REIMAGINING THE URBAN FORM

AUSTIN'S COMMUNITY MOBILITY HUB

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ABOUT ROCKY MOUNTAIN INSTITUTE
Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; Washington, D.C.; and Beijing.

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EXECUTIVE SUMMARY

With the arrival of the automobile, our cities began a century-long process of transformation through design practices that prioritize the use of personal vehicles. Cities widened once-walkable and vibrant streets into traffic arterials; they displaced entire neighborhoods to make way for highways; and they replaced countless acres of natural ecologies with parking lots. Although these methods were originally justified as a tool for reducing congestion, they most often worsened traffic, made public transit less viable and more difficult to use, and required the use of an automobile. Our dependence on automobiles has worsened public health, saddled cities with debt from massive infrastructure expenditures, disproportionately burdened low-income households with transportation costs that often account for the majority of household expenses, and contributed significantly to greenhouse gas emissions. The transportation sector is responsible for 28% of greenhouse gas emissions, the bulk of which (60%) are produced by personal mobility.

Rocky Mountain Institute's (RMI's) Mobility Transformation team committed itself to advancing a paradigm of "new mobility"—mobility as a service that is electric and ultimately autonomous. RMI recognizes that shifting the mobility paradigm requires a different approach to the way we design cities—to reverse the current trend of auto-centric design and reimagine our cities as places for people. In addition to the environmental impact associated with our transportation system, RMI is addressing other pressing challenges, including public health and equity, both of which are strongly tied to personal mobility.

This past summer, RMI launched a Community Mobility Hub in Austin, Texas, to demonstrate a scalable approach for tackling the environmental, health, and equity impacts of our mobility system, including the urban design patterns that are so interconnected with it. This effort has been influenced, in part, by the concept of mobility hubs in other cities, including Toronto, San Diego, and Austin (led by Capital Metro).[1] These efforts tend to feature significant long-term infrastructure investments and high-capacity transit stations, along with traditional carshare and bikeshare.

RMI saw an opportunity to complement these efforts by developing a low-cost and experimental approach to quickly introducing an array of mobility services and urban space improvements in neighborhoods with little or no access to mobility services, high-frequency transit, or public gathering space.

Goals and Desired Outcomes

RMI established two goals for the Community Mobility Hub:

- Provide or enhance walkable access to existing amenities that would otherwise not be available or would only be available via personal car (e.g., healthful food and social gathering space)
- Enhance access to—and user experience associated with—a variety of personal-car-alternative mobility services

In creating these goals, RMI saw an opportunity to test the relationship between the urban form and personal mobility. We hypothesized that making changes to one could impact the other in positive ways. And through doing so, we hoped to accomplish the following outcomes:

- Reduce emissions
- Improve physical health
- Improve mental health and well-being
- Enhance equity and access

In collaboration with five mobility service companies, a public engagement firm, and a number of community organizations, RMI designed and implemented a neighborhood-based access point for mobility, where public transit and new mobility services are readily available for use. Our team also introduced a number of "placemaking" and urban space improvements intended to enhance the experience of accessing services and

using the space around them. RMI and its partners added shading, trees, a variety of plants, and food trucks to transform a space that was largely dedicated to personal vehicles.

To measure success and put other cities and communities in a position to replicate, learn from, and understand the potential impact of Community Mobility Hubs, RMI established a data collection and assessment methodology. Our team employed the use of on-the-ground surveys, camera footage, and data provided by the mobility service companies to track progress toward our goals and intended outcomes.

The Community Mobility Hub came together in three phases:

1. Baseline insights
    - RMI conducted interviews and surveys to capture community insights
2. Post-mobility
    - RMI worked with mobility service providers to ensure availability of services
    - RMI conducted a second survey to measure changes in perceptions; the team also used camera footage to observe user behaviors and mobility patterns
3. Post-placemaking
    - After implementing placemaking improvements, RMI conducted a third and final survey; the team also monitored behaviors and mobility patterns using a remote camera

Key Findings

- Phase 2: Following enhanced availability of mobility services in the area:
    - Survey respondents highlighted positive experiences using the newly available services
    - Survey respondents highlighted fewer challenges associated with transportation than they did in Phase 1
- Phase 3: Following placemaking improvements:
    - Observed walk trips increased by 25%
    - Observed dwell times increased by 144%
    - Self-reported automobile mode-share decreased by 39%
- Since the launch of Phase 2:
    - Data from one of our mobility service provider partners, corroborated by data collected by the City of Austin, indicates that the launch of the Community Mobility Hub coincided with a broader, rapid increase in dockless mobility service use citywide, such as e-scooters and bikes
    - The same data suggests that trips using dockless services are likely replacing car trips more than they are replacing transit or walk trips
- Community Mobility Hubs contribute to:
    - Reduced greenhouse gas emissions
    - Reduced CO, particulate matter (PM2.5), and NOx
    - Reduced obesity (through increased physical activity), improved respiratory health, and healthy birth weight
    - Enhanced mental health and wellbeing

REIMAGINING THE URBAN FORM

Progressive planners, architects, and urban economists have questioned auto-centric development for years, in some cases successfully bringing back an emphasis on walkable urban design. Additionally, the rise of on-demand mobility services has significantly increased concerns about auto-centric design because of the many potential impacts it has on the urban form, Most notably, ride-hailing companies like Lyft and Uber have had considerable impacts on cities. The parking industry is witnessing significant revenue losses on weekend nights due to use of ride-hail services,[2] and cities are wrestling with new challenges associated with congestion,[3] including a need to rethink allocation of curb space and other urban transportation infrastructure. These developments—along with a renewed interest in transit in many cities—raise new questions about the future of city design.

In July of 2017, Rocky Mountain Institute received a grant from the Robert Wood Johnson Foundation (RWJF) to explore and enhance the relationships among health, urban design, and personal mobility. This grant helped advance our Mobility Transformation Program in Austin, Texas, and opened up an opportunity for RMI to work on an entirely new challenge at the important intersection between health and the environment.

The fields of urban design, mobility, and health are vast; the relationships among them provide ample research and demonstration opportunities. For instance, street design, road networks, architecture, and zoning—as well as their health and equity impacts—should all be revisited in light of current changes in mobility. For the purposes of the Robert Wood Johnson Foundation grant, RMI focused its urban form work on placemaking,

which, along with the inclusion of additional mobility services, has enabled us to establish a Community Mobility Hub.

COMMUNITY MOBILITY HUB GOALS AND OUTCOMES

In developing the Community Mobility Hub, RMI set out to explore and better understand relationships among the built environment, mobility, health, and equity. The team established project goals geared toward (1) improving built environment amenities and (2) enhancing access to new mobility services. RMI's hypothesis was that each of these goals would contribute to reduced emissions, enhanced physical and mental health, and improved equity.

Goals

Goal 1

- Provide or enhance walkable access to existing **amenities** that would otherwise not be available or would only be available via personal car (food, social gathering space).

Goal 2

- Enhance access to—and user experience associated with—a variety of personal-car-alternative **mobility services.**

The table below illustrates how each goal was expected to drive outcomes related to emissions, health, and equity.

EXHIBIT 1: HOW PROJECT GOALS DRIVE OUTCOMES

	Outcomes			
Goals	**Reduced Emissions**	**Enhanced Physical Health**	**Enhanced Mental Health**	**Improved Equity**
Enhance walkable access to **amenities** that would otherwise not be available or would only be available via personal car (food, social gathering space)	Replaced car trips with walk trips	Increased the number of people walking to and around the space	Increased social interaction	Improved community amenities in an area typically underserved by such amenities
Enhance access to—and user experience associated with—a variety of personal-car-alternative **mobility services**	Reduced transportation emissions by replacing car trips with low-carbon modes: walking, biking, transit, and scooters	Further increased the likelihood that people will walk to the hub and use an active mode for their trip	Enhanced user experience, including enhanced perception of safety and ease of accessing mobility services relative to doing so without a hub	Improved access to affordable mobility options for accessing nearby services, schools, healthy food, and jobs

Outcomes

Reduced Carbon Emissions

It is widely agreed that, by creating sprawl, increasing trip lengths, and decreasing walkability, auto-centric design greatly increases transportation-related carbon emissions. Walkability is a foundational attribute of a people-centric community; it unlocks the possibility of forgoing vehicle ownership and increases the viability of transit. Reduced transit ridership is often blamed on consumer preferences for automobiles, but this argument overlooks the role that urban design plays in the viability and use of alternatives to driving. In areas without proximity of housing, employment opportunities, and social gathering places, public transit and on-demand mobility services struggle to provide the coverage and ride frequency they could within a denser urban form and thus suffer from a lack of users. Other urban design characteristics, such as the width of sidewalks (or even the mere presence of a sidewalk), have a tremendous impact on the viability of these services. Furthermore, public transit and on-demand mobility services alike contend with personal vehicles for space to load passengers. Modifying and improving the design of our urban form, including streets, parking lots, pedestrian space, and loading areas, can increase the use of these services and by extension reduce mobility-related emissions.

Health

The popularity of emerging mobility services and their influence on the built environment is raising interesting research questions about physical and mental health. There are many conceivable (but often barely understood) health impacts associated with this transition, including those associated with physical activity, pollution, traveler satisfaction, and social interaction. In the future, will these mobility services and technologies negatively impact health by encouraging fewer people to walk and more to rely on personal vehicles, or will they help create environments that prioritize people over cars? Will the traveler experience improve with the introduction of more services, thus enhancing mental wellbeing? Will safety improve? Ride-hailing and other mobility services are already having dramatic effects on the way people access mobility and reach destinations. These questions could take years to fully understand. At this nascent stage of upheaval in personal mobility, it's critical to start now.

Enhanced Physical Health

Many are beginning to theorize about the impacts that new mobility services and ultimately autonomous vehicles will have on the physical health of our communities and the people that live in them.

Enhancements in urban design, combined with the availability of mobility alternatives, may dramatically improve physical health. Research has already shown that transit users tend to walk more than drivers, often meeting the minimum requirements of healthy physical activity simply by walking to and from the bus or train every day.[4] The inclusion of new mobility services may have a similar impact on physical health, as they provide even more alternatives to owning or using an automobile.

Improvements in physical health can also be achieved absent of any increase in the availability of mobility services. Simply by improving the quality of a space, we can attract more people to walk or bike. Organizations like Better Block have done great work in improving underused, often auto-dominated areas and transforming them with natural features, bike-paths, and food options, as well as spaces to gather or simply relax. These "placemaking efforts" revitalize underused and underappreciated environments to foster greater community health. As discussed in greater detail below, RMI has pursued similar practices to improve physical health in Austin, Texas.

Enhanced Mental Health

Leon James, PhD, professor of psychology at the University of Hawaii, and his team have studied impacts of driving on mental and psychological health.[5] Participants of the study carried recorders in their cars to capture what they said. It was found that negative emotions surge through people while driving. According to James, "driving is an activity in which you are surrounded by hundreds of people having negative emotions." Also, Andrew Baum, PhD, professor of psychology and psychiatry at the University of Pittsburgh, has also shown that commuting and sitting in traffic can raise irritability and blood pressure. These negative health effects may be

reduced by getting people out of cars and enjoying their environment and community on a more personal level via bike, scooter, or foot.

Founded in 2015, the Center for Urban Design and Mental Health is conducting extensive research on the relationship between urban design and mental health. The organization has found a strong correlation between better urban design (e.g., exposure to nature, as well as active, social, and safe spaces) and reductions in anxiety, ADHD, and dementia. Transportation plays a major role in improving upon or exacerbating health, as well. Nearly everyone can relate to the stressful experience of traffic and congested commutes.

The way a city is designed (e.g., how safe people feel walking, the availability of public and natural space) can positively or adversely affect mental health.[6] By enhancing the user experience of new mobility services and the environment in which people access those services, we may be able to improve mental health while driving significant behavior change in commuting patterns.

Improved Equity

The average American household spends over $9,000 on transportation every year. However, this figure does not sufficiently paint the picture of how these costs burden households of different income brackets. Likewise, it doesn't reflect the complicated relationship between transportation and housing. Referencing an analysis by the Center for Neighborhood Technologies illustrating the combined cost of housing and transportation, Robert Steuteville states that in cities with sprawling, auto-dominated environments (a Walk Score less than 40[i]) housing and transportation costs combined account for 50% of an average household's income—compared to 40% in more urban and walkable areas.[7] The burden on low- and moderate-income families is disproportionately higher. In fact, housing and transportation costs have been outpacing income increases. Strong Towns has done extensive work to highlight that lower-income neighborhoods are disproportionately affected by the cost and safety implications of auto-centric design.[8] *Governing Magazine* conducted a study in 2014 that found that the "bottom third of Census tracts, in terms of per capita income, recorded pedestrian fatality rates twice that of higher-income tracts."[9] A similar study funded by the Robert Wood Johnson Foundation found that in high-income areas, 89% of streets had sidewalks, while only 49% of low-income areas had sidewalks.[10] Crosswalks are also more prevalent in high-income areas.

The jury is still out as to whether new mobility will provide an affordable alternative for lower-income people. However, recent studies suggest that the dockless bikes and scooters that have started to flood cities across the globe are used by a more diverse set of users than traditional, station-based bikeshare. Washington, D.C., for instance, has been reporting greater user diversity among the dockless providers than the existing Capital Bikeshare program.[11] Although the companies don't collect or report racial demographic data, they are reporting a significant number of trips originating and ending in predominantly African-American neighborhoods. This is likely because no docking stations are needed, which CityLab notes are typically stationed in predominantly white neighborhoods.

