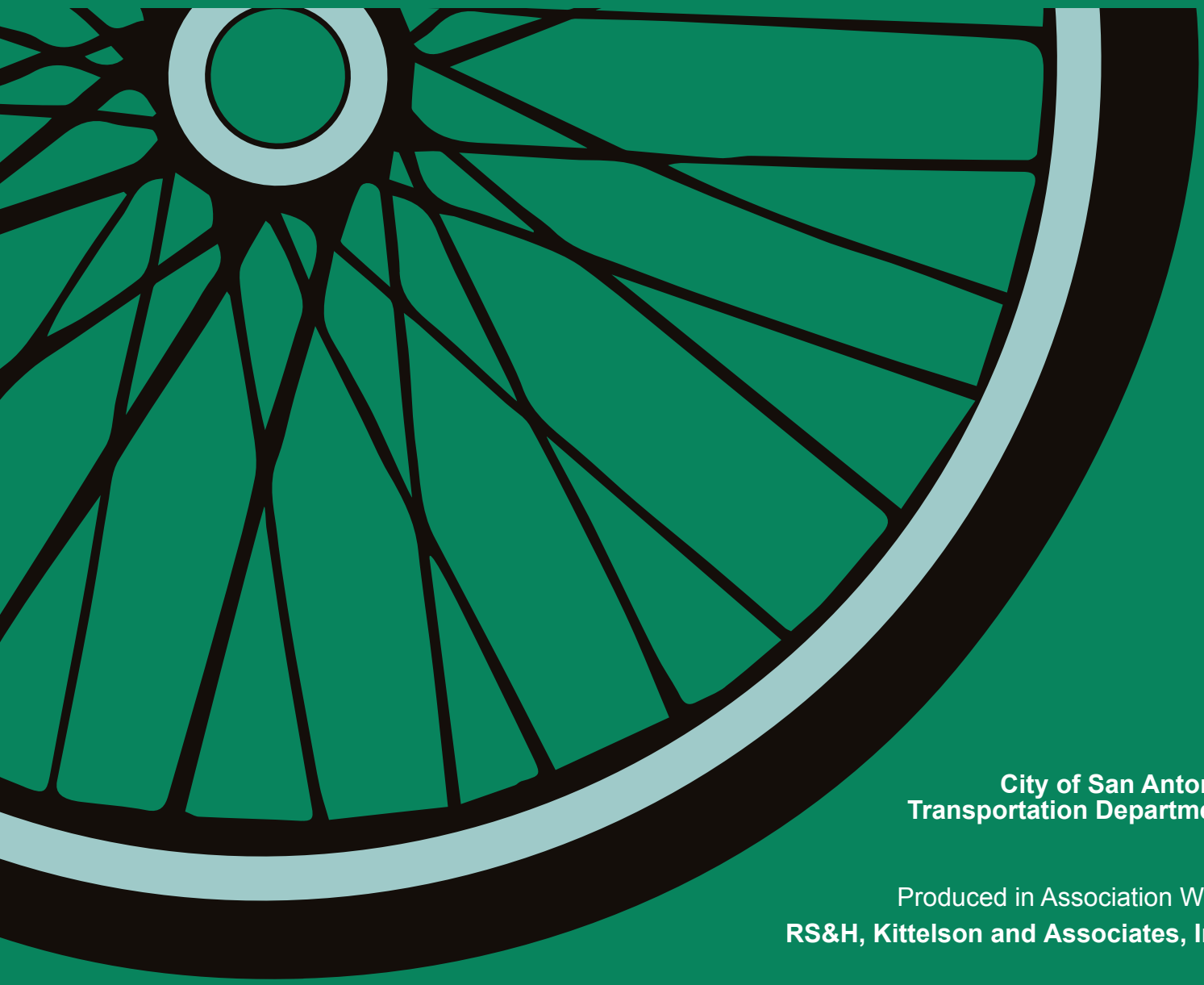
Bike Network Plan

Appendix A:

Existing Conditions, Needs Assessment, and Inventory Report



City of San Antonio
Transportation Department

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ACKNOWLEDGEMENTS:

This report was produced by various consultant staff members on the Bike Network Plan (BNP) team and was reviewed by several City of San Antonio Transportation Department Staff members. Thank you to the following individuals for their work on this report: Cat Hernandez, Harley Hubbard, Isaac Levy, Zan Marshall, Joe Conger, Sean Beauvais, Murray Myers, Venessa Garza, Phyllis Huegel, Chris Romano, Vamshi Yellisetty, Conor Semler, Marissa Tucker-Borquez, Kyle Benne, Nick Arnio, Liz High, David Bemporad, Alex Bonelli, A.J. Thomspon, Carley Nguyen, Clay Anderson, and Lauren Schleinat.

CONTEXT:

This report was produced as the first formal working paper associated with the City of San Antonio's Bike Network Plan (BNP). The goal of this report is to serve as a comprehensive summary of the context in which the BNP exists, providing a foundation onto which design guidelines, routing studies, cost estimates, and implementation guidance can exist. This report is being published alongside two other reports, The Health Impact Assessment Existing Conditions Report and the 2023 Public Engagement Report. These documents serve different functions but may feature overlapping ideas and data with this report – allowing them to, at times, summarize the expansive discussion in this report. All data recorded here is one essential component of the BNP, but not all will be included in the final BNP document. This report will serve as an appendix to the final BNP for reference.

CHAPTER 1. BIKE NETWORK PLAN OVERVIEW

The City of San Antonio Bike Network Plan (BNP) is a visionary effort to rethink how San Antonians get around. The plan will serve as a blueprint for building and maintaining a comfortable, complete, and accessible bicycle network for all people regardless of their age or ability. San Antonio's 2011 Bike Master Plan established a foundation for on- and off-street bicycle facilities throughout the city, but a lot has changed since the plan was adopted. Innovations in design for bike facilities, heightened concerns regarding safety for all users, recognition of social inequities and the need to address them, a fast-growing population, and increasing demands for greater mobility options all make it necessary to update San Antonio's bike plan. The BNP will build off existing best practices, innovations, and industry standards to better guide decision-making and investments to transform San Antonio into a city with world-class bicycling facilities that meet the needs of the people who live, work, and travel here.

WHY THIS PLAN IS IMPORTANT

San Antonio has made large strides in building a transportation network that provides choices for how to travel. However, additional investments are needed to create an interconnected, safe, and comfortable biking network that meets the needs of all San Antonians, no matter their confidence level. The following section addresses the benefits of promoting biking and other micromobility, as well as the evolving needs of San Antonians.

San Antonian's Need More Transportation Options

More than 200,000 San Antonians do not have access to a vehicle and depend on walking, biking, and transit to reach their destinations. Among these residents, some cannot afford to own and operate a car, while others are too young or too old to drive. Many San Antonians have illnesses or disabilities that prevent them from operating a vehicle, while others simply prefer not to drive. With limited transit options and disconnected bicycle facilities, there is a large demand for low-cost mobility options that allow residents to access jobs, healthcare, education, and services.

7.9%

Of households in San Antonio do not have access to a vehicle.

Source: 2021 ACS 5-Year Estimates

Bicycle Safety Is a Priority for the City

When we design it for our most vulnerable road users, we make transportation safer for all road users. In 2022, San Antonio was ranked the 16th deadliest city for cyclists in the Nation[1]. Between January 2018 and December 2022, over 3,900 pedestrian crashes and over 1,540 bicyclist crashes were reported in San Antonio alone[2]. While education and other efforts are important, safe infrastructure that is designed for separation between motorists, bicyclists, and pedestrians is the most effective way to reduce crashes and crash severity. Infrastructure also impacts who walks or bikes, as many may choose not to walk or bike at all if it is perceived too dangerous or too indirect to use.

In 2022, San Antonio was ranked the 16th deadliest city for cyclists in the Nation.

Source: National Highway Traffic Safety

1. National Highway Traffic Safety Administration, 2022.
2. Texas Department of Transportation Crash Records Information System (CRIS)

San Antonians Need More Active Living Choices

Lack of physical activity is associated with increased risk of many health problems, particularly obesity, diabetes, and heart disease. Implementing walking and biking facilities creates access to places where residents can be physically active and provides more opportunities for social interaction that have positive impacts for individual mental health. In addition, increased informal, neighborhood social exchanges can help grow a sense of community and creates a more active and healthier San Antonio.

San Antonians typically spend **22% of their income** on transportation.

Source: 2023 Center for Neighborhood Technology

A more Bikeable San Antonio Creates an Economically Stronger San Antonio

Bicycle investments provide numerous economic benefits including lower transportation costs for individuals; savings to public agencies from less wear and tear on streets; and the potential to attract new residents and employers to the city. Studies show that shops and restaurants along bike lanes see higher sales[3] and self-report positive impacts to their businesses[4] than businesses without bike lanes in their vicinity because cyclists are more likely to slow down and stop to visit them compared to people in cars.

houses in areas with above-average walkability/bikability are **worth $34,000 more**

Source: ULI Active Transportation and Real Estate

On an individual level, encouraging more walking and biking can save San Antonians thousands of dollars each year. Between the cost of gas, insurance, and repairs, vehicle ownership and maintenance are expensive – especially when compared to peer cities in Texas. On average, annual transportation costs for households in San Antonio are $13,342, which accounts for 22% of yearly income. In comparison, transportation costs in Austin and Dallas account for 17% of household incomes[5]. Because of the lack of safe, reliable options to get around without a car, low-income households often strain their budgets to afford a vehicle.

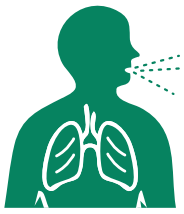
Motorized vehicles are one of the largest contributors to greenhouse gas emissions in the US.

In San Antonio, private vehicles account for 90% of transportation emissions.

Source: San Antonio Climate Action and Adaptation Plan

Responsible Environmental Stewardship

According to the City of San Antonio Office of Sustainability, transportation is the second leading cause of greenhouse gas emissions after energy production, with over 90% of transportation emissions resulting from private vehicles[6]. Simply replacing short vehicle trips with walking and biking trips can reduce particulate matter, nitrous oxide, sulfur oxide, volatile organic compounds, and carbon dioxide, helping the City to achieve its goal of net zero carbon emissions by 2050.



San Antonio ranked **27th** **In the Nation for asthma prevalence,** emergency room visits for asthma, and deaths due to asthma. [11]

Source: Asthma and Allergy Foundation of America

3. Salt Lake City Division of Transportation. 300 South Progress Report. 2015.
4. Emily Drennen. Economic Effects of Traffic Calming on Urban Small Businesses. 2003.
5. Center for Neighborhood Technology
6. City of San Antonio Climate Action and Adaptation Plan

SAN ANTONIO OVERVIEW

Originally settled in the early 1700s and incorporated in 1837, San Antonio has evolved into a thriving, full-service community with historic charm, beautiful neighborhoods, and robust recreational amenities. It stands as one of the nation's premier tourist destinations due to attractions such as the Riverwalk, the San Antonio Missions, and multiple theme parks. At over 1.4 million residents, San Antonio has consistently been one of the nation's fastest-growing cities[7] and is currently the third fastest-growing in the country[8].

A variety of unique neighborhoods and 13 regional centers form San Antonio's urban fabric. San Antonio is connected by an extensive network of interstates, highways, local roadways, trails, and bike facilities. However, while there are over 4300 miles of roadways in San Antonio today, less than 10% of roads have a bike facility.

SAN ANTONIO AT A GLANCE

- 7th largest city in the United States and 2nd most populous in Texas
- Known for the Alamo, the number one tourist attraction in Texas and one of the city's five Spanish colonial missions.
- Host to more than 39 million visitors a year
- Home to the River Walk and Howard W. Peak Greenway Trail System –a 110-mile network of multi-use paths along San Antonio's waterways.
- Includes more than 240 parks, totaling over 16,000 acres of park and conservation land.

As illustrated in Figure 1.1, the San Antonio BNP study area includes the entire City of San Antonio municipal area. The BNP primarily focuses on transportation facilities owned, operated, and/or maintained by San Antonio and how those facilities connect to and intersect with facilities located in other agencies. Other agencies may include state, local and neighboring jurisdictions, and other government agencies operating facilities adjacent to or crossing San Antonio roadways. In addition, special planning consideration will be given to how biking facilities can be better connected from San Antonio to its extraterritorial jurisdiction (ETJ) in unincorporated Bexar County.

7. Kirkpatrick, Brian. 2023. San Antonio was the fastest growing major U.S. city during the pandemic.
8. U.S. Census Bureau. 2023. Large Southern Cities Lead Nation in Population Growth https://www.tpr.org/news/2023-05-22/san-antonio-was-the-fastest-growing-major-u-s-city-during-the-pandemic

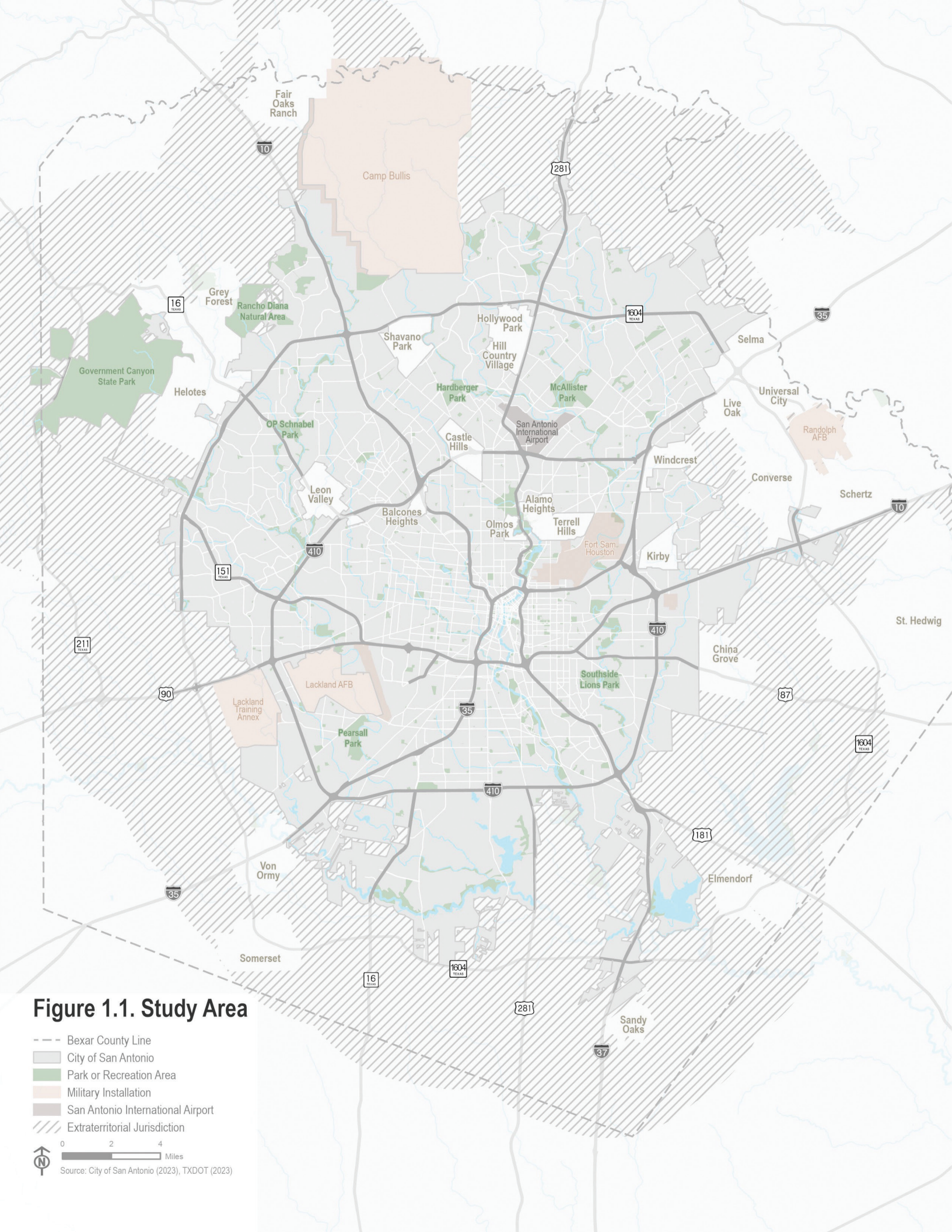


Figure 1.1. Study Area

- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport
- Extraterritorial Jurisdiction

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

PLAN DEVELOPMENT PROCESS

The development of the BNP is a collaborative effort that brings together residents, special interest communities, regional and state partners, local stakeholders, and internal City departments to create a strategic transportation vision for San Antonio. The Plan's process includes listening, complex technical analysis, as well as coordination with concurrent planning initiatives and community partners.

