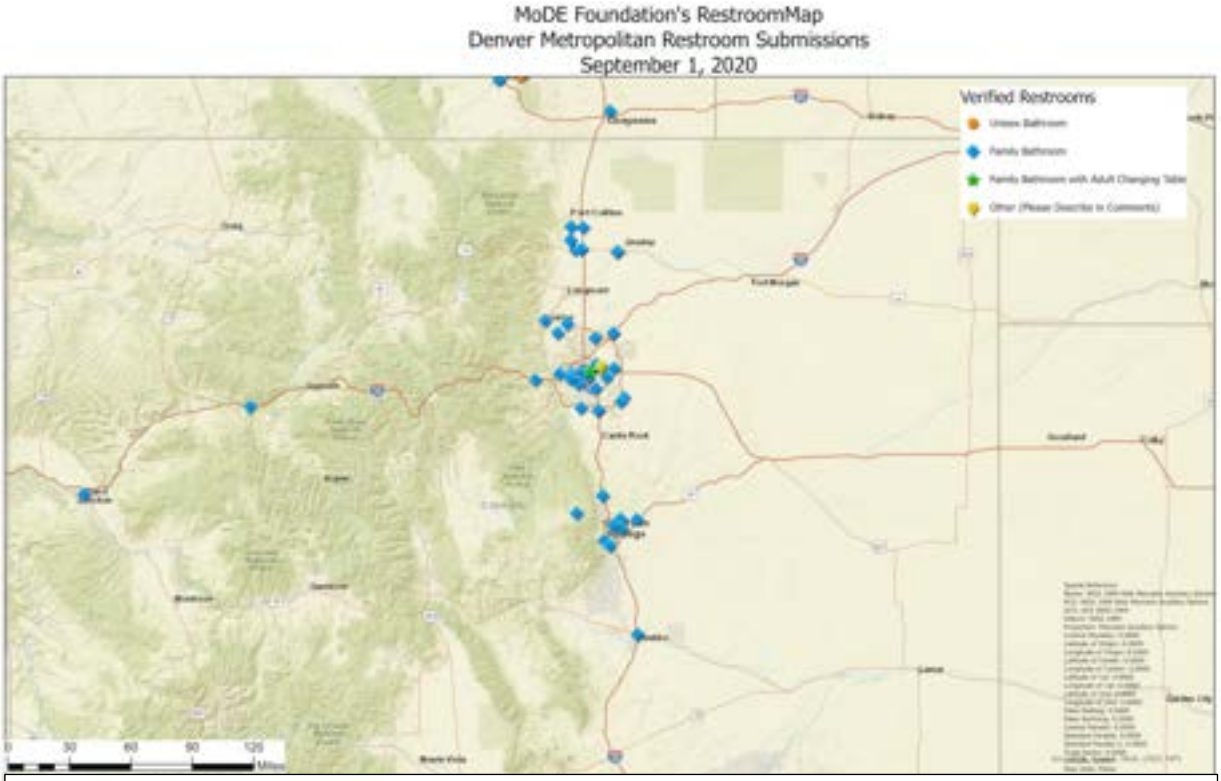

Figure 16. RestroomMap view of submissions in Denver Metropolitan Area, USA. Source: David Nykodym, 2020

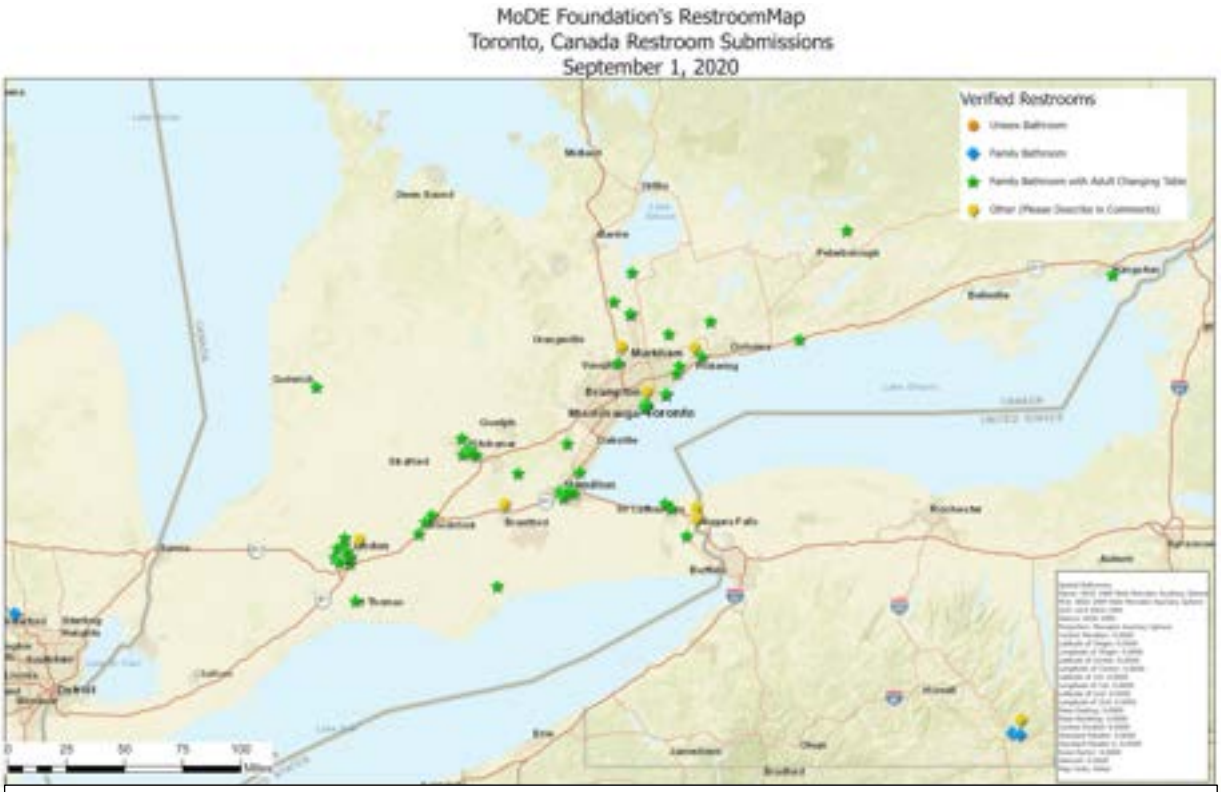

Figure 17. RestroomMap view of submissions in Toronto, Canada. Source: David Nykodym, 2020.

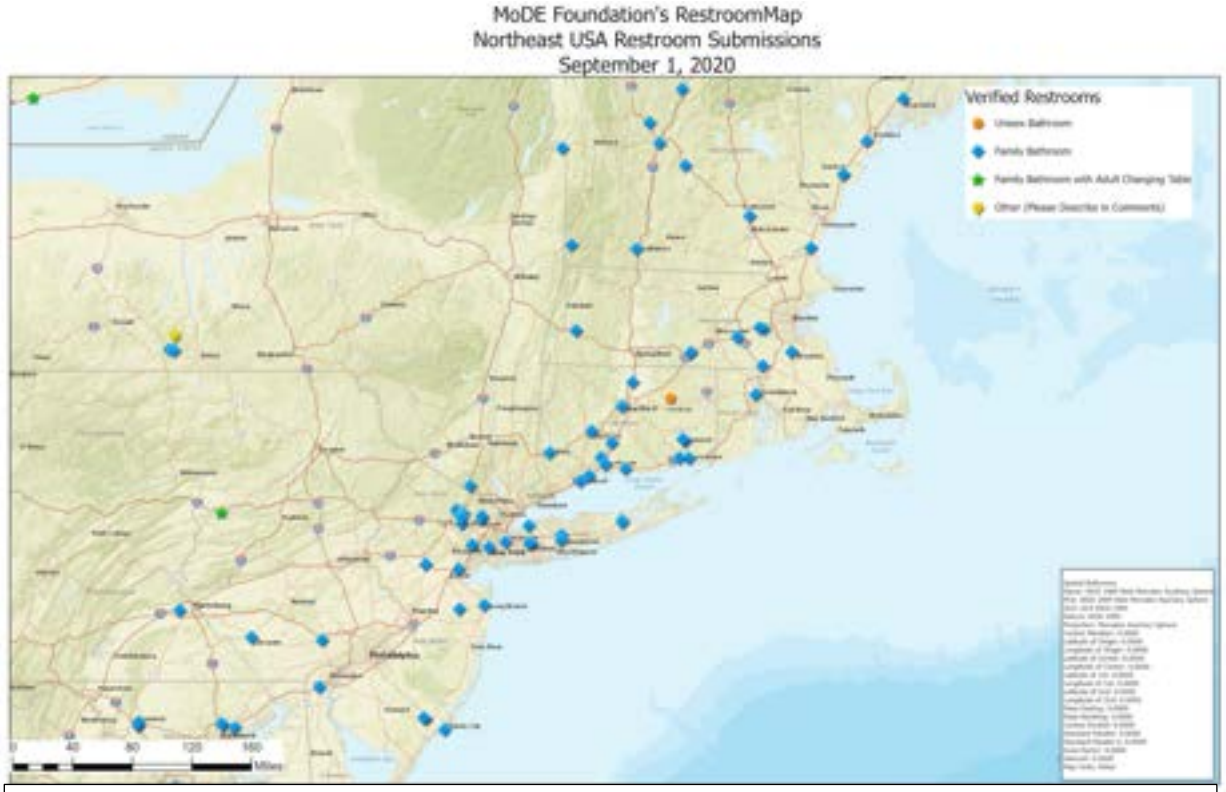

Figure 18. RestroomMap view of submissions in Northeast Megalopolis, USA. Source: David Nykodym, 2020.

Although the restroom reports are likely to be more common in areas with more restrooms this also leaves empty spaces where no data is collected. This can either be due to low coverage in less populated areas or this can highlight areas where there are no bathrooms available that meet the map's accessibility standards.

Robin, an interviewee who is a member of MoDE, described RestroomMap as a positive way to start a conversation about using restrooms and access to it. The topic of using restrooms "...can be seen as taboo" to discuss and it may be something you do not want to bring up so you do not embarrass somebody. By having that visual and spatial representation of where restrooms are located with universal changing tables and gender-neutral bathrooms, acts as a primer to start that conversation. Bringing experiences into the mainstream from a minority group enlightens people to common everyday struggles that people with disabilities have to deal with.

5.2 Community Accessibility Reporter Results

The Community Accessibility Reporter was released for public use on April 4, 2019. To date 116 features were submitted from volunteers. Out of those features, 23 were removed from the final dataset due to the feature not meeting the data standards criteria. These points were removed because they were either not in the study area, were more than 5 meters away from the feature site, or did not have adequate information filled in for when a feature was labeled as Other and had no accompanying data to define it.

5.2.1 Temporary and Permanent Features

In total 93 feature submissions were kept in the final dataset as in Figure 19.

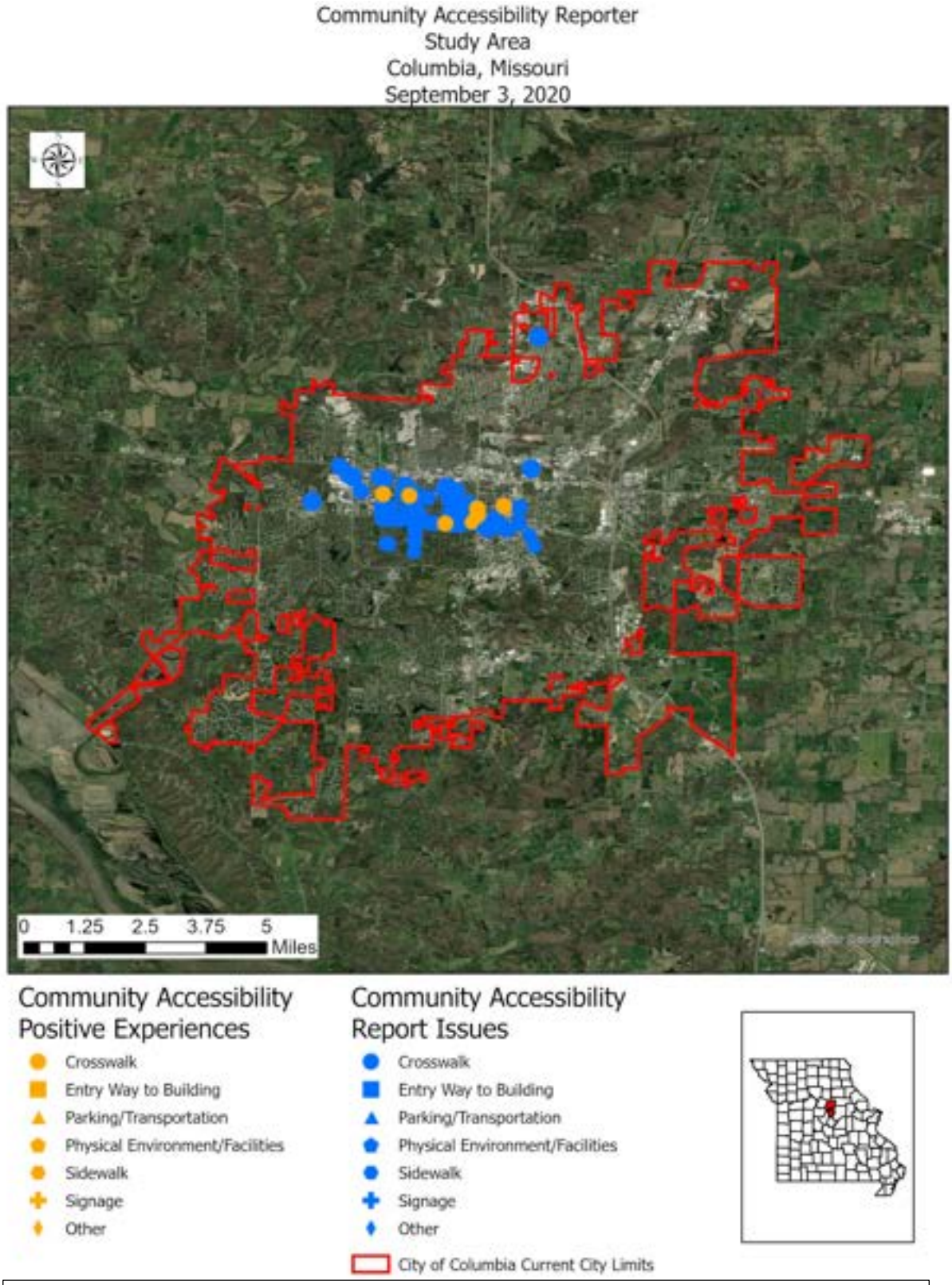

Figure 19. Community Accessibility Reporter Study Area and Final Submissions. Source: David Nykodym, 2020.