RMI conducted its own analysis of the cost-saving opportunities afforded by the transition from personally owned vehicles to new mobility. Our *Peak Car Ownership* report found that by 2030, electric, autonomous mobility services have the potential to be less expensive than the marginal operating cost of driving a personal car.[12]

The sum of these several factors—climate, health, and equity—define value that could be unlocked by new mobility operating in a city designed for it. As a result, mobility-centric rather than auto-centric urban design is a key enabler of this future.

[i] Walk Score is an organization that promotes walkable neighborhoods and assigns a numerical walkability score (0 to 100) to any address in the United States, Canada, and Australia. It also provides a Transit Score and Bike Score.

DESIGNING THE COMMUNITY MOBILITY HUB

Site Selection Criteria

Prior to selecting a site for the Community Mobility Hub, RMI developed the following criteria:

Walkable and Bike-friendly Environment Outside of the Downtown Core

RMI prioritized an area outside the downtown core, where alternative mobility services are in shorter supply. We hoped this would provide an opportunity to showcase the viability of these services for a larger and more diverse population of people than those working in or visiting downtown. However, rather than working in a purely suburban neighborhood, we prioritized areas that had strong potential for walking, biking, transit, and alternative mobility services.

Low(er) Transit Frequency

Like many cities, Austin has a number of neighborhoods that are highly walkable and fairly compact, yet they do not have access to high frequency transit (i.e., 10–15-minute intervals). Our team explored locations on lower frequency routes (i.e., 30–45-minute intervals) where additional mobility services could provide the most value.

We also recognized the value of placemaking in areas with low transit frequency. In Austin, heat and torrential rains can create very difficult conditions for those who use transit. Although bus shelters are helpful, they are most commonly funded for routes with high ridership, which typically correlates with frequency. Improving spaces adjacent to low-frequency transit routes through shading, shelter, and greenery directly benefits users of transit.

Demographic Diversity

Many assumptions have been made about the popularity (or lack thereof) of new mobility among various demographics, particularly with regard to the recent explosion of dockless bikes and scooters. To test these assumptions, our team prioritized an area with diverse household income, race, and age.

Poor Health Metrics

In line with the health outcomes discussed above, RMI sought a location where our work could have a positive impact on health. Therefore, we prioritized a location with comparatively high rates of physical and mental health problems.

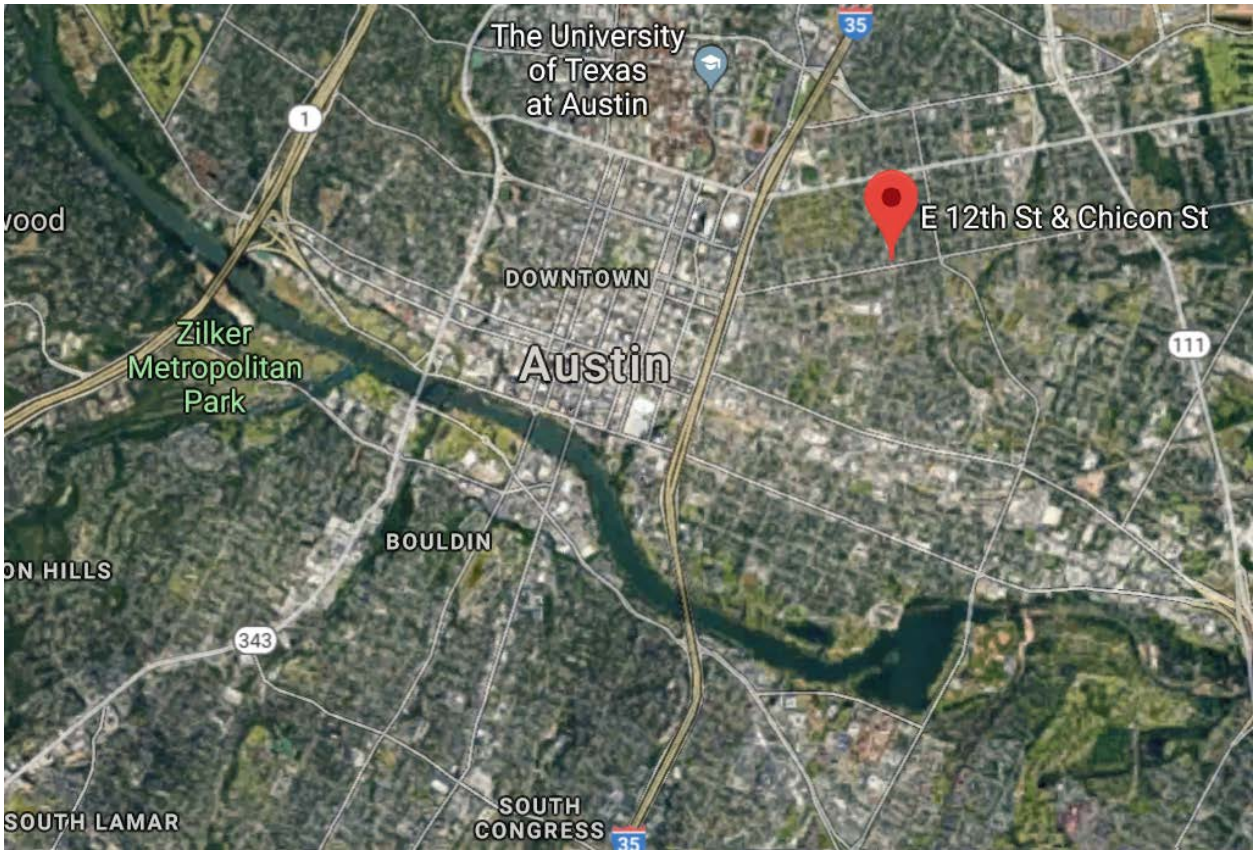
Proximity to Housing and Businesses

RMI sought locations in close proximity to housing and businesses. This criterion ensured that a cluster of both origins (i.e., households) and destinations (i.e., businesses and other places of interest) are within walking distance of the Community Mobility Hub.

Site Selection: 12th and Chicon

Ultimately, RMI selected the intersection of East 12th Street and Chicon Street as the location for the Community Mobility Hub, because it satisfied our criteria in the following ways.

EXHIBIT 2: SATELLITE IMAGE OF THE CITY OF AUSTIN. RMI'S COMMUNITY MOBILITY HUB CAN BE FOUND IN THE NORTHEAST SIDE OF THE CITY.
Source: Google Maps, 2018



Walkable and Bike-friendly Environment Outside of the Downtown Core

Located about one and a half miles east of the center of downtown Austin, the site is surrounded by well-gridded blocks, high intersection density, and small residential lots, making for a highly walkable environment (Walk Score: 76). Moreover, the community is nearly devoid of hills and contains bike lanes on many streets—earning it a Bike Score of 99. Exhibit 3 below shows a close-up of the intersection.

EXHIBIT 3: SATELLITE IMAGE, SHOWING 12TH AND CHICON, AS WELL AS THE SURROUNDING NEIGHBORHOOD.
Source: Google Maps, 2018

Low(er) Transit Frequency

There are four bus stops at the intersection servicing the north-south route along Chicon and the east-west route along East 12th. Buses on both routes stop every 30–45 minutes. Only one of the bus stops has a shelter, therefore passengers on other routes must contend with Austin's often oppressive summer heat and frequent heavy rains. Our staff has observed many people walking from long distances to catch their bus, only to wait long periods of time in the sun. The bus stop connected to our Community Mobility Hub was open to the elements prior to the launch of our project.

Demographic Diversity

Described in greater detail below, the 12th and Chicon intersection is surrounded by a number of old Austin neighborhoods. The area has long been a central, cultural hub for Austin's African American and Hispanic communities. Many of the homes are occupied by families that have lived in the neighborhood for decades. However, Austin's growth, for better and worse, has led to an influx of younger and predominantly white residents.

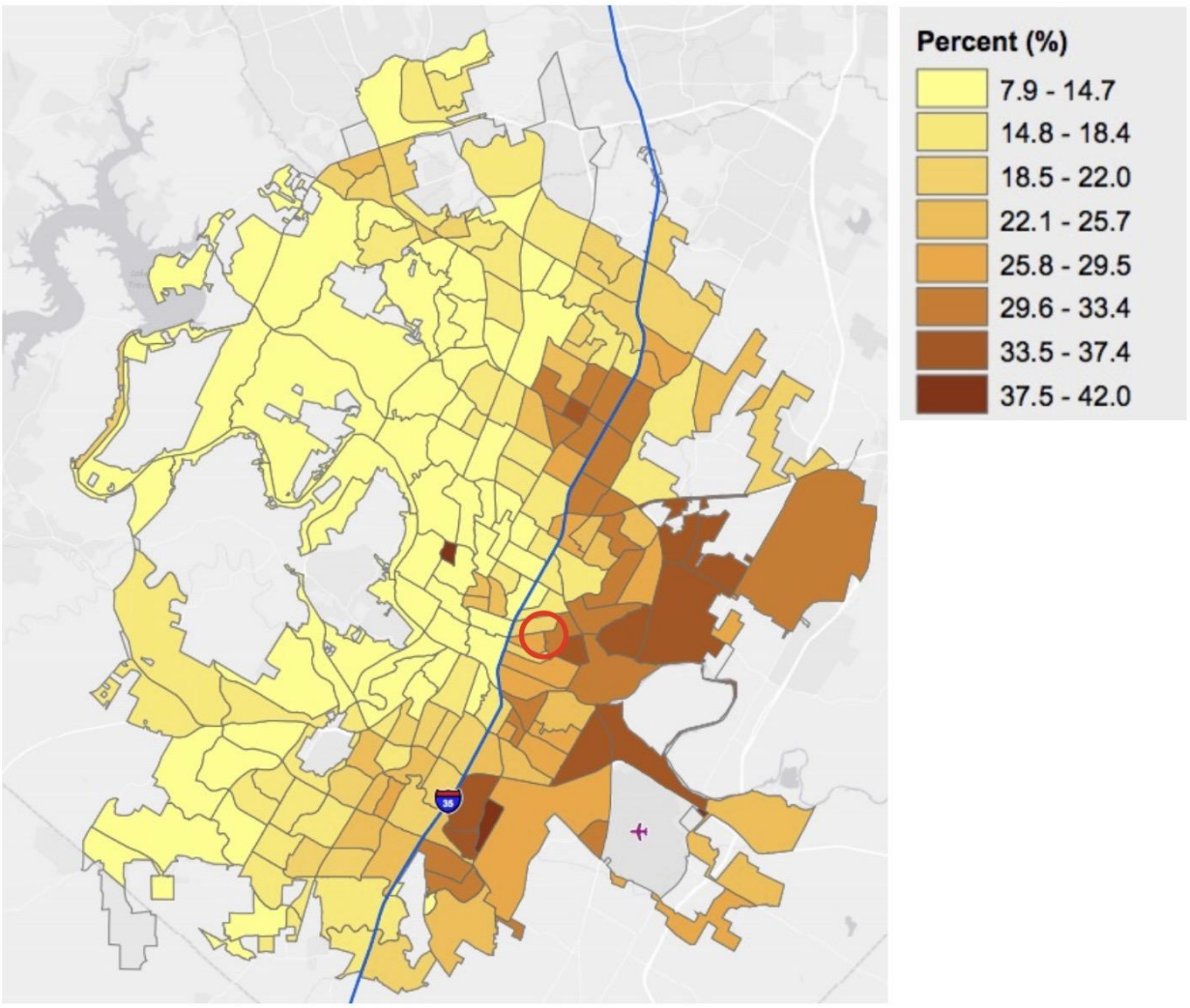
Health Risks

Using the Center for Disease Control's 500 Cities Database,[13] we examined census-tract level health data and determined locations with the highest need for improved health outcomes. Lack of physical activity and obesity are prevalent in the area surrounding 12th and Chicon, as they are in much of East Austin. The area exhibits worse mental health metrics as well.

Exhibits 4 and 5 below show a clear contrast in physical health between the east and west sides of I-35, while Exhibit 6 illustrates the mental health discrepancy.