The development of the BNP began in January 2023 and will be completed in the following steps:

San Antonio Today

Understand Current Conditions. Conduct a comprehensive inventory of existing land use, socioeconomics, safety, roadway, and active transportation conditions within the study area as of November 2023.

Action Plan

Develop a Citywide Vision for Biking. Identify system gaps and opportunities to create a citywide bicycle network that incorporates on- and off-street facilities to get people to where they want to go.

Vision for Biking in San Antonio

Implementation and Action Plan. Identify, evaluate, and prioritize issues, needs, and potential facility improvements to create a phased implementation plan.

This document, Technical Memorandum 1: Existing Conditions Assessment, presents a detailed inventory and assessment of existing conditions within the study area.

CHAPTER 2. HISTORY OF BIKING IN SAN ANTONIO

HISTORY OF SAN ANTONIO'S BIKE NETWORK

Since the first known bicycle activity in San Antonio in 1869, the city has made significant progress in developing a bicycle network. The largest single expansions have been a result of extending the Riverwalk and constructing the Howard W. Peak Greenway Trail System. Yet, the City's history leaves a fragmented network for walking and bicycling. Like most American cities, San Antonio is seeking ways to retrofit its built environment for walking and bicycling so that the city can adequately serve the transportation needs of residents and visitors. While the timeline below presents essential milestones in bike planning for San Antonio, the city has faced significant setbacks. For additional information please see Appendix A to this report.

1869 The San Antonio Herald announces the city's first bicycle.[9]

1891 San Antonio's first bicycle club -- The Alamo Wheelmen -- is formed.[10]

1900's Various city by-laws that govern the use of bicycles in San Antonio are introduced.

1990 San Antonio Police Department begins its first downtown bicycle patrol.[11]

1995 Alamo Area Metropolitan Planning Organization (AAMPO) forms the Bicycle Mobility Advisory Committee (BMAC).[12]

1997 City of San Antonio's adopted Master Plan Policies identified policy to "Promote the safe use of bicycles as an efficient and environmentally sound means of recreation and transportation by encouraging a citywide network of lanes, trails, and storage facilities".[13]

2000 Funding for the Howard W. Peak Greenway Trail System was first approved by voters, followed by three subsequent elections, to use 1/8 cent from local sales tax revenue to develop the trails.

2007 Construction of the Howard Peak Greenway Trail System began.[14]

City of San Antonio adopts the 2011 Bike Master Plan and a Complete Streets Policy[15].

2011 "B Cycle" San Antonio bike sharing program is inaugurated, the first bike share program in Texas[16].

First Síclovía event in San Antonio[17].

2015 City of San Antonio passes the first Vision Zero Policy in Texas[18].

2022 AAMPO forms the Active Transportation Advisory Committee which informed AAMPO's Mobility 2050 Plan – laying out a multimodal vision and highlighting the necessity to construct bicycle facilities for users[19].

2023 **San Antonio Launches its update to the 2011 Bike Plan – the Bike Network Plan[20].**

9. https://www.census.gov/newsroom/press-releases/2023/subcounty-metro-micro-estimates.html
10. Hemphill, H. (2015). Bicycles, Velocipedes and High-Wheelers. In San Antonio on wheels: The Alamo City learns to drive (p. 7), Maverick Pub Co.
11. San Antonio Bicycle History. History (bicycles) - Texas Transportation Museum. (n.d.). https://classic.txtransportationmuseum.org/history-bicycles.php
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14. The City of San Antonio - official city website > home. (1997). https://www.sanantonio.gov/Portals/0/Files/Planning/NPUD/master_plan.pdf
15. Aguirre, P. (2023, February 26). "beautiful vision": San Antonio opens 100th mile on Greenway Trail System. San Antonio opens the 100th mile on Greenway trail system. https://www.mysanantonio.com/lifestyle/outdoors/article/greenway-san-antonio-17805593.php
16. Introduction - sa.gov. (2011). https://www.sa.gov/files/assets/main/v/2/transportation/documents/san-antonio-bike-plan-2011/01-intro.pdf
17. About Us... San Antonio. (n.d.). https://sanantonio.bcycle.com/about-us
18. Síclovía. YMCA of Greater San Antonio. (2023). https://www.ymcasatx.org/programs/community/siclovia
19. Dimmick, I. (2020, January 31). Vision zero initiative calls for reduced speed limits – is San Antonio ready?. San Antonio Report. https://sanantonioreport.org/vision-zero-initiative-calls-for-reduced-speed-limits-is-san-antonio-ready/
20. Alamo Area Metropolitan Planning Organization. Alamo Area MPO. https://www.alamoareampo.org/Committees/ATAC/

ACHIEVEMENTS SINCE THE SAN ANTONIO BIKE PLAN 2011

The San Antonio 2011 Bike Plan envisioned that by 2030, "bicycling will be a fundamental component of the complete transportation and recreation system of the San Antonio-Bexar County region. Residents and visitors of all ages and abilities know they can easily find a comfortable place to ride their bicycles – be it a multi-use path, bicycle boulevard, cycle track, bicycle lane, route, or other well-designed bikeway - in most areas of the region." To make this vision a reality, the Alamo City region has made significant improvement to its bicycle and pedestrian infrastructure, programming, and policies. The following table outlines select action steps since 2011 and their completion status.

SINCE COMPLETION OF THE 2011 BIKE PLAN

48% of Tier 1 Projects

27% of Tier 2 Projects

have received some type of bike infrastructure.

Table 2.1. Achievements Since the 2011 Bike Plan

Achievements	Status
Adopted Complete Streets Policy in 2011[21]	Complete
Adopted No Parking Policy for All New Bike Lanes in 2014[22]	Complete
Passed Resolution instructing the City study Mandating Helmet usage for bike users	Complete
Voters Approved Sales Tax funding for Greenway Trails for the 4 times.[23]	Complete
Adopted Vision Zero Policy in 2015.[24]	Complete
Developed Vision Zero Dashboard.	On-Going
Develop advertising campaign to increase public awareness of bicyclists and pedestrians.[3]	On-Going with Vision Zero Policy
Implement bikeway projects in coordination with other capital projects such as the resurfacing program	On-Going
AAMPO began a Street Skills class to educate adults and mature teens on important street riding information in a classroom-style session.	On-Going
AAMPO established a permanent Active Transportation Advisory Committee.	Complete
Establish a Transportation Department to guide pedestrian and bicycle decision-making and investments	Complete
Completed 100 miles of greenway trails, with more than 60 miles still planned.[4]	On-Going

… But There is More to Be Done …

21. Bike network plan. City of San Antonio. (n.d.). https://www.sa.gov/Directory/Departments/Transportation/Initiatives/Biking/Bike-Network-Plan
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23. City of San Antonio. (2014). Resolution 2014-05-29-0018R. In Support Of Further Evaluation By Staff Regarding Bicycle Helmet Usage And Increased Bicycle Safety Awareness.
24. Brnger, Garrett. (2020). KSAT. Future of greenway trails system funding uncertain https://www.ksat.com/news/local/2020/09/10/future-of-greenway-trails-system-funding-future-uncertain/
25. https://www.sa.gov/files/assets/main/v/1/omb/documents/fy2024/adoptedcip.pdf
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While many of the successes listed above moved bike infrastructure in San Antonio forward, others had more **complex and tortuous implementations**.

For example, the 2014 policy ending parking in bike lanes only applied to new bike lanes and required the installation of new signage, leaving hundreds of miles bike lanes without a "No Parking" sign and **frequently parked in**. Additionally, recommendations from the San Antonio Bike Plan 2011 were based on national guidance at the time. In recent years, national best practices and guidance have evolved to implement bicycle facilities that are considered **safer and more comfortable** for **all ages and abilities**. This includes bike boulevards, which are **low stress routes** along neighborhood streets, as well as protected bike lanes, which are on-street bicycle facilities that are **physically separated from motor vehicle traffi**c by a vertical element or barrier, such as a curb, flexible delineators, or vehicle parking aisle.

Despite considerable success in San Antonio — **more action remains** to make the city a safe and desirable place to ride a bike.

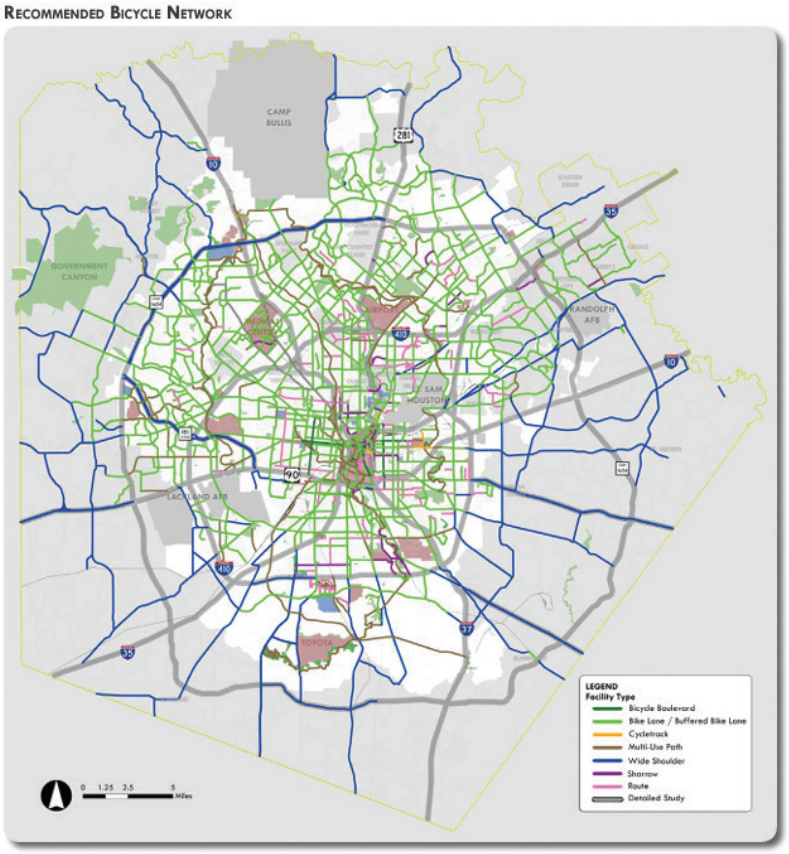
BUILDING OFF PREVIOUS PLANS

To connect current and past thinking about San Antonio's transportation network, a review of previous planning documents was conducted. Building upon these plans, the BNP leverages information, findings, and community feedback to further understand San Antonio's bicycle challenges and needs. The following provides a summary of major documents and programs reviewed. A full review of previous plans is provided in Appendix B.

City of San Antonio Plans

San Antonio Bike Plan (2011)

Approved September 29, 2011, the original Bike Network Plan identified developed a vision to expand the city's existing 209 miles of bike facilities into a 1,768-mile interconnected bicycle network that provides access for residents and visitors of San Antonio to destinations throughout the City and surrounding region. As illustrated on the right, the recommended bicycle network includes:



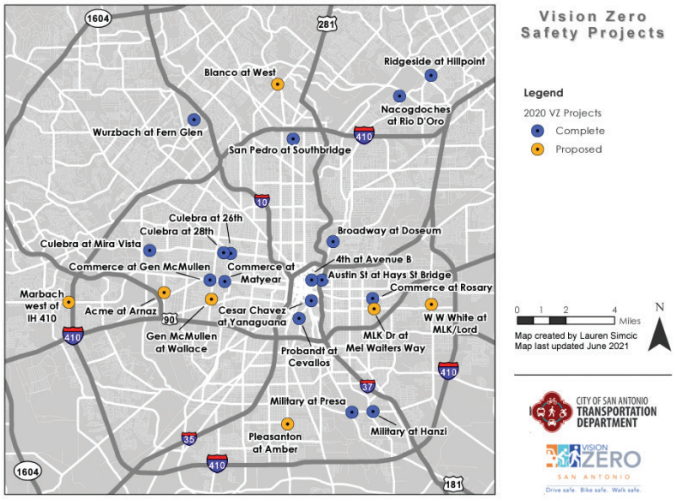
- 861 miles of bicycle lanes,
- 45 miles of buffered bicycle lanes,
- 12 miles of bicycle boulevards,
- 231 miles of multi-use paths and cycle tracks,
- 480 miles of wide shoulders, and
- 140 miles of additional bicycle routes.

The network was also evaluated and prioritized based on need, connectivity, ease of implementation, and community support. The plan recommends Tier 1 improvements to be completed within the first 5 years after adoption, and Tier 2 improvements within the subsequent 5 years. The plan also outlined a series of policies, programs, and staffing needs to implement the plan. These include expanding bicycle education opportunities, incentivizing bicycle commuting options, implementing police officer training programs, and increasing Bicycle Program city staff and funding opportunities to plan, design, and construct bicycle facilities.

As transportation research has progressed, much of the infrastructure recommended in the 2011 Bike Plan is no longer best practice. Wide shoulders, painted bike lanes, and bike lanes without separation or protection from cars may intimidate less experienced riders, discouraging them from biking. While the 2011 Bike Plan provides a foundation for developing cycling infrastructure in San Antonio, an update is needed to accommodate the safety needs or more types of riders.

2022-2027 Bond Project Proposal (2022)

In 2017, an $850 Million Bond program was passed to improve city facilities, including dedicated funds for street infrastructure and over 200 miles of new sidewalk construction. On May 7, 2022, the San Antonio public approved six propositions for the City's 2022-2027 Bond Program totaling $1.2 billion and including 183 projects. The Bond encompasses a variety of street, sidewalk, and park projects to construct or improve street amenities, sidewalks and multimodal (pedestrian, bike, and transit) infrastructure facilities with the aim of increasing recreational opportunities. A full listing, and the status of 2017 Bond project and 2022 recommended projects, is available on the City's website. During the development of the BNP, opportunities to integrate recommendations into Bond projects will be reviewed.



Vision Zero San Antonio (2022)

Vision Zero San Antonio sets standards, goals, and an action plan for reaching zero fatalities for all modes of transportation. Vision Zero reinforces the concept that transportation is not only about moving people between locations, but that doing it safely is the most important goal. The Plan recognizes the need to plan safe facilities not only for cars, but also for people walking and biking. As part of the program, infrastructure projects to improve pedestrian and bicycle safety have been identified. The BNP will review pedestrian and bicycle safety conditions to determine safety countermeasures to improve pedestrian and bicycle safety.

SA Tomorrow

SA Tomorrow serves as the City's official, long range planning document providing strategic direction for decision making and community investment. Developed as an innovative, three-prong planning effort, SA Tomorrow includes three guiding documents:

- **Comprehensive Plan** addresses land use, urban design, and municipal policy to direct the city's long range development efforts and the other types of plans utilized by the city.
- **Sustainability Plan** crates a roadmap for achieving the overall vision of a sustainable San Antonio. The plan proposes quantifiable goals for improving bicycle and pedestrian mobility through the creation of neighborhood bike scores, walking scores, and the implementation of a Bike Facility Action Plan.

- **Multimodal Transportation Plan** is a long-range blueprint for travel and mobility in San Antonio and Bexar County, establishing a shift in focus from moving vehicles to moving people. The Plan identifies a variety of policies and actions to encourage and support walking and biking including:
    - Changes to design requirements that improve the bicycle and pedestrian network (such as having separated bicycle facilities on roads with posted speed limits above 35 MPH),
    - Committing 2% of Transportation and Capital Improvements capital budget each year to pedestrian and bicycle improvements,
    - Conducting outreach to stakeholder in advance of implementing bicycle facilities, and
    - Repurposing parking space.

SA Tomorrow Sub-Area Plans and Regional Center Plans

Following adoption of the Comprehensive Plan in August 2016, the City's Planning Department began development of 13 Regional Centers and 17 Community Areas to identify specific neighborhood land use and mobility strategies and needs unique to the area. Completed plans include a future land use plan and mobility framework to guide priority bicycle routes and streetscaping opportunities. Recommendations from these plans will be reviewed and integrated into the overall BNP.