Of those, 6 were marked as temporary and 87 were marked as permanent features. As in Figure 20 the majority of submissions were for permanent features.

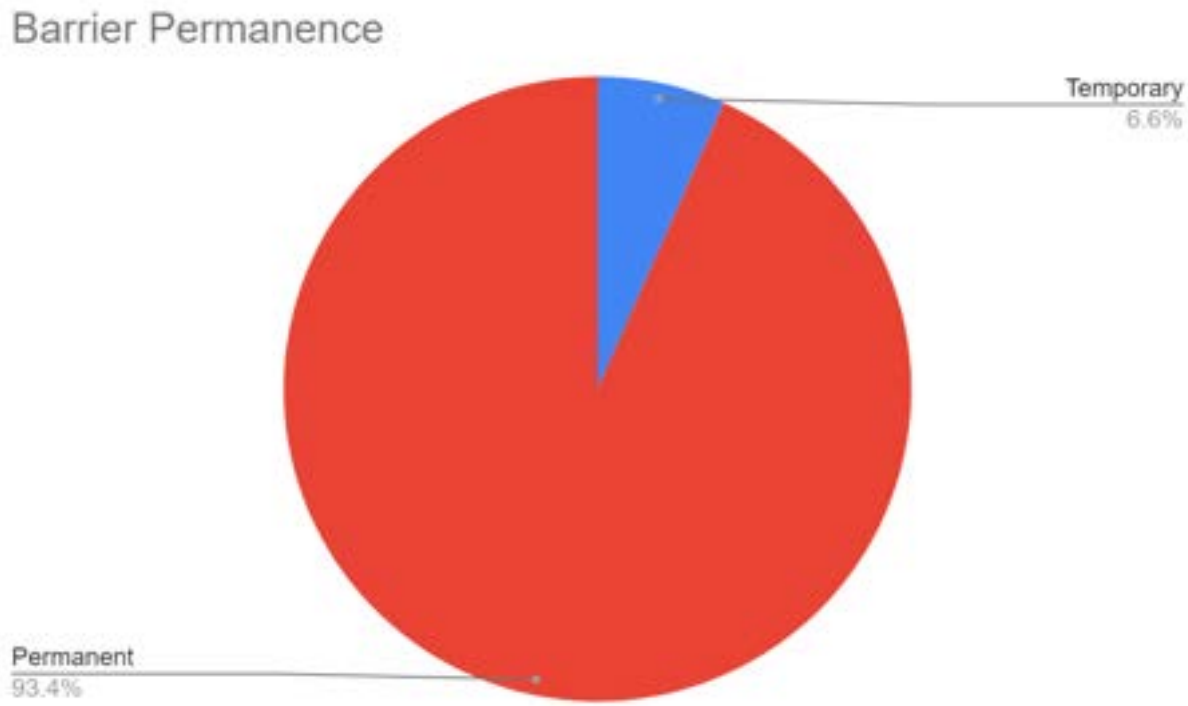

Figure 20. Community Accessibility Reporter feature breakdown between permanent and temporary features. Source: David Nykodym, 2020.

This is due to the frequency and timing of when these features are encountered. As conveyed in Figures 21 through 24 temporary features that were reported include sidewalks covered in mud or snow, construction of crosswalks, objects blocking sidewalks, vehicles blocking accessible ramps, and heaved sidewalks due to extreme heat.

Figure 21
Heaved Sidewalk ~3 inches above grade. Source: CAR Participant, 2019

Figure 22
Construction of crosswalk. Source: CAR Participant, 2019

Figure 23.
Supplies for store blocking sidewalk. Source: CAR Participant, 2019

Figure 24
Trash blocking sidewalk on garbage pickup day. Source: CAR Participant, 2019

Heaved sidewalks, as in Figure 21, were included in the temporary category because even though these are more permanent compared to weather events and garbage, due to the severity and extreme grade of heaved sidewalks, this one being 3 inches above grade, the City of Columbia addresses these very quickly. During the interview Dawn, a self-identifying self-advocate, brought a stack of business cards to the table where we were sitting. Each card was a report she filed with the City Public Works Department concerning an issue she encountered when traveling. The stack had approximately 60 cards in the stack. Dawn said that the process was very easy to file a complaint and the City is quick to address these issues. This raised the question of does the quick turnaround time to address these issues make the city more accessible? Dawn said this does help with accessibility and that by building a personal relationship with the City's leadership and city programs that they actively acknowledge her issues when she brings them to her attention. This was a prominent theme in the interview, and one that every interviewee openly acknowledged, is that people with disabilities can advocate for themselves and can live an independent life. By self-advocating for themselves and the community at large they are able to promote changes in the built environment.

Temporary features are related to weather or obstructions on the sidewalk. Compared to a permanent feature most users may not encounter these features or if they are encountered by a user they could be removed or dealt with in a relatively short amount of time. This also brings into consideration temporal components of accessibility. A sidewalk may be accessible for most of the year but during the winter, snow may decrease the accessibility of that sidewalk. Similarly, sidewalks may be obstructed on garbage pick-up days. Once the garbage is removed the sidewalk returns to being accessible. So, while these may not be permanent or regularly encountered, it is important to consider temporary features in a temporal sense to assess if there

are patterns that can be established for when areas are not accessible and if anything can be done to reduce these temporary events.

5.2.2 Sidewalks

The majority of features reported were permanent features. Of those permanent features sidewalks were the most common features reported followed by crosswalks as in Figure 25. Sidewalks were the most reported features likely due to the pedestrian network primarily being composed of sidewalks compared to crosswalks and bus stops.

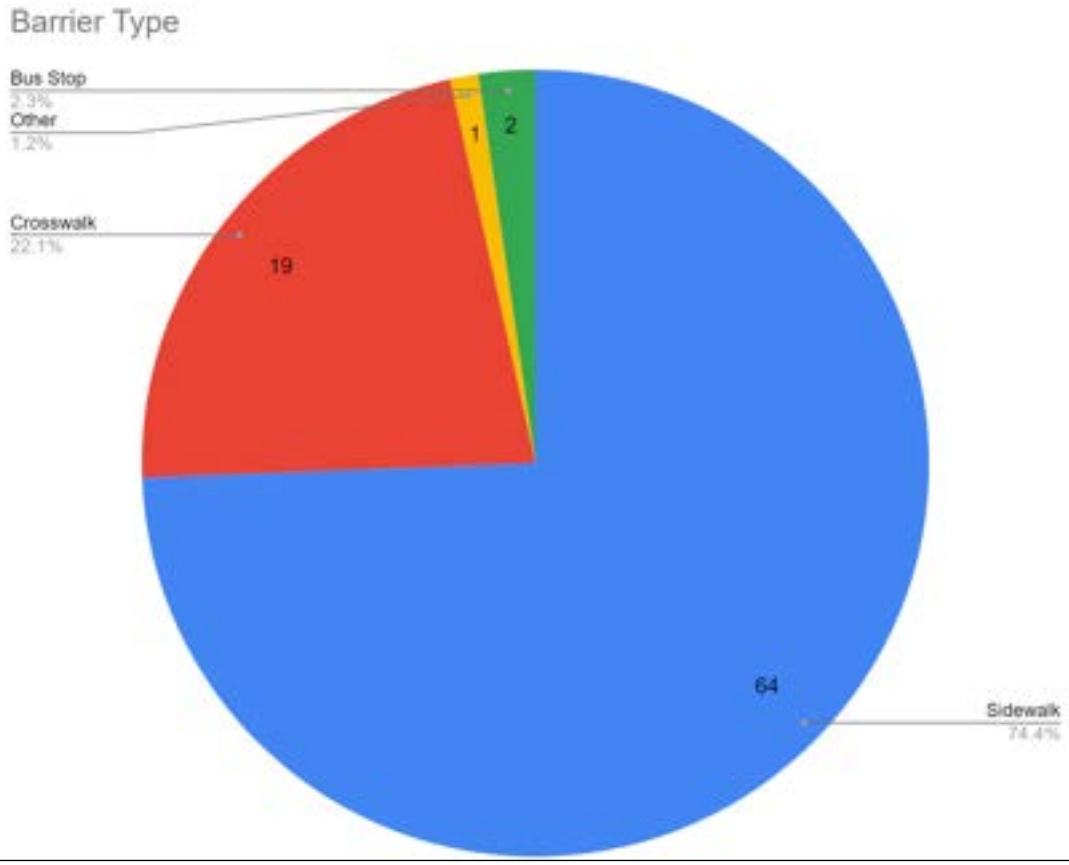

Figure 25. Community Accessibility Reporter feature breakdown of barrier types reported. Source: City of Columbia, 2019.

There were multiple different classifications for why sidewalks were reported as inaccessible. The most common issue was cracked sidewalks as in Figures 26 through 30.

Figure 26
Cracked Sidewalk and snow coverage. Source: CAR Participant, 2019

Figure 27
Cracked and heaved sidewalk.

Figure 28
Cracked and heaved Sidewalk ~1.5 inches above grade. Source: CAR Participant, 2019

Figure 29
Cracked sidewalk with no connection. *Source: CAR Participant, 2019*

Figure 30
Cracked and degraded sidewalk. Source: CAR Participant, 2019

The ADA guidelines for sidewalks recommends any crack that makes the vertical change greater than or equal to a quarter inch needs to be addressed (Leverson, 1998). Most of these cracks were less than a quarter of an inch but were often accompanied by multiple cracks or crumbling sidewalks. Some of these cracks were on the maximum of the vertical height ranging from a quarter inch to two inches as in Figure 29.

Another report was physical obstructions worked into the actual sidewalk as in Figures 31 through 40.

Figure 31
Exposed water valve in sidewalk. Source: CAR Participant, 2019

Figure 32
Exposed utility cover and cracked sidewalk. Source: CAR Participant, 2019

Figure 33
Recessed water meter and exposed pipe from removed parking meter. Source: CAR Participant, 2019

Figure 34
Removed parking meter with exposed pipe. Source: CAR Participant, 2019

These include drainage pipes from buildings' rain gutters, removed parking meters, recessed water meters, and utility coverings. These features are harder to address since it's not just repairing a sidewalk with cracks but it also involves changing other infrastructure. As in Figure 32, a storm sewer drain is at the base of a crosswalk curb cut, which is in violation of ADA guidelines (Leverson, 1998) but to address this issue involves changing not only the curb cut but also the storm sewer drain location.

Figure 35
Exposed drainage pipe cover in sidewalk. Source: CAR Participant, 2019

Figure 36
Exposed drainage pipe and cracked area around pipe. Source: CAR Participant, 2019

Figure 37
Exposed drainage pipe with 4-inch drop to asphalt. Source: CAR Participant, 2019

Figure 38
Exposed drainage pipe in sidewalk. Source: CAR Participant, 2019

Figure 39
Storm drain at base of curb stop,
Sidewalk covered in snow. Source: CAR Participant, 2019

Not all obstructions were embedded in the sidewalks. Some vegetation hangs low over sidewalks as in Figure 40 and could potentially cause issues for those who are blind or visually impaired.

Figure 40
Vegetation obstructing sidewalk path and cracked sidewalk. Source: CAR Participant, 2019.

Other reports involved multiple issues with the sidewalk as in Figures 41 through 46.

Figure 41
Phone poll in middle of sidewalk, sidewalk less than 4 feet wide, and mud-covered sidewalks. Source: CAR Participant, 2019

Figure 42
Cracked sidewalk covered in mud and snow. Source: CAR Participant, 2019

Figure 43
Cracked sidewalk, 2-inch gap from grade, and gravel where sidewalk deteriorated. Source: CAR Participant, 2019

Figure 44
No curb cut and cracked sidewalk. Source: CAR Participant, 2019

Figure 45
Cracked sidewalk, uneven grade of sidewalk, and trash can as obstruction. Source: CAR Participant, 2019

Figure 46
Degraded and cracked sidewalk that is covered in snow. Source: CAR Participant, 2019

These included a combination of temporary issues along with permanent issues as in Figure 41 where a telephone pole was located in the middle of a mud-covered sidewalk. Also, there were multiple permanent issues as in Figure 46 that often times included transitions from sidewalk to crosswalks.

The City of Columbia has been focusing on making Columbia a bike friendly city. This involves constructing and improving bike lanes along streets. When this was brought up in an interview Dawn mentioned that this was “Fine by me because they don’t have bumps unlike the sidewalks and are much smoother than sidewalks that are crumbling”. Since some sidewalks need repair it gives wheelchair users or power chair users the option to use a service that may be more comfortable or conducive for them to travel. Having this versatility in choosing a way to travel and alleviating the City from having to repair both the sidewalks and bike paths may be a way to address making pedestrian ways more accessible and keeping down cost.

One of the more common submissions was reporting on the absence of sidewalks or sidewalks that abruptly ended. As in Figures 47 through 50 there are areas where sidewalks abruptly end or just do not exist.

Figure 47
End of sidewalk path. Source: CAR Participant, 2019

Figure 48
End of sidewalk path. *Source: CAR Participant, 2019*

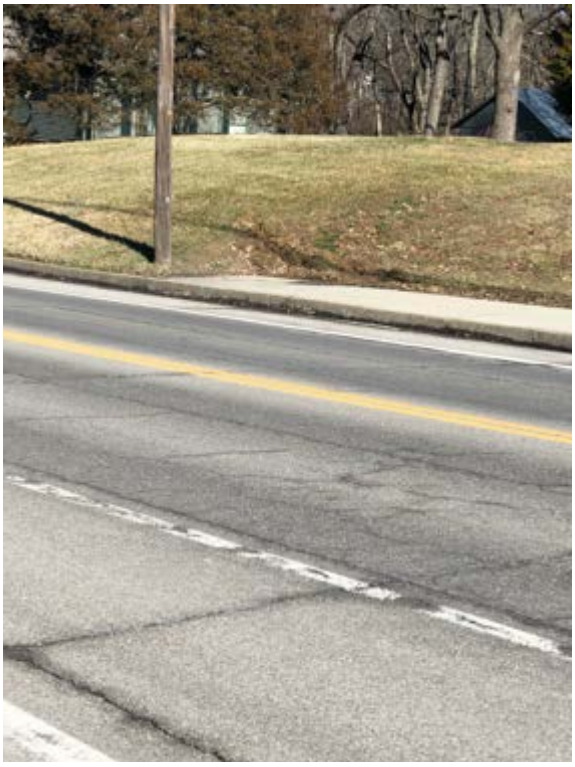

Figure 49
End of sidewalk path. Source: CAR Participant, 2019

Figure 50
End of sidewalk at crosswalk, crosswalk connects to no sidewalks and covered in snow. Source: CAR Participant, 2019

While the ADA does not cover network connectivity this is an important accessibility issue to be addressed. Figure 51 shows the City of Columbia's ADA Transition Plan data showing that a crosswalk complies with ADA standards while a submission to CAR marks an accessibility issue at a crosswalk not connecting to any sidewalks.