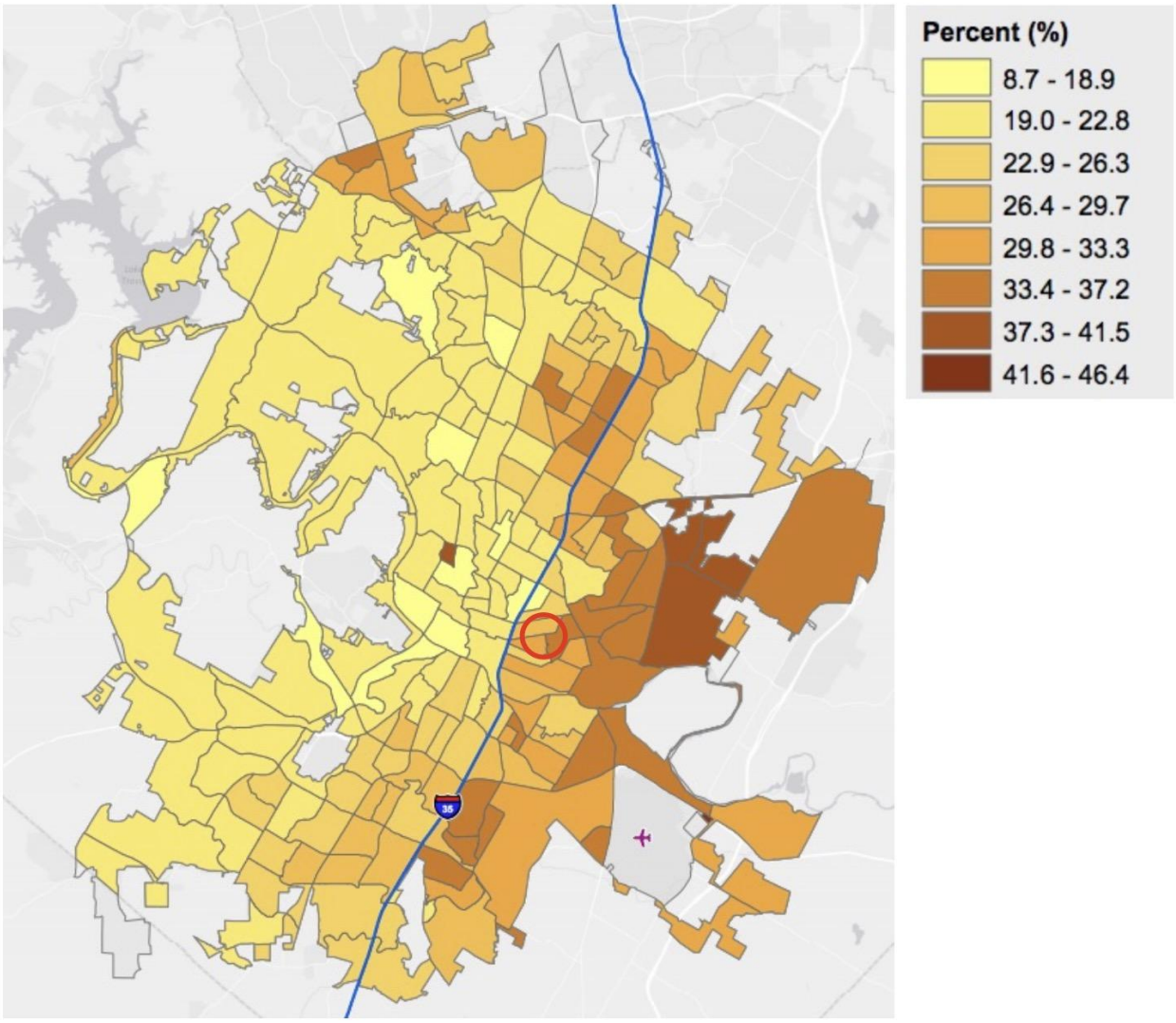
Lack of Physical Activity

EXHIBIT 4: PREVALENCE OF LACK OF PHYSICAL ACTIVITY AMONG ADULTS AGE 18 OR OLDER BY CENSUS TRACT, 2014. THE RED CIRCLE INDICATES THE 12TH AND CHICON AREA.
Source: CDC / 500 Cities; Image adapted from ESRI <ftp://ftp.cdc.gov/pub/MAPBOOKS/TX_Austin_MB_508tagged.pdf>



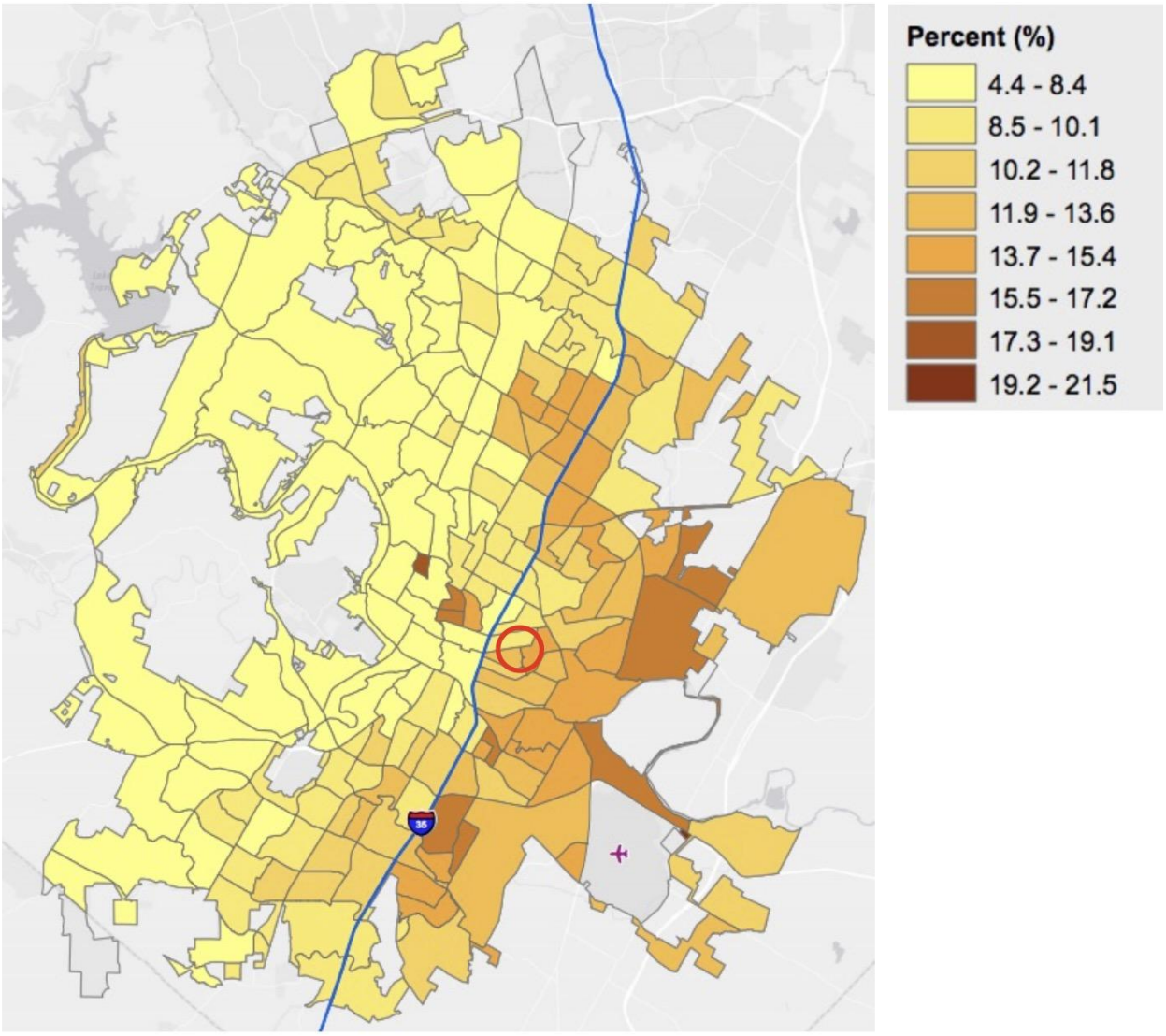
Obesity

EXHIBIT 5: PREVALENCE OF OBESITY AMONG ADULTS AGE 18 OR OLDER BY CENSUS TRACT, 2014. THE RED CIRCLE INDICATES THE 12TH AND CHICON AREA.
Source: CDC / 500 Cities; Image adapted from ESRI <ftp://ftp.cdc.gov/pub/MAPBOOKS/TX_Austin_MB_508tagged.pdf>



Mental Health

EXHIBIT 6: PREVALENCE OF MENTAL HEALTH NOT BEING GOOD FOR 14 DAYS OR MORE AMONG ADULTS AGE 18 OR OLDER, 2014. THE RED CIRCLE INDICATES THE 12TH AND CHICON AREA.
Source: CDC / 500 Cities; Image adapted from ESRI <ftp://ftp.cdc.gov/pub/MAPBOOKS/TX_Austin_MB_508tagged.pdf>



Proximity to Housing and Businesses

The north side of East 12th features a Cajun-style restaurant, several popular bars, a hair salon, and two clothing stores. Just north of East 12th, two new affordable housing developments were recently completed, adding over 40 new households. Another affordable housing development three blocks to the east of the Hub includes over 100 units. The southwest corner previously contained only parking and a barbeque food truck (Archie's BBQ). Today, due in part to the Community Mobility Hub project, it hosts two additional food trucks that will attract more usage of the space.

Other Neighborhood Metrics: Results from Desktop Research

The following metrics were used to develop a baseline understanding of the area in and around 12th and Chicon. While all are relevant to our goals and intended outcomes, RMI did not set out to improve each and every one of the following.

Air Pollution

Historically, Austin's air quality has remained within attainment status, meaning that its air pollution has not reached 76 parts per million, the National Ambient Air Quality standard. Austin's air quality ranges between 63 and 65 parts per million. However, there is concern that, with the continued growth of the city, Austin's air quality will worsen.

Population by race and ethnicity[14]

- Hispanic: 37.4%
- Caucasian: 31.9%
- Black: 26.2%
- Mixed: 3.3%
- Asian: 1.1%

Percentage of population living below the federal poverty line[15]

- The median income for the Chestnut neighborhood (the largest neighborhood in the 12th and Chicon area) was $38,435 in 2013, compared to $53,946 citywide.
- Over 16% of households live below the federal poverty level.

Housing Costs in Relation to City/County Median (source: Zillow)

- Since 2010, the median home value in Central East Austin has increased 90%, from $240,000 to $457,000. The median home price listed in Central East Austin is $514,500.
- At the same time the City of Austin saw a lower growth rate of 70%.

Food Access and presence of grocery stores[16]

- There are no grocery stores within a mile of the Community Mobility Hub. The closest grocery stores, HEB and the Fiesta Mart, are 1.5 and 1.7 miles away, respectively.
- A report, *Feeding Chestnut: Improving Food Accessibility in East Austin,* found transit-dependent people spend an average of $2.50 on trips to and from the grocery store and average one hour and fifteen minutes commuting back and forth.
- Even though it may not be obvious from desktop research or an outside perspective that food access is a challenge in the area, it became clear through on-the-ground surveys that food access was a major theme and concern among local residents.

HISTORICAL BACKGROUND

Today, East Austin is marked by popular restaurants, concert venues, and bars—and of course, significant real estate development. Like many neighborhoods in popular, growing cities across the country, the changes have been both a boon and a source of conflict.

Like other US cities, Austin has an unfortunate history of redlining. In 1928, the City of Austin cut off electricity and water to black families in the West Austin neighborhood of Clarksville—one of America's first post-Civil War freedman towns—coercing all but a small handful of families to move east. The de facto boundary for segregation, East Avenue, eventually became I-35, an elevated highway that today separates East Austin from the downtown.

EXHIBIT 7. EAST AVENUE IN THE 1960S. FOR DECADES, THE ROAD WAS THE SEGREGATING LINE THAT BOUND AFRICAN AMERICANS TO THE EAST SIDE OF AUSTIN. EAST AVENUE BECAME INTERSTATE 35 IN 1962.
Source: Texas Dept. of Transportation

In recent years, Austin has grown considerably. Much of that growth has taken place on the east side, leading to increased property values and rising rents, displacing lower-income families along the way. These issues have been further exacerbated by an auto-centric land development code that hasn't been updated since 1984, restricting density in many central neighborhoods, and making mixed-use, walkable development hard to build. Since 1984, the city population has more than doubled, growing 136%. Much of that growth has taken place on the fringes, in sprawling communities. Although some growth has occurred along key central corridors feeding the downtown, it has not produced nearly the density and connectivity that would be possible with a more walkable and housing-focused code. Then there is East Austin, which is changing dramatically, largely due to a history of relaxed land-use regulations. Meanwhile, development in many more affluent, central neighborhoods that hug the downtown area has remained virtually frozen for decades, failing to grow or adapt over time, and, in turn, adding little to no housing supply. Herein lies one the major challenges that East Austin (and many neighborhoods like it) face—gentrification in one neighborhood is often the result of restricted development elsewhere.

With regard to mobility, the community has historically been underserved. Residents east of I-35 have historically been last to receive new services. If a resident did not have the means to own a vehicle, the only option was the bus. While there has been some recent transit service enhancement on the east side, the area has historically suffered from lower frequency, numerous transfers, and inadequate bus shelters. By increasing mobility options, people can potentially feel empowered to use multiple modes of transportation that can improve access to work, services, and entertainment.

Community Engagement

Considering the complex landscape in which we wanted to work, RMI conducted an extensive community engagement process from the beginning. This is a critical component of initial framing and design if the goal is for significant numbers of everyday people to use and interact with the features or services associated with a project of this kind. It is critical to (1) understand a community's challenges and needs; (2) understand its inevitably diverse views; and in this case, (3) generate support from merchants and nearby residential developments. All of this builds an inclusive process which is more likely to be a success in the community.

RMI was supported in community engagement by Public City, a public engagement firm based in Austin. Together, we identified key stakeholders and organizations likely to be affected by the Community Mobility Hub. These included the East 12th Street Merchants Association, which represents a number of small, independent businesses on and around the corridor; Six Square, an arts and culture nonprofit that seeks to retain the culture and history of the six square miles that encompass the original African-American district east of Interstate 35; neighborhood associations to help communicate the goals of the Community Mobility Hub to local residents; city staff; a nearby residential development; and Capital Metro.

With Public City, we held meetings to establish the needs of the neighborhood and sought local champions to help inform the community and gather additional feedback. During the process, we sought input on the potential design of the Community Mobility Hub. This collaborative engagement process was supplemented with RMI's preliminary research on the ground.

Implementation Partners: Mission Possible and Eureka Holdings

Executing the Community Mobility Hub required a number of key partners, most importantly the owners of the land. To secure the use of the southwest corner of the intersection of 12th and Chicon, RMI partnered with Mission Possible, a local church and nonprofit with a range of programs aimed at fighting substance abuse and supporting victims of domestic abuse. Mission Possible has a strong presence in East Austin and has been a positive force in engaging the local community. As a landowner and critical community stakeholder, the organization made for an obvious choice in partnering.

We also worked with another partner, Eureka Holdings, a real estate development company that owns the parking lot on the southeast corner. From the outset of this project, Eureka played a valuable role in co-developing the Community Mobility Hub at 12th and Chicon.