Additional City plans and programs reviewed are located in Appendix B and include:

- Northeast Corridor Revitalization Plan (2014)
- Trail Design Strategy (2018)
- San Antonio Parks System Plan (2019)
- SA Climate Ready: A Pathway for Climate Action & Adaptation Plan (2019)
- Smart Cities Roadmap (2021)
- Bandera Road Corridor Plan (2022)
- Major Thoroughfare Plan (MTP) (2023)
- San Antonio Airport Plan (2022)
- San Antonio Complete Streets Policy (2024)

Non-City of San Antonio Plans

To ensure that BNP recommendations integrate regional planning efforts, a review of studies, plans, and programs conducted by neighboring jurisdictions and agencies was conducted. A full review of these previous plans is provided in Appendix B and includes:

- AAMPO Bicycle & Pedestrian Data Collection Project (2010)
- AAMPO Bicycle Travel Patterns Survey (2010)
- VIA Metropolitan Transit Vision 2040 Long Range Plan (2016)
- AAMPO Thoroughfare Plan (2018)
- ULI Mobility Hubs in San Antonio (2021)
- Ghisallo Cycling Initiative Railroad Crossings Plan (2021)
- Great Springs Trail Plan (2022)
- Centro Downtown Tomorrow Strategy (2023)
- AAMPO Bicycle and Pedestrian Planning Study (2016)
- TxDOT Bicycle Tourism Trails Study (2018)
- AAMPO Alamo Area Bike Share Master Plan (2018)
- TxDOT San Antonio District Bike Plan (2024)

CHAPTER 3. SAN ANTONIO TODAY

Understanding socioeconomic, mobility and land use trends and challenges happening today lays the foundation for the City of San Antonio of tomorrow. This section provides an overview of existing socioeconomics, land use and travel patterns, and socioeconomic characteristics that sets a baseline for evaluating the City's bicycle network.

San Antonio at a Glance

From its lively urban center to its quiet sun-drenched neighborhoods, San Antonio is humming with a rich cultural heritage, a strong economic present, and a resilient, diverse future. The pull of San Antonio is clear, with its 1. million residents making it the one of the fastest growing cities in the United States and more than 39 million people visiting ever year.

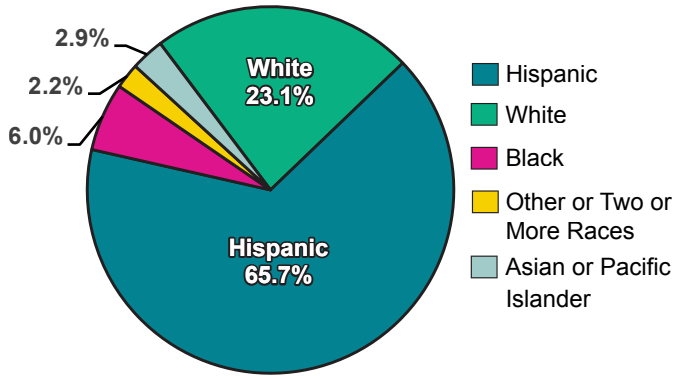
- **Total Population (2021 ACS):** 1,434,540
- **People of Color:** 76.8%
- **Total Housing Units:** 585,402

Trends and Changing Demographics

Since the 2010 US Census Bureau American Community Survey, San Antonio has grown and changed:

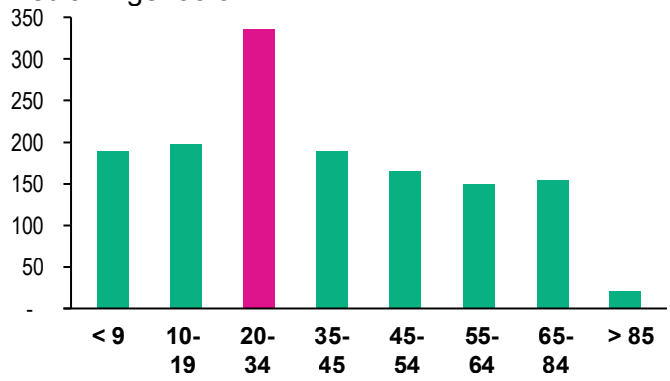
- **We are getting a tad older.** In 2010, the median age was 32.5, in 2021 the median age increased to 33.9. However, in 2021, nearly 25% of San Antonio's population was 18 years of age or younger.
- **We are getting more diverse.** In 2010, the percentage of racial and ethnic minorities in the City was around 72.5%. In 2021, that percentage increased to 76.9%.
- **We are getting more educated.** In 2010, 23.7% of San Antonio residents 25 years or older had a bachelor's degree or higher. In 2021, 27.3% of residents have attained a bachelor's degree or higher.
- **We are getting wealthier.** In 2010, the median household income was $43,152 and $55,084 in 2021. Along with this, we have more access to vehicles; the percentage of San Antonio households without access to a vehicle decreased from 9.5% to 7.9%.

Population by Race



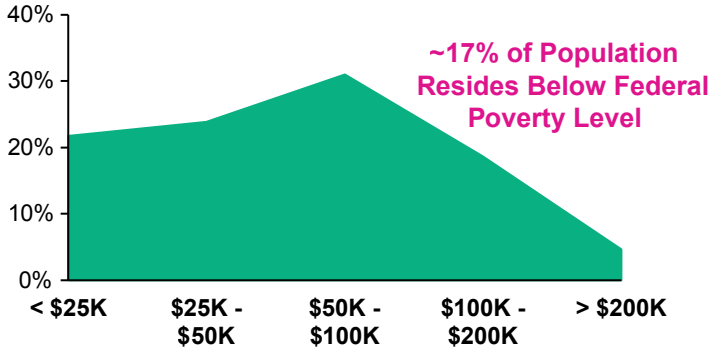
Population by Age in thousands

Median Age: 33.9



Household Income

Median Household Income: $55,084



Source: U.S. Census Bureau. ACS 2021-5vear Estimates

WHERE WE LIVE

A City of Vibrant Districts and Sub-Areas

To better understand the distinct needs of San Antonio's diverse neighborhoods, the SA Tomorrow Comprehensive Plan identified 30 sub-areas used for planning. Beyond distinct physical characteristics, each sub-area has diverse cultural and population groups that influence how people travel around San Antonio.

Figure 3.1 presents the location of the City's 10 City Council Districts, as well as the SA Tomorrow Sub-Areas. The unique character and conditions of each district and sub-area plays an integral role in defining and determining the bicycle facility needs of the City. Table 2.1 outlines examples of how the character of San Antonio's Council Districts differ across the City. As shown in the table, District 5 is the most ethnically diverse, but it also has the greatest percentage of the population residing below the poverty level. Whereas District 9 has the highest median age (37.2 years old), but also has the lowest percentage of Black, Indigenous, and People of Color residents.

Table 3.1 Population Characteristics by District

District	Median Age	% Black, Indigenous, and People of Color	% Below Poverty
1	35.8	78.2%	21.1%
2	31.8	81.8%	23.0%
3	33.9	88.1%	21.0%
4	31.5	88.2%	18.7%
5	33.5	95.2%	30.0%
6	31.7	81.4%	11.1%
7	35.2	74.5%	16.0%
8	30.6	66.5%	15.9%
9	37.6	54.7%	8.8%
10	36.2	58.8%	9.9%
San Antonio	33.9	76.8%	17.3%

Source: U.S. Census Bureau, ACS 2021 5-year Estimates

A Growing Metropolis

In 2023, the US Census Bureau identified San Antonio as the third fastest growing city in the nation, with a staggering increase of over 18,880 residents between July 2021 and July 2022. This rapid growth not only creates opportunities but poses challenges to the City's bicycle network. Understanding where people reside today and where growth is occurring is imperative to creating a plan that addresses the transportation needs of its residents.

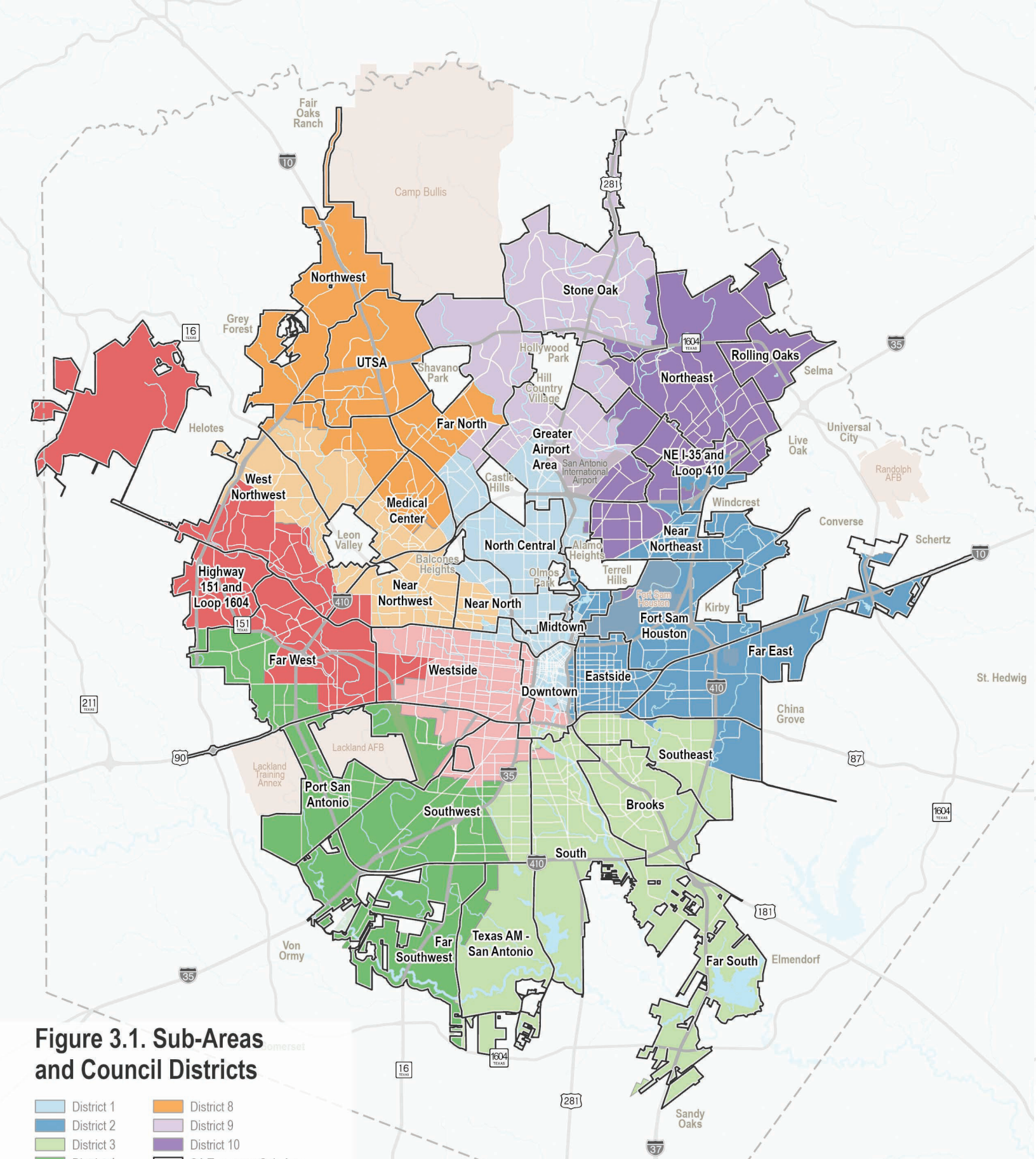


Figure 3.1. Sub-Areas and Council Districts

- District 1
- District 2
- District 3
- District 4
- District 5
- District 6
- District 7
- District 8
- District 9
- District 10
- SA Tomorrow Sub-Area
- Bexar County Line
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

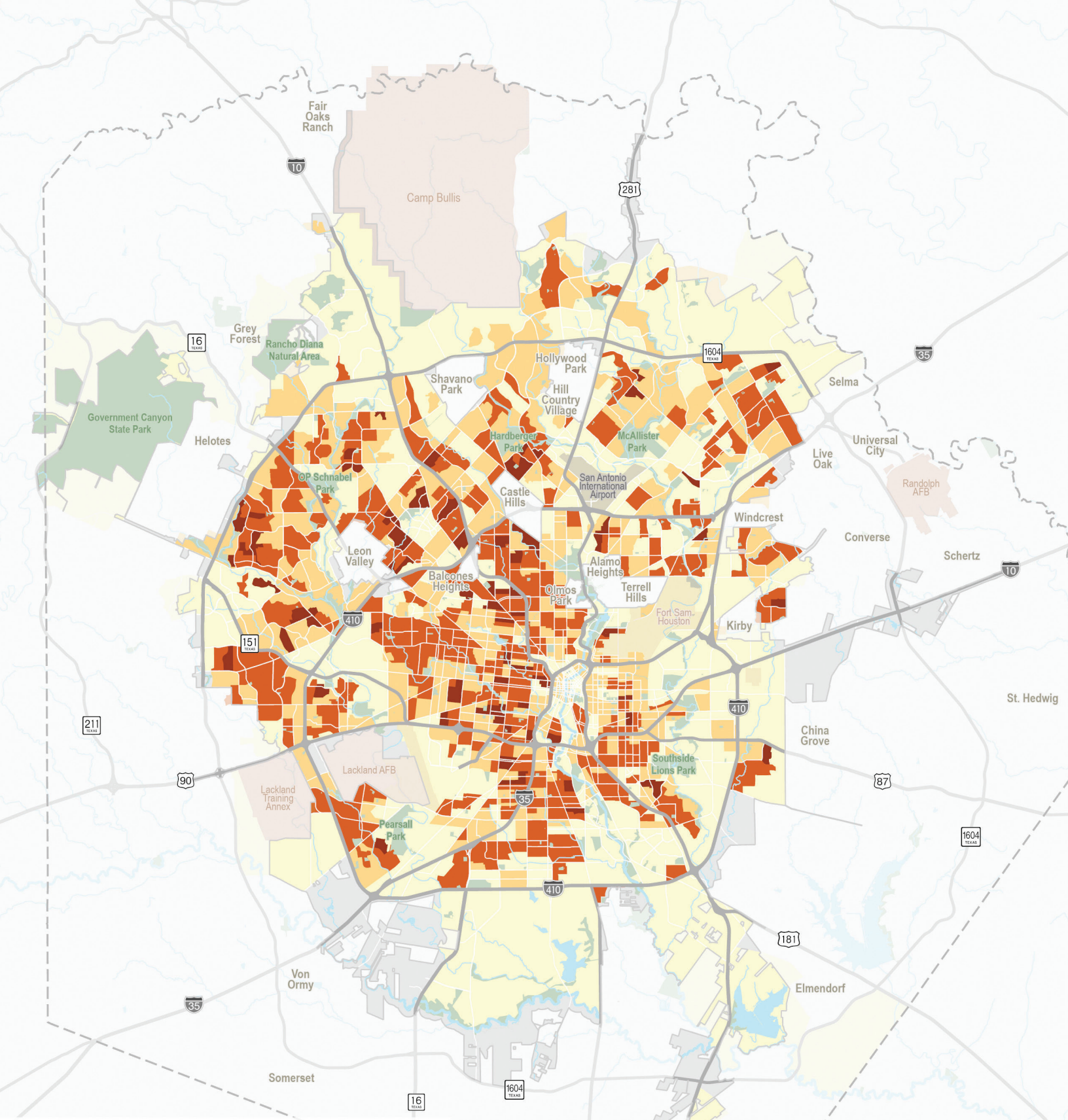


Figure 3.2. Population Density

Population per Square Mile

- Less than 2,800
- 2,801 - 5,000
- 5,001 - 10,000
- Greater than 10,000

- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: US Census Bureau (2021 ACS), City of San Antonio (2023), TXDOT (2023)

WHERE WE WORK

With over 954,000 people working in the region today, San Antonio is one of the fastest growing job markets and economies in the United States[27]. To provide equal access to jobs and opportunities, understanding where employment and major job centers are located is imperative. As illustrated in Figure 3.3, employment opportunities can be found throughout the City; however, increasingly larger employment centers are being located outside of the urban core to suburban areas that may have limited bicycle connections. Neighborhoods with higher-than average employment density are primarily located in central and northern San Antonio, and with particularly high concentrations of jobs in Downtown, Midtown, North Central, the Medical Center, and the Greater Airport Area.

Major Employers

San Antonio is home to multiple large Fortune 500 companies. Major employers in the region include:

- Joint Base San Antonio (including Fort Sam Huston, Camp Bullis, Randolph Air Force Base, and Lackland Airforce Base).
- USAA.
- H-E-B.
- University of Texas at San Antonio Health Science Center; and
- Methodist Healthcare System.

To help attract and maintain quality talent, transportation infrastructure and travel options must be strengthened to meet commute demands.