Figure 51. CAR results compared to ADA Transition Reporter Results on conflicting accessibility concerns at the corner of West Blvd and Worley St. Source: David Nykodym, 2020

Robin stated the ADA is "...kind of a first step and I think a lot of businesses and organizations say, oh, well, we've hit our ADA requirements, and they mean well, but they don't understand that that's basically a minimum and they could exceed those standards if they chose." Even though the ADA has laid the legal foundation for equal treatment for people with disabilities it still has issues of only meeting certain accessibility requirements and usability for certain disabilities, especially when it predominantly covers physical disabilities. Even when a

space is ADA compliant the accessible features of that space may hinder someone with a different impairment. Robin told a story that they were giving directions to a person who is blind and because the space is wider to accommodate wheelchairs it made it harder for them to navigate since the person relies on sound to navigate and people using that space did not follow the same "traffic flow" as in a smaller space. There is also the scenario of cognitive disabilities where a space may need to be brighter for someone who is visually impaired but this may be overwhelming for someone with cognitive disabilities. As Michelle said "...a lot of people think of accessible spaces as simply the physical, not anything else with the sensory." This brought up the topic of is there such a thing a fully accessible space. As Christina said in reply "I don't think we can think of these as binary. I think there's probably like a range rather than it is or it isn't." Christina commented it would be better to label a place as having "accessible features" instead of stating that it is accessible. Accessibility is a very personal component where there is not a one size fits all solution. But by sharing these experiences it moves people in the direction to work on making spaces accessible and fitting a broader spectrum of needs.

5.2.3 Crosswalks

Crosswalks were noted as the second most common accessibility issue. These issues can be in Figures 52 through 58.

Figure 52
No curb cut to road and telephone pole obstructing crosswalk path. Source: CAR Participant, 2019

Figure 53
Crosswalk cracked and filled with water. Source: CAR Participant, 2019

Figure 54
No curb cut and sidewalk does not extend to street. Source: CAR Participant, 2019

The prominent issues involved lack of rumble strips on the edge of curb cuts, cracks or potholes in the crosswalk, lack of crosswalk signage, entry from curb cut to the street not level, or no auditory signals for crosswalks.

Figure 55
No markings and no clear route for crosswalk. Source: CAR Participant, 2019

Figure 56
Inadequate time to cross when light signals for pedestrians. Source: CAR Participant, 2019

Figure 57
Trip hazard transition to road and transition from sidewalk to asphalt not level. Source: CAR Participant, 2019

With some crosswalks there was also the temporary issue of water building up on the curb cut since often the curb cut is lower than the street grade which does not allow water to not flow away from crosswalks as in Figure 58.

Figure 58
Pooled water in crosswalk. Source: CAR Participant, 2019

5.2.4 Positive Features

There were areas of the community where users captured features they felt were very accessible. Although there were issues reported with crosswalks, 6 out of 7 of the positive experiences reported were for crosswalks that users wanted to acknowledge for helping with accessibility. As in Figures 59 through 61 all the crosswalks noted are not associated with stop lights and allow pedestrians to cross the street safely on stretches of roads that do not have traffic lights nearby.

Figure 59
Crosswalk near public health building. Source: CAR Participant, 2019

Figure 60
Crosswalk to public park. Source: CAR Participant, 2019

Figure 61
Crosswalk to college and junior high school. Source: CAR Participant, 2019.

These crosswalks are often near public facilities as noted in Figure 62.

Figure 62. CAR Positive accessibility experiences. Source: David Nykodym.

These buildings include the public library, schools, neighborhood parks, and the county health department. This provides a safe way to access these buildings and also externally signals acceptance of patrons regardless of how they traveled to the building. Although there are fewer positive accessibility accounts published does not mean that there are not more examples of city infrastructure and businesses going above ADA guidelines to make spaces more usable. As discussed with Dawn there are policies that must be accounted for as well when assessing accessibility. There is also the effect of negativity bias where people are more likely to remember and report on negative experiences even though positive experiences may occur as frequently (Vaish, A, Grossman, T., & Woodward, A. 2008)

5.2.5 Community Accessibility Reporter and Columbia ADA Transition Plan

The intent of CAR was to capture crowdsourced personal accessibility experiences while the City of Columbia's ADA Transition Plan was developed to capture ADA deficiencies in the pedestrian network that was collected by City employees. Although the scope was different between the two applications in terms of area covered within Columbia and the types of features collected, there was overlap in agreement between the two methods. As in Figure 63 and Figure 64, when comparing the results from CAR to the ADA Transition plan, most of the accessibility issues noted in CAR were the same as the ones noted in the ADA Transition Plan. The main area of difference between the two methods on accessibility issues came when issues were submitted in CAR concerning network connectivity.

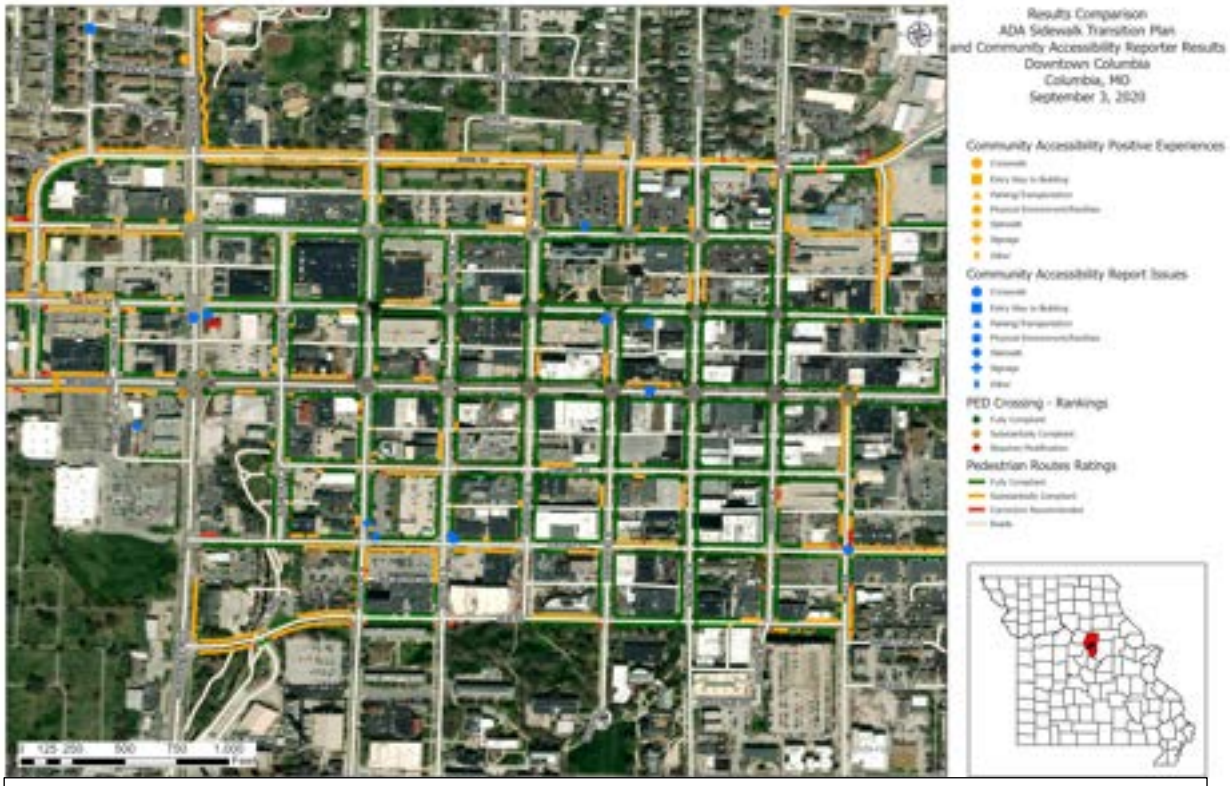

Figure 63. CAR results correspond to ADA Transition Plan results in Downtown Columbia. Source: David Nykodym

Figure 64. CAR results correspond to ADA Transition Plan results in Worley St Area. Source: David Nykodym

Reporting on these issues is important not only to improve the pedestrian network but also to create a space to give freedom of choice of how someone wants to travel. For people with disabilities, typically the choices of travel are limited. Dawn noted that the public bus and Paratransit, the City's local public transportation for people with disabilities, were their primary modes of transportation. Even though these modes of transportation are physically accessible to people with disabilities they have limited times of operation and have limited access to certain parts of Columbia. There is one taxi service in town that purchased vans that can accommodate wheelchairs and power chairs but Dawn noted that the prices are higher for the use of those vehicles compared to standard taxi services.

All participants were asked, if the City had the money do you think they would use that money to improve or update the bus and pedestrian routes? All respondents replied no. Dawn said that "we have a country in America that says everybody should drive...they want everybody to drive. People don't like to give up their cars." Sarah stated that "...it's the mindset again of who they want to use the money for and the people that need it just aren't high on the priority list…". Christina stated regarding the bus system "..it's stigmatized here. If you're riding the bus you have no option. It's either you have a disability that prevents you from driving or you do not have the finances to drive a car."

One of the common themes from the interviews was a lack of public knowledge of these issues. All interviewees mentioned "They just don't think about it" or "that never occurred to me" when concerns are raised about changing spaces to make them accessible. Michele stated, by crowdsourcing data "...it empowers them to take control of the narrative of disability rather than us telling them what's accessible...so it's a little bit of participatory democracy." Using GIS to crowdsource data gives the ability to take control of the narrative of personal experiences.

This is an empowering part of advocacy and gives a platform to share those narratives to those who may not be exposed to the experiences of a person with disabilities. It also gives the opportunity to create change to make spaces more inclusive to people with disabilities. Sarah mentioned the scenario for "...wheelchair accessible, I think of like maybe, the stadium at the college and you go well, they have a place for wheelchairs to be but is it fully equitable accessibility because then can the wheelchairs be in the MVP section whatever it's called and you know, probably not because they have usually one place they can be and is that the place that they want to be sitting?" Even though a space is accessible does not mean it is equitable. Just like the example of the back-door treatment where accessible entrances are in the back of a building (Imrie 2000), other buildings can have areas that dictate where a person is or is not allowed to go based on ability. Similarly, just because a person can use the bus system does not mean they have the freedom or convenience to decide when they get to go somewhere or even though there may be a sidewalk available does not mean everyone gets to use it if its cracked.

Chapter 6: Conclusion and Reflection

Throughout this research the concept of defining accessibility as "…the extent to which a setting can be approached, entered, and used safely and with dignity regardless of an individual's functioning" (McDonald et al. 2015) has been one of the main drivers of this research. The ability to access a space is only part of accessibility. There also needs to be the equitable component that preserves a person's dignity as well. As outlined in this paper the space people are able to occupy represents how they are perceived in society. By segregating people with disabilities to either enter through the entrance in the back or to be relegated to one accessible place says "…they belong to one space but not another, their dignity as individuals is spatially contingent" (Boddie 2010: 423). The purpose of this project was to spatially show where people

with disabilities have issues with traveling to and accessing facilities in their community. This project wanted to spatially share those stories so that others could relate to the reports that were submitted by participants. These applications provided a platform to convey the message that there are areas that are not accessible to everyone. The stories and interviews shared in this project outline this as well but they also share that there are people and places that are doing the right things because they acknowledge that these are not just people with disabilities but they are people. The following were the original objectives of this research and how they were accomplished through this project.

1. Experience Sharing: Both applications gave platforms for people to share their experiences with accessibility regarding access to restrooms that go above ADA guidelines or by showcasing where accessibility barriers or exceptional accessibility existed in their communities.
2. Accessible Data Collection: The ability to have applications be customizable to control the style and color of symbols, size of text, integrate with a device's accessible features, and the ability to have these applications work on different types of devices and internet browsers give the flexibility for people to use these applications that fits their needs.
3. Democratizing Data Collection: This gives a bottom up approach where users can dictate what is accessible to them rather than institutions regulating what counts as accessible. These two sources do overlap with each other a majority of time as assessed with the comparison of CAR data to the ADA Sidewalk Transition Plan. There were still features such as network connectivity that are not addressed by the ADA that make the pedestrian network inaccessible.

4. Policy Making: By demonstrating these applications to bigger institutions and advocacy groups, this expanded the interest to develop both applications into more advanced tools. This will make them easier to use, more available to a wider audience, and having better trained programmers address more complicated tasks in the applications to make them accessible to users with different impairments. The University of Missouri will be collaborating with MoDE to develop RestroomMap into a more robust application and they have expressed interest in using CAR as a system to report accessibility issues on campus to report to the public and to prioritize work orders. PedNet has also expressed interest in CAR to develop a Walk Audit tool to interview community members and mark where they have concerns about walking. By expanding their usage this brings in more users to collect data that can be used in policy making.
5. Advocacy Tool: By reporting where deficiencies occur, this gives the ability for advocates to address common areas where issues occur more frequently and to bring those deficiencies to the attention of a wider audience. It also gives the ability to highlight areas that are more accessible to act as a model for the rest of the community. These issues can then be presented to decision makers in a quantifiable method to give additional legitimacy to accessibility in the community.

Some deficiencies were encountered in this project. When comparing the CAR to Rice et al.'s mapping project at George Mason University some differences became apparent. Since crowdsourcing is dependent on a small group of data collectors, the amount of data collected was not as robust as expected. Rice et al. utilized volunteers from university students and groups who

were incentivized to collect data for their project. If this project was conducted with the backing of a larger entity, the amount of points collected would have been larger. Also, there were spatial accuracy differences. Rice et al. utilized GPS units to collect points around campus. There are GPS receivers that can connect via Bluetooth to phones and devices but these are typically expensive for your average person and cheaper GPS units are not conducive to real time data collection due to the workflow to process that data. In the future smart devices will become more accurate as technologies advance which will enhance the ability to get higher accuracy data from the general public. The biggest deficiency that was encountered was that while these projects were intended to report accessibility issues often times the project was not accessible for all who would want to use these applications. This project assumes that most people have access to smart devices or computers which may not be the case for everyone due to affordability or because of physical or cognitive impairments with using a smart device or computer. But there is a growing field that is working to make maps or similar products more accessible by utilizing Touch and Speak for guiding or audio cues for directions and for detailing what features are in the vicinity with apps like Access Earth (Access Earth 2020) or BlindSquare (BlindSquare 2020). There is also the aspect of who created these applications. These were designed by an able-bodied white man who is a caregiver for a person with disabilities. These applications were first developed under those conditions. Input and recommendations were encouraged to be given every step of the way while demoing and discussing this project with those in the disability community. Future endeavors for this would be developed by a larger more diverse team and be used by an institution to track and log accessibility issues so that they can be addressed or known about by others to effectively plan routes or, ideally, advocate for change.