Mobility Services

On Eureka's lot, our team partnered with Car2Go to add two carsharing parking spots. In addition, we partnered with JUMP Bikes, Uber's new dockless electric bicycle acquisition, to establish a charging hub that can accommodate ten bikes. JUMP often charges its bikes at a location outside of the city. By providing a central charging location, the partnership can reduce the vehicle-miles-traveled associated with charging and re-balancing bikes. The Community Mobility Hub is slated to be the first charging station for dockless e-bikes in the city. In addition, JUMP began to rebalance its bikes to the 12th and Chicon intersection on August 1.

RMI also partnered with scooter providers, Lime and Bird, whose operations had largely been concentrated in the downtown, the area in and around the University of Texas, and other popular tourist destinations. Through the partnership, Lime and Bird began rebalancing their electric scooters to the 12th and Chicon intersection on

August 1st. The partnership also resulted in data-sharing agreements with both companies designed to enable RMI to observe usage in the area.

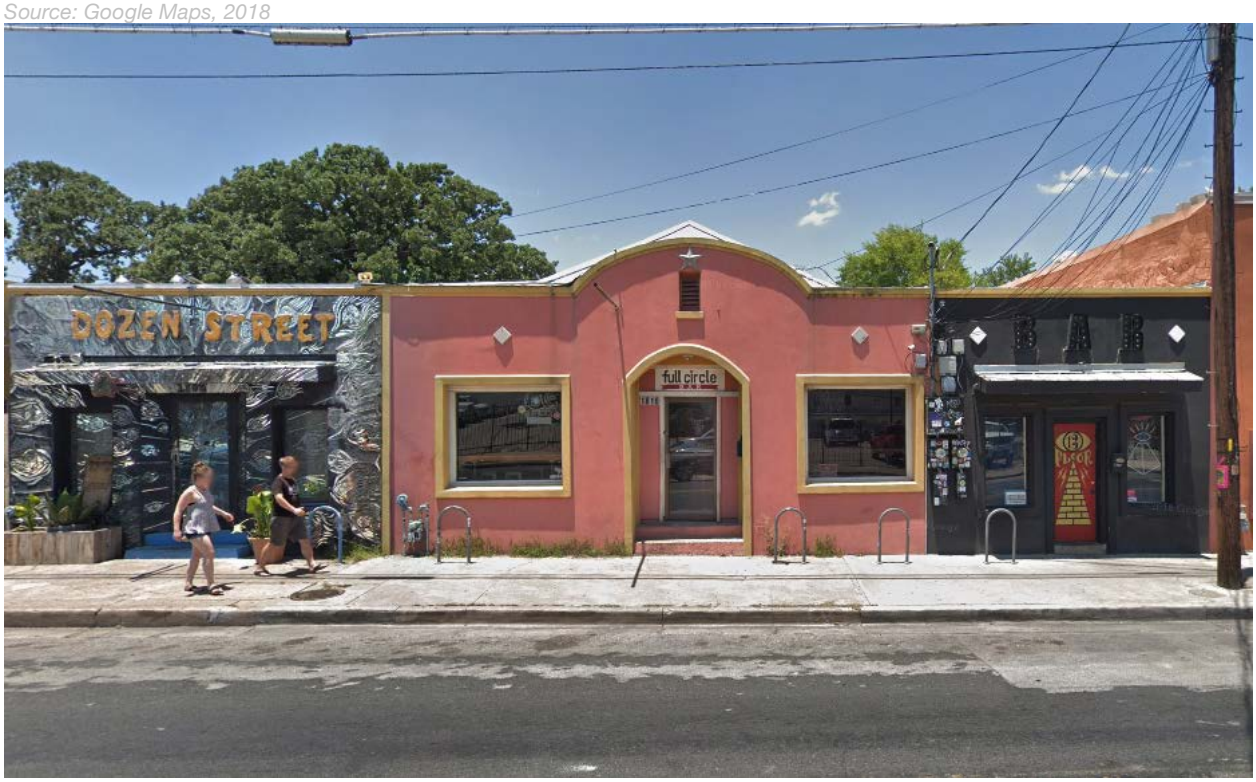
In addition, RMI partnered with Lyft, which offered discounted rides that originated from or ended at the Community Mobility Hub. This discount coincided with community events taking place at the hub. Lyft agreed to share data with RMI, but the usage was so low that it did not allow us to find any relevant insights.

Placemaking

In keeping with RMI's efforts to understand the relationship between mobility and urban design, our team sought to make aesthetic and functional changes to the urban form at 12th and Chicon. Compared to other areas in East Austin, this intersection sees much less foot traffic, which is largely due to the absence of markets, retail, or other daytime destinations. Though the 12th and Chicon area is marked by empty lots and underdeveloped land, it is on the cusp of significant development. Our team was inspired by the work of groups like Better Block, Street Plans Collaborative, Strong Towns, the Incremental Development Alliance, and other organizations dedicated to transforming underappreciated, auto-centric environments into vibrant neighborhood centers.[17] RMI hypothesized that adopting similar approaches would improve the use of mobility services and increase the likelihood of walking or cycling. But first we sought to understand the unique characteristics of the area and what changes might be most valuable.

Currently, a handful of bars are the main drivers of foot traffic. However, most of these establishments do not open until 5 p.m. Exhibit 8 below shows three popular establishments: Dozen Street, Full Circle, and the 13th Floor Bar.

EXHIBIT 8. POPULAR ESTABLISHMENTS ON 12TH AND CHICON
Source: Google Maps, 2018



For its placemaking work, RMI chose to focus on the southwest corner of the intersection, where a food truck, Archie's BBQ, served as the primary daytime attraction in the area. In addition, there is an uncovered bus stop that serves the east-west route to and from downtown. Through the partnership with Mission Possible, RMI was able to transform a portion of the lot into a hybrid of a public space, mobility access point, and food truck park.

RMI installed a camera on the roof of Mission Possible's offices to observe the use of the site before and after introduction of mobility services and placemaking features. Exhibit 9, below, shows the scope of view of this camera.

EXHIBIT 9: SCREEN CAPTURE FROM THE VIDEO CAMERA INSTALLED AT MISSION POSSIBLE'S OFFICES ON THE NORTHWEST CORNER OF 12TH AND CHICON

On-the-ground observations, hundreds of hours of camera footage, and surveys of local residents indicated that lack of shade and greenery was adversely affecting transit users and discouraging use of the existing seating at Archie's BBQ. To address these challenges, RMI invested in three shade sails and a significant amount of greenery, including two crepe myrtle trees and a variety of other plants.

Exhibit 10 shows newly installed shade sails providing coverage to both patrons of Archie's BBQ and to users waiting for the bus or accessing nearby mobility services. Not pictured are several plants lining the perimeter of the Community Mobility Hub, as well as two recently added food trucks which relocated to 12th and Chicon in response to the space improvements.

EXHIBIT 10. SHADE AT ARCHIE'S BBQ
Source: Mueller Highlifeat

DATA COLLECTION METHODOLOGY

RMI's goal in developing a data collection methodology for the Community Mobility Hub was to provide a toolkit for organizations, cities, and communities wishing to further explore the relationship between mobility and urban design and to characterize their impact with respect to greenhouse gas emissions, health, and equity.

Our methodology is framed to measure whether a community-centric mobility hub can achieve the outcomes outlined in the Goals and Outcomes sections above: reduced carbon emissions, enhanced physical health, enhanced mental health, and improved equity. Much of the data collection was influenced by Gehl Institute's Inclusive Places Framework, particularly the surveys and observational research related to our placemaking efforts.

To test the impact of increasing the availability and predictability of mobility alternatives in combination with placemaking, RMI ran data collection for three phases: (1) Baseline; (2) Post-Mobility; and (3) Post-Placemaking. The baseline phase was designed to understand the status quo of the neighborhood. The post-mobility phase examined emissions, health, and equity impacts correlated to the addition of affordable, accessible mobility options at the hub. The post-placemaking phase assessed emissions, health, and equity impacts correlated to the introduction of placemaking (permanent shading, greenery, trees, and an improved entrance) and measured changes in the usage of mobility services at the hub resulting from these improvements.

RMI's data collection methodology for the Community Mobility Hub resembled in many ways its approach to data collection in its curb access pilot,[18] including the use of a camera to observe people's movements. In that pilot, our interest was to demonstrate a safer alternative for ridesharing companies and taxis to load and unload passengers at the curb. This required observing only the curb. With this project, we expanded the study area to attempt to capture how the whole Community Mobility Hub location—spanning two lots at different corners of an intersection—was being used by the neighborhood at large.

Data Types (aka Methods)

We used four methods of data collection for the Community Mobility Hub: desktop research, surveys, observation, and projections. It is important to look at the data type when planning a project to determine levels of effort associated with each. Project managers should be aware of the hours needed for collecting surveys or observational data collection, and consider using volunteers or part-time workers as those activities can accumulate significant hours.

Desktop Research

In order to assess the Community Mobility Hub with respect to the state of the urban space and the existence of mobility services, particularly for the baseline phase, we gathered data from desktop research. The results of this research are referenced above in the Site Selection and Neighborhood Metrics sections. The part of Gehl's Inclusive Healthy Places Framework that we utilized and put into practice for the Community Mobility Hub is shown in Exhibit 11 below.

EXHIBIT 11: DESKTOP DATA TYPES
Source: Gehl, Inclusive Healthy Places Framework

Data Typology	Description
Administrative Data	Data collected by public agencies, hospitals, or other organizations required to report on outcomes at boundaries dictated by administrative or political districts; this data is not collected for research purposes
Economic Data	Data about public investment, business, finance, money, and markets (e.g., consumer markets, real estate values, housing market trends)
Population Data	Sociodemographic data
Publicly Available Data	Data collected by public agencies, governments, or private entities and made available for public use
Vital Statistics	Data collected for the registration of vital events, specifically births and causes of death
Policy Data	Information about public policies including legislation, regulations, benchmarks, or targets as well as policies of relevant institutions or organizations

Surveys (Including Interviews)

RMI conducted a series of on-the-ground surveys to complement community engagement interviews with leading stakeholders and community representatives. This work was also heavily influenced by Gehl Institute's approach to measuring user perceptions. Exhibit 12 below shows the data types defined by Gehl Institute. For the Community Mobility Hub, our survey data collection was in-person and on the ground at the selected site, and we supplemented the work on the ground by sending the surveys out to nearby residential complexes and neighborhood associations. We conducted informal interviews with patrons of the area and conducted formal interviews with businesses and organizations operating in the area.

EXHIBIT 12: SURVEY DATA TYPES
Source: Gehl, Inclusive Healthy Places Framework

Data Typology	Description
Survey Data	Data collected by researchers from a population of interest using standardized questions via various modes, including in-person, telephone, web-based, or paper questionnaires
Interviews	Primary data collected by researchers through conversations, structured or unstructured, including interviews, focus groups (group interviews), and other discursive methods

To gather data directly related to individual health and travel patterns, RMI ran three surveys on the ground in line with each of the phases:

1. Baseline: a baseline survey to capture existing community characteristics and insights
2. Post-Mobility: a survey after deploying mobility services, to measure perceptions about their availability
3. Post-Placemaking: a final survey after implementing placemaking improvements.

Note: The surveys consisted of relatively small sample sizes—54, 42, and 38 respectively

The surveys were gathered during both day and evening hours. The audience for the surveys included patrons of the 12th and Chicon business district, local business owners, nearby condo residents, and nearby neighborhood associations.

Observation

Exhibit 13 describes two approaches to observational research. In addition to anecdotal observations gathered from survey respondents, RMI's use of video footage uncovered insights about the use of the space and the mobility services available there, the flow of pedestrians and cyclists, and the behaviors of transit users. Footage was captured before and after enhanced mobility services were introduced and placemaking efforts implemented.

EXHIBIT 13: OBSERVATION DATA TYPES
Source: Gehl, Inclusive Healthy Places Framework

Data Typology	Description
Built Environment Data	Quantitative or qualitative data about the features and characteristics of physical space (e.g., park amenities, streetscape elements, accessibility)
Spatial Observation Data	Primary data collected by researchers through use of observational methods in space. This may include systematic or non-systematic observational methods.

Projections

Given that Gehl metrics only measure current conditions, RMI decided to also incorporate projections. A projection is an estimate or forecast of a future condition or trend based on a study of present ones. We made health and environmental projections based on our study of changes in mobility at 12th and Chicon over the past three months. We measured actual change in mobility usage in the area and used that data to project health and environmental changes against the baseline health and environmental secondary research that we collected. Projection data types are described below in Exhibit 14.