Major Job Centers

As a part of the SA Tomorrow Plan, the City identified 13 distinct employment centers (**Error! Reference source not found.**) based on existing and planned growth. These employment centers are grouped into the following categories based on their existing uses and urban forms:

- **Activity Centers:** Located across San Antonio, Activity Centers are characterized by mixed-use development and high concentrations of people and jobs. The dense mix of land uses and people in activity centers lends itself to short-trips (i.e., 0.25- to 2-mile trips) which can be made by people walking and biking.
- **Logistics/Service Centers:** Primarily located in northeast San Antonio along major interstates, Logistics/ Service centers support the regional, national, and international movement of goods. The job types in these centers draw employees from across the city at all hours of the day. Some of these employees may have limited or no access to personal automobiles and may rely on transit and nonmotorized travel to commute.
- **Special Purpose Centers:** Concentrated around major military installations (Fort Sam Houston and Lackland Air Force Base), special purpose centers are characterized by large employers and institutions. Due to their specialized (i.e., military) activities, these centers are deliberately separated from the surrounding city with built barriers or buffers. This can make it harder for people to travel through these centers on foot or by bike.

27. San Antonio opens the 100th mile on Greenway Trail System - MySA. (). https://www.mysanantonio.com/lifestyle/outdoors/article/greenway-san-antonio-17805593.php

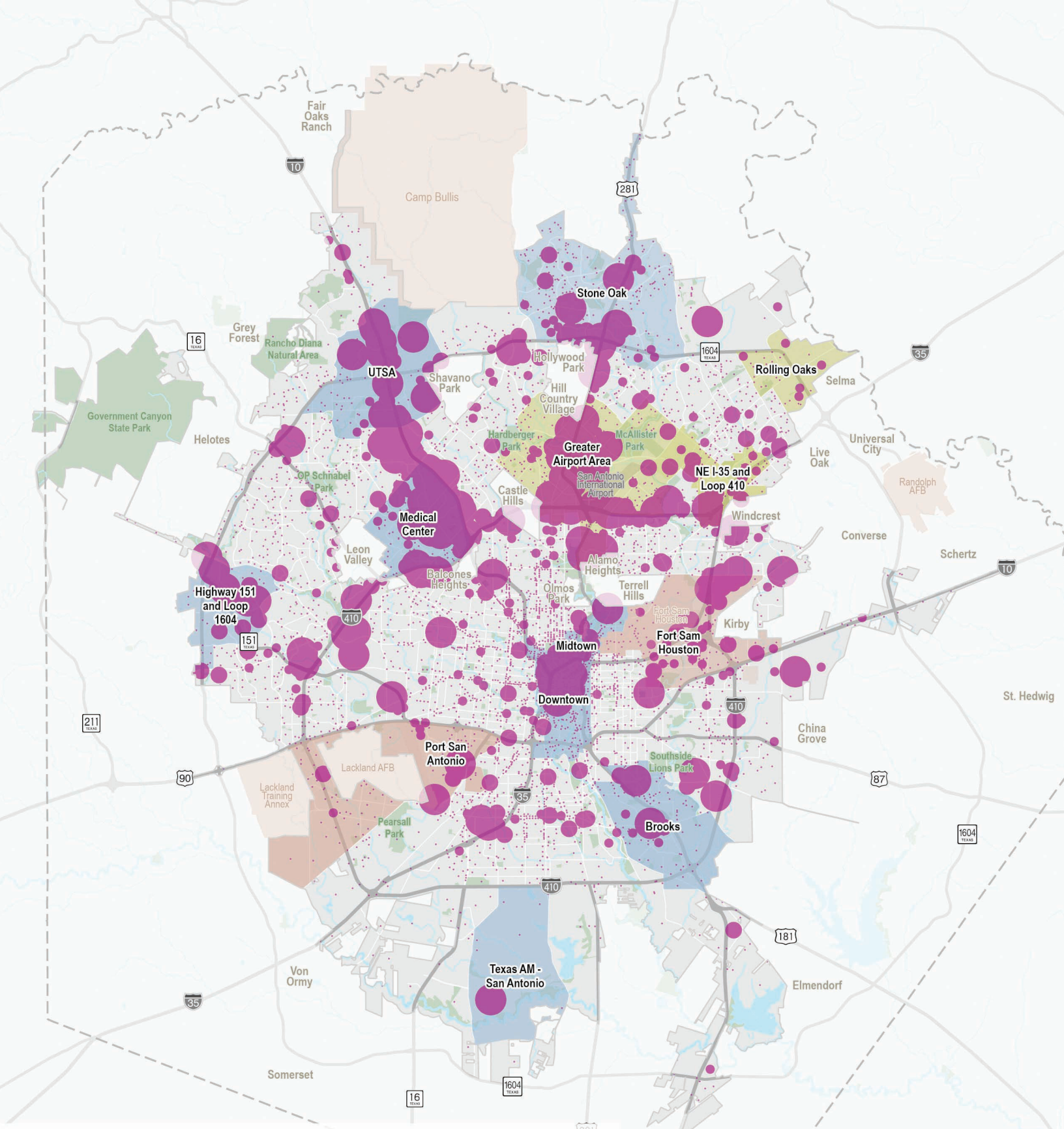


Figure 3.3. Major Employment Areas

San Antonio Regional Centers
- Activity Center
- Logistics/Service Center
- Special Purpose Center

- Less than 250 Jobs
- 251 - 500 Jobs
- 501 - 1,000 Jobs
- More than 1,000 Jobs

- Bexar County Line
- City of San Antonio
- Military Installation
- Park or Recreation Area
- San Antonio International Airport

0 2 4 Miles

Source: US Census Bureau (2023), City of San Antonio (2023), TXDOT (2023)

WHERE WE SHOP, PLAY, LEARN, AND WANT TO GO

Activity centers represent key destinations that generate transportation trips for people looking to work, play, live, and learn. Understanding where key activity centers are located is imperative to developing a complete and connected bicycle network that conveniently connects people to the places that want and need to go. Figure 3.4 illustrates major activity centers and transportation generators in the City, obtained through ESRI Business Analyst and developed by SafeGraph, including:

- **K- 12 Schools,** which represent major destinations students and families may want to access on foot or bike. Today, there are 17 school districts within San Antonio, with over 123 public elementary, middle, and high schools. In addition, there are a variety of private and charter schools located throughout the City.
- **Higher Education,** which includes colleges and universities where students and employees may choose to walk or bike. San Antonio hosts over 100,000 students across its 31 higher-education facilities which includes the University of Texas at San Antonio, Texas A&M University-San Antonio, and the Alamo Community College District's five colleges. Other schools include St. Mary's University, the University of the Incarnate Word, Trinity University, and Our Lady of the Lake University.
- **Health Care Facilities,** which include places like senior centers and medical clinics, dentist offices, and other places people may need to access regularly.
- **Parks and Trailheads,** which provide access to San Antonio's extensive greenway system and other open space and recreational destinations.
- **Key Tourist Destinations,** which include major destinations visitors and locals alike visit. Significant year-round destinations in San Antonio include:
    - **The River Walk –** 15-mile network of stone paths along the San Antonio River that connects hotels, shops, restaurants, theaters, and more, connecting the Downtown, Mission, and Museum Reach districts.
    - **The Alamo –** #1 tourist attraction in Texas, one of the city's five Spanish colonial missions, and a UNESCO World Heritage site, located directly in the Downtown area in Alamo Plaza.
    - **Historic Market Square –** A three-block outdoor plaza lined with shops and restaurants that hosts the largest Mexican market in the U.S. with more than 100 locally-owned shops and stalls, located in downtown San Antonio.
    - **Missions National Historical Park –** A UNESCO World Heritage Site preserving four Spanish frontier missions from the 18th century in a 9-mile stretch along the San Antonio River.
    - **Theme Parks –** SeaWorld San Antonio, Six Flags Fiesta Texas, Morgan's Wonderland (world's largest ultra-accessible theme park designed for those with special needs)
    - **Museums –** Witte Museum, San Antonio Museum of Art, McNay Art Museum, Briscoe Western Art Museum, and the DoSeum.

Major Residential Areas

Providing direct and convenient bicycle network connections between major residential communities and key activity centers creates opportunities to connect people to the places they need to travel; however, large residential developments can often create barriers to access. Subdivisions with circuitous, disconnected internal roadways, walled permitters that limit access, and land uses that create large distances between individual homes and destinations, all create barriers to access.

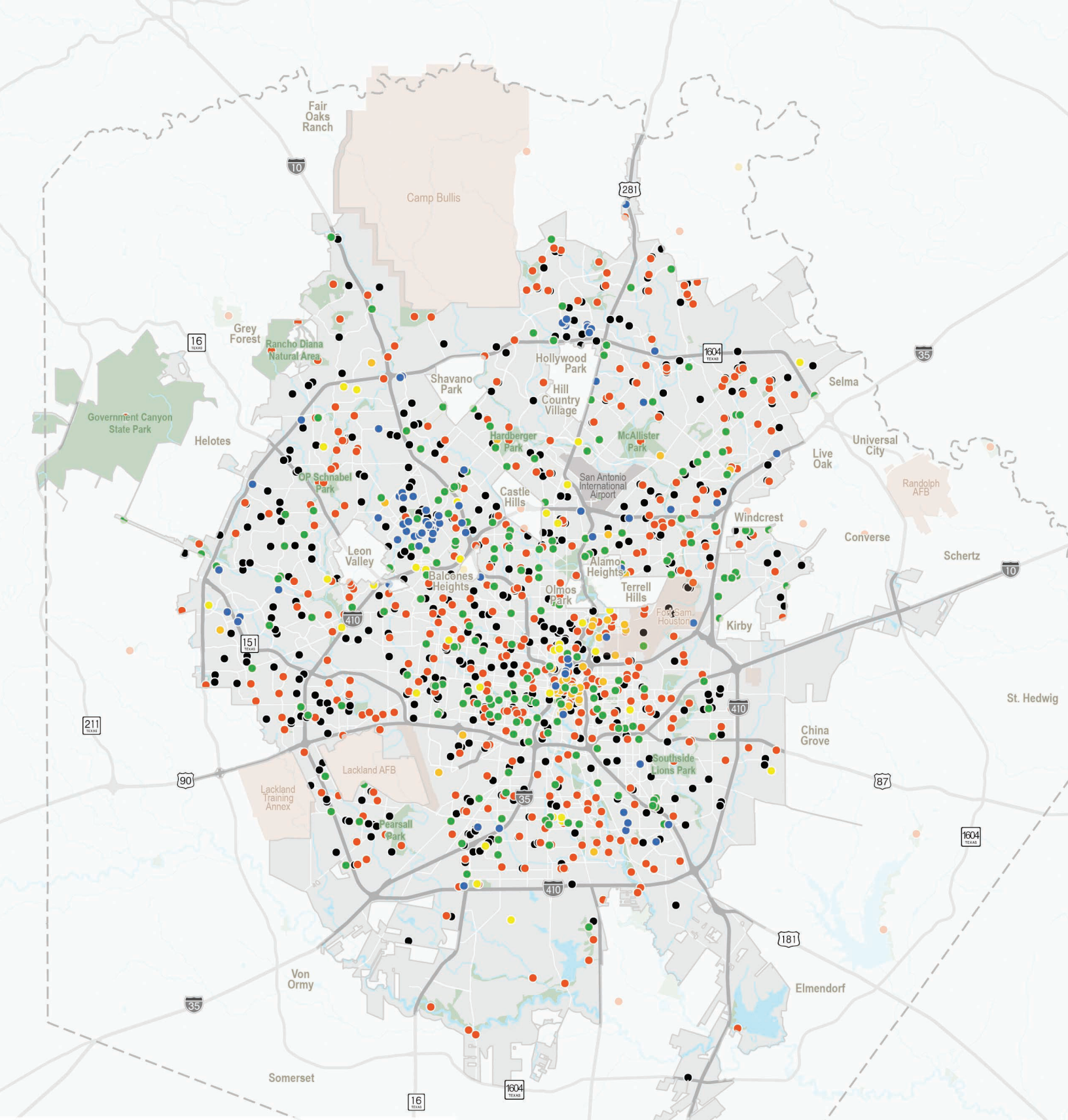


Figure 3.4. Key Destinations

- Health Centers
- Grocery Store
- Higher Education Institution
- Key Tourist Destinations
- Parks and Trailheads
- Schools
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

HOW WE GET AROUND TODAY

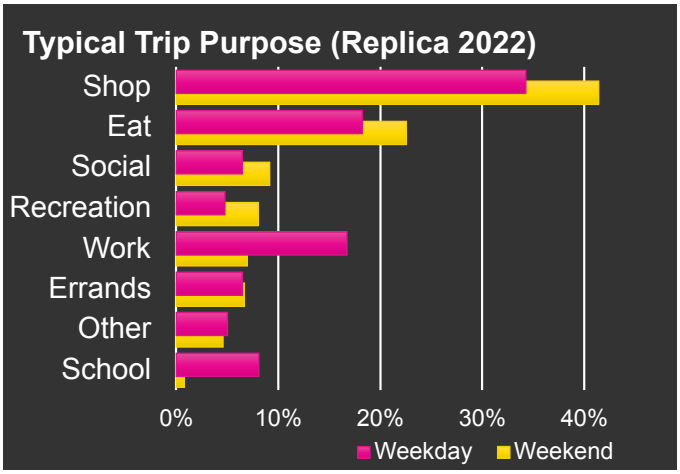
Today, we have more choices than ever before to get to the places we want to go and the people we want to see. Understanding **where people want to go** and **how they choose to get there** – regardless of if that's by walking, biking, driving, or taking transit – will help us define a future transportation network that is enables safe, efficient, and comfortable travel in San Antonio.

The following analysis uses data from Replica, a software that incorporates anonymized data from a variety of sources like physical counts, the US Census Bureau, mobile location data, land use / economic data, and others to model where, how, and when people travel. Unlike a forecast, which predicts how people might travel in the future, Replica uses current data to model how people operate today. While a useful data source, Replica is one source of many. The results are considered in relation to the other data sources reviewed in the existing conditions efforts and is compared to engagement findings from the BNP and other plans and studies to help create a collective understand of how people get around San Antonio.

Why We Travel

We travel for many reasons every day, such as going to the doctor or getting exercise. This analysis identified several trip purposes we might take, including:

- **Getting to Work**: all trips that end at a person's workplace (like commute trips or trips back from lunch).
- **Going to School**: trips to a school or college.
- **Traveling for Goods and Services**: all trips to places where people shop, dine, and run errands.
- **Leisure and Recreation**: all trips to recreational destinations like parks and trailheads (this does not include trips without a destination, like walking the dog or jogging).



In San Antonio today, more than 3 out of every 4 trips we take are to do the things that make up our quality of life, like shop, eat, socialize, and run errands.

How We Get There

We choose to travel in different ways depending on the type of trip, the day of the week, and how far away the destination is (see Table 3.2) Replica data shows that while we mostly choose to drive, walking is the second most common way we choose to travel.

Getting to Work

San Antonian's mostly choose to drive to work alone or with others, and our travel patterns are similar on weekdays and weekend days.

Getting to School

While most students are driven to school, getting to school has the highest percentage of biking (5.5%) and walking trips (16%). Getting to school is by far the shortest trip type but takes longer—potentially due to a larger share of people walking and biking compared to other trips.

Traveling for Goods and Services

San Antonian's generally choose to travel in the same ways, go similar distances, and spend a similar amount of time on weekends and weekdays. Approximately 1 in 10 trips to meet daily needs are done by walking compared to 1 in 200 that do so by biking.

Leisure and Recreation

We tend to drive to get outside or visit friends whether it is a weekend or weekday but tend to drive a tad more on the weekend.

Table 3.2. How We Travel Today (Replica 2022)

	WEEKDAY						
	Drive	Transit	Bike	Walk	Other	Average Travel Distance [mi]	Average Travel Time [min]
Getting To Work	93.2%	0.6%	0.2%	5.2%	0.7%	10.9	22.4
Getting to School	76.5%	0.2%	1.7%	21.5%	0.1%	3.7	15.7
Travel for Goods and Services	83.8%	1.1%	0.8%	11.9%	2.5%	11.4	21.0
Leisure and Recreation	83.8%	1.1%	0.8%	11.9%	2.5%	12.1	24.1

	WEEKEND						
	Drive	Transit	Bike	Walk	Other	Average Travel Distance [mi]	Average Travel Time [min]
Getting To Work	93.7%	0.6%	0.2%	4.7%	0.7%	10.7	17.0
Getting to School	89.8%	0.4%	0.3%	9.2%	0.3%	6.9	19.4
Travel for Goods and Services	88.4%	0.8%	0.4%	8.5%	1.5%	11.3	20.9
Leisure and Recreation	87.1%	0.9%	0.4%	9.0%	2.5%	11.9	23.9

Source: Replica Southwest, Fall 2022 where the Trip Origin is within the City of San Antonio

Where are We Going for Short Trips and How are We Getting There?