By delegating how people with disabilities can use space, this restricts public participation and being represented in the public sphere. In a 2015 study, it was found that pedestrian wheelchair users were three times more likely to be killed by motor vehicles when compared to able-bodied pedestrians (Kraemer and Benton 2015). These safety concerns limit the interaction that people with disabilities have with their community and could be fixed creating safer pedestrian infrastructure (Kraemer and Benton 2015). By having hostile environments like this it limits the public interaction from people with disabilities. Without public interaction and exposure, this makes the phrase "I didn't even think of that" much too common when discussing how to make a space accessible and safe. Representation matters because without it stereotypes and stigmas continue to perpetuate in the world of disability. Where those stigmas and stereotypes exist, those ideas permeate to circles in society. Those disparaging ideas of disability are found in our language, entertainment, and in our policy making. In *Board of Trustees of University of Alabama v. Garrett* two people with disabilities were fired because of their impairments. In the decision, five supreme court justices sided with allowing those people to be fired, violating the basic premise of the ADA, because "…it would be entirely rational (and therefore constitutional) for a state employer to conserve scarce financial resources by hiring employees who are able to use existing facilities…" (Board of Trustees UA v. Garrette 2001: 12). Additionally, those same justices state that "…these incidents taken together fall far short of even suggesting the pattern of unconstitutional discrimination…", even though 300 cases of discrimination were presented at the trial and over 200 years of disability history would suggest otherwise. Larger cultural ideas about disability need to be addressed. Under the social disability theory this is what causes disability; the built environment is just a side effect of the way our society perceives disability. To help change these ideas, stories

need to be shared and heard. Advocating through GIS applications is one platform that can help portray that these stories do not just exist in isolated areas.

In cooperation with MoDE Foundation, these applications will remain open and maintained for future use to report accessible restrooms and to report on accessible features in communities. Currently, MoDE and the computer engineering department at the University of Missouri's College of Engineering are developing a mobile application that will be available on smart devices to streamline the user's data entry process and will be able to address accessibility issues that were outside the scope and complexity of this project. Until that application is developed RestroomMap will be maintained and updated by MoDE, with my help, as new techniques and software upgrades are implemented by ESRI.

This research has been presented to multiple institutions such as the City of Columbia, University of Missouri, and PedNet, a local advocacy group that promotes walkable and roll-able neighborhoods. PedNet has expressed interest in using a modified form of CAR to report accessibility issues as a way to communicate with the public where obstructions exist and to raise awareness about improving pedestrian and bike transportation. They also want to provide decision makers with quantitative data of where issues most frequently occur so that in depth investigations can be conducted to learn why some geographic areas more prone to accessibility issues than others. As these applications are developed, continual input and testing will be conducted by people with varying disabilities and backgrounds.

In terms of accessibility, either to restrooms or to community infrastructure, further research could consider where barriers exist and why more barriers exist in certain parts of communities. The issue of accessibility for people with disabilities is much more widespread than simply looking at physical access. It's important to also look at how accessibility may

correspond with income, race, age, gender, weather and climate, a community's political identity, and even looking at the age of the community itself to see how much historical infrastructure still exists. GIS should continue to play an important role in this research by finding how spatial interaction would interact with demographics, societal makeup, and climate.

Not only would this research help with improving all people's access but it would also address why limited access was allowed in areas to begin with. Learning the root cause for why people with disabilities have been left out of planning in a community helps to evaluate who has a say in how a community is built, maintained, and further developed.

REFERENCES CITED

Access Earth.2020. Access Earth About. https://access.earth/, accessed on September 13, 2020.

ADA.1990. Introduction to the ADA. *United States Department of Justice Civil Rights Division.* https://www.ada.gov/ada_intro.htm#:~:text=To%20be%20protected%20by%20the,as%20having%20such%20an%20impairment., accessed on September 13, 2020.

ADA.2010. 2010 ADA Standards for Accessible Design. *Department of Justice.* https://www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards.pdf, accessed on September 13, 2020.

ADA.2008. Americans with Disabilities Act Title III Technical Assistance Manual. *Department of Justice.* https://www.ada.gov/taman3.html*.,* accessed on September 29, 2020.

ADAPT. 2020. The ADAPT Activist Handbook. *ADAPT.* https://adapt.org/the-adapt-activist-handbook/, accessed on September 13, 2020.

Aldred, R. & Woodcock. J. 2008. Transport: challenging disabling environments. *Local Environment.* 13(6), 485-496.

Americans with Disabilities Act. 2012. Curb Ramps and Pedestrian Crossings Under Title II of the ADA. *ADA Best Practices Toolkit for State and Local Governments.* https://www.ada.gov/pcatoolkit/chap6toolkit.htm. Accessed September 13, 2020.

Anastaasiou, D. & Kauffman, J.M. 2013. The Social Model of Disability: Dichotomy between Impairment and Disability. *Journal of Medicine and Philosophy.* 38, 441-459.

Asadi-Shekan, Z., Moeinaddini, M., Shah, M.Z. 2013. Disabled Pedestrian Level of Service Method for Evaluating and Promoting Inclusive Walking Facilities on Urban Streets. *Journal of Transportation Engineering.* 139(2), 181-192.

AP. 2018. Missouri pair makes map of handicapped-accessible restrooms. https://apnews.com/article/ce91c75102954ceba0b999e59749eabb accessed on October 2, 2020.

BBC. 2019. Apple changes Crimea map to meet Russian demands. *BBC.* https://www.bbc.com/news/technology-50573069, accessed on September 13, 2020.

Beale, L., Field, K., Briggs, D., Picton, P., & Matthews, H. 2006. Mapping for Wheelchair Users: Route Navigation in Urban Spaces. *The Cartographic Journal.* 43(1), 68-81.

Bensinger, G. 2020. Google redraws the borders on maps depending on who's looking. *Washington Post.* https://www.washingtonpost.com/technology/2020/02/14/google-maps-political-borders/, accessed on September 13, 2020.

Bill Schuette, Attorney General of Michigan, Petitioner v. Coalition to Defend Affirmative Action, Integration and Immigrant Rights and Fight for Equality by Any Means Necessary (BAMN), et al.. 572, (U.S. 2014)

BlindSquare. 2020. What is BlindSquare?. *BlindSquare.* https://www.blindsquare.com/about/, accessed on September 13, 2020.

Board of Trustees of the University of Alabama, et al., Petitioners v. Patricia Garrett et al.., 531, (U.S., 2001)

Bodie, E.C. 2010. Racial Territoriality. *UCLA Law Review.* 58(2). https://www.uclalawreview.org/pdf/58-2-2.pdf, accessed on September 14, 2020.

Bostock, L. 2001. Pathways of Disadvantage? Walking as a mode of transport among low-income mothers. *Health and Social Care in the Community.* 9(1), 11-18.

Bouche, T. & Rivard, L. 2014. America's Hidden History: The Eugenics Movements. *Nature.* https://www.nature.com/scitable/forums/genetics-generation/america-s-hidden-history-the-eugenics-movement-123919444/, accessed on September 13, 2020.

Brault, M.W. 2012. Americans With Disabilities:2010 Household Economic Studies. *U.S. Department of Commerce, United States Census Bureau.* 1-23

BTS. 2017. Data Analysis. *Bureau of Transportation Statistics.* https://www.bts.gov/archive/publications/freedom_to_travel/data_analysis#:~:text=Transportation%20Use&text=More%20than%2090%20percent%20of,table%2020%20and%20table%2021), accessed on September 13, 2020.

Cheek, Amber. 2019. Understanding the ADA and How It Works. *University of Missouri Division of Inclusion, Diversity, and Equity.*

Church, R. L., & Marston, J. R. 2002. Measuring accessibility for people with disability. *Geographic Analysis*, 35(1), 83-96

City of Columbia. 2020. Street and Sidewalk Problem Reporting. *City of Columbia Public Works.* https://www.como.gov/CMS/WebForms/form.php?formid=165, accessed on September 13, 2020.

City of Columbia. 2013. 2012 Sidewalk Master Plan Update City of Columbia, MO. 1-17.

City of Columbia. 2015. Strategic Plan 2016-2019. City of Columbia, Missouri. 1-12. Retrieved from https://www.como.gov/strategic-plan/

City of Columbia. 2019 City of Columbia ADA Transition Plan Update. City of Columbia ADA Coordinator. Retrieved from https://www.como.gov/ada/

City of Columbia. 2019. Americans with Disabilities Act (ADA) Sidewalk Transition Plan. *City of Columbia, MO Public Works Department.* 1-12.

City of Columbia. 2020. Bus_Shelter_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020. Bus_Shelter_TotalRankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Driveway_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020. Driveway_Total_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020 Driveway_Total_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Gaps_Sidewalk_Deficiencies.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Other_Sidewalk_Deficiencies.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.PED_Crossing_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.PED_Crossing_Total_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Ramp_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Sidewalks_Rankings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Sidewalks_Total_Ranksings.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Slopes_Sidewalk_Deficiencies.shp. *City of Columbia GIS Division.*

City of Columbia. 2020.Trips_Sidewalk_Deficiencies.shp. *City of Columbia GIS Division.*

Colclough, J. G., & Owens, E. 2010. Mapping pedestrian journey times using a network-based GIS model. *Journal of Maps*, 230-239.

DAV. 2020. About DAV. *Disabled American Veterans*. https://www.dav.org/learn-more/about-dav/, accessed on September 13, 2020.

De Vaus, David. 2010. Research Design in Social Research. *Sage Publications Ltd.*

Dirth, T.P, & Branscombe, N.R. 2017. Disability Models Affect Disability Policy Support through Awareness of Structural Discrimination. *Journal of Social Issues.* 73(2), 413-442.

DMH. 2020. Rules of Department of Mental Health Division 45-Division of Developmental Disabilities Chapter 3-Services and Supports. *State of Missouri Department of Mental Health.* https://www.sos.mo.gov/cmsimages/adrules/csr/current/9csr/9c45-3.pdf, accessed on September 13, 2020.

DREDF.2020. About Us. *Disability Rights Education & Defense Fund.* https://dredf.org/about-us/, accessed on September 13, 2020.

Duval-Diop, D., Curtis, A., & Clark, A. 2010. Enhancing Equity with the public participatory GIS in hurricane rebuilding: faith-based organizations, community, mapping, and policy advocacy. *Community Development.* 41(1), 32-49.

Easter Seals. 2020. The Story of Easter Seals. *Easter Seals.* https://www.easterseals.com/who-we-are/history/, accessed on September 13, 2020.

Eisland, N.L.1994. The Disabled God. Nashville, TN. *Abingdon Press.*

ESRI, 2020. Hosted Layers. https://doc.arcgis.com/en/arcgis-online/manage-data/hosted-web-layers.htm accessed October 2, 2020.

Fainstein, S.S. & Defilippis, J. 2016. Readings in Planning Theory. *Wiley Blackwell.*

Federal Geographic Data Committee. 1998. Geospatial Positioning Accuracy Standards Part 3: National Standards for Spatial Data Accuracy. *National Spatial Data Infrastructure*. FGDC-STD-007.3-1998. Pp. 1-28.

Frank, L.D., Engelke, P.O., Schmid, T.L. 2003. Health and Community Design. *Island Press.*

Gerring, J. 2001. Social Science Methodology. *Cambridge University Press.*

Gleeson, B. 1995. Disability: A State of Mind? *Australian Journal of Social Issues.* 30(1), 10-23.

Gomez, Basil and Jones III, John Paul. 2010. Research Methods in Geography. West Sussex. Blackwell Publishing.

GPS.2020. How accurate is GPS?. *U.S. Global Positioning System.* https://www.gps.gov/systems/gps/performance/accuracy/#:~:text=For%20example%2C%20GPS%2Denabled%20smartphones,receivers%20and%2For%20augmentation%20systems., accessed on September 13, 2020.

Hansen, K, & Philo, C. 2006. The Normality of Doing Things Differently: Bodies, Spaces and Disability. *Royal Dutch Geographic Society.* 98(4), 493-506.

Harley, J.B.1988. Silences and Secrecy: The Hidden Agenda of Cartography in Early Modern Europe. *Imago Mundi.* 40, 54-76.

Heipke, C. 2010. Crowdsourcing geospatial data. *Journal of Photogrammetry and Remote Sensing.* 65, 550-557.

Henry-Nickie, M., Green, R.D., & Phoenix, J.A. 2008. Leveling the Playing Field: Enabling Community-Based Organizations to Utilize Geographic Information Systems for Effective Advocacy. *Published Articles and Papers.* 87, 33-41.

Houtenville, A. and Boege, S. 2019. Annual Report on People with Disabilities in America: 2018. Durham, NH: University of New Hampshire, Institute on Disability

Imrie, R. 2000. Disability and discourses of mobility and movements. *Environment and Planning,* 32, 1641-1656.

Ingoglia, Christina. 2018. ESRI ArcUser. Making the World More Accessible. https://www.esri.com/about/newsroom/arcuser/making-the-world-more-accessible/ accessed on October 2, 2020.

Jansuwan, S., Christensen, K. M., & Chen, A. 2013. Assessing the transportation needs of low-mobility individuals: Case study of a small urban community in Utah. *Journal of Urban Planning and Development*, 139(2), 104-114.

Jordan, L., Stallins, A., Stokes, S., Johnson, E., & Gragg, R. 2011. Citizen Mapping and Environmental Justice: Internet Applications for Research and Advocacy. *Environmental Justice.* 4(3), 155-162.

Kraemer, J.D., and Benton, C.S. 2015. Disparities in road crash mortality among pedestrians using wheelchairs in the USA: results of a capture-recapture analysis. *BMJ Open.* 5: 1-8

Kurban, H., Henry-Nickie,M., Green, R.D., and Phoenix, J.A. 2008. Leveling the Playing Field: Enabling Community-Based Organizations to Utilize Geographic Information Systems for Effective Advocacy. *Published Articles and Papers.*87: 33-41.

Kwan, M. & Weber, J. 2003. Individual Accessibility Revisited: Implications for Geographical Analysis in the Twenty-first Century. *Geographical Analysis.* 35(4), 341-351.

Kwan, M.2013. Beyond Space (As We Knew it): Toward Temporally Integrated Geographies of Segregation, Health, and Accessibility. *Annals of the Association of American Geographers.* 103 (5): 1078-1086.

Laakso, M., Sarjakoski, T., & Sarjakoski, L. T. 2011. Improving accessibility information in pedestrian maps and databases. *Cartographica*, 46(2), 101-108.

Laakso, M., Sarjakoski, T., Lehto, L., & Sarjakoski, L. T. 2013. An information model for pedestrian routing and navigation databases supporting universal accessibility. *Cartographica*, 48(2), 88-99.