EXHIBIT 14: PROJECTION DATA TYPES
RMI addition to Gehl's framework

Data Typology	Description
Environmental Projections	Environmental projections use mobility data changes over time to project change in indicators such as particulate matter (PM2.5), carbon monoxide, and NOx
Health Projections	Health projections use mobility data changes over time to project change in indicators such as obesity, respiratory health, and birth weight

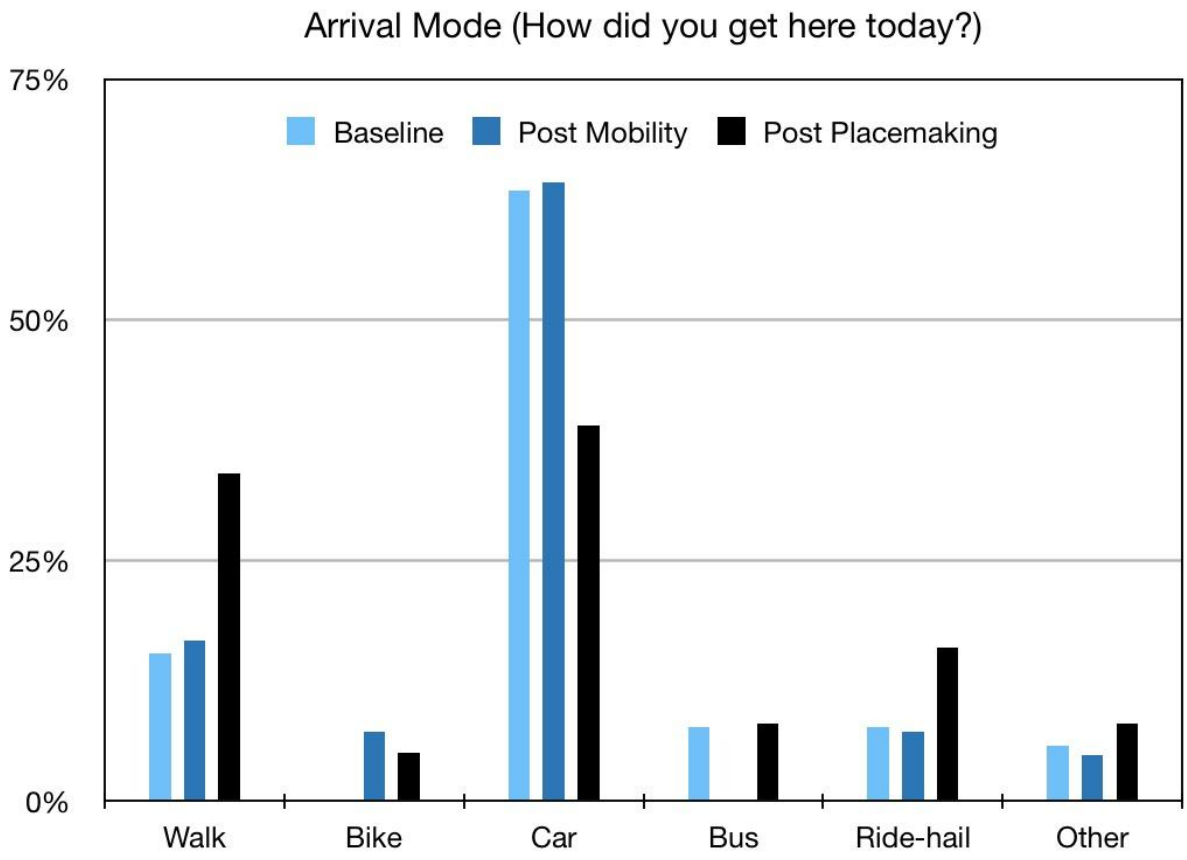
RESULTS

Several caveats accompany the results below. The sample size from surveys was relatively small (~40), which may not have been sufficient in all cases to accurately represent the community's response to mobility services or placemaking improvements. Survey respondents represented a mix of local residents and visitors, meaning the aggregated survey results may not accurately represent the views of the local community as a whole. The three phases of data collection (baseline, post mobility, and post placemaking) were conducted across two seasons (summer and fall) and at varying times of day. This could have introduced external factors such as weather, climate, and time of day that make it difficult to exclusively attribute outcomes to introduction of enhanced mobility services or placemaking improvements. For example, the baseline and post-mobility data collection phases occurred during the most brutally hot months of Austin's summer, while the post-placemaking phase occurred toward the fall when the weather started to cool down, which could have been a factor in the shift from driving to walking and biking. At the same time, rain was a much more prevalent factor in the post-placemaking phase relative to the baseline and post-mobility phases, which normally leads fewer people to walk and more to drive.

Surveys

Arrival Mode as an Impact on Physical Health and Carbon Reduction

EXHIBIT 15: SURVEY RESULTS: ARRIVAL MODE



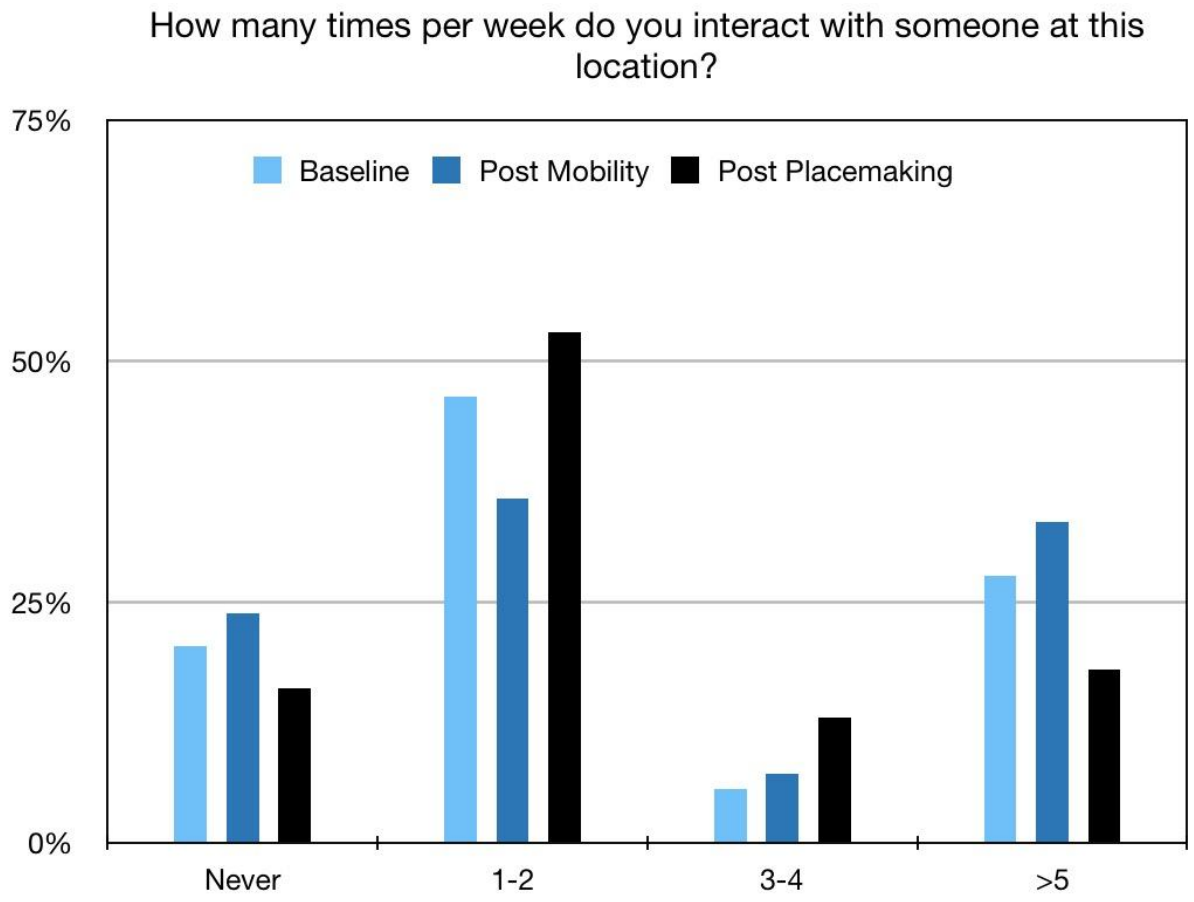
RMI was particularly interested in unearthing insights about travel behaviors in and around the Community Mobility Hub. RMI's hypothesis was that each of the goals—improving built environment amenities and enhancing access to new mobility services—would contribute to reduced emissions, enhanced physical and

mental health, and improved equity. We set out to measure if mode-share of single-occupancy trips in personally owned, gasoline vehicles could be reduced through greater use of active modes such as walking and biking, transit, new mobility services, and improvements to the space. We hypothesized that doing so could tangibly reduce carbon emissions, improve physical and mental health, and increase the availability of services for people of all incomes.

Survey respondents in the baseline phase overwhelmingly drove personal vehicles to the area. However, there is a clear set of neighborhood residents who walked to their destinations. After the placemaking improvements, survey respondents walked more and drove less. There is reason to be optimistic about the eventual rise of active and other personal-vehicle-alternative modes such as walking, cycling, and new mobility services with further enhancements to the urban form at the Community Mobility Hub and continued enhancement of the mobility services there.

Social Interaction as an Impact on Mental Health

EXHIBIT 16: SURVEY RESULTS: SOCIAL INTERACTION

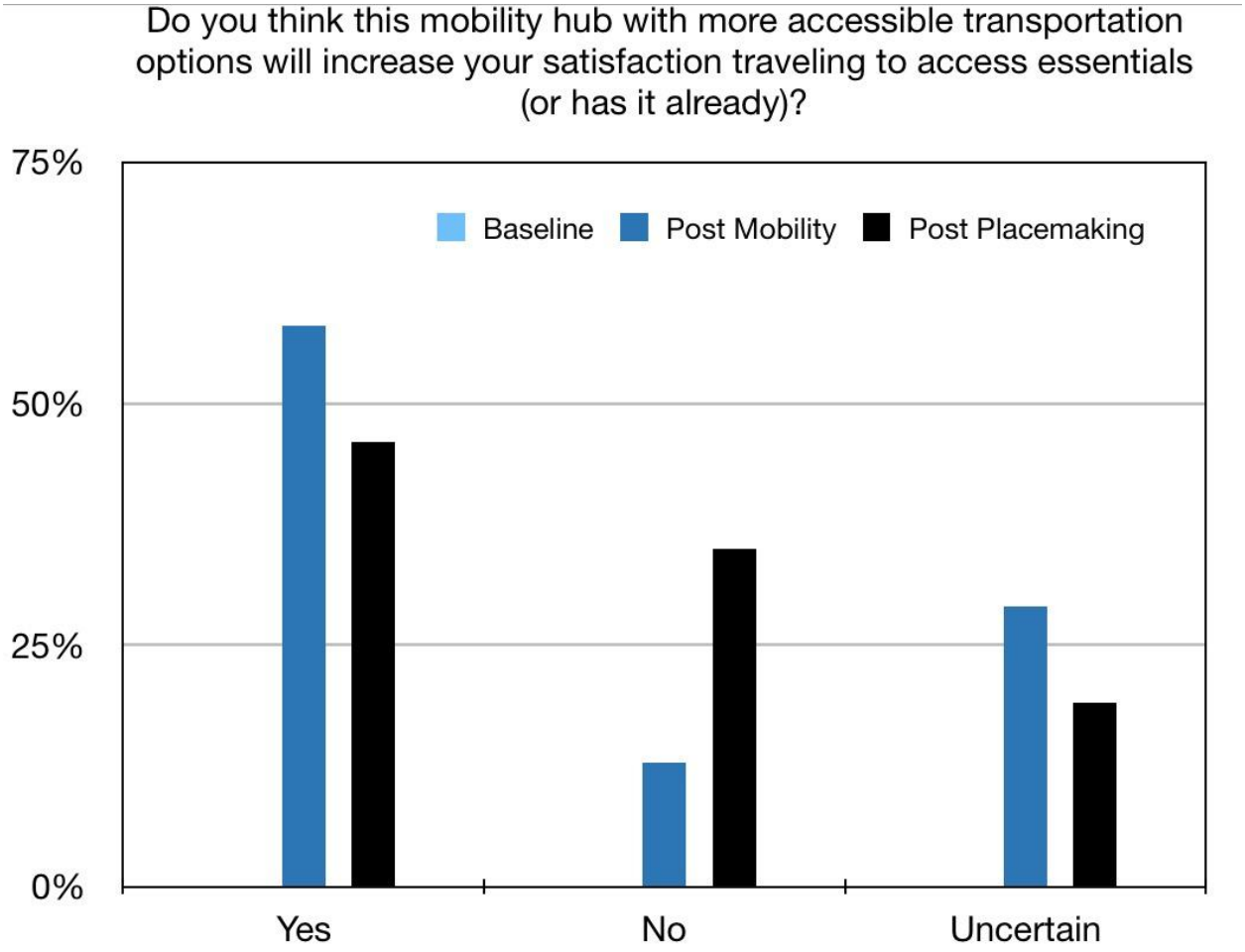


RMI sought to understand social interactions at and around the Community Mobility Hub, with the goal of increasing those interactions through the inclusion of new mobility services and placemaking improvements. An increase in social interactions could indicate an improvement in the quality of the space and has been correlated to increased mental wellbeing. We found that the frequency of interactions was relatively consistent across the three phases, leading to no clearly attributable effect from mobility services or placemaking. Anecdotally, RMI

observed that many of the respondents who gave high numbers for social interactions tended to be loyal customers of the businesses on East 12th street or nearby residents.

Access to Essentials as an Impact on Mental Health

EXHIBIT 17: SURVEY RESULTS: PROJECTED OR ACTUAL EFFECT OF COMMUNITY MOBILITY HUB ON SATISFACTORY ACCESS TO ESSENTIAL GOODS AND SERVICES



Roughly half of the respondents indicated that the existence of the hub would increase their satisfaction with access to essential goods and services (or that it had already). While a quarter of people said they were not or would not be affected, it is important to note that some respondents were traveling by car to a local restaurant or bar and thus may not have had a strong sense of personal investment in the area.

Travel Satisfaction and Perceived Value of Community Mobility Hub Space as an Impact on Mental Health

EXHIBIT 18: TRAVEL SATISFACTION AND VALUE OF THE COMMUNITY MOBILITY HUB SPACE

Scale of 1-10	Baseline	Post Mobility	Post Placemaking
Please rate your degree of satisfaction with traveling to and from this area.	7.8	7.6	7.0
Please rate your degree of satisfaction with the quality of this space.	7.5	7.1	7.3
How valuable is this place to you?	7.8	7.8	7.9

Respondents indicated satisfaction overall with both their experience traveling to and from the area associated with the Community Mobility Hub and with the space itself.

We observed a slight drop in satisfaction with traveling to and from the area across the three phases. Respondents sometimes mentioned traffic as a reason for a slightly lower rating. At the same time, those who walked indicated that undermaintained, or in some cases areas where the sidewalk disappeared altogether during their walk, contributed to their lower satisfaction rating. Another major complaint from pedestrians was the need for a more pedestrian-friendly intersection at 12th and Chicon, including the need to repaint the faded crosswalks there. Finally, the rainy weather that characterized much of the post-placemaking phase may have further contributed to the decrease. Rain significantly affects pedestrians who comprised an increased share of trips to the area relative to the other phases.