More than half of all trips in the United States are within a 20-minute bike ride or less, and more than one in four trips are within a 20-minute walk or less. According to Replica data, 6.2 million trips are taken within San Antonio on a typical Thursday, but nearly 27% of these trips are 2 miles or less. Despite the short distance, these trips are mainly taken by automobile. When a safe and convenient walking and bicycle network is available, short trips are more likely to be made by walking, biking, or using micromobility devices.

Error! Reference source not found. depicts the destination location of trips taken that are 2 miles or less within San Antonio today. It's important to note that short trips are often a product of mixed land uses, as can be seen in Downtown and Midtown. As shown in the Figure,

- People tend to make more short trips in western San Antonio than eastern parts of the City.
- Neighborhoods with the highest number of average weekday short trips include the Southwest, South, Brooks, the western portion of Southeast, Eastside, Midtown, Downtown, Westside, Medical Center, North Central, and UTSA, among others.

Additionally, many of the roads San Antonian's use the most for short trips are arterials or collectors as they provide direct access to destinations. While some of these roads can see high volumes of travel and may be intended to serve longer distance, regional trips, this data indicates they are often also serving shorter, local trips. In this case, developing safe, comfortable bike facilities on these roadways with parallel neighborhood connections on slower speed streets may not only provide San Antonian's of all comfort levels with better places to walk or bike, but may also shift shorter distance, local trips off of arterials and collectors.

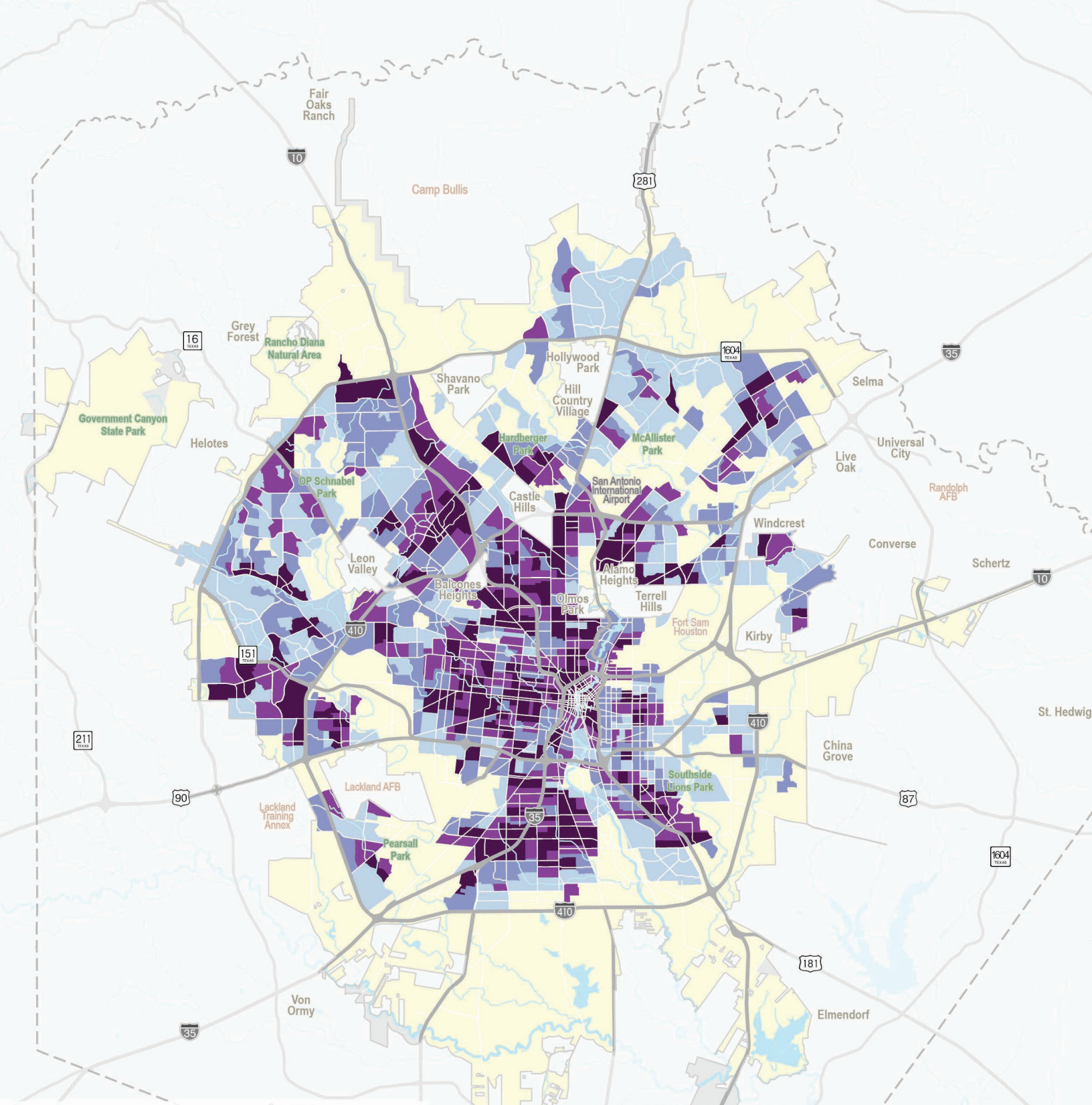


Figure 3.5. Total Weekday Trips Less Than 2 Miles

OUR SOCIAL NEEDS

Often, transportation and land use decisions place unfair burdens on disadvantaged communities. Conducting an analysis of traditionally underserved populations helps identify locations with high concentrations of people who may not have the financial capacity to own a vehicle and rely on walking, biking, and transit to meet their daily travel needs. Table 3.3 illustrates the current socioeconomic populations within the City of San Antonio.

Race and Ethnicity

The City of San Antonio has 29.6% more people of color than Texas as a whole. Of the 76.9% who identify as people of color in San Antonio, 85.5% identify as non-white Hispanic/Latino.

Population with Disabilities

People under 65 years of age in the City of San Antonio are 41.5% more likely to have a disability than compared with the State of Texas overall.

Language

45.5% of households in San Antonio speak Spanish. Of the households with limited English, 88.3% of them were Spanish speaking.

Poverty

36.0% of San Antonians who experience poverty are children, while 13.6% are those 65 years and older.

Vehicle Access

7.9% of households in San Antonio lack access to a vehicle. While San Antonio's vehicle ownership rate is quite high, 51.9% more households do not have access to a vehicle compared to Texas.

Table 3.3: San Antonio Socioeconomic Conditions

	City of San Antonio	Bexar County	Texas Statewide
Age 65 and Older	12.5%	12.1%	12.5%
Minority Population	76.9%	73.5%	59.3%
Population with a Disability (<65 years)	11.3%	10.6%	8.0%
Population below the Poverty Level	17.6%	15.1%	14.0%
Limited English Proficient Persons	7.4%	6.3%	7.1%
Households with no Vehicles	7.9%	6.5%	5.2%

Source: US Census 2021 American Community Survey (5-year Estimates). Disability status is determined for the civilian noninstitutionalized population based on six types of difficulty: hearing, vision, cognitive, ambulatory, self-care, and independent living difficulty.

Areas of High Equity Concerns

The Equity Atlas is a tool to help to help highlight the demographic differences and socioeconomic disparities within the City of San Antonio. The Equity Atlas was developed by the City in tandem with community members, partners, and other decision makers in order to help make data-informed decisions that address these disparities and promote greater equity. The overall equity score, mapped in Figure 3.6, is a combination of race and income.

- **Areas of High Equity Concerns** includes areas with a greater concentration of people of color, combined with the greater density of below median income households, which results in a combined score of 8 or higher.
- **Areas of Low Equity Concerns** includes areas with lower concentrations of people of color combined with the density of above median income households, which results in a combined score of 4 or lower.

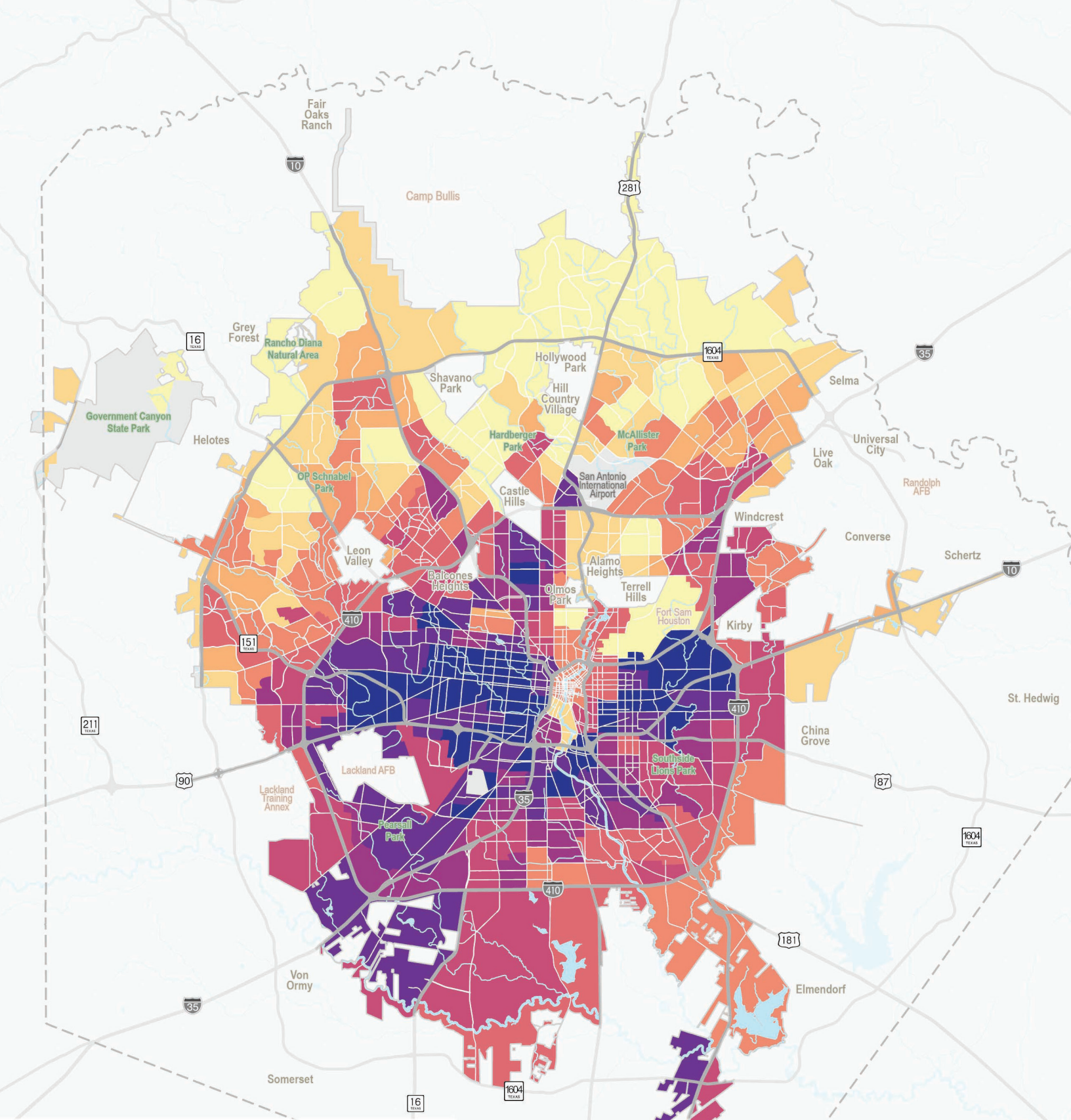
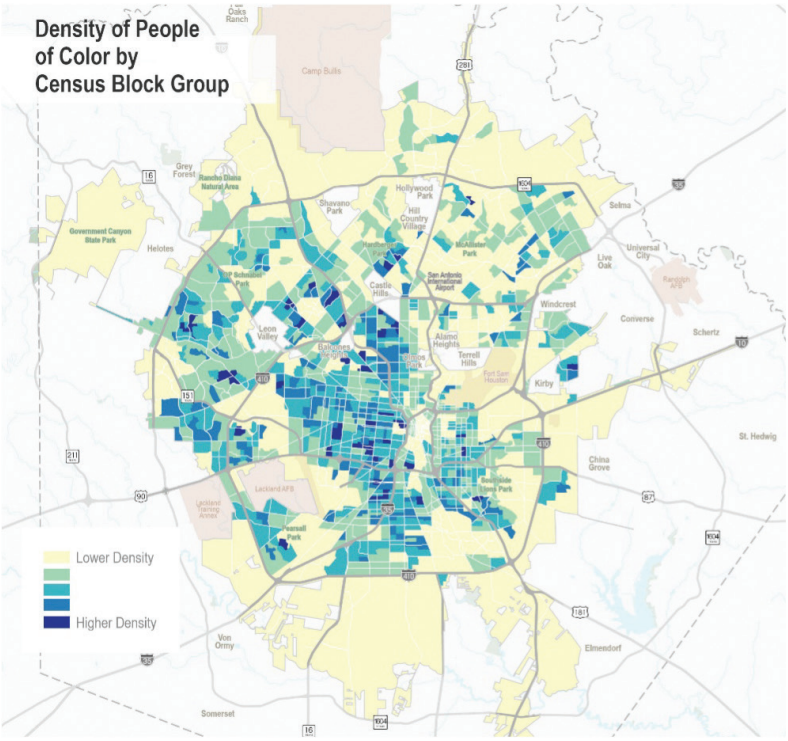


Figure 3.6. San Antonio Equity Atlas

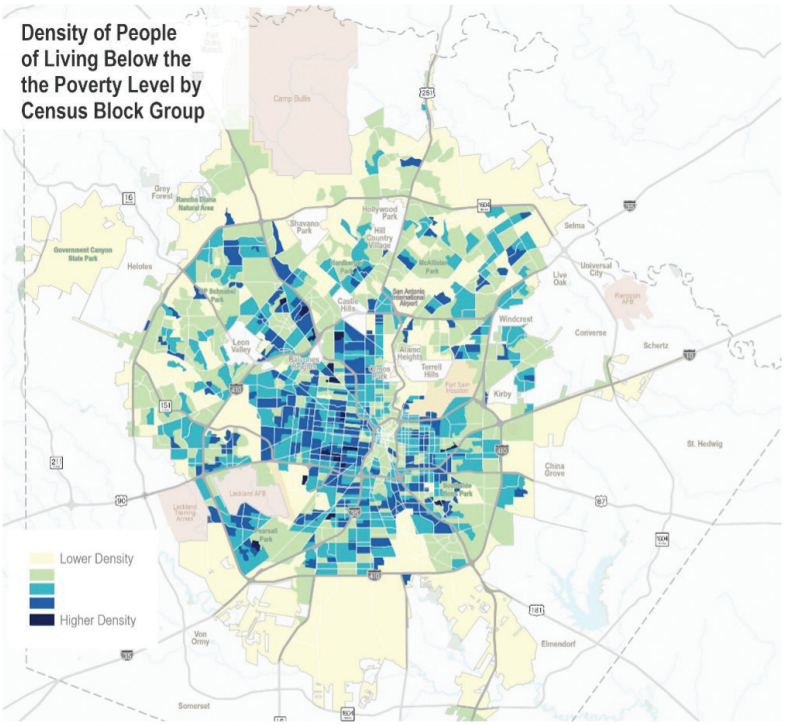
People of Color

Across the U.S., people of color bike for transportation at higher rates than white people, and more low-income people bike for fun and transportation than middle- and upper-income people.[28] However, minority communities have historically been underserved by transportation investments nationwide. As illustrated on the right, Hispanic, Black, Indigenous, and other people of color are largely concentrated in the Central, Southern, and Western portions of the City, while the greatest density of white residents lies broadly in northern San Antonio.