Linton, Simi. 1998. Claiming Disability. *New York University Press.*

Liu, S.B.2014. Crisis Crowdsourcing Framework: Designing Strategic Configurations of Crowdsourcing for the Emergency Management Domain. *Computer Supported Cooperative Work.* 389-443.

Lo, C.P., Yeung, A.K.W. 2007. Concepts and Techniques of Geographic Information Systems. *Pearson Prentice Hall.*

Lopez, N. & Lukinbeal, C. 2010. Comparing Police and Residents' Perceptions of Crime in a Phoenix Neighborhood using Mental Maps in GIS. *Association of Pacific Coast Geographers.* 72, 33-55.

Mahmoud, A. 2019. The Impact of Built Environment on Human Behaviors. *International Journal on Environmental Science and Sustainable Development.*

Matthews, H., Beale, L., Picton, P., & Briggs, D. 2003. *Area.* 35(1), 34-45.

Mackay, Mercedes. 2018. New interactive map shows accessible family restrooms in Missouri. KOMU. https://www.komu.com/news/new-interactive-map-shows-accessible-family-restrooms-in-missouri accessed on October 2, 2020.

McDonald, K.E, Williamson, P., Weiss, S., Adya, M., Blanck, P., & Southeast ADA Center PAR Research Consortium. 2015. The March Goes On: Community Access for People with Disabilities. *Journal of Community Pshychology.* 43(3), 348-363.

Mullagh, L., Blair, L., & Dunn, N. 2014. Beyond the 'Smart' City: Reflecting Human Values in the Urban Environment. *The Third International Conference on Smart Systems, Devices, and Technologies.*

NCD. 2002. Supreme Court Decisions Interpreting the Americans with Disabilities Act. *National Council on Disability.* https://ncd.gov/publications/2002/Sept172002#L, accessed on September 13, 2020.

NCD. 2017. Highlighting Disability/Poverty Connection, NCD Urges Congress to Alter Federal Policies that Disadvantage People with Disabilities. https://ncd.gov/newsroom/2017/disability-poverty-connection-2017-progress-report-release accessed on October 2, 2020.

O'Sullivan, D. 2006. Geographical information science: critical GIS. *Progress in Human Geography.* 30(6). 783-791.

Ortega, E., Martin, B., Nunez, E., Ezquerra, A. 2015. Urban fragmentation map of the Chamberi district in Madrid. *Journal of Maps,* 11, 5, 788-797.

Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N., & Hoagwood, K. 2015 Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Ment Health,* 42, 5, 533-544.

Panek, J. 2016. From Mental Maps to GeoParticipation. *The Cartographic Journal.* 53(4). 300-307.

Patel, J.K. 2019. Where the Subway Limits New Yorkers with Disabilities. *New York Times.* https://www.nytimes.com/interactive/2019/02/11/nyregion/nyc-subway-access.ht, accessed on September 13, 2020.

Pavlovskaya, M. 2018. Critical GIS as a tool for social transformation. *The Canadian Geographer.* 62(1), 40-54.

Peet, R. & Hartwick, E. 1999. Theories of Development. *The Guilford Press.*

Project Sidewalk. 2020. Project Sidewalk. *University of Washington and University of Maryland.* https://sidewalk-dc.cs.washington.edu/, accessed on September 13, 2020.

Quach, Toan. 2018. For loved ones with disabilities, online map could help families find privacy. Columbia Missourian. https://www.columbiamissourian.com/news/local/for-loved-ones-with-disabilities-online-map-could-help-families-find-privacy/article_6dd11d54-a0ab-11e8-8e0f-1391ed84bbb2.html accessed October 2, 2020.

Reardon, M. 2018. Building better maps for the disability community. *CNET.* https://www.cnet.com/news/building-better-maps-for-the-disability-community/, accessed on September 13, 2020.

Rice, R., Aburizaiza, A., Rice, M., & Qin, H. 2016. Position Validation in Crowdsourced Accessibility Mapping. *Cartographica.* 51(2) 55-66.

Rice, R., Curtin, K., Paez, F., Seitz, C., & Qin, H. 2013. Crowdsourcing to Support Navigation for the Disabled. *U.S. Army Corps of Engineers*. 1-50

Roberts, S., Grosser, S., & Swartley, D.B. 2012. Crowdsourcing to Geocode Development Credit Authority Data: A Case Study. *USAID.* 1-23.

Schindler, S. 2015. Architectural Exclusion: Discrimination and Segregation through Design of the Build Environment. *Yale Law Journal.* 124, 1934-2024.

Schweik, S.M. 2009. The Ugly Laws. *New York University Press.*

Seattle Department of Transportation. 2020. Seattle Accessible Route Planner. *City of Seattle.* https://www.arcgis.com/apps/webappviewer/index.html?id=86cb6824307c4d63b8e180ebcff58ce2, accessed on September 13, 2020.

Seekins, T., Arnold, N., & Ipsen, C. 2012. Developing methods for grading accessibility of a community's infrastructure. *Journal of Urban Planning and Development*, 138(3), 270-276.

Shapiro, J. 2020. Amtrak To Drop $25,000 Ticket Price For 2 Wheelchair Users After Complaints. *NPR.* https://www.npr.org/2020/01/20/798000308/amtrak-to-drop-25-000-ticket-price-for-two-wheelchair-users-after-complaints, accessed on September 13, 2020.

Sobek, A. D., & Miller, H. J. 2006. U-access: A web-based system for routing pedestrians of differing abilities. *Journal of Geographic Systems*, 8, 269-287.

Spagnuolo, N. & Shanouda, F. 2017. Who counts and who is counted? Conversations around voting, access, and divisions in the disability community. *Disability and Society.* 32(5), 701-719.

Taaffe, E.J. & Gauthier, H.L.1973. *Geography of Transportation.* Englewood Cliffs, New Jersey: Prentice Hall, Inc.

Thatcher, J., Bergmann L., Rose-Redwood, R., O'Sullivan, D., Barnes, T.J., Barnesmoore, L.R., Imaoka, L.B., Burns, R., Cinnamon, J., Dalton, C.M., Davis, C., Dunn, S., Harvey, F., Jung, J., Kersten, E., Knigge, L., Lally, N., Lin, W., Mahmoudi, D., Martin, M., Payne, W., Sheikh, A., Shelton, T., Sheppard, E., Strother, C.W., Tarr, A., Wilson, M.W., Young, J.C. 2016. Revisiting Critical GIS. *Environment and Planning.* http://dx.doi.org/10.1177/00308518X15622208

UCP. 2020. About United Cerebral Palsy. *United Cerebral Palsy.* https://ucp.org/about-us/, accessed on September 13, 2020.

University of Missouri Libraries. 2012. Columbia and Boone County Guide: Facts, History, Geography. *University of Missouri Libraries.* https://library.missouri.edu/missourian/columbiabeat/facts/#:~:text=Columbia%20was%20founded%20as%20Smithton,seat%20on%20April%207%2C%201821, accessed on accessed on September 13, 2020.

USAB. 2006. U.S. Access Board Technical Guide Using the ADA Standards. *United States Access Board.* https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/guide-to-the-ada-standards/chapter-1-using-the-ada-standards#:~:text=The%20ADA%20does%20not%20apply,subject%20to%20the%20ADA%20Standards., accessed on September 13, 2020.

USCB. 2020. QuickFacts Columbia City, Missouri. *United States Census Bureau.* https://www.census.gov/quickfacts/fact/table/columbiacitymissouri/RHI225219, accessed on September 13, 2020.

USDOT. 2010. Accessible Sidewalks and Street Crossings. *United States Department of Transportation.* 1-39.

Vaish A., Grossmann, T., & Woodward, A. 2008. Not all emotions are created equal: The negativity bias in social-emotional development. *National Institute of Health.* 143(3), 383-403.

Vale, D.S., Ascensao, F., Raposo, N., Figueiredo, A.P. 2017. Comparing access for all: disability-induced accessibility disparity Lisbon. *Journal of Geographic Systems.* 19, 43-64.

Walansky, A. 2019. Burger King faces backlash after employee refused to serve a deaf customer. *Today*. https://www.today.com/food/burger-king-faces-backlash-after-employee-refused-serve-deaf-customer-t161440, accessed on September 13, 2020.

Warren, C.A.B & Karner, T.X. 2015. Discovering Qualitative Methods. *Oxford University Press.*

Weber, J. & Kwan, M. 2002. Bringing Time Back In: A Study on the Influence of Travel Time Variations and Facility Opening Hours on Individual Accessibility. *The Professional Geographer.* 54(2), 226-240.

Weisman, L.K. 1994. Discrimination by Design. *University of Illinois Press.*

Wiesel, I. 2009. Community and the geography of people with intellectual disability. *Social and Cultural Geography.* 10(5), 599-613.

Worth, N. 2008. The significance of the personal within disability geography. *Area.* 40(3). 306-314.

APPENDICES

Appendix A: IRB Application

Project Number: 1491579-1
Approval Date: September 30, 2019
This stamp must be on all consenting documents

NAU NORTHERN ARIZONA UNIVERSITY
Office of Research Compliance

Online Survey Consent

You are being invited to participate in a research study titled Crowdsourcing Data to Report Accessibility Issues that Express Concerns with Physical Environment and Community's Values. This study is being done by David Nykodym and Dr. Jessica Barnes from Northern Arizona University.

The purpose of this research study is to give people who have issues with physical accessibility in their city a platform so they can report their experiences to a wider audience. This platform is a publicly available web site where people can put on a map where that experience was and then explain why it was either a positive or negative experience. By having this space to share their experience, this data can be used to see if there are areas that where more people have recorded what areas are inaccessible or accessible. This also gives a chance for policy makers to analyze the data and determine if the city's infrastructure supports its core values. For example, if a city values accessibility then the infrastructure should support that.
If you agree to take part in this study, you will be asked to complete an online survey/questionnaire. This survey will ask about your personal experiences with accessibility in Columbia, both good and bad, and its will also ask some demographic information of you as well. The survey will take you approximately 10 minutes to complete.

You may not directly benefit from this research; however, we hope that your participation in the study may bring awareness of accessibility issues in Columbia and be used by decision makers to improve the accessibility of Columbia. We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach of confidentiality is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by storing data in a secure cloud storage environment that is password protected and fields are voluntarily field out to your comfort level.

Your participation in this study is completely voluntary and you can withdraw at any time. You are free to skip any question that you choose. If you choose not to participate it will not affect your relationship with Northern Arizona University or result in any other penalty or loss of benefits to which you are otherwise entitled.

If you have questions about this project or if you have a research-related problem, you may contact the researcher David Nykodym at (573)825-5007 or at dn354@nau.edu. If you have any questions concerning your rights as a research subject, you may contact Northern Arizona University IRB Office at irb@nau.edu or (928) 523-9551.

By submitting this survey, I affirm that I am at least 18 years of age and agree that the information may be used in the research project described above.

NAU Online Survey
vSept 2019

Consent Version: 09/17/2019
Page 1 of 1

NAU NORTHERN ARIZONA UNIVERSITY
Office of Research Compliance

Institutional Review Board for the
Human Research Protection Program

805 S Beaver
PO Box: 4062
Flagstaff AZ 86011
928-523-9551
https://www.nau.edu/IRB

To:	David Nykodym
From:	NAU IRB Office
Approval Date:	September 30, 2019
Project:	Crowdsourcing Data to Report Accessibility Issues that Express Concerns with Physical Environment and Community's Values.
Project Number:	1491579-1
Submission:	New Project
Action:	APPROVED
Project Risk Level:	MINIMAL RISK
Approval Expiration Date:	September 30, 2024
Next Report Date:	
Review Category/ies:	**The project is not federally funded or supported and has been deemed to be no more than minimal risk.**

This project has been reviewed and approved by an IRB Chair or designee.

- Northern Arizona University maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00000357).
- All research procedures should be conducted in full accordance with all applicable sections of the guidance.
- The Principal Investigator should notify the IRB immediately of any proposed changes that affect the protocol and report any unanticipated problems involving risks to participants or others. Please refer to Guidance Investigators Responsibility after IRB Approval, Reporting Local Information and Minimal Risk or Exempt Research.
- All documents referenced in this submission have been reviewed and approved. Documents are filed with the HRPP Office within IRBNet. If subjects will be consented, the approved consent(s) are available within IRBNet upon approval notification from the HRPP Office.

Important

The principal investigator for this study is responsible for obtaining all necessary approvals before commencing research. Please be sure that you have satisfied applicable external and University requirements, for example (but not limited to) data repositories, listserv permission, records request, data use agreement, conducting University surveys, data security, international, conflicts of interest, biological safety, radiation safety, HIPAA, FERPA, FDA, sponsor approval, clinicaltrials.gov, tribal consultation, or school approval. IRB approval does not convey approval to commence research in the event that other requirements have not been satisfied.

Generated on IRBNet

Appendix B: Recruitment Letter

Hello,

Is there more to an accessible community than good sidewalks? Do you wish you had a way to report problems with accessibility here in Columbia?

My name is David Nykodym. I am a graduate student at Northern Arizona University, in the Geography, Parks, and Recreation Program and a resident of Columbia, MO. I am working on my graduate project that uses a web accessed reporting system to report accessibility experiences, both positive and negative, for exterior features in Columbia, MO. This project is a way for people to share their experiences with accessibility in the community and will be used for research to assess how well Columbia expresses their stated value of accessibility in the physical space and to find areas where there are shared experiences on accessiblity. If you are interested in reporting an issue please use this link below:

Community Accessibility Reporter

This can be used on a personal computer, tablet, or smart device. Once you have submitted a report you will be asked to take a short 5-minute survey. All the data is confidential and you only have to fill in information that you are comfortable with.

Thank you for your time and I hope to hear back from you. Please feel free to share this message with other people who have concerns with accessibility as well. If you have any question please feel free to contact me.

Best,

David Nykodym

dn354@nau.edu

Appendix C: CAR Feature Questions

APPENDICES

Community Accessibility Reporter Web Map Documentation

https://technodrone.maps.arcgis.com/apps/CrowdsourceReporter/index.html?appid=1a07c2f6816f499b8d10d44db174e9d9

A.) **Report Accessibility Concern and Report Positive Accessibility Experience Questions**

1. Location of Feature
2. Feature Type (select one):
    a. Crosswalk
    b. Entryway
    c. Parking
    d. Physical
    e. Other
3. Please Describe Feature
4. If Barrier is "Other", Please Describe
5. Email Address of Reporter
6. Date Reported
7. Name of Building if Applicable
8. Is the feature Permanent or Temporary?
9. How frequently do you encounter the feature?
    a. Once a Day
    b. Once a Week
    c. Once a Month
    d. First Time Encountered
10. Picture Attachment can be submitted.

B.) **Community Accessibility Reporter Questionnaire**

1. What makes a place accessible to you?
2. What is your primary mode of transportation
3. What challenges do you have with transportation?
4. What makes the are you noted accessible?
5. What makes the area you noted inaccessible?