Respondents' degree of satisfaction with the quality of the space was essentially constant across phases (albeit very slightly downward).

Respondents across all three phases attributed high value to the space. The high ratings make sense here given that many respondents indicated, via an open-ended question at the end of the surveys for all three phases (see below), the importance of preserving the local community and culture.

Insights from Open-Ended Survey Question

RMI included an open-ended question in the surveys for all three phases, giving respondents the opportunity to provide input on community needs and desired improvements to the area. For the first two phases, baseline and post-mobility, the question was, "What would improve this area?" For the third phase, post-placemaking, we asked a different question given that RMI and its partners had already implemented improved mobility options and placemaking enhancements: "What do you think of this space?"

Baseline Survey

In the 54 baseline surveys, several themes emerged, with particular emphasis on infrastructure, food, greenery, shade, preservation of the local community and culture, transportation, walkability, and affordable housing.

- 15 individuals discussed the need for better infrastructure, including improved roads, parking lots, sidewalks and crosswalks, more and dedicated bike lanes, and shelter at bus stops.

- 12 individuals discussed the need for more food, including grocery stores, farmers' markets, and food trucks.
- 11 individuals discussed the need for more greenery, trees, and shade.
- 10 individuals discussed the importance of preserving the local community, culture, and businesses.
- Eight individuals asked for better transportation, including bikes, scooters, trollies, improved rail service, and a higher frequency of bus routes.
- Eight individuals indicated they would like the area to be more walkable.
- Four individuals discussed the need for more affordable housing.

One individual shared that he witnessed a female pedestrian get knocked over in a crosswalk by a vehicle that was not paying attention, indicating that clearer crosswalk striping on the road may have helped protect her. Another request, from a young couple, was for the implementation of a historical sign to preserve a mural of inspiring black figures on a west-facing wall on the northeast corner of 12th and Chicon, across the street from the Community Mobility Hub. A prior mural by the same artist had been painted over, sparking a strong community response that ultimately resulted in the new mural.

Post-Mobility Survey
During the collection of surveys in the post-mobility phase (i.e., after scooters, bikes, and carshare were deployed in the area) there was some variation in the themes that emerged compared to the baseline. Overall, though, infrastructure was still the most-discussed topic. Out of the 41 responses:

- 13 discussed needs for improving sidewalks, intersections, traffic controls, walking signals, bike lanes, roads, bus stops, parking lots, pedestrian accessibility, and adding a road calming feature.
- Food continued to be the second-most discussed topic, tied with preservation of culture.
- Food was discussed eight times, with respondents noting that accessibility and affordability were key issues and citing a desire for natural, healthy grocery options nearby. Still others indicated the desire for more restaurants and food trucks.
- Eight people discussed the importance of preserving culture and slowing gentrification by making a commitment to the local community to make room for people who are long-time residents, including by creating active measures to stop displacement, offering financial support for family-owned businesses, and creating more cultural engagement opportunities.
- A desire for more greenery was discussed six times, with respondents expressing desire for more trees, gardens, landscaping, beautification projects, parks, and open space.

Interestingly, in the post-mobility phase, the topic of better transportation was not as predominantly discussed as in the baseline surveys, and walkability, a major theme in the baseline surveys, was not discussed at all. This may be attributable to the increased mobility in the area, specifically the scooters and bikes that our mobility service provider collaborators were deploying on a reliable, daily basis. Only four people raised transportation as an issue, but the focus was on the need for more public transportation, including transit and increased bus frequency. In addition to the major themes that were raised, a couple of people discussed "space," indicating that the parking lots on the southern side of the 12th and Chicon intersection—the target area of the Community Mobility Hub—deaden the space and need to be more inviting.

Post-Placemaking Survey
Significantly, 19 of the 38 total respondents expressed a pleasant attitude about the space. Responses included "It's a nice place," "I like it," "It's better than it used to be," "I like the ease of traveling by scooter," "I appreciate it because people can gather," "Glad greenery is being added," "It's pleasant compared to walking on the street because there is shade," and "I like the mixed use of the space." There were still seven people that expressed the need for more food (this was before the arrival of two additional food trucks which relocated to 12th and Chicon in response to the space improvements) and there were a handful of comments about the need for improved infrastructure.

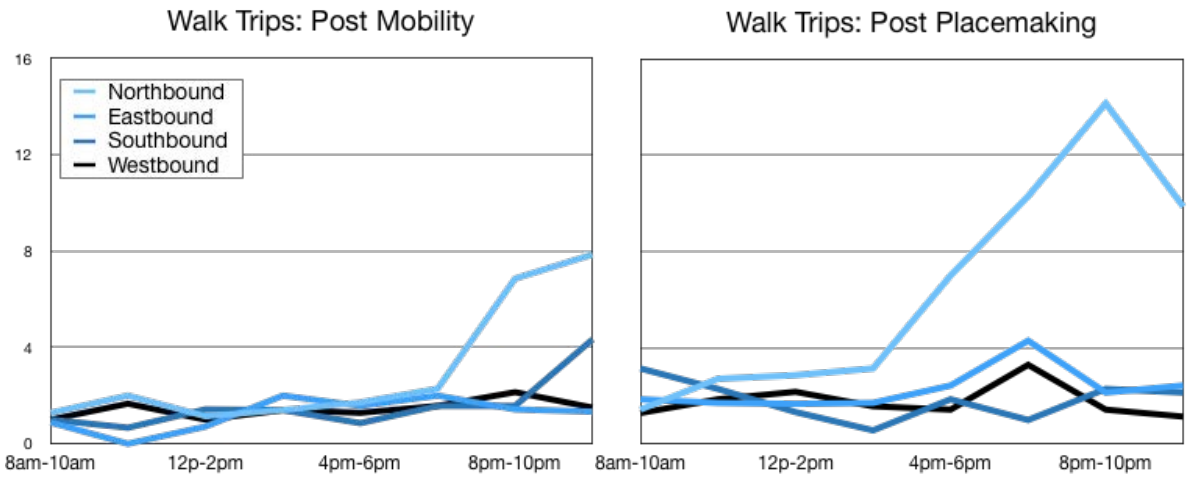
Overall, respondents indicated a positive response to the scooters, bikes, shade, trees, and greenery added to the space.

Observation

Walk-trips per hour

We measured foot traffic at the intersection of 12th and Chicon by monitoring pedestrian movements. Due to the limited scope of the camera, RMI was only able to capture a portion of movements. The eastern and southern crosswalks of the intersection were not visible through the camera's perspective. Likewise, our team was unable to directly monitor movements to and from the bars and businesses on the northern side of Chicon, which capture the majority of foot traffic in the area. However, the charts below illustrate a high volume of northbound foot-traffic, particularly after 5:00 p.m. when many of those establishments open. In addition to the growing popularity of the bars and businesses on the northern side of Chicon, this may be due to transit riders returning home after work and a regular series of nighttime events held at the Mission Possible community center. There are also three additional food trucks north of Chicon, a popular establishment called Rio Rita, and two newly built, 24-unit housing complexes.

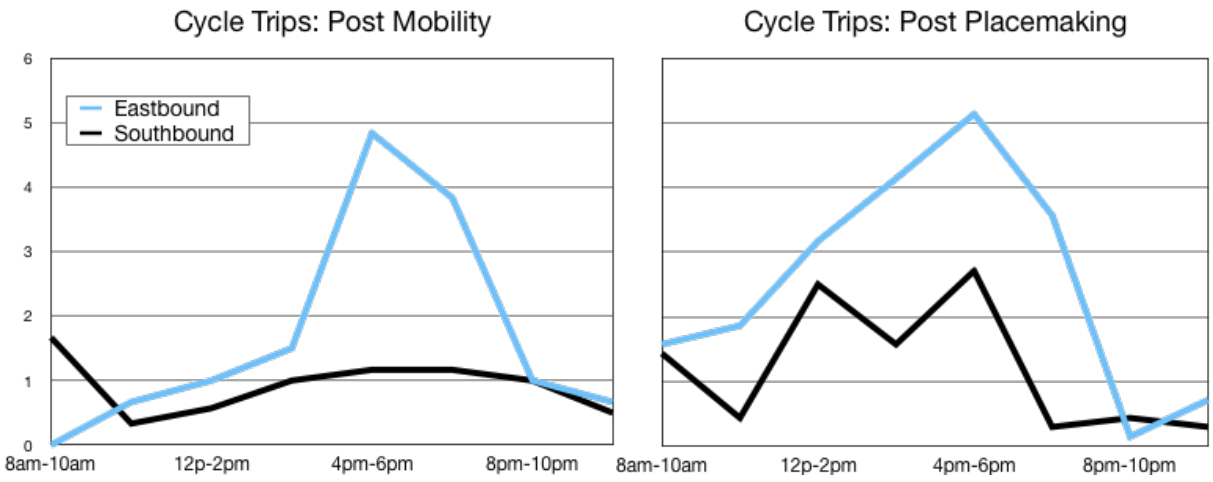
EXHIBIT 19. WALK TRIPS: POST MOBILITY AND POST PLACEMAKING



Cycling trips per hour

RMI's camera observations uncovered a moderate amount of cycling trips through the intersection at 12th and Chicon. Although we were only able to view eastbound and southbound trips, the footage provided a sense of when cycling is at its highest volume. Eastbound trips in the afternoon likely indicate return commutes from downtown Austin.

EXHIBIT 20. CYCLE TRIPS: POST MOBILITY AND POST PLACEMAKING



Daily Visits and Dwell Time

Prior to placemaking, the primary reason for visiting the site of the Community Mobility Hub was to purchase food from Archie's BBQ. RMI hypothesized that placemaking could potentially increase the number of daily customers, draw people into the space for shelter and relaxation, and increase the use of nearby mobility services, including public transit. We did not observe that, but we did observe an increase in dwell time among customers. Prior to placemaking, only 12% of customers stayed to eat their food on the site. After placemaking, 42% of customers remained on site. RMI also observed a number of transit riders using the shade while waiting for their bus to arrive.

EXHIBIT 21. DAILY VISITS: POST MOBILITY AND POST PLACEMAKING

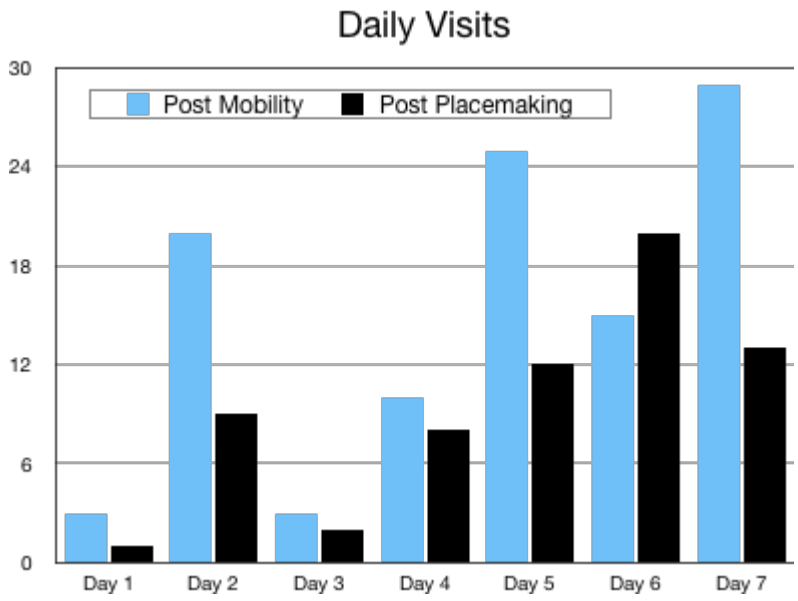
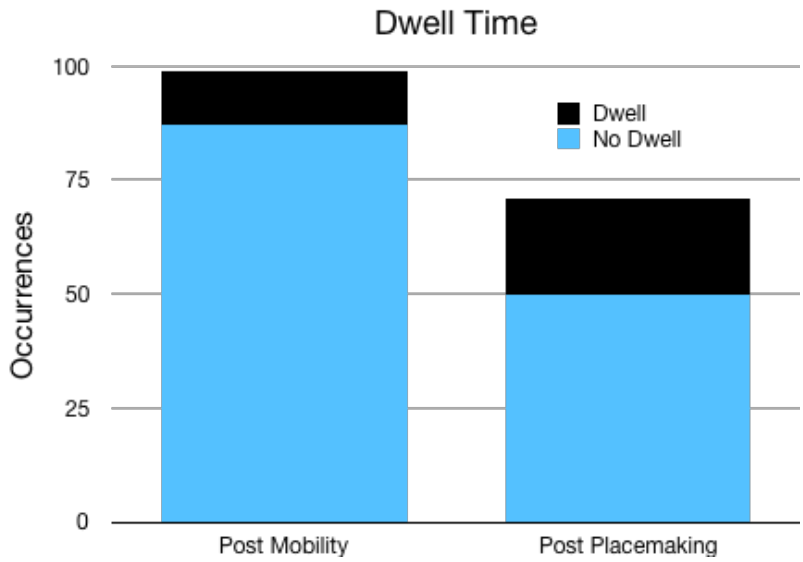


EXHIBIT 22. DWELL TIME: POST MOBILITY AND POST PLACEMAKING



Note: Occurrences are quantified by the number of daily visits to Archie's BBQ at the Community Mobility Hub. Dwell time indicates an instance in which a visitor remained on the site after purchasing food.