Residents Experiencing Poverty

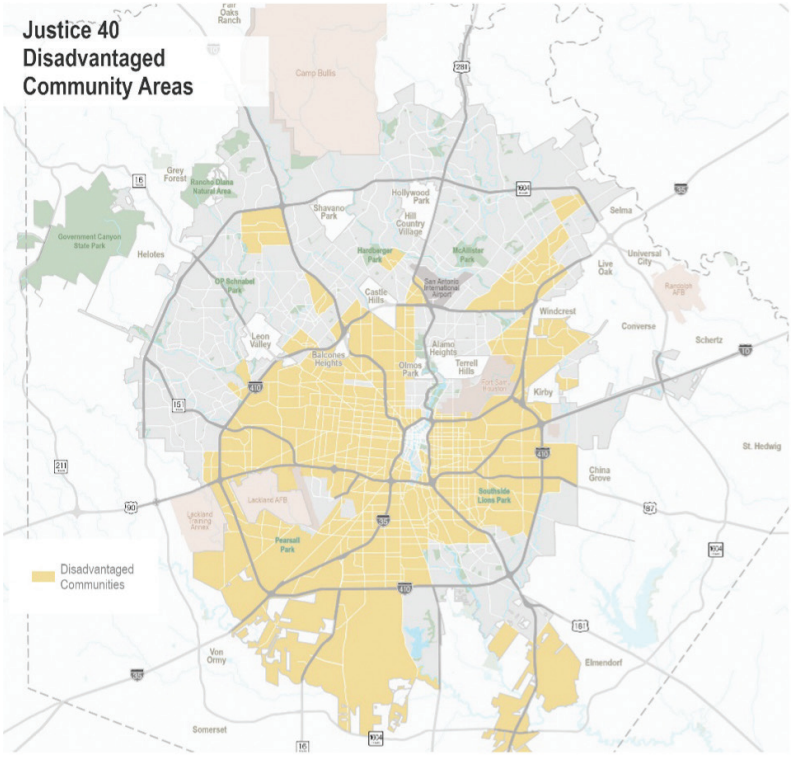
Since low-income households are less likely to own a vehicle, this population disproportionately relies on walking, biking, or riding transit to access school, jobs, and daily needs. As illustrated on the right, areas with high concentrations of people of color largely see the highest concentrations of households experiencing poverty.



28. People for Bikes. 2023. List of Silver League Cities. https://www.peopleforbikes.org/

Federally Designated Disadvantaged Areas

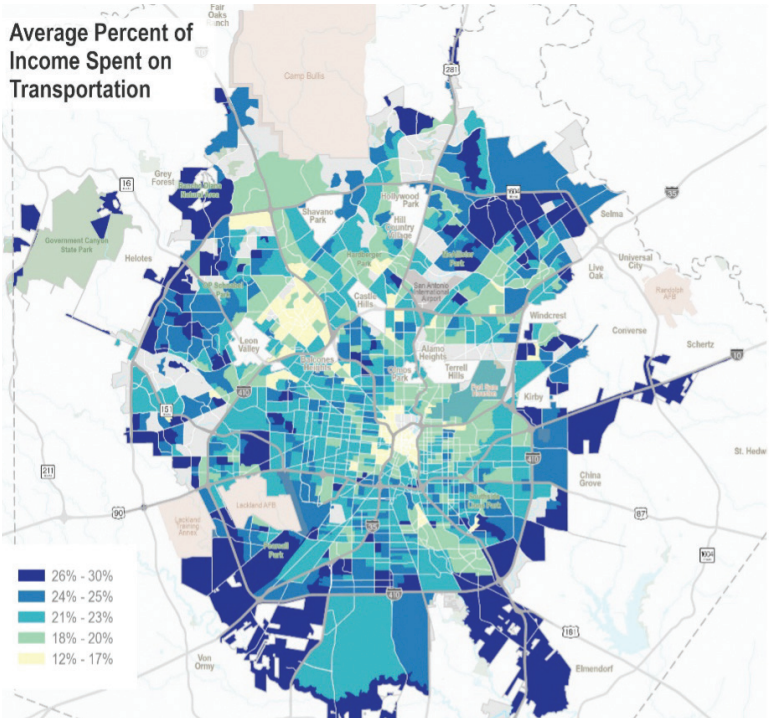
Justice40 is a federal initiative and policy goal that 40 percent of Federal investments should flow to disadvantaged communities. To define disadvantaged communities, the Climate and Economic Justice Screening Tool (CEJST) was developed to define seven categories for which a community may be disadvantaged (including health, housing, transportation, workforce development, among others). Several areas within San Antonio are considered disadvantaged as defined by each of the seven categories. Areas with higher concentrations of disadvantaged populations may be eligible for funding opportunities to address transportation inequities.



Transportation Cost Burden

In 2017, transportation accounted for $1.2 trillion of total national household spending in America, making transportation the fourth largest household expenditure category after healthcare, housing, and food. The Center for Neighborhood Technology's Housing and Transportation Affordability Index identifies the combined cost of housing and transportation as a percentage of income and sets a target of no more than 55% of income be spent on these costs. Housing and transportation costs make up about 46% of income in San Antonio, with transportation accounting for 22% of annual income.

As illustrated in the figure on the right, areas with higher transportation costs are generally areas located in less dense neighborhoods with limited access to jobs, goods, and efficient transit services. When looking at transportation costs alone, there is a strong correlation between the cost of transportation and the distance from Downtown. When people live far away from the places they need to go, there are more costs than just to that individual. People living in more compact neighborhoods and within shorter distances to places they need to travel simply need to travel fewer miles to get there.



HOW HEALTHY ARE WE?

Transportation networks shape how people move and influence when, where, and what modes people use to travel. Networks that include safe and comfortable options for walking and biking provide opportunities to incorporate physical activity into residents' daily lives. Providing opportunities for people to walk or bike for short trips instead of using their car may help mitigate chronic public health issues including diabetes, heart disease, stroke, and other chronic health conditions.

Public Health Trends

Table 3.4 compares key public health conditions in San Antonio to county-wide and nationwide averages. Generally, residents of San Antonio have worse health outcomes when compared to Bexar County and the Nation as a whole. These health conditions are in part due to inactivity.

Table 3.4: San Antonio Public Health Indicators

	City of San Antonio	Bexar County	Nationwide
Adults Reporting to be Obese	39.4%	38.7%	33.0%
Adults Diagnosed with Diabetes	13.1%	12.7%	11.3%
Adults Diagnosed with High Blood Pressure	34.1%	31.5%	32.7%
Adults Diagnosed with Asthma	9.8%	9.4%	9.7%
Adults Diagnosed with Depression	24.7%	23.5%	19.8%

Source: PLACES Project, Centers for Disease Control (2021)

Health Index

The Climate and Economic Justice Screening Tool (CEJST) health category determines if communities are disadvantaged due to health outcomes. The index considers low-income communities to be disadvantaged in addition to communities that are at the 90th percentile for rates of asthma, diabetes, heart disease, and lower life expectancy. As illustrated in Figure 3.7, areas with large health disparities are located primarily in the east, west, and southern portions of the City.

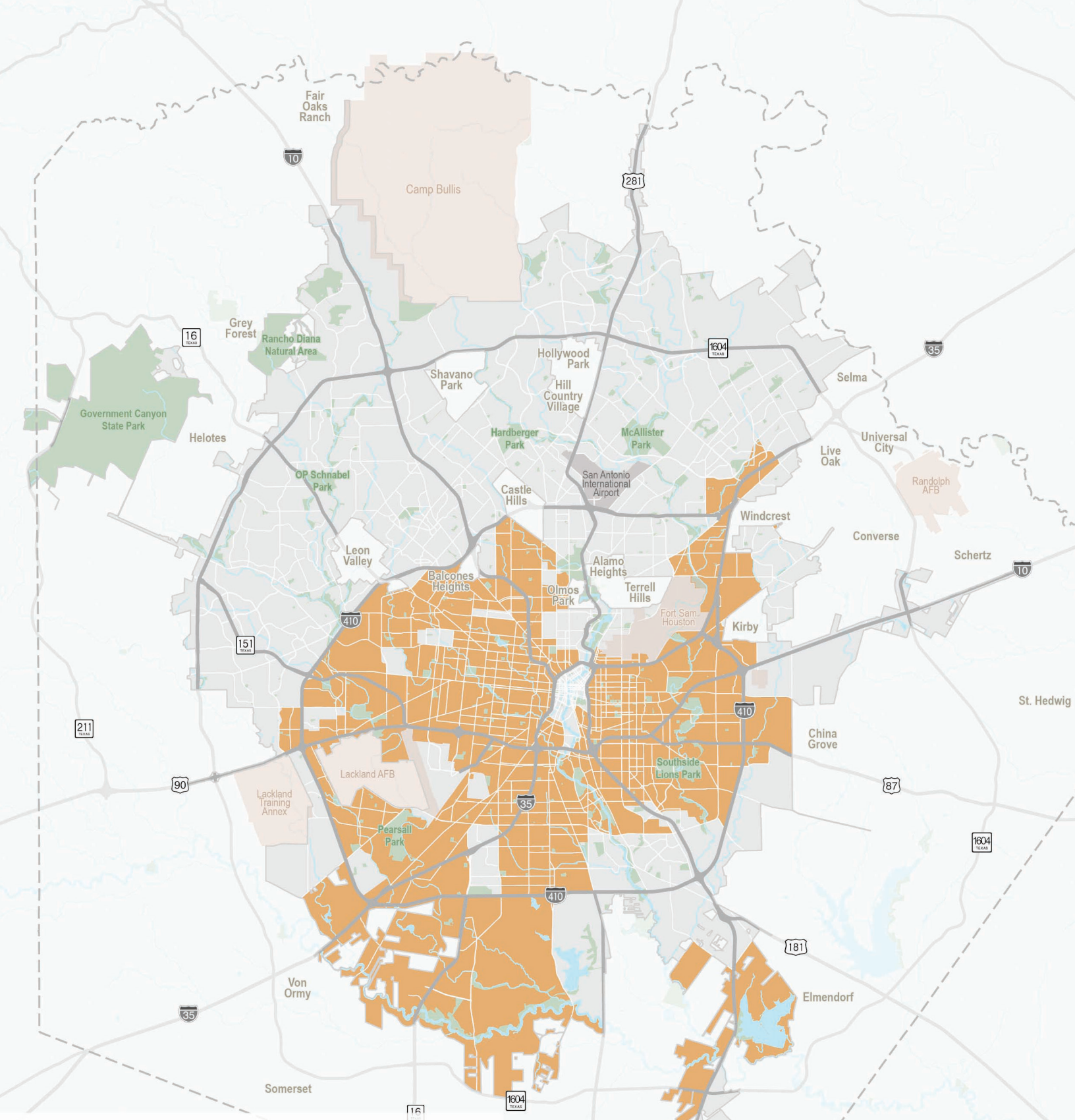


Figure 3.7. Areas of Disproportionately Poor Health Outcomes

CHAPTER 4. LEARNING FROM OUR PEERS

PEER CITY REVIEW

A peer city review was conducted to highlight successes and lessons learned from peer cities (cities that are similar in demographics, land area, and other factors) and aspirational cities (cities that can serve as a model for San Antonio to improve the connectivity, safety, and friendliness of its pedestrian and bicycling environment). Ultimately, the successes and lessons learned from these peer agencies will help to form part of the baseline for decision making and project selection for the BNP.

Selecting Peer Cities For Review

The goal of this peer selection is to highlight both the similarities these cities have with San Antonio, as well as the state of their current bicycle and pedestrian practices. A universe of 22 Texas, United States, and international peer cities were identified and evaluated to select the cities that share commonalities with San Antonio and have a strong bicycle and pedestrian program. The criteria used to score these cities included:

Population Size

Land Area

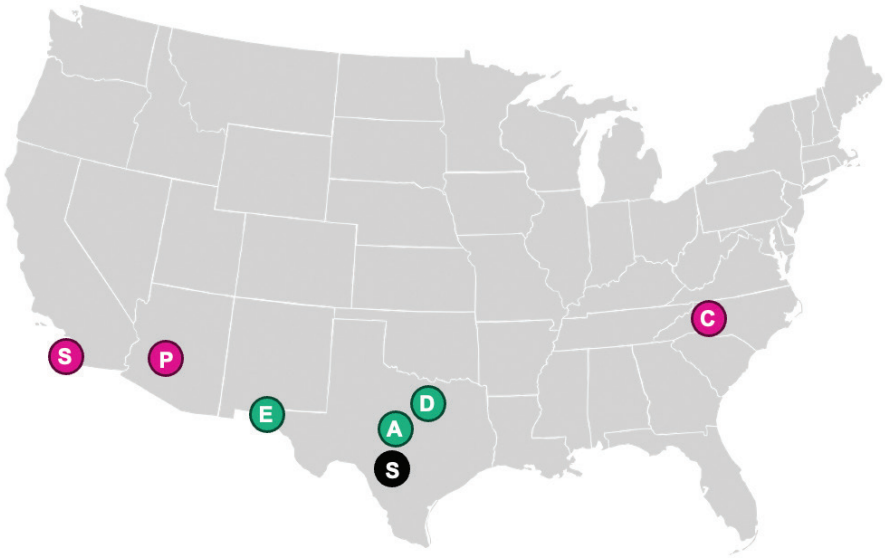
Land Use Context

Bicycle Facility Development

Development Trends

Commuting Patterns

The selected cities, illustrated below, were placed into three categories to help identify peers at different levels and stages of bicycle and pedestrian practices: Texas cities, other US cities, and international cities.



Texas Cities

- E — El Paso
- A — Austin
- D — Dallas

U.S. Peer Cities

- C — Charlotte, NC
- P — Phoenix, AZ
- S — San Diego, CA

International Cities

Barcelona, Spain

Medellin, Colombia

Summary of Findings

Of the peer cities reviewed, the City of San Antonio covers the largest area (square miles) and offers a unique challenge of ensuring districts remain connected. Cities such as Austin and San Diego are spending more on sidewalk and bikeway improvements than any other peer city. While the exact number of staff dedicated to bikeway and pedestrian programming is hard to quantify, there is a distinct difference in staffing levels between peer cities. Austin and Charlotte have detailed budgets for their bicycle and pedestrian projects instead of broader project financing. Most cities are moving towards separated bikeway implementation to develop a connected and accessible "all ages and abilities" network.

Total Population

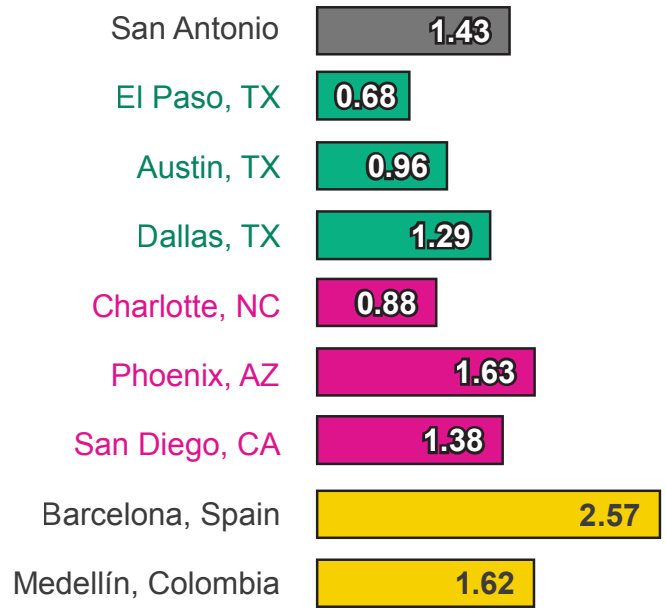
The total population of a city is key to understanding the demographic, structural, and development trends that have taken place since its inception. Most of the peer cities have a population similar to that of San Antonio. The peer city with the largest population is Barcelona with nearly 3 million total residents, nearly double the population of San Antonio. The peer city with the smallest population is El Paso, which is about half the size of San Antonio.

Land Use Size

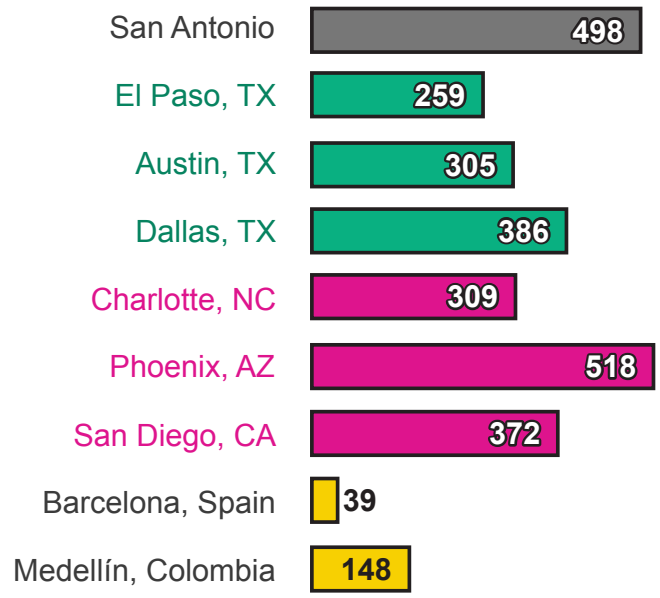
Geographic city size in square miles was also considered for each city. Cities such as San Antonio and Phoenix boast a significantly larger footprint coming in around 500 square miles in total. On the opposite end of the range, the international cities reviewed are under 150 square miles each.