6. What values are most important to you in a community? Select 3
    a. Social Equity
    b. Public Safety
    c. Economic Development
    d. Infrastructure
    e. Operational Excellence
7. What values do you think your community values most? Select 3
    a. Social Equity
    b. Public Safety
    c. Economic Development
    d. Infrastructure
    e. Operational Excellence
8. What is your age range?(Select One)
    a. 18-24
    b. 25-34
    c. 35-44
    d. 45-54
    e. 55-64
    f. 65+
9. What gender do you identify with?
10. What ethnicity do you identify as?
11. What is your income range?
    a. Less than $20,000
    b. $20,000 to $34,999
    c. $35,000 to $49,999
    d. $50,000 to $74,999
    e. $75,000 to $99,999
    f. Over $100,000
12. Do you have any other comments concerning accessibility or on the accessibility of the community?

Appendix D: City of Columbia GIS Data License Agreement

GIS DATA LICENSE AGREEMENT

This Agreement dated the 11 day of February 2020, is made by David Nykaza, herein Licensee. If the Licensee is a business entity of any type, then the term Licensee shall include all officers, directors, employees, and agents of the Licensee who may be provided access to the GIS files, which are the subject matter of this Agreement. Payment may be required for the data, and will be recorded in an attached document to this Agreement.

In consideration of the grant by the Public Works Department of the City of Columbia, Missouri (herein sometimes referred to as "Licensor") of rights of use concerning specified GIS files of the City of Columbia, Missouri, to which the Agreement is applicable and which are now in existence or hereafter developed and as further defined and described in the License Agreement, the undersigned Licensee hereby agrees to accept and use such GIS files subject to and under the following terms and conditions:

1. The term "GIS files" used in this Agreement means all computer generated digitized files developed, retained, and as may be developed by the Public Works Department of the City of Columbia, Missouri in the future as a part of its geographic information systems, regardless of format, developed in cooperation with Boone County, Missouri or Boone Electric Cooperative and provided to the undersigned Licensee. The undersigned Licensee hereby acknowledges that the City of Columbia, Missouri, has protected legal rights under the federal copyright law and state law to any and all such GIS files provided hereunder in existence or hereafter develop and that such GIS files are the proprietary, intellectual property of Licensor.

2. The undersigned Licensee hereby agrees to use such GIS files solely for purposes connected with its personal or business functions and the operations of the undersigned Licensee and for no other purposes. Subject to the terms and conditions of the Agreement, Licensor hereby grants Licensee a non-exclusive, non-assignable License to use the GIS files as identified in the body of this License Agreement or attached itemization provided to the Licensee by the Licensor, for its internal use only, and not for resale, distribution, assignment, sublicense or transfer to any third party. The Licensee agrees that by acceptance of the GIS files under this License Agreement it shall preserve all of Licensor's right, title, and interest in the licensed GIS files. The undersigned further agrees to make any of the licensed GIS files, or any revisions, additions or modifications to them, available to the City of Columbia for purposes of inspection or reuse for governmental purposes.

   The City of Columbia hereby grants the undersigned their request and right to use this requested data (*to be completed by requestor*): of Sidewalk inspection ratings & other ratings of curb cuts & crosswalks for the purpose of (*to be completed by requestor*): using this data set to assess accuracy & comparison with the crowdsource collection I created for my graduate project. Upon completion of the project, results and products of the work ☒ **will** ☐ **will not** (*requestor to check one*) be shared with the City. This License Agreement shall expire upon the completion of the above task.

3. The undersigned Licensee agrees not to distribute the GIS files, whether in present format or in any other further-developed format, or transfer them to any person or entity of any type without the consent of Licensor. The undersigned further agrees not to permit any person

within its employ, or agent or contractor, or other person, to use, reuse or distribute the GIS files provided hereunder for any purpose except as authorized by this Licensee Agreement without the written consent of the Public Works Department of the City of Columbia, Missouri.

4. The Licensee accepts the GIS files from the Public Works Department of the City of Columbia, Missouri now in existence or hereafter developed without warranty of any type and it hereby agrees to accept the GIS files in the condition given. Licensor shall be under no obligation to provide maintenance of the GIS files, and shall not be responsible for providing maintenance or for informing Licensee that maintenance has been performed on the GIS files, or that the information provided in the GIS files has been updated or in any fashion changed. Licensor expressly disclaims warranties of merchantability and fitness for a particular purpose. In no event shall licensor be liable for any indirect, special, or consequential damages (including, without limitation, loss of use, data, business, or profits, and claims of customers of Licensee) arising out of this Agreement or use of the licensed materials. In no event shall Licensor's liability exceed the total amount paid by the Licensee for the use of the GIS files provided under this License Agreement. The Licensee further covenants that it releases and discharges the City of Columbia, Missouri, and/or Boone County, Missouri, and/or Boone Electric Cooperative (the group sometimes referred to as the Boone Consortium), or their officers, employees, or agents for any use made of them by the undersigned Licensee.

5. Notwithstanding the provisions of Paragraph 6 below, the undersigned further acknowledges and agrees that the license for use hereby granted is revisable, modifiable and revocable upon order of the Public Works Department of the City of Columbia, Missouri.

6. This License shall commence on the date first written above and shall continue in force until terminated. Licensee may terminate this License at any time by providing written notice to Licensor. Upon breach of any obligation under this License by Licensee, Licensor may terminate this license upon thirty days written notice to Licensee. Licensee may cure the breach before the effective date of termination. Within thirty days of any termination, Licensee shall certify in writing that Licensor that all copies of the Licensed Materials have been destroyed or returned to Licensor.

IN WITNESS WHEREOF the undersigned has executed this License Agreement effective on the day and year first above written

Signed: _____

By: David Nykodym, Graduate Student, Northern Arizona University
(Print Name, Title, and Company Name)

AUTHORIZATION- The City of Columbia, Missouri hereby authorizes the above License Agreement effective the day and year first above written

City of Columbia
Public Works Department

By: David Nichols, Director
(Type Name and Title)

Master Agreement last updated by: dsr, 10/01/2019

Appendix E: City of Columbia Disabilities Commission

City of Columbia, Missouri

Meeting Minutes - Final

Disabilities Commission

Thursday, October 10, 2019 3:00 PM	Regular	Walton Building Board Room 300 South Providence Road – Columbia, MO

I. CALL TO ORDER

Chair Chuck Graham called the meeting to order at 3:00 pm

II. INTRODUCTIONS

Present: 9 - Chuck Graham, Gretchen Maune, Rene Powell, Julie Walden, Dawn Zeterberg, Ann Marie Gortmaker, John Bowders, Teri Miller and Stephanie Bono

Excused: 2 - Hazel Fields and Jacquelyn Semple

Unexcused: 1 - Jonathan Asher

Staff present: Adam Kruse, Tammy Baker
Other members of the public present.

III. APPROVAL OF AGENDA

Gretchen Maune made motion to approve the agenda. John Bowders seconded the motion. All in favor; motion approved.

IV. APPROVAL OF MINUTES

Dawn Zeterberg made motion to approve the minutes from September 12, 2019, meeting. Teri Miller seconded the motion. All in favor; motion approved.

V. SPECIAL ITEMS

Dave Nykodym presentation on Community Accessibility Map

Dave Nykodym presented a review of the Community Accessibility Map he is working on for this thesis. Dave will provide a link so the commission can contribute to the data being collected.

VI. OLD BUSINESS

White Cane Awareness Day Proclamation

Adam Kruse read the Mayor's proclamation making October 15, 2019, "White Cane Awareness Day" in the City of Columbia.

VII. NEW BUSINESS

Discussion on ADA accommodations at Taqueria don pancho

This item will be passed to the November meeting.

Discussion Health Care Agencies not providing timely notices of closing.

Angela Grant from Services for Independent Living (SIL) met with the Disabilities

Commission to discuss the Health Care Agencies that are closing and the timeliness of giving clients proper notice when they are closing. Angela was very knowledgeable and did a great job of answering the commission questions. Dawn Zeterberg will contact Representative Kip Kendrick for further discussion at the State level.

VIII. REPORTS

Staff

Adam Kruse let the commission know that the online reporting of parking violations reminder and information will be included in the November City Source. Tammy Baker reminded everyone that election of officers will be held at the next meeting.

Public Transit Advisory Commission (PTAC)

Rene Powell was unable to attend the meeting, no update at this time.

Bicycle & Pedestrian Commission

No meeting was held.

Vision Zero

No meeting was held.

MU Chancellor's Committee on Person with Disabilities

John Bowders discussed the committee would like to have Disabilities Commission attend another meeting in the upcoming year. There is a search being conducted for a new Disabilities Center Director.

IX. GENERAL COMMENTS BY PUBLIC, MEMBERS AND STAFF

Dawn Zeterberg brought up issue a friend had at being refused service at a nail salon. The discussion was that the individual who was refused service needed to be the one to file a complaint with Human Rights Commission at City, State or Federal level.

X. NEXT MEETING DATE NOVEMBER 14, 2019

XI. ADJOURNMENT

John Bowders made motion to adjourn at 4:30 pm. Julie Walden seconded the motion. All in favor; motion approved.

Appendix F: Interview Transcripts

MODE Thesis Interview (Robin, Sarah, Christina, and Michelle) 3/1/2020

0:01 - 0:10
According to my address now. Okay. So first question what makes a place accessible to you?

• 0:14 - 0:17
Whatever or whatever you want to do.

• 0:54 - 1:23
Yeah, I mean, I don't think I can add anything to that but different. Okay, so along those or so if you think of a place that's accessible but you think of a successful what is there the characteristics of that place so we could just go around the Sarah start with yeah.

• 1:30 - 1:46
So if you think of a place of like all this place is great. It's so accessible. What are the characteristics of that place? You can pass due to pass. No, no. No. I have no idea.

• 1:47 - 2:16
It's like my brain is not in that box. Nope, that is totally over. It needs to have.

• 2:18 - 2:47
Wheelchairs need to be able to access every part of the facility what else there needs to be accessible restrooms with that are you know single user wide use the tables the universal tables are good. I think space kind of thinking about seeing smash is very spacious sensory needs to and its really to accessibility limited to physical. It's not.

• 2:47 - 3:17
And it's really hard what my son wants sensory wife might be what triggers your sudden sensory needs might trigger mine. My son wants a lot of input and lots of people in your son might not want to be even into that and we try to have a variety of spaces within a facility that meets a variety of needs does that yeah, so there needs to be little.

• 3:17 - 3:47
Pockets of places all my eggs are for somebody who needs kind of inputs movement needs quiet. Somebody who needs like yeah. Yeah having those quiet spaces. It's the entire building is more loud and bright and overwhelming that having that room that's small and quiet and darker signage for people to be able to find that room and Q, you know, making sure that it's something that.

• 3:47 - 4:17
That has Braille on it or as they said you've got your visual impaired exactly. That's a whole nother issue. You know, it's exactly thinking through all those things thinking along those lines. Like is it fair to label a place as accessible if it doesn't account for all disabilities? Well, I don't think we can think of these things as a binary. I think there's probably like a range rather than like it is or it isn't it? I think it's probably like we like to get as close.

• 4:17 - 4:47
To it is accessible as we can and get and move away from it isn't but recognizing that there's probably no such thing as a perfect space but I do think some concepts of Universal Design should be adhered to because that accounts for a lot. Although it may not account for her. I mean they cleaned the account for everything but I don't know how his face could possibly write address everything and I think a lot of people think of accessible spaces as simply the physical.

• 4:48 - 4:51
Not everything else with this Theory.

• 5:18 - 5:39
So I think you know, I think the Futures words and that's a good. Yeah, I like that. So on the opposite of that. Yeah think of a space that you're like this is or a place as inaccessible. What makes it accessible stairs?

• 6:13 - 6:39
I also think like when hallways or aisles or super narrow, I guess for me. It is a sort of fundamentally about just having more space to do anything. But I also think yeah, I also think about bathrooms a lot for obvious reasons. So I think about like yeah the family style or single user restroom. The one thing I noticed with.

• 6:40 - 7:09
A lot of space in this might just be very because I'm horrible with directions. I was trying to guide through the capital. She doesn't want to be touched. She's blind. You know, I just say okay to the left to the right when it's a very big space. There's not the same traffic flow were certain people, you know, and so it was a little bit trickier to navigate because people weren't following that lock on the right side of the hall kind of thing. It was all over and then it was like, okay some other don't know for.

• 7:09 - 7:39
You know, it was just plus I don't know my left and right very well so and it was so it's just very odd. It was it was a limited a little challenging at times. Well, that's interesting that it's a space being fully accessible for someone who uses a wheelchair but not for someone who's blind or visually impaired because of just doesn't follow the rules right? I think that's interesting. That's kind of what you're saying about like some needs like well needs very you guys said this already and like depending on the situation.

• 7:40 - 8:09
It might even be diametrically opposed like some people's needs like some people might need more noise and some people might need less noise or some people might need bigger space and some people might need smaller salt. And if you're a visual impaired you might need it bright and other kids can't handle. / I mean, it's just it's really hard. Yeah, but we're more sensory. So we always look at Ya that initial walk in like I'm gonna be able to do this or we leaving but if you can see there's different levels of Life. Yeah, because like should we walk into a restaurant?

• 8:09 - 8:30
Truant and are instantaneously looking at the lights the sound how busy it is and we walked out of restaurants closed with no this isn't going to work for us, but that brings up a good point because is it more than just the physical space that makes it accessible to people in a way that was going to say I know you.

• 8:37 - 8:38
Absolutely.

• 8:40 - 9:08
That's the thing. You can take an inaccessible space or a relatively inaccessible space for a given need and if someone understands that you have to modify the spacer use it in a way. It wasn't intended. It can be okay at times like I'm thinking of rest rooming, but if they're not understanding or unwilling to modify how they use this space or how they would like the public to the space. Then it becomes more challenging. Yeah. Yeah. Yeah. That's right.

• 9:09 - 9:34
I'm even thinking of like, you know, wheelchair accessible I think of like maybe the stadium at the college and you go well, they have a place for wheelchairs to be but is it fully Equitable accessibility because then can the wheelchairs be in the MVP MVP section whatever it's called and you know, probably not because they have usually one place they can be and is that the place that they want to be sitting exactly?

• 10:42 - 11:06
I know everybody's able to drive right now. I was gonna say is their use of like public transportation or sidewalks or kind of pedestrian routes with that be a feature that would be promoted down the line or I would absolutely love to have it more because.

• 11:07 - 11:31
You know when we lived in England we didn't have a car and when I love being able to jump on a bus or jump on a train it just made it easy and convenient and then I would love it. If it was I would much I would love to be able to walk to a bus stop. So what hinders like what is there like.