Mobility Provider Data

Although our dockless scooter and bike mobility service partners agreed to provide data, RMI is unable to publish the use of these services to and from the Community Mobility Hub. In one case, a provider made the data available but prevented RMI from publishing it at a level of specificity relevant to the Community Mobility Hub. In another, we were unable to acquire the data within the specified timeframe of the project. However, all dockless companies in Austin are bound to report a set of data to the City of Austin, which has in turn aggregated the data to produce quarterly usage reports.

EXHIBIT 23: USE OF DOCKLESS MOBILITY SERVICES IN AUSTIN, TX

AUGUST 2018 Dockless Mobility Reporting					
Device Type	**Trips**	**Miles Traveled**	**Duration in Minutes (Avg.)**	**Trip Miles (Avg.)**	**Unique Devices**
Scooter	300,000	350,000	17	1.2	3,300
Bicycle	13,000	25,000	24	1.9	800
(All Types)	313,000	375,000	17	1.2	4,100

The data above indicates significant use of dockless services during the time of launching the Community Mobility Hub. In reviewing the aggregate data provided by one of our partners, it is evident that the total trip volume citywide has increased by nearly 70 times since August, with the average trip distance remaining fairly steady. What stands out from this data is that the distance traveled per ride suggests that these services may be replacing automobile trips more than walk trips. The standard "pedestrian shed"—or distance that someone will likely walk to a destination—is typically a quarter mile (or at most a half mile).[19] Urbanists have also called this the five-minute walk. As we've seen in the debate around ride-hailing services, the question still remains whether the dockless mobility services cannibalize transit trips.

Another point worth noting, albeit anecdotal, is that in reviewing camera footage, the RMI team observed the use of dockless services as connectors to public transit on a number of occasions. While on the ground in Austin, the team frequently saw users start and complete scooter and bike trips at the bus stops of 12th and Chicon, suggesting that the services may actually benefit transit ridership by providing first- and last-mile convenience.

Projections

Projections can be a useful tool in the methodology toolbox, depending on the specific goals of a project. Baseline desktop research correlating mode choice to environmental and health outcomes can be combined with mobility provider and survey data to project changes in greenhouse gas emissions and health.

Greenhouse Gas Emissions

An electric scooter or electric bike trip uses only a fraction of the energy required for a vehicle trip. By making the assumption that a scooter is 200 pounds with a person on it, considering that an average vehicle is 4000 pounds,[20] and accounting for the inherent inefficiencies of internal combustion engines, one can safely assume that an e-scooter or bike requires much less than 5% of the energy per mile required to move a vehicle. This translates to reducing carbon emissions by more than 95% when taking a scooter or bicycle ride instead of taking a gasoline-vehicle trip.

However, it should be noted that this comparison is only of the energy required to *move* the machines and does not include the vehicle-miles associated with collecting the scooters and bikes to charge (companies or their contractors typically transport them to remote locations to charge each night) and to redistribute (rebalance) them each day.

Peer-reviewed analysis of the total carbon intensity of dockless e-scooters and bikes is sparse. An outfit called Chester Energy and Policy (CEP)[21] found that the electrical energy consumed by e-scooters on the Washington D.C. electricity grid generates 4–9 grams of CO_2 per mile compared to the emissions of an average car, at about 400 grams of CO_2 emissions per mile.

Making assumptions on how e-scooters are rebalanced and charged, CEP estimated the additional daily CO_2 this generates per scooter varies between 40 grams (assuming carrying 20 at a time and rebalancing and recharging within a two-mile round trip) and 808 grams (collecting only a few scooters and needing a 10-mile round trip to rebalance).

Assuming that e-scooters at the Community Mobility Hub are in the middle of that range at 424 grams of CO_2 per mile, then adding the CO_2 from the trips themselves (assuming an average of 6.5 grams per mile), results in a grand total of about 431 grams per mile. Given that the average scooter trip length is many times the average walk trip length, we can safely assume that only every other scooter trip is actually replacing an individual car trip (with the others replacing walk trips). We conservatively assume that the trips replaced by scooters are all walk trips rather than accounting for the share of replaced transit trips. As long as users travel a bit over two miles on a scooter on any given day, CO_2 is being saved relative to today's mobility system. Data from the City of Austin's August 2018 Dockless Mobility Reporting (Exhibit 23) suggests scooters cover an average of 3.5 miles per day.

As for shared e-bikes, neutral studies on greenhouse gas emissions impact are hard to come by, but a recent study funded by Uber suggests there is significant potential for overall CO_2 savings resulting from their use relative to today's mobility system.[22]

The emissions intensity of e-scooters and e-bikes is dominated by rebalancing and their emissions advantage can be relatively easily negated with inefficient charging and rebalancing practices. This can be addressed by placing electric charging stations for e-scooters and e-bikes around a city, as the team secured an agreement to do in collaboration with Uber Technologies' JUMP at the Community Mobility Hub, and incentivize riders to drop them off at a nearby charging station if their ride is toward the end of the day or their battery is low. Providers can even encourage riders to charge the e-scooters and bikes at home instead of just dropping them outside their residence. Several providers are experimenting with such approaches.

Based on survey and observational data, we observed an increase in the use of personal-vehicle-alternative modes following the three phases of implementing the Community Mobility Hub, including deducing an increase in the use of e-scooters at the Community Mobility Hub based on City of Austin and provider data. Even accounting for the fact that some scooter and bike trips may be replacing walk and transit trips rather than car trips, we conclude that, to the extent that Community Mobility Hubs increase the use of electric scooters and bikes, they contribute to reducing greenhouse gas emissions.

Physical Health

Health projections link changes in mobility over time—particularly those related to mode choice—to health indicators such as obesity, respiratory health, and birth weight. These indicators are in turn largely driven by environmental factors including PM2.5, carbon monoxide, and NOx.

In an Atlanta-based study conducted by Larry Frank of Urban Design 4 Health, Inc., who the RMI team interviewed during the research phase preceding the launch of the Community Mobility Hub, each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity. Conversely, each additional mile walked per day was associated with an 8% reduction in the likelihood of obesity.[23]

According to the Environmental Protection Agency, for each vehicle-mile in a passenger vehicle replaced by a walk, bike, or scooter trip, 9.5 grams of carbon monoxide (CO), 0.0041 grams of PM2.5, and 0.70 grams of nitric oxide or nitrogen dioxide emissions (collectively: NOx) are avoided.

After twenty years of epidemiological studies, scientists have revealed a significant correlation between fine particle pollutants such as PM2.5 and respiratory morbidity and mortality.[24] In European Union countries, PM2.5 decreased average life span by 8.6 months.[25]

A 2009 study of Air Pollution and Infant Health in New Jersey found that “CO has a significant effect on fetal health even at the relatively low levels” and that for every 50% increase in CO from the mean, the risk of low birth weight increases by 8%.[26] A 2004 California-based study found that PM2.5 exposure also correlates to lower birth weight,[27] while a 2007 study conducted across Canada correlates lower birth weight to CO, PM2.5, and NOx.[28]

We cannot exclusively attribute the reduction in passenger vehicle trips and increase in walk trips to the mobility service and placemaking improvements introduced through the Community Mobility Hub. We nonetheless observed a correlation between them and conclude on that basis that Community Mobility Hubs likely contribute to reduced CO, PM2.5, and NOx, and therefore to reduced obesity, improved respiratory health, and healthy birth weight.

LESSONS LEARNED

Community Interests

One of our earliest observations during the community engagement process was that the community members we partnered with and sought feedback from showed much more interest in the placemaking work than in the addition of new mobility services. The availability of app-based scooters and bicycles held little appeal to many of the community partners we spoke to who assumed there would be low interest in the community. This may have resulted from the fact that the community partners we spoke to were largely focused on representing the voices of older neighborhood residents. That being said, while these services are often associated with millennials,[29] the team did observe older community members occasionally using the scooters as well.

Conversely, we encountered a great deal of agreement around the need for public space improvements and placemaking. However, "improvements" can mean very different things to different people. Communities like the ones that surround 12th and Chicon have a diverse array of needs and a healthy skepticism of outsiders offering solutions. We engaged with partners early on before starting the process and learned that "placemaking" is not a simple job of adding shade and trees. It requires a collaborative, community-driven, and communitywide process of breathing new life into the local businesses, street life, arts, and culture in addition to the urban form.

Due to the feedback provided by community partners, RMI pursued a collaborative engagement process to highlight voices of the community. This involved an array of interviews and surveys on the ground and with different organizations. As part of this, the team attempted to engage nearby affordable housing communities, but was unable to do so due to the timing constraints of the project and schedule challenges among the organizations we tried to engage.

Time-of-Day Concerns: Foot Traffic, Users, Motivations

Although 12th and Chicon lies at the center of two key corridors and redeveloping neighborhoods, the lack of basic amenities, such as grocery stores or retail businesses, has kept daytime foot traffic low in the area. This was an issue our team underestimated at the outset of the project.

While the placemaking improvements were meant to create a destination (i.e., a place to linger and access mobility services), it became clear from survey responses that the location needed more food trucks as well. This likely affected mobility service usage and it most clearly came across in the surveys conducted on the ground. Shading was the most significant element of our placemaking work, but it only created the highest value during midday hours. While Archie's BBQ confirmed that their customers were spending longer times at the site and remarking on the improvements, the bulk of their business (and the foot traffic on the block) continues to take place between 7:00 p.m. and 9:00 p.m. at which point the shading provided little value.

In the nighttime hours, the use of the space seemed to serve as a brief dining spot for younger people frequenting the bars. While some people remarked that the improvements made the hub a more pleasant environment, they didn't show significant impact in increasing foot traffic. The team expects that the two additional food trucks that have resulted from the improvements (and that were added after the team's observation period) will result in increased foot traffic and use of mobility services.

Camera Footage: Installation, Viewing, and Recording Challenges

Our camera was unable to capture a wide enough field of view to truly understand the flow of people, cyclists, vehicles, and mobility services in the area. Although on-the-ground observations proved useful, a broader camera view would have helped us measure the use of the roads, sidewalks, and spaces more thoroughly.

There were also logistical complications around installing the camera. We talked with all the owners of the lots on the corners of the intersection but not all corners were suitable, either because they didn't afford an adequate view of the Community Mobility Hub or didn't offer a secure means of installing and providing power and internet to the camera.

Our video footage provider only saves footage online for a period of 30 days. Noting how long the footage will be available through the account can inform decisions about whether to make observations over time or save the footage to a local drive and condense it into a time lapse to review later.

Mobility Data Collection

In designing the Community Mobility Hub, RMI placed heavy emphasis on mobility provider data, particularly related to new dockless scooter and bike companies. We developed memorandum of understandings (MOUs) clearly stating specific asks for data and insights, including:

- Origin and destination within the area surrounding the Community Mobility Hub
- Miles traveled: per trip, average, or total
- Unique user counts over time
- Heat map of usage in the area

Despite securing agreements with key mobility partners, RMI was ultimately unable to publish the above information due to privacy and competitive concerns from most of the partners. Therefore, we had to resort to publishing an aggregated and dated report from the City of Austin's website. This report from August represents total usage, citywide, at the very early stages of dockless deployment.

This is of course reflective of the challenges that cities face in seeking better understanding around the use of new mobility services and how those services may impact urban environments. Questions remain about the impact of new mobility on public transit, congestion, traffic flows, curb space allocation, and street design, to name just a few, and using data that providers currently own is at the heart of this understanding. Certainly, the dockless mobility companies have ushered in an exciting new era of "micro-mobility" that may provide many benefits to the transportation system, but stakeholders generally require more granular and widely available data than what is currently available in order to ensure optimal outcomes for all.

This unfortunate outcome underscores the importance of specific data-sharing agreements with mobility data producers that create enforceable accountability. In their absence, the kind of create-your-own-data camera observation and on-the-ground data collection that we highlight in this report may have to suffice.

CONCLUSION

Creating a Community Mobility Hub at the neighborhood scale presents a host of challenges that may be less difficult to tackle in downtown entertainment or employment centers, where foot traffic and availability of destinations are significantly higher. Certainly in those areas, new mobility services are already thriving. However, RMI's Community Mobility hub demonstrates a need and opportunity to activate surrounding areas with additional services and space improvements. The inclusion of the word "community" in RMI's adaptation of the mobility hub was meant to reflect a desire to create a context-sensitive and community-driven approach to transforming neighborhoods globally.

RMI is seeking to create a scalable approach to improve the impacts that our mobility system and urban design patterns have on the environment, health, and equity. This potential for scalability is the primary reason RMI established a data collection methodology to measure the results of our interventions. It is our belief that the approach outlined above can be adopted in nearly any neighborhood with similar characteristics or adapted to neighborhoods with unique characteristics. It is, in effect, a work in progress meant to inspire other similar efforts. With that desire in mind, our team will be extending invitations for collaboration in future efforts.

APPENDICES

Appendix A: The Data Collection Framework

The table below outlines the framework used to measure how changes in public space and mobility can improve physical and mental health. It lists our goals and outcomes along with the metric—a single, specific data point—that was used for measuring them. Each metric serves a different purpose, and multiple metrics typically support single indicators. An indicator is a term used by Gehl in their Inclusive Healthy Places Framework; it is "a quantitative or qualitative measure derived from observed facts that simplifies and communicates the reality of a complex situation." Indicators reveal the relative position of the phenomenon being measured and, when evaluated over time, can illustrate the magnitude and direction of change. The table also indicates how the metric was measured and whether it was a Gehl metric or a new addition from RMI.