Population density is also an important factor in comparing peer cities. This metric can have implications for trip length and density along bike routes. While the U.S. cities all have similar population densities, Barcelona and Medellin have significantly denser urban development.

Total Population (in millions)



Land Use Size (square miles)

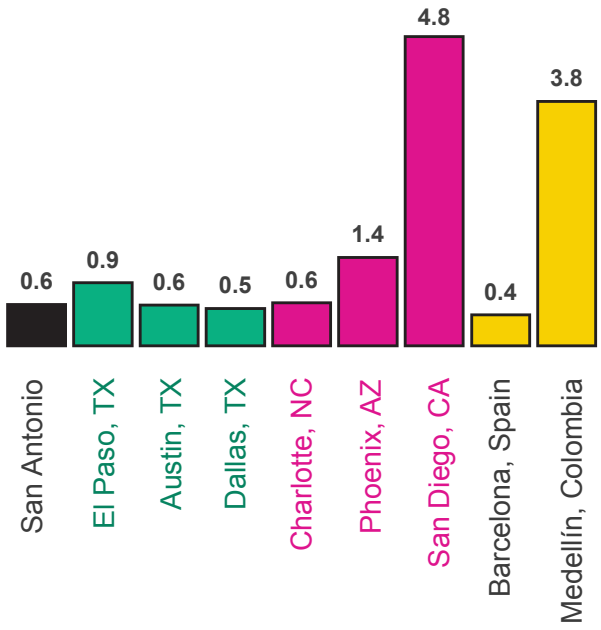


Total Facility Miles

All the peer cities have a robust and diverse network of bicycle facilities, with the San Diego region largely surpassing the other locations with approximately 1,800 miles of designated bike routes. Following San Diego, Phoenix has over 700 miles of total bicycle facilities. Some of the peer cities, such as Charlotte, El Paso, Austin, Dallas, and Barcelona, are continuing to grow and improve their bicycle facilities.

It is important to note that these facility mile totals include both on-street and off-street routes. On-street routes can vary in their level of safety and comfort for bicyclists, i.e., a protected or buffered bike lane will offer more protection for riders from vehicle traffic than a shared lane. Increasingly popular are the “All Ages and Abilities” (AAA) bike networks which are designed to provide safety and comfort to all users.

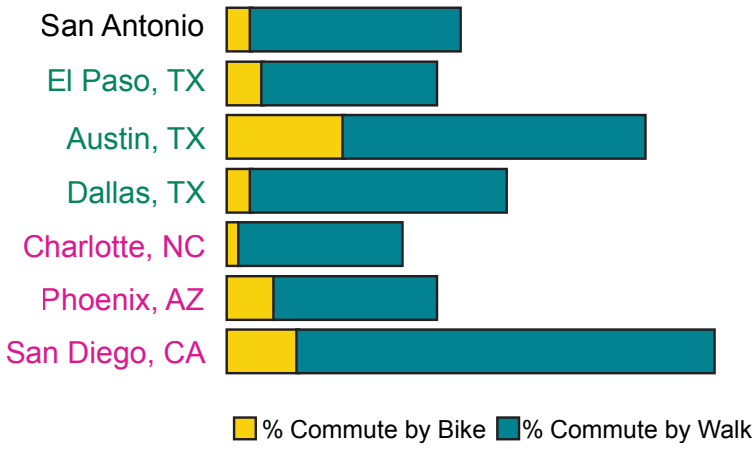
Miles of Bicycle Facilities Per Square Mile of City Land Area



Bike Trips

As displayed on the right, the percentage of commuters that make trips by bike and walking are generally low. While Austin has a significantly lower number of miles of bike facilities than many of the peer cities, it has the highest bicycle commute mode share (1.0%). Conversely, while San Diego has a high number of bicycle facilities, there is a low bicycle commute mode share. This indicates that the rate of commuting by bicycle is not dependent on the quantity of facilities, but rather the quality of infrastructure. Factors such as the comfort of bike facilities, availability of other modes, human-centered urban design, and overall travel distance influence how people choose to commute.

Commuters that Walk or Bike



Funding

In general, funding sources vary by city and also by what the funding is used for (maintenance of existing sidewalks, construction of new sidewalks, or bikeway projects). It is a challenge to compare funding totals across all cities because bicycle facilities can be a part of a larger "complete street" projects or part of private developments, making it difficult to identify if funds dedicated exclusively to bike infrastructure were used in the project. Instead of total funding, sources of funding are compared.

	San Antonio TX	El Paso TX	Austin TX	Dallas TX	Charlotte NC	Phoenix AZ	San Diego CA
What Funding Sources Area Used to Plan, Design, Improve, or Maintain Bike Infrastructure and?							
City Funds	I	I	I	I	I	I	I
Federal Funds	I	I	I	I	I	I	I
State Funds	I	I	I	I	I	I	I
Regional Agency	I	I	I	I	I	I	I
Non-City Agency	I	I	I	I	I	I	I
Private Developer	I	I	I	I	I	I	I
Additional Funding Details	$1.2 Billion voter-passed Bond supports select bike projects		Over $600 million dedicated bikeway and trail funding in 2020 $460 million transportation bond approved in 2020 (including $120 million for bikeways and urban trails)	Currently funds $2.5 million annually. $1 billion transportation bond scheduled to go to vote in 2024	$146.2 million transportation bond approved in 2022, including at least 10 miles of new bikeways	Dedicated 0.7% city sales tax to fund all street improvements. Prop 400e tax supports regional bike	

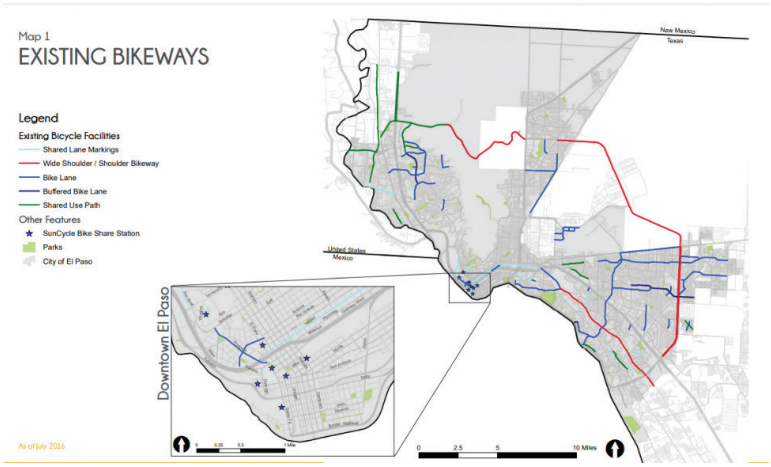
El Paso, Texas

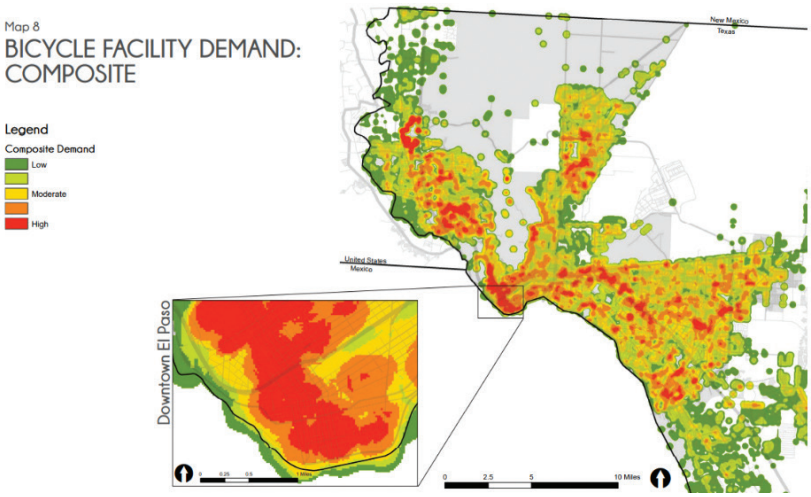
What Are They Doing?

The City of El Paso strives to become one of the most bicycle friendly cities in the country. To achieve this goal, the City is working to promote bicycling as a “viable, safe, everyday activity and transportation choice”. Through Plan El Paso (2012), the City of El Paso Bike Plan (2016), the El Paso Metropolitan Planning Organization Metropolitan Transportation Plan (2022), and the City of El Paso Complete Streets Policy (2022), the City is working to expand its existing bikeway network, which currently consists of bike lanes, wide shoulder lanes, buffered bike lanes, shared-use paths, signed/marked bike routes, and mountain bike trails. With a history of residents, commuters, and visitors hesitant to take up bicycling because of El Paso’s car-centric design, El Paso is now looking to implement strategic policy changes and infrastructure investments to capitalize on the City’s beauty, weather, and highly frequented destinations to support and promote multimodal transportation.

Bike Plan Policies

- Implement land use policies to enhance the City’s bicycle friendliness.
- Work closely and coordinate planning, design, implementation, and maintenance of bicycle improvements with all City departments, El Paso County, MPO, TxDOT, Fort Bliss, Dona Ana County, Ciudad Juárez, and other adjacent communities and regional partners to enhance the regional transportation system and make the bicycle network as cohesive = as possible.
- Achieve a complete network of bicycle-friendly infrastructure suitable for all abilities, ages, and user types.
- Support programs that educate, increase awareness and safety, promote a healthy and sustainable community, evaluate bicycling impacts, improve tourism opportunities, and foster positive attitudes about bicycling.
- Encourage and promote bicycling at every department of civic government and encourage the regional government to do the same.





What Are They Doing Well?

The recently adopted El Paso Complete Streets manual presents an updated framework for a fourteen-step implementation strategy for all projects. The identified steps are designed to assist with all phases of project management, including but not limited to staff selection and training; the collection of relevant information and current best practices; development of a project plan, timeline, and tools; and facilitating implementation. Beyond implementation, the City is also required to select indicators for near-term and long-term performance measurement. The manual also proposes the development of a tool capable of quantifying Complete Streets elements to enhance the project selection process.

Goals

- Become a Silver Level bicycle-friendly community by the League of American Bicyclists[29].
- Become the least car-dependent city in the Southwest.

Supporting Organizations

- Bicycle Advisory Committee
- Borderland Mountain Bicycling Association
- El Paso Bicycle Club
- El Paso Cyclists
- Additional bike-share and wilderness/wildlife-focused departments

Driving Principles

The League of American Bicyclists' Six Es approach to bicycling:

- Engineering
- Education
- Evaluation
- Equity
- Encouragement

Funding

The City identified multiple potential funding sources at the federal, state, and local levels. While the City acknowledges federally funded grants are critical for capital project implementation, there is a desire to capitalize on partnerships and non-traditional funding opportunities as well to bring the Bike Master Plan to fruition.

Project Spotlight: River Bend Drive Hike and Bike

A corridor was created along river Bend Drive between Frontera Road and Turnstone Drive in the City of El Paso. The creation of the corridor was to improve pedestrian and bicyclist connectivity to existing communities. Project components included construction of the path, adding pavement markings, and the addition of trees and lighting.

29. League of American Bicyclists. 2023.

Austin, Texas

What Are They Doing?

The City of Austin is growing, and its bicycle network is growing with it. The City's current bicycle strategy is focused on developing a safer and more complete bicycle network by constructing on-street protected bike lanes and protected intersections. In the last 25 years, Austin's bicycle network has rapidly grown, doubling the miles of streets with painted bicycle lanes to 260 miles of facilities between 2009 and 2019. This growth has created a major need for increased maintenance, bike parking facilities, and other bicycle amenities.

Austin's bicycle system is an important tool they use to help their community achieve mobility and connected access. Austin has given many of its residents' reliable mobility options and is dedicated to making their facilities safe for all users. Bicycling and active transportation within Austin have shown an increase in public health while supporting the environment and helping community members connect to the city's open spaces.

AUSTIN'S PRIORITIZATION RESULTS FOR THE AAA BIKE PRIORITY NETWORK.

Bike Policies

- Make streets safe for bicycling.
- Complete the Bicycle Priority Network.
- Remove infrastructure gaps in the bicycle system.
- Provide a comfortable bicycle network with trip end facilities.
- Work with partner agencies and other jurisdictions to develop a regional bicycle system.
- Maintain the usability of the bicycle system.

BLUEBONNET BIKE LANES

What Are They Doing Well?

Austin focuses on rapid implementation, using a unique field engineering strategy to improve existing streets and paths in a matter of days. Field engineering involves assigning a team of builders to a site where they can immediately begin making changes to the roadways based on their judgment and expertise. This method has been integral in reducing design costs and time, particularly for smaller projects.

Austin's success can also be credited to their transparent public engagement process. While public engagement methods may vary slightly from project to project, the end goal is always the same: feedback from all stakeholders (staff, elected officials, residents, business owners, etc.). One example of their thorough public engagement efforts was a media campaign designed to normalize for safe streets design. This effort resulted in hundreds of community members voicing what they wanted to see within their community. More recently, the city has implemented a slow streets program which includes the publishing of an online map of eligible streets for traffic calming treatment and a call for projects / permit process for community members to identify and aid in the implementation of slow streets.

Goals

- Increase the number of major roadways that have all ages and abilities bicycle facilities.
- Increase the linear miles of all ages and abilities facilities.
- Increase the number of children commuting to school by bicycle.
- Achieve 4% of residents who bicycle to work by 2039 (1.3% of residents commuted to work by bicycle between 2013 and 2017).
- Increase the share of Austin residents who live in the central city and bicycle to work.
- Decrease travel time to work by bicycle.
- Increase the linear miles of Tier I Urban Trails (100% by 2029).

Funding

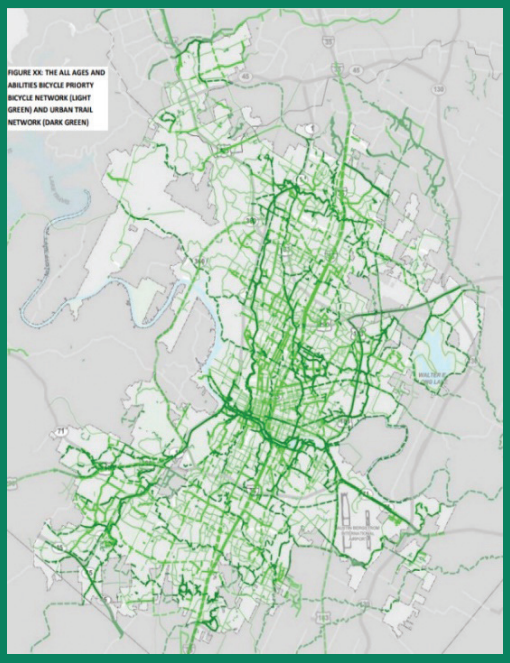
- Increase the number of major roadways that have all ages and abilities bicycle facilities. The 2016 Mobility Bond dedicated $101 million to regional mobility projects to address congestion and enhance safety.
- These projects focus on roadways and intersections. Improvements include expansion, signal modifications, changes to the design of medians or addition of medians, driveway reconstruction, and improved bicycle and pedestrian facilities.
- These projects are being done in partnership with the Texas Department of Transportation, local communities, county, and other officials within Austin.

All Ages and Abilities Bike Priority Network (BPN)

The City of Austin 2023 Bicycle Plan (Draft) outlines the approach to the All Ages and Abilities Bike Priority Network. The main components of this complete network are protected bicycle lanes and protected intersections, neighborhood bikeways and shared streets, intersection crossings, and off-street facilities (Urban Trails Program). The AAA BPN is being built in a phased approach initially using quick build strategies.

Project Spotlight: Red Line Trail (Part of Urban Trails Program)

The Red Line Trail is a planned trail network that will follow CapMetro's Red Line Rail from Downtown Austin to Leander once completed. The Red Line Trail presents a great opportunity for North-South connectivity and would provide key connections to public transit, including linking with Cap Metro's Red Line Train. Currently, six segments are complete and open for public use. The segment currently under construction received $15 million in funding.



THE AAA BIKE PRIORITY NETWORK (LIGHT GREEN) AND URBAN TRAIL NETWORK (DARK GREEN).