• 11:32 - 11:37
Distance so to get to our nearest bus stop is.

• 11:38 - 11:59
Not just like I don't mind walking a mile in the winter is different than a mild summer, but not only that but there's no cycle sidewalks between there's a section like I could get to one point and then there's a huge section where there's no sidewalks and it's a two-lane road. So there's just I just hit on one of my favorite topics.

• 12:09 - 12:37
Once every hour and if you have to trade buses, it could take you three hours to get some tell ya it's now I think 45 minutes. They used to Crunch it down a little bit around rush hours and then extend it out not rush hours, but now it's all 45 minutes. Yeah, it's just it's not at all interested. I

really feel like for anyone put in the system. First of all people are going to start using I don't think you can expect you to start using it right based on 45 minutes, right? You know, but if you start having it words every 15 minutes,.

• 12:38 - 13:08
People may start using it and my brother lives in Baltimore and he has disabilities and he uses the bus system to get to work. I mean, that's just just what they do. Yeah, and I don't I don't want you to like speak for himself per se but like it does it does he like have any like say oh, it's great or I was horrible. Well, it's it gives them Independence. And then without it he wouldn't be able to work across town where he works for my parents get up to take him and that's.

• 13:08 - 13:22
Ideal when you're 30, so I mean, I don't know who loves the buzzer does that mean? It's just it's kind of like a striving. I mean, it's just what you do. It's not even a big deal and Independence is a huge huge.

• 13:40 - 14:02
But it's just not practical right now thinking about Colombia's public tree-like bus system. What do you think inhibits it from being?

• 14:05 - 14:08
Like being used being accessible or.

• 14:17 - 14:43
Not always sidewalks leading up to it. I think we'd have to put in a lot of money to make it would work and to make it get some start rolling as revenue and they're just not willing, you know, I don't know there's just no vision for it because they will have to run at a loss for a bit make it profitable and I just don't think they're ever willing to and I think we're a fairly affluent community. And so the demand isn't there's not a whole lot.

• 14:43 - 15:13
People screaming it city council get this done and maybe those that aren't being listened to I don't know, you know. Yeah, that's sad. But well there's that Transit Coalition who's still at it in one form or another and that's like Faith voices and ped NE and huh. But yeah, I just I think they have to view a different Columbia. Like they have to have a different vision for accessibility and and just.

• 15:13 - 15:43
So it makes for all sorts of you. So being brought up that it's a monetary issue with all this.

• 15:43 - 16:05
Do you all think if the city be a had money to be able to improve busing or pedestrian system would they invest in it or those two mindset again and what they want to use the money for and the people that need it are just not high on the priority list and of the airport, it would go. Yeah roads. I mean it was yeah it was.

• 16:43 - 16:46
Seniors everyone else's was like those my feet. Oh.

• 17:17 - 17:42
Yeah, I think so.

• 17:43 - 17:56
Shopping center is but yeah, I don't know. It's just weird to me that there's like two bus system. Yeah see that if it would work too well, and then every apartment has their own shuttle bus.

• 18:11 - 18:40
So do you think with the students in town that that makes like competing access for these resources for improving spaces for like to transport people with disabilities or I get the impression of that? I don't know whether it's true, but that's the impression I get. So here's the thing.

• 18:41 - 19:11
That's right. Like that's my impression as well that it is the school privilege over everyone else. But if you look at places like in Lawrence, Kansas, right they have an amazing public transportation system that accounts for students and people who need the bus system and not only that they pick up where they called Free Riders like the people who don't have to take it but they want to take it because it is so good. That's and so like I think there are models out there, but I just don't know why we can't be one of.

• 19:11 - 19:41
Men like to be known for progress and not truly. Yeah. Okay. So kind of Switching gears a little bit and focusing on like the mapping portion of all this stuff. So what yeah, so what.

• 19:41 - 19:45
Some applications that Express The Narrative about accessibility.

• 19:55 - 20:23
Visual representations are powerful. I think you can list off needs but when you see like with restroom app, when you see that there's whole areas where no sir. People certain groups of people can't use the restroom. It's very powerful. That's me, too. I'm visual. So I love to see things visually, so it's like if I can see a map that shows how look here's all these restrooms out here. Here's four. Here's bus schedule and.

• 20:23 - 20:27
No, I'm not most people that when I pull up the bus schedule. I look at the text.

• 20:37 - 21:07
I think it's like compelling it almost makes like a visual argument in a way and I think that that can be more powerful than just like here are my needs. I want you to listen to my needs. But if I show you physically the I don't know there's something about it that just seems very powerful because they're looking at a bar graph for infographics are so popular or word anyway, but yeah,

I think it is just like a picture is worth a thousand words.

• 21:08 - 21:31
It's just people if they can see the need they see, you know, the kids walking around with no shoes that speaks to them a lot more than saying those these kids don't have shoes you oh, well, that's a bummer. But if you see it you go. That's horrible. Look at the calluses. Look at the sores on their feet, you know, it makes it more real and more connectable and think about how we learn our me think about.

• 21:31 - 21:47
Out years ago where our grandparents at around the radio. And so that was all auditory. So at that time auditory was probably but nowadays we learn everything from TV or our phones or whatever. So we're we've turned into a very visual Society.

• 21:57 - 22:26
We're always like where are we? What does it mean for us? And we find where we are. And so if you look at a map they will that's where I live. Oh my goodness. There's not enough, you know, there's no bathroom close to me. But you know, it's I know this is very self-focused, but that's why I don't know. I mean, it's all personal experience. I mean, it's.

• 22:30 - 22:38
Okay, another question for bikes completely spaced it..

• 23:40 - 24:07
Okay, so talk about restroom map. What do you all think of kind of been some of the positive experiences negative experiences, you know just kind of a general feeling about restroom at like administering it or running it or side. I think one positive is this is kind of shocking. It opened the eyes of the disability community that we need accessible restrooms.

• 24:07 - 24:36
Surprise number of places that they're supposed to be disability focused and didn't have accessible Universal and occasion tables or restrooms and it opened their eyes as well as the public like we're oh my goodness. So we had a lady come up to us at a conference and tell us my Tony Stark Loft told us about the st. Louis Arch, so they redid the museum at the bottom of the arch. So National Monument or something.

• 24:37 - 24:38
We're just stories.

• 25:08 - 25:15
That was really thinking of like gender-neutral and all that. I'm that's kind of one of the biggest surprises. So yeah, yeah.

• 25:18 - 25:43
As well, you know, like the overlap of needs and like that an accessible restroom. Yeah, I can

have a universal changing table and that everyone's going to use it. But just by the nature of having a single use the restroom, you're helping a lot of population.

• 25:46 - 26:15
Negative Express like experiencing a universal accessible bathroom for me might not be for you. And so it's like well, you know, that's great that you got.

• 26:16 - 26:31
Down at the Capitol but that table doesn't go up and down. Hey, yo never to make everyone happy. Right and I agree. It's not the best fix man. At least you have a private place to put it's very bad for right and it starts a conversation starts the conversation.

• 26:42 - 27:10
Oh, yeah, and that although we have almost 500 points on it now or 400 and some most of them have been submitted by us or people who like no us. And so I think in this crowdsource model, you still need I feel like drivers who are collecting data because people don't always have the time or remember until.

• 27:10 - 27:31
It's more mainstream. I don't know that's been a challenge for sure. I mean like what we've really cool is if when you put in your accessible table, there's the whatever those codes are called that you scan. It automatically loads, you know, we're doing that's something I don't know if there's some way we can have it that simple. I know that isn't so.

• 27:52 - 28:03
I know we've been working with stuff with the camera at work just of people scanning QR codes

• 28:16 - 28:20
Okay. So crowdsourcing was brought up in that bring.

• 28:22 - 28:26
Is it valuable to have this as a crowdsourcing does it mean we crowdsource is there?

• 28:32 - 28:59
Once people get used to it and know about it it empowers them to take control of the narrative disability rather than us telling them what's acceptable sorry The Narrative of accessibility rather than a stick hitting it. So there's a little bit of participatory democracy if you will, but it is challenging to get it up and running and to get people to think about it is consistently. Yeah, and it would.

• 29:00 - 29:20
Well, I mean not only would it's easy enough as an owner to pin my thought but to have someone come in the yet still update. Yeah, it still maintained. It's still good. It keeps it current and so that's nice of the crowdsourcing because then it also takes the onus on the organization.

• 29:31 - 29:54

I still think the dream would be for like Google Maps or ways to just incorporate this as a feature because they have such high traffic and it's just part of those apps. Well ways, especially like you said it information. It would just be so nice to have that let's put ourselves out of business. Maybe I got enough.

• 29:58 - 30:25
We're gonna get our food at the restaurant on Yelp. And it's a pop-up with the thing that says this is restroom accessible and that's what does it have a family bathroom, you know, like population might not necessarily know.

• 30:25 - 30:53
Know what we would want it to be but they might be at least able to say that it does have a single use family restroom or yeah, there was a table in there. I guess it's Universal changing table. Like that's it. But I mean something like that like that kind of integration to an app is easy for those big companies. So if we could get into one of those and have that or at least have them add the question that feeds into our app.

• 31:55 - 31:56
Yeah.

• 32:16 - 32:29
I keep having this feeling I should ask about like ADA requirements and changing tables and just like ADA requirements and just building codes in general, but I don't know how to phrase that question.

• 32:44 - 33:14
Stay on some things and its really it's about getting in an access to the buildings, but not necessarily making gurgling use verbal.

• 33:14 - 33:37
Is all the sidewalk comes to an end. Like there's no more sidewalk and it just they'll be walking along and also ends. There's no crosswalk to get across the middle part and there's just no sidewalks clerk for the Ada networking connectivity is in part of that. So so yeah the sidewalk beefy meet all the ADA requirements, but then where do you go?

• 33:39 - 34:08
That is frustrating to he's been in stops or said you have to walk on that because that means someone in a wheelchair and I get to the clock and I think Ada but I think it's very very focused on physical disabilities. And I think as we know from our work in other areas with legislation, like any bill is or something that becomes a law isn't compromised piece of language and I think.

• 34:09 - 34:38
That the Ada that doesn't mean I don't mean to say that the Ada is unimportant. I think it's really important but it's kind of a first step and I think a lot of businesses and organizations say, oh, well, we have a debate we've hit our ADA requirements and they mean well, but they don't understand that that's basically a minimum and they could exceed those standards if they chose

and in some instances exceeding the standards is not that expensive. It might be something, you know, really small. I can't think of anything right now, but the idea is an important minimum we can do.

• 34:39 - 35:07
Better. Yeah, I think that's where that Universal accessibility comes. Yeah. I have a boat downstairs and it's just about like Universal accessibility and it's kind of just like it's like the levels of accessibility and then.

• 35:08 - 35:29
The other thing too is that there's just so many loophole or not. I want to see if the poles but like exceptions for the Ada. So like the timing that of building was built good if it was renovated recently and then it has to be a substantive quote-unquote substantial rate that rotation which is what's substantial. So.

• 35:30 - 35:49
Yeah, that's it. That's what we figured with the school's. I mean any school built before to the 90s? They're not going to have to redo it and I get you at some grandfathering into some point. But at some point you also need to see it's under here. So you need to make this accessible for all your students. So, where do you draw that line?

• 35:52 - 36:10
I think just like the bus system and sidewalks like communities organizations. They they prioritize and unfortunately, I feel like schools and others always prioritize accessibility. Yeah.

• 36:38 - 36:51
There's this one changing table. I had her in the men's room and blow dryer was right by her head. So anytime soon went to go dry their hands. It will be shooting this hot air all over her and actually yes exactly.

• 36:51 - 36:57
On this issues nine months old so she was just not happy about it. But I'm like who designed this bathroom? Yeah.

• 37:14 - 37:14
So is.

• 37:18 - 37:19
Having.

• 37:21 - 37:28
Somebody who has his experiences during the designing or decision-making or input like that be valuable.

• 37:51 - 38:00
And maybe some helmets in training or something that that just be a standard, please consider.

• 38:20 - 38:50
was suggesting we ask them to include a universal changing table and I was like, that's a great idea. But also like why haven't they include that because certainly some people with Autism could benefit from that not all but some so like I said for me issues of some right right. I just think they just don't think about it. And I think it's a little bit taboo and I think we all have different.

• 38:51 - 38:59
Kept things private, you know, like didn't want to embarrass their kid, or they don't want to talk about it or look at this woman.

• 39:45 - 40:04
It's so simple. Yes, put a trash can in there at least larger wheelchair trash can like yeah, I didn't think it because I was just like why would you put trash can in a men's stall? He's right. So I feel like they don't have a.

• 40:18 - 40:21
Yeah, I guess I never thought about that that was.

• 40:41 - 40:51
I mean that's kind of all the questions. I have kind of just like you have it. Do you have any final thoughts anything I miss a thing I should well I am.

• 40:52 - 41:02
I think you did an amazing job on the map. I mean, it's incredible. It's helped so many people already.

Dawn (Self Advocate) Interview 2/14/2020

0:01 - 0:09
Okay, so that's recording. Let me pull up the question. So and they're the same ones that I can mailed you.

• 0:19 - 0:24
Okay for the maps.

• 0:29 - 0:53
Okay, that's why I mean it was just more for informational. So just to see if there's anything on there that you saw me like, oh, yeah, I know exactly where that spot is or something. So but I'll one of the links it's just a it's just a map with point on it and you can click on a point and it brings up some information about it and there's also a picture associated with it about like.

• 0:54 - 1:12
Hey, there's a big crack in the sidewalk or there's a big gap here. So yeah, so that's just some of

the stuff that's on the map that same thing. I showed off with the commission. Yes. Okay. So first question what makes a place accessible to you?

• 1:24 - 1:25
Curb cuts

• 1:29 - 1:36
Also who owe curb Cuts? Yeah.

• 1:40 - 1:57
I was kind of surprised walking along Broadway how there's some of them that just completely jet up out of nowhere. Okay. Well, it's a ramp curb Cuts anything else to you.

• 2:10 - 2:27
Yeah, or yeah, there's not a ton of them here. So yeah. Yeah. Yeah, and I noticed that there's a lot of sidewalks that they just stopped like they don't connect anywhere.

• 2:31 - 2:34
Yeah, so yeah having him would be helpful.

• 2:36 - 2:37
I'm okay.

• 2:51 - 3:00
Yeah there I noticed one West and West Boulevard and throughout the town. They're focusing a lot on bike paths more than anything.

• 3:17 - 3:17
that’s fine by me

• 3:20 - 3:25
They don't have bumps. Oh, yeah.

• 3:30 - 3:55
Right. Yeah, they're a little bit more level since the they're also building along with the roads. Oh, yeah, I can definitely see that. Okay.

• 3:56 - 4:05
Yeah, I didn't think about the bike path eyes being a little bit kind of better to focus on since they're a little smoother. So yeah, okay.