EXHIBIT 24: DATA COLLECTION FRAMEWORK

Outcome	Metric	Data Method	Gehl/RMI
Reduced carbon emissions; enhanced physical health; improved equity	Air pollution rates	Desktop	Gehl
Improved equity	Population by age, sex, gender or gender identity, race and ethnicity, individual income, education, nativity status	Desktop	Gehl
Improved equity	Percentage of population living below federal poverty line	Desktop	Gehl
Improved equity	Housing cost (rental and property value) in relation to city/county median including change over time	Desktop	Gehl
Enhanced physical health; improved equity	Presence of grocery stores—total count per neighborhood or square mileage	Desktop	RMI
Enhanced physical health; reduced carbon emissions; improved equity	Walk Score Index	Desktop	RMI
Enhanced physical health	Diabetes	Desktop	RMI
Enhanced physical health	Obesity	Desktop	RMI

Enhanced physical health; reduced carbon emissions	Number of users performing an activity (e.g., cycling, walking)	Observation	Gehl
Enhanced physical health; reduced carbon emissions	Number of users performing an activity (e.g., cycling, walking)	Observation	Gehl
Improved public space (links to Goal 1 in Exhibit 1)	Number of users (e.g., measured in a snapshot, over time, by zone)	Observation	Gehl
Reduced carbon emissions; enhanced physical and mental health	Percentage of the space with vegetative cover	Observation	Gehl
Reduced carbon emissions; enhanced physical and mental health	Number, size, and location of trees within a public space	Observation	Gehl
Improved public space (links to Goal 1 in Exhibit 1)	Absence of obstructions along pathways and access points	Observation	Gehl
Enhanced mental health; improved equity	Presence of sufficient lighting for the space	Observation	Gehl
Enhanced mental health	Quality assessment of entrances, access routes and crossing intersections	Observation	Gehl
Improved public space (links to Goal 1 in Exhibit 1)	Presence of basic public space features and amenities that encourage lingering and physical activity, including: • children's playground and/or features for play-seating (formal or informal), picnic tables, shade or sheltering structures, barbeques, gardens or planted areas • evidence of programming (see event and programming indicator in P2) • concessions, kiosks, or other commercial activity serving the space • public access toilets • use of noise reduction strategies in the space • use of natural materials in the space	Observation	Gehl

	• water features (Presence of site furnishings and materials that invite people to linger) Presence of features and amenities that enhance diversity of public space experience, including: • Presence of features or facilities that promote physical activity, such as walking paths and – cycleways • shade along walking paths or seating areas • signs that dogs are allowed (Level of Maintenance)		
Enhanced physical health; reduced carbon emissions; improved equity	Self-reported mode of transportation	Survey	RMI
Enhanced physical health; reduced carbon emissions	Self-reported type of physical activity	Survey	RMI
Enhanced physical health	Self-reported rate of physical activity	Survey	RMI
Enhanced mental health	Self-reported degree of satisfaction with traveling to and from area	Survey	RMI
Enhanced mental health	Self-reported degree of satisfaction with quality of the public space	Survey	Gehl
Enhanced mental health	Self-reported perceived value of public spaces	Survey	Gehl
Enhanced physical health and mental health	Self-reported time spent outside per day/week	Survey	Gehl
Enhanced physical health	Self-reported rate of physical activity	Survey	Gehl
Enhanced mental health	Self-reported rate (e.g., daily, weekly, etc.) of informal socializing	Survey	Gehl
Enhanced mental health	Self-reported frequency (e.g., daily, weekly, etc.) of unplanned contact	Survey	Gehl
Enhanced mental health	Self-reported level of positive sensory experience, sense of high aesthetic quality in the space	Survey	Gehl

Improved public space (links to Goal 1 in Exhibit 1)	Self-reported individual frequency of use	Survey	Gehl

Appendix B: Survey Questions

Baseline Survey Questions

1. How did you get here today?
    a. Walked
    b. Biked
    c. Drove my car
    d. Took the bus
    e. Took a taxi
    f. Took a ride-hailing service (Uber, Lyft, RideAustin)
    g. Used carshare
    h. Other
2. Please rate your degree of satisfaction with traveling to and from this area.
    a. 1 (Least satisfied)
    b. 2
    c. 3
    d. 4
    e. 5 (Neutral)
    f. 6
    g. 7
    h. 8
    i. 9
    j. 10 (Most satisfied)
3. Please rate your degree of satisfaction with the quality of this space.
    a. 1 (Least satisfied)
    b. 2
    c. 3
    d. 4
    e. 5 (Neutral)
    f. 6
    g. 7
    h. 8
    i. 9
    j. 10 (Most satisfied)
4. How valuable is this place to you?
    a. 1 (Least valuable)
    b. 2
    c. 3
    d. 4
    e. 5 (Neutral)
    f. 6
    g. 7
    h. 8
    i. 9

   j. 10 (Most valuable)
5. How much time do you spend outside per day?
   a. <1
   b. 1 hour
   c. >1
6. How many hours of physical exercise do you get per week?
   a. 0
   b. 30 minutes – 3 hours/week
   c. (3–4 hours/week) or (~30 minutes/day)
   d. >5 hours/week
7. What type of physical activity do you do?
   a. Walking
   b. Cycling
   c. Other
8. How is your experience traveling to get groceries?
   a. 1 (Very easy)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Very difficult)
9. How do you currently travel to buy groceries?
   a. Walk
   b. Bike
   c. Bus
   d. Drive personal car
   e. Other
10. How is your experience traveling to access health services?
   a. 1 (Very easy)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Very difficult)
11. How many times/week do you interact with someone at this location?
   a. Never
   b. 1–2
   c. 3–4

    d. >5
12. How often do you come to this space?
    a. Everyday
    b. A few times a week
    c. About once a week
    d. A few times a month
    e. Once a month
    f. Less than once a month
13. What would improve this area? (open-ended)

Post-Mobility Survey Questions

1. How did you get here today?
    a. Walked
    b. Biked
    c. Drove my car
    d. Took the bus
    e. Took a taxi
    f. Took a ride-hailing service (Uber, Lyft, RideAustin)
    g. Used carshare
    h. Other
2. Please rate your degree of satisfaction with traveling to and from this area.
    a. 1 (Least satisfied)
    b. 2
    c. 3
    d. 4
    e. 5 (Neutral)
    f. 6
    g. 7
    h. 8
    i. 9
    j. 10 (Most satisfied)
3. Please rate your degree of satisfaction with the quality of this space.
    a. 1 (Least satisfied)
    b. 2
    c. 3
    d. 4
    e. 5 (Neutral)
    f. 6
    g. 7
    h. 8
    i. 9
    j. 10 (Most satisfied)
4. How valuable is this place to you?
    a. 1 (Least valuable)

   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Most valuable)
5. How much time do you spend outside per day?
   a. <1
   b. 1 hour
   c. >1
6. How many hours of physical exercise do you get per week?
   a. 0
   b. 30 minutes – 3 hours/week
   c. (3–4 hours/week) or (~30 minutes/day)
   d. >5 hours/week
7. What type of physical activity do you do?
   a. Walking
   b. Cycling
   c. Other
8. How is your experience traveling to get groceries?
   a. 1 (Very easy)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Very difficult)
9. How do you currently travel to buy groceries?
   a. Walk
   b. Bike
   c. Bus
   d. Drive personal car
   e. Other
10. How is your experience traveling to access health services?
   a. 1 (Very easy)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6

   g. 7
   h. 8
   i. 9
   j. 10 (Very difficult)
11. How many times/week do you interact with someone at this location?
   a. Never
   b. 1–2
   c. 3–4
   d. >5
12. How often do you come to this space?
   a. Everyday
   b. A few times a week
   c. About once a week
   d. A few times a month
   e. Once a month
   f. Less than once a month
13. What would improve this area? (open-ended)
14. Has or will new mobility alter your travel patterns?
   a. Yes – they have decreased my public transit usage
   b. Yes – they have increased my connectability to public transit
   c. Yes – they have decreased my car usage
   d. Yes – I move around more than before
   e. Haven't used them
   f. I plan to use them to connect to public transit
   g. I think their presence in this area will shift more of my trips to new mobility instead of the bus
   h. I think their presence in this area will shift more of my trips to new mobility instead of the car
   i. Not planning to use them
15. Do you think this mobility hub with more accessible transportation options will increase your satisfaction traveling to access essentials (or has it already)?
   a. Yes
   b. No
   c. Uncertain

Post-Placemaking Survey Questions

1. How did you get here today?
   a. Walked
   b. Biked
   c. Drove my car
   d. Took the bus
   e. Took a taxi
   f. Took a ride-hailing service (Uber, Lyft, RideAustin)
   g. Used carshare
   h. Other
2. Please rate your degree of satisfaction with traveling to and from this area.

   a. 1 (Least satisfied)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Most satisfied)
3. Please rate your degree of satisfaction with the quality of this space.
   a. 1 (Least satisfied)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Most satisfied)
4. How valuable is this place to you?
   a. 1 (Least valuable)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Most valuable)
5. How much time do you spend outside per day?
   a. <1
   b. 1 hour
   c. >1
6. How many hours of physical exercise do you get per week?
   a. 0
   b. 30 minutes – 3 hours/week
   c. (3–4 hours/week) or (~30 minutes/day)
   d. >5 hours/week
7. What type of physical activity do you do?
   a. Walking
   b. Cycling
   c. Other
8. How is your experience traveling to get groceries?

   a. 1 (Very easy)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Very difficult)
9. How do you currently travel to buy groceries?
   a. Walk
   b. Bike
   c. Bus
   d. Drive personal car
   e. Dockless scooters or bikes
   f. Carshare
   g. Other
10. How is your experience traveling to access health services?
   a. 1 (Very easy)
   b. 2
   c. 3
   d. 4
   e. 5 (Neutral)
   f. 6
   g. 7
   h. 8
   i. 9
   j. 10 (Very difficult)
11. How many times/week do you interact with someone at this location?
   a. Never
   b. 1–2
   c. 3–4
   d. >5
12. How often do you come to this space?
   a. Everyday
   b. A few times a week
   c. About once a week
   d. A few times a month
   e. Once a month
   f. Less than once a month
13. Have your travel patterns altered due to the regular access to mobility in the space?
   a. Yes – they have decreased my public transit usage
   b. Yes – they have increased my connectability to public transit
   c. Yes – they have decreased my car usage
   d. Yes – I move around more than before

   e. No – not planning to use the new mobility in the space
   f. No – but interested to try the new mobility in the space
   g. I plan to use them to connect to public transit
   h. I think their presence in this area will shift more of my trips to new mobility instead of the bus
   i. I think their presence in this area will shift more of my trips to new mobility instead of the car
14. Have you noticed an increased sense of satisfaction since the addition of more mobility options and improvements to the space?
   a. Yes
   b. No
   c. Uncertain
15. What do you think of this space? (open-ended)
16. Do you think you will come to this space more frequently now?
   a. Yes
   b. No
   c. Uncertain

Appendix C: Additional Survey Results

Physical Activity

How much time do you spend outside per day? (hours)	Baseline %	Post-Mobility %	Post-Placemaking %
<1	22%	21%	5%
1 hour	11%	26%	21%
>1	67%	52%	74%

How many hours of physical exercise do you get per week?	Baseline %	Post-Mobility %	Post-Placemaking %
0	4%	3%	3%
30 minutes - 3 hours/week	15%	33%	34%
(3-4 hours/week) or (~30 minutes/day)	33%	28%	26%
>5 hours/week	48%	38%	37%

What type of physical activity do you do?	Baseline %	Post-Mobility %	Post-Placemaking %
Walking	48.15%	69.05%	61%
Cycling	7.41%	28.57%	16%
Other	44.44%	50.00%	53%

Accessing Groceries

How is your experience traveling to get groceries? (Satisfaction on a scale of 1-10 [Low to High])	Baseline %	Post-Mobility %	Post-Placemaking %
1	50%	38%	21%
2	6%	2%	5%
3	4%	14%	18%
4	4%	10%	5%
5	15%	17%	13%
6	7%	7%	11%
7	2%	2%	5%
8	2%	2%	13%
9	2%	2%	5%
10	9%	5%	3%

How do you currently travel to buy groceries?	Baseline %	Post-Mobility %	Post-Placemaking %
Walk	13%	17%	3%
Bike	2%	12%	8%
Bus	4%	5%	11%
Drive personal car	78%	93%	61%
Other	4%	5%	21%
Dockless scooters or bikes			0%
Carshare			0%

Accessing Health Services

How is your experience traveling to access health services? (Satisfaction on a scale of 1-10 [Low to High])	Baseline %	Post-Mobility %	Post-Placemaking %
1	39%	31%	18%
2	7%	2%	5%
3	6%	7%	3%
4	2%	5%	5%
5	28%	38%	37%
6	4%	5%	5%
7	7%	5%	16%
8	4%	2%	8%
9	0%	0%	0%
10	4%	5%	3%

Use of the Mobility Hub Space

How often do you come to this space?	Baseline %	Post-Mobility %	Post-Placemaking %
Everyday	24%	14%	13%
A few times a week	20%	26%	26%
About once a week	15%	21%	29%
A few times a month	13%	12%	13%
Once a month	11%	14%	5%
Less than once a month	17%	12%	13%

Do you think you will come to this space more frequently now?	Post-Mobility %
Yes	38%
No	35%
Uncertain	27%

Influence of New Mobility Services on Travel Behavior

Will new mobility services alter your travel patterns (or have they already)?	Post-Mobility %	Post-Placemaking %
Yes - they have decreased my public transit usage	6.45%	0%
Yes - they have increased my connectability to public transit	6.45%	0%
Yes - they have decreased my car usage	29.03%	26%
Yes - I move around more than before	19.35%	18%
Haven't used them yet	51.61%	
I plan to use them to connect to public transit	0.00%	0%
I think their presence in this area will shift more of my trips to new mobility instead of the bus	3.23%	3%

I think their presence in this area will shift more of my trips to new mobility instead of the car	6.45%	5%
Not planning to use them	38.71%	37%
No, but interested to try the new mobility in the space		26%

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