• 4:29 - 4:30
What was the last part?

• 4:33 - 4:50
We have old sidewalks are crumbling. Okay? Yeah.

• 4:57 - 4:58
Yeah.

• 5:02 - 5:16
I was looking at some points along West Boulevard same area. And yeah, the sidewalk is either all mud or there's a telephone pole. There's a telephone post right in there.

• 5:23 - 5:27
So when you come across like.

• 5:29 - 5:32
Issues like that. Do you do have you ever reported them to the city?

• 5:35 - 5:41
Oh, okay. What kind of process is that like?

• 5:52 - 5:53
It's not hard, okay.

• 6:27 - 6:28
Oh, okay.

• 6:33 - 6:33
Yay.

• 6:55 - 6:56
Sorry, what was?

• 6:58 - 6:59
Yeah.

• 7:03 - 7:05
Oh, yeah, I heard about that. So, I'm sorry.

• 7:46 - 7:55
I can go okay.

• 8:02 - 8:10
I okay.

• 8:16 - 8:24
Dang, oh, wow, that's impressive.

• 8:56 - 9:04
Right. Okay, so they kind of just sort of like is it is it more of a.

• 9:07 - 9:13
You're on the street. So you definitely know what the issues are. Okay.

• 9:42 - 9:42
Yeah.

• 10:12 - 10:23
Okay, so the pipe was it a drainage Pipe, okay.

• 10:25 - 10:28
I like this.

• 11:00 - 11:27
The times that I've talked to him, he's yeah, he's great and he gets stuff done which is nice. So that's yeah, that's great. Okay. So the issue with the pipe they did they fix it up pretty quick too like the sidewalk. Oh, okay. Great. All right. Yeah. Well, I was pretty I remember during the summer there was a big heave on the side.

• 11:27 - 11:32
Walks kind of buckled up over by intersection was that.

• 11:33 - 11:35
Over by McDonald's.

• 11:38 - 11:41
I'll be your fine.

• 12:14 - 12:15
Close.

• 12:25 - 12:26
Yeah.

• 13:09 - 13:11
Oh, you're that's fine.

• 13:27 - 13:42
Okay, so what's next question? So what is your primary mode of transportation looking at that now like I know?

• 13:52 - 13:58
Okay. Oh and the bus do.

• 14:06 - 14:10
Okay, so your chair and Paratransit?

• 14:22 - 14:31
Okay, and with those what challenges do you have for transportation?

• 14:37 - 14:38
when they don’t run

• 14:43 - 14:43
Oh, they don't run.

• 14:53 - 14:55
They don't run after 7, or.

• 14:57 - 14:57
Oh, okay.

• 15:05 - 15:21
Kd cab. Oh, okay. Is that that taxi?

• 15:31 - 15:32
Right.

• 15:38 - 15:41
Yeah, because a lot of money to just fit those vans.

• 15:50 - 15:51
Oh, yeah.

• 15:53 - 15:54
Hi.

• 16:02 - 16:08
From oh good.

• 16:14 - 16:17
From here to knife on Park in a taxi.

• 16:22 - 16:24
Ten dollars.

• 16:27 - 16:33
I can tell by your face on way off. How much is it?

• 16:45 - 16:45
What?

• 16:48 - 16:51
In the taxi service, okay.

• 16:58 - 16:58
Okay.

• 17:15 - 17:21
To where go deep. Oh the Golden Corral.

• 17:22 - 17:25
I honestly don't know where going crowd is that but.

• 17:33 - 17:34
Where's that?

• 17:41 - 17:42
Oh, okay. Yeah.

• 17:44 - 17:46
If it's $25.

• 17:49 - 17:55
He's probably got to be like 50 60 dollars. Mmm.

• 18:03 - 18:04
Wow.

• 18:24 - 18:25
Fifteen.

• 18:29 - 18:39
$12. Wow, just from here to city is that to go to like like public hearings and and see Council meetings. Wow.

• 18:43 - 19:06
And is that just a one way trip or wow, so it's $12 both way from here to City Hall. Wow. Can you go like what's the range on?

• 19:13 - 19:15
The orange one, uh, huh?

• 19:39 - 19:43
Three round trips 2020, okay.

• 19:52 - 19:53
To you.

• 19:58 - 20:01
Okay, that's pretty far. That's not bad.

• 20:21 - 20:38
Okay. Oh, yeah, that's good that it's got that kind of range on it. So yeah, okay.

• 20:39 - 20:41
Well, I'm sure you'll find yeah.

• 20:43 - 20:55
Dude, just like the seller give you an a range on that or is it depending on like the weather and the road conditions and stuff?

• 21:13 - 21:30
50 miles or oh seven. Oh, okay.

• 21:39 - 21:40
Yeah.

• 21:51 - 21:52
He has.

• 21:57 - 21:57
Yeah.

• 22:10 - 22:16
Okay, really?

• 22:31 - 22:32
She has the.

• 22:47 - 22:54
Oh, she controls the chair by her mouth and she has to blow it into the pipe. Oh, okay.

• 23:00 - 23:02
Really? Oh, yeah.

• 23:15 - 23:15
Yeah.

• 23:20 - 23:20
Huh?

• 23:21 - 23:27
Yeah, I just never thought about that. Yeah.

• 23:30 - 23:36
So like it for that kind of chairs are much more limited range TR.

• 23:41 - 23:47
Okay. Yeah it like you said every chose different. So hmm.

• 23:49 - 24:00
I love to go downtown and back.

• 24:11 - 24:22
Okay. Well we downtown's place to go. So yeah, so when you're downtown do you?

• 24:23 - 24:27
Is it pretty easy to get down get around over there?

• 24:31 - 24:35
I go down, okay.

• 24:39 - 24:43
So just down a street. Okay. Try to see what's on Ash Street.

• 24:45 - 24:51
So we're no that's Walnut. I'm thinking of Walnut nevermind as that's a that's where like blue blue used to be and stuff.

• 24:55 - 24:55
Sure.

• 25:36 - 25:42
Okay, okay.

• 25:44 - 25:55
Yeah, and Ashes a lot more it's like not as much traffic and okay, they just feel safer on it on that street. Okay. Yeah, that makes yeah, that makes sense.

• 26:01 - 26:03
E there's a bike path.

• 26:08 - 26:09
Where am I?

• 26:22 - 26:22
It's true.

• 26:25 - 26:26

Yeah.

• 26:35 - 26:52
I wasn't catching that last word. It's too busy. Yeah. Yeah, there are yeah, that's one thing I noticed when I walk down Broadway is you have to be full attention when you're good.

• 27:04 - 27:12
Yeah, yeah. Yeah.

• 27:26 - 27:27
Yeah, and.

• 27:29 - 27:43
Yeah, it's very narrow and I noticed it's a some parts are not as cracked as others, but it's of each block is completely different. So you never know what you're going to get.

• 27:46 - 28:02
So do you would do you have like set routes planned out or is it pretty kind of you? Just go kind of wherever you feel like going or are there place to re like I don't like this sidewalk, so I have to move around it.

• 28:06 - 28:07
I have.

• 28:27 - 28:37
For best sidewalks. Okay it is that just trial and error how you figure that out?

• 28:39 - 28:40
Okay.

• 28:54 - 28:55
So.

• 28:58 - 28:59
So with.

• 29:01 - 29:03
With those areas like.

• 29:11 - 29:27
so like with some of the areas that you've noted with like sidewalks and bike paths and all that. Like what makes those areas accessible to you.

• 29:38 - 29:52
So like are there within those like the route that you take and when going and traveling around Colombia are there areas that you feel are more accessible than others to you.

• 29:53 - 29:57
Okay. So like what makes those areas more accessible just like the.

• 29:59 - 30:03
The structural like the curb Cuts in the ramps all that.

• 30:10 - 30:13
Oh, they they struggle or.

• 30:28 - 30:30
See they have to be used as to be what?

• 30:32 - 30:33
Oh smooth.

• 30:42 - 30:45
Okay, so smooth it so.

• 30:47 - 30:50
If you're traveling on the sidewalk, and there's a big gap there.

• 30:51 - 31:00
Either it's uncomfortable right order or you just can't get over it or okay.

• 31:01 - 31:02
All right.

• 31:03 - 31:05
Yeah, that makes sense. So.

• 31:23 - 31:25
I don't know how.

• 31:45 - 31:45
Oh.

• 31:47 - 31:48
Hm.

• 32:17 - 32:18
Yeah, that'd be interesting.

• 32:30 - 32:36
Oh, yeah.

• 32:39 - 32:41
Yeah, that'd be yeah, that'd be interesting.

• 32:53 - 33:04
Yeah, that would be a lifetime experience. Okay. Yeah, that'd be interesting. Yeah. Well, so yeah, we could plant some not like that.

• 33:10 - 33:17
Yeah, what's the what's the weather turns around a little bit so so.

• 33:20 - 33:34
I'm just thinking with that quick turnaround time of when the city addresses those issues that you bring up to him. Does that help with making things more accessible? Okay.

• 33:43 - 33:44
Yeah a lot. Okay.

• 33:57 - 34:01
Yeah, yeah. Yeah when you call this.

• 34:07 - 34:09
Oh, okay. Do you just email or.

• 34:17 - 34:18
Okay.

• 34:26 - 34:47
Okay, so you just email them and they file that can that okay. Oh, yeah, I'm sure because yeah, like you said your fear of reported. Well your reporting and you know the street so well, so yeah, they.

• 34:51 - 34:52
Okay.

• 36:12 - 36:24
Oh, wow. Okay. Do you mind if I look you're okay. So the each is each one of these just a complaint. Oh, no, these are cards. Oh, wow, okay.

• 36:36 - 36:37
Okay, yeah.

• 36:45 - 36:52
Oh, we're leaving UPS. Okay. Oh nice.

• 36:54 - 37:23
Okay. So each card just has a different issue that you've brought up to the city. Oh, we're leaving

Bernadette they seem to go down there a lot. Well, let me know that makes sense because that's where the yeah, that's where the church is at. Yeah. Okay. So one thing I've noticed with the seems like they need to put a.

• 37:23 - 37:25
Us walk right there.

• 37:26 - 37:41
Like we're on that I guess on that north side of Bernadette because I go across there and I feel like there's people darting across the street all the time to get. Oh, that's true.

• 37:43 - 38:08
Yeah, because on some days everybody's going across the street to that the to park and yeah, okay for us time is pretty quiet. Yeah. Okay. Yeah, so I mean that's a good point of like it just being like a tight like yeah certain parts of the day or much more.

• 38:09 - 38:12
Easy go through than others. Okay.

• 38:19 - 38:43
Yeah. Wow. Okay. So these numbers are those like the case. Are those the complaint number? Okay. Wow, that's great and do they contact you after they take care of an issue and say hey we we fixed it or oh sometimes okay.

• 38:45 - 39:08
Hm. Yeah, I mean if if it's a if it's an issue that you encounter all the time and all the sudden you're like, oh this was a lot easier. Okay. All right. Well, wow, that's amazing. Yeah.

• 39:11 - 39:13
So with okay so next week.

• 39:16 - 39:32
So with the like this is the most common with out of these reports the most common ones for that you report is that like cracks is cracks in the sidewalk or what would you say is the most common complaint that you issue but.

• 39:38 - 39:46
Number one complaint and I - okay.

• 39:51 - 39:53
Does Ash have a sidewalk?

• 39:55 - 39:56
Yeah.

• 40:21 - 40:21

Okay.

• 40:25 - 40:36
For areas like that where there are no sidewalks or like just really old ones. Do you feel like there's a reason they don't update those.

• 40:46 - 40:54
Yeah, cuz yeah.

• 40:58 - 41:11
Gabriel a good budget or.

• 41:31 - 41:32
The Met something sidewalks.

• 41:34 - 41:35
Or bus system.

• 41:41 - 41:48
Yeah, and did you feel like they want to update those if they did have the money?

• 42:05 - 42:06
Yeah, that's a tricky question. I know it's a trip.

• 42:31 - 42:31
Oh, yeah.

• 42:36 - 42:36
A car.

• 43:07 - 43:08
Right.

• 43:20 - 43:21
Oh, yeah.

• 43:41 - 43:42
To give.

• 43:48 - 44:00
Yeah, and even just looking around town about that. I mean most most lands for parking lots and and for getting cars around.

• 44:04 - 44:05
Yeah.

• 44:12 - 44:29
Yeah, yeah. Oh, yeah.

• 44:44 - 44:44
Yeah.

• 44:47 - 44:50
Yeah, if Trucking that money to help sorry.

• 45:15 - 45:33
No, Opie tack. Oh set to public transit and I can't remember what they stand for. Okay. All right.

• 45:37 - 45:41
Public transit advisory Council, okay.

• 1:02:23 - 1:02:33
I'm looking at my project. I'm like if it's not accessible then it's not accessible. So and that's really what I'm more concerned about. So.

• 1:02:41 - 1:02:42
Okay.

• 1:02:57 - 1:03:06
Yeah, that's true. I mean that lie live just right across the street from curves and it's great because five minutes and I'm anywhere.

• 1:03:27 - 1:03:38
She'll okay.

• 1:03:43 - 1:03:44
Wait.

• 1:03:45 - 1:03:47
Close.

• 1:03:48 - 1:04:17
Yeah, that's I mean, it's the perfect location especially little because what Business Loop is right there and there's restaurants and all that and and I notice that they're building a bunch of new houses here.

• 1:21:22 - 1:21:34
Yeah, that's why projects change. I don't really need any of that. So I mean, do you have like any other comments or anything just to bring up about like accessibility in Colombia or.

• 1:22:03 - 1:22:14
Yeah, now when you say a lot more that needs to be done, is that like with improving sidewalks

and bike routes or is there something else in particular?

• 1:22:28 - 1:22:36
Yeah, cuz if you're dealing with potholes and if it's what you can do around the community.

• 1:22:38 - 1:22:39
Okay.

• 1:22:40 - 1:22:41
Yeah, that makes sense.

• 1:22:44 - 1:22:52
Great. No, that's that's good. We yeah, well she got something else or.

• 1:22:54 - 1:22:55
Okay.

• 1:22:58 - 1:22:59
He.

• 1:23:03 - 1:23:04
Yeah.

• 1:23:18 - 1:23:19
What was that?

• 1:23:32 - 1:23:51
Yeah, you can always email me extra thoughts or actually, I have my card you can add to you all your other cards and by numbers on there as well, too. So, yeah, so if you got something else, yeah, don't be shy. Yeah.

• 1:23:52 - 1:23:54
Obviously we have the proof.

• 1:23:58 - 1:24:12
Okay. Well, yeah, I don't want to take up too much more of your time. But thank you so much for sitting down and talking with me. Oh great. Okay. Well, go ahead and stop that.