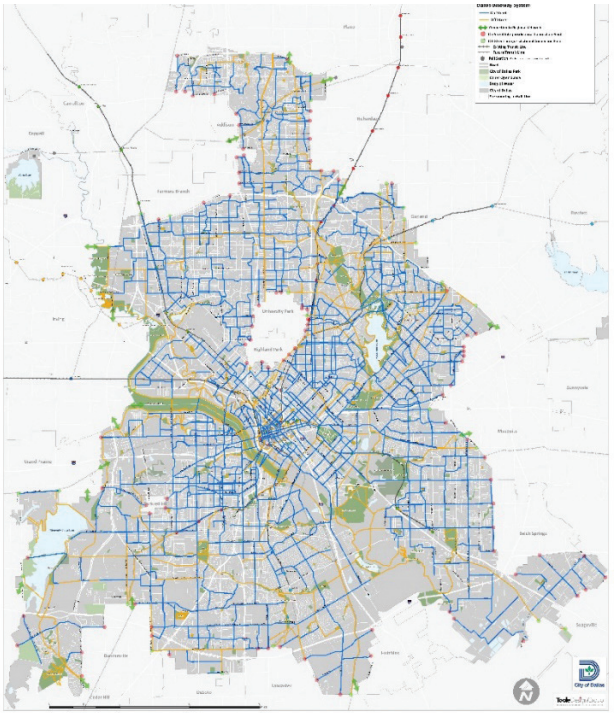
Dallas, Texas

What Are They Doing?

In 2023, Dallas finalized an update to its 2011 Bike Plan t in order to achieve its goals outlined in the Comprehensive Plan, Connect Dallas, and Vision Zero initiatives. The updated Dallas Bike Plan will design, build, and maintain projects across different intergovernmental departments. It will ensure the correct projects happen in the right order and that funding is acquired to build infrastructure to the highest standards. The overarching goal of the Bike Plan is to reflect Dallas's vision for safe bicycling and growing a comfortable and direct bicycle network that serves the different users.

Mobility Plan Policies

- Clarifying the right-of-way policy to require a clear path for pedestrians to be provided during any public or private construction on city streets.
- Supporting DART in piloting innovative partnerships with Transportation Network Companies (TNCs) like Uber, Lyft, and other mobility-on demand services to enhance first/last mile trips.
- Adopting the Complete Streets Design Manual, which provides a multimodal approach to street design and has resulted in successful implementation on key City-led projects.
- Revising the Street Design Manual, which codifies many complete streets recommendations, into street design standards, including setting narrower lane minimums on many street types and wider minimum sidewalk widths on all commercial streets.
- Adopting a Vision Zero resolution that sends a strong message about prioritization of safety within the city and the City's commitment to reducing fatal and severe injury crashes.
- Incorporating ambitious goals for the transportation sector towards reducing the City of Dallas' greenhouse gas (GHG).



2011 DALLAS BIKEWAY SYSTEM

Mobility Plan Recommendations

- Update The Bike and Thoroughfare Plans
- Develop A Freight Master Plan
- Operationalize Vision Zero
- Align Land Use Goals
- Establish A Streamlined Project Development Process
- Establish A Transit Support Program
- Reform The Development Review Process,
- Emphasize TDM To Improve System Efficiency
- Proactively Manage The City's Curbside Assets
- Enhance Internal And External Coordination
- Align The Capital Improvement Program.

What Are They Doing Well?

The Complete Streets Manual (2016) developed standards and a future vision for the bike network and transit network overlays. It identified opportunity corridors and project opportunities to build off and complement the Bike Plan (2011). The manual developed general guidance for the selection of facilities based on existing and proposed complete streets efforts and set standards for the type of bicycle facilities required on the different roadway classifications. Since its adoption, the manual has allowed Dallas to build and develop a robust and ever-growing complete street and bicycle network. The 2023 Bike Plan Update will focus on identifying quick-win priority facilities.

Driving Principals

- Safety
- Environmental sustainability,
- Equity
- Economic vitality
- Housing
- Innovation

Funding

The Dallas Mobility Plan identified several funding strategies to ensure projects are implemented, such as aligning with Capital Improvement Projects, funding plans/projects through maintenance agreements, and dedicating funding to innovative solutions. Bicycle facilities, trails, and sidewalks are important pieces of the mobility plan and are seen as equal to roadway projects. By utilizing these adopted strategies, bicycle-related projects can be implemented to the City's standards.

Project Spotlight: Bishop Arts District Bike Parking Parklet

In 2020 the Council of Government funded an eco-friendly bike parking design in the Bishop Arts District. The Green Bicycle Parking Pilot Project designed and developed an easily replicable parklet to include a "green" design bicycle parking area. The parklet was developed to enhance and complement the mixed-use area and the walkable retail districts. The project used the dimensions of two on-street parallel parking spaces for the parklet, comprised of 13 bicycle parking spaces. The parklet design includes wheel stops at each end, landscape planters, and shaded seating. This project was designed and funded by Green Blue Grey Grant

Bishop Arts District Parklet

Bishop Arts District Parklet

Charlotte, North Carolina

What Are They Doing?

The City of Charlotte focuses on bicycles and other micro mobility technologies by encouraging and supporting complete and connected facilities. This is achieved through a variety of context-based facilities (which includes a robust on street and off-street network) Charlotte has stitched together its networks to create and encourage bicycle access throughout its communities. The City works with public and private partners to develop a connected network of bicycle facilities that allow communities to choose biking as a safe mobility option. Their current bicycle plan highlights their goals to "build, operate, and maintain bike network connections that overcome physical barriers, shorten routes, connect local and regional destinations, and function as integral parts of the city's overall transportation network." Charlotte also through its Strategic Mobility Plan will continue to create a safe, comfortable, and convenient network of bicycle facilities that aid and encourage bicycling and other micro mobility for residents and visitors.

Strategies Utilized

- Bicycle Prioritized Network —Comprehensive prioritized framework of reliable bikeways that provide and encourage alternative modes of transportation.
- Advance and Support the Greenway System — Support the greenway system as an integral part of the transportation network and partner with Parks and Recreation to prioritize bicycle investments that provide connections between greenway trails.
- Streets Map — Implement bicycle facilities on all new or reconstructed roadways and resurfacing projects in the city and ensure that regulations provide adequate space for safe bicycle facilities.
- Bicycle Signals — Increase the number of signalized intersections that detect bicyclists.
- Bicycle Program — Maintain, fund, support, and update a Charlotte Bikes Action Plan that identifies and prioritizes program and project investment, and sponsor education activities.
- Bicycle Advisory Committee — Support the Committee as the chief citizens' advisory group for bicycle related issues and receive recommendations in accordance with its mission.

6TH STREET CYCLETRACK RIBBON CUTTING

6TH STREET PILOT PROJECT

What Are They Doing Well?

Charlotte has a adopted a strategy that creates a “Culture that Educates, Promotes, & Welcomes Bicycling.” This program allows for the city to sponsor educational opportunities, identify initiatives, offer incentives, and support efforts to promote bicycling for people of all ages and abilities.

Goals

- Safe - Eliminate transportation-related fatalities and serious injuries.
- Connected - Increase the share of trips made without a car and broaden multimodal connectivity.
- Equitable - Increase investment and access to support equitable and affordable mobility options.
- Sustainable - Increase access to sustainable and zero carbon transportation modes.
- Prosperous - Prioritize transportation investments that promote economic vibrancy.
- Innovative - Integrate emerging mobility solutions and new technologies.

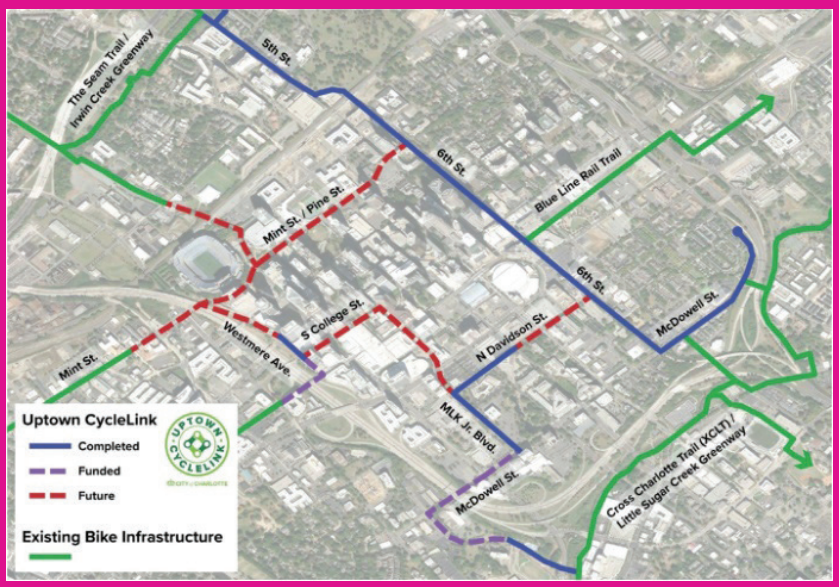
Funding

The Bicycle Capital Investment Program funds the construction of the bicycle network, building new bike connections, and repurposing existing infrastructure to create facilities for all.

Bicycle Program funding is part of the City’s ongoing capital investment program financed through public bonds approved by Charlotte voters every two years. The Proposed FY 2023 Budget includes $8 million for the Bicycle Program, with an additional $8 million planned in both the 2024 and 2026 Bonds.80+ miles of bicycle infrastructure were funded as a part of the program.

Project Spotlight: Uptown CycleLink

The City of Charlotte is currently constructing the Uptown CycleLink, a 7-mile all ages and abilities (“AAA”) network of separated bike lanes. The completed CycleLink will connect over 40 miles of bikeways across center city Charlotte. The CycleLink was planned over the course of four years, with a focus on minimizing impact on vehicle traffic, connecting existing bikeways, and providing access to major destinations. Currently, approximately half of the CycleLink is available for use, with a 2.3-mile segment in progress.



COMPLETED AND PLANNED UPTOWN CYCLELINK SEGMENTS.

Phoenix, Arizona

What Are They Doing?

With a plethora of extensive bike lane projects in the works, the City of Phoenix is capitalizing on its year-round warm weather, wide streets, flat landscape, and grid layout to improve bicyclist mobility. The installation of bike lanes, buffered bike lanes, and protected bike lanes is helping the City achieve its goal of becoming “safe and easy to bike anywhere in the city.” The City’s current Bicycle Master Plan aims to achieve “a well-connected infrastructure network [that] will link people and places, making bicycling a preferred option for daily transportation, recreation, and healthy lifestyles”. With a history of barriers to active transportation safety, including long distances and high vehicle speeds, Phoenix looks to achieve its goals by creating several programs with a focus on bicyclist mobility and safety.

Active Transportation Plan Policy Objectives

- Advance complete streets policy implementation.
- Support the goals of the climate action plan.
- Support the Vision Zero Road Safety Action plan.
- Share opportunities for integrating active transportation policies and guidance into the general plan.
- Build safe, connected, enjoyable, and equitable active transportation networks.

Bicycle Master Plan Policies

Bicycling in Phoenix will be…

- A viable mode of transportation for those who cannot or choose not to drive.
- Recognized as the norm.
- An integral component of an accessible public transit system.
- Viewed as a means to enhance the quality of life and accessibility of a community.

Goals:

- Systematically improve levels of bicycle friendliness as defined by the League of American Bicyclists Bicycle Friendly Communities program.
- Become a League of American Bicyclists Platinum Bicycle-Friendly Community.

What Are They Doing Well?

The City of Phoenix is committed to a long-term long-range plan to improve the safety and mobility of active transportation users. With 222.2 miles of new bicycle lanes installed from January 2016 to June 2022, the City is staying on-track to achieve the goals it set in 2011. The Key Corridors Master Plan (KCMP) outlines the actions the City has taken that have been instrumental in growing both the size and success of the bicycle network. The City of Phoenix performed a gaps assessment by analyzing the current state of bike accessibility (both overall and job accessibility) and comparing the existing conditions to the desired complete network. Additionally, the KCMP assigns typologies to Phoenix’s streets to describe the transportation needs, land use characteristics, development pattern, and function. Through the gaps and street typology assessments, bicycle priority streets can be identified. This helps to prioritize areas in need of low-stress bicycle facilities.

Programs

Mobility Improvements Program: Established to support the T2050 plan by improving safety and connectivity for all roadway users along arterial, collector, and local roadways. The focus is on improving access to major transportation corridors and increasing ADA accessibility through the construction of new bicycle facilities.

Road Safety Action Plan Vision Zero: Under this Action Plan, The City of Phoenix:

- Regularly collects bicyclist counts and analyzes bicyclist crash data to identify trends.
- Implements these strategies to address the “Pedestrians & Bicyclists” Action Plan focus area:
    - Expand safety enforcement 10% annually and conduct 12+ annual enforcement impact programs.
    - Expand public promotion and efforts for student education on bicyclist safety awareness.
    - Reduce crash risk and the number of fatal and serious injury bike crashes.
    - Review gaps in infrastructure and prioritize improvements.

Safe Routes to School Program: This program focuses on the safety of children commuting to and from school across Maricopa County. The program conducts projects and activities to improve environmental conditions, reduce traffic volumes, and increase physical activity for children.

Funding

Both federal and local funding have supported the City of Phoenix’s bicycle transportation network. These projects fall under the Street Improvements category which currently receives funding from several sources including: 13.8% of the Transportation 2050 sales tax, the state-collected motor fuel tax, the city’s general fund, regional MAG funds (Maricopa Association of Governments), federal funds, grants, and impact fees. 15% of these funds went to mobility improvements. In 2022, Phoenix budgeted approximately $44M for street construction and maintenance projects. For the next five years, $285M is budgeted.

Project Spotlight: Transportation 2050 Plan- 1,080 Miles in 35 Years

The City of Phoenix Street Transportation Department is working to support the 2014 City of Phoenix Bicycle Master Plan through the addition of 1,080 miles of bi-directional bicycles lanes along arterials and major collectors between 2016 and 2050. Success of the plan requires the installation of 31 miles of bike lanes each year. In fiscal year 2022, the City surpassed the annual goal, installing 35.9 miles. At the end of 2022 the City reported being at or above the expected target to achieve the over-arching goal.

Project Spotlight: Shifting Gear

This five-year program was a program designed to address a subset of the total 1,080 bike lane miles in the 35 years plan. Running from 2017 to 2022, the goal of the program was to construct 176 new bicycle lane miles. Five corridors featuring both existing and proposed bicycle facilities were selected for the locations of these miles.

BIKE LANES IN PHOENIX.

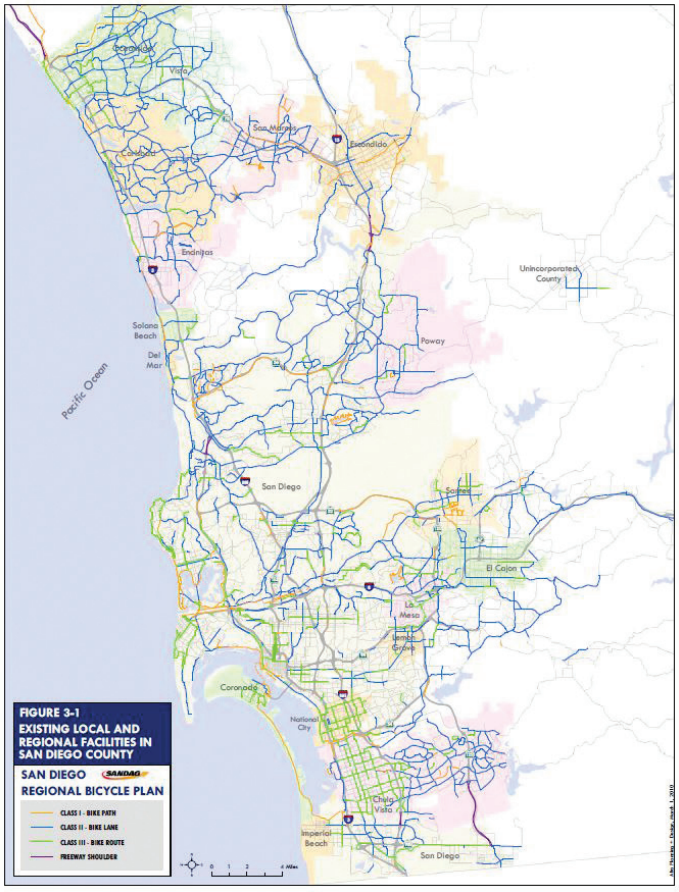
San Diego, California

What Are They Doing?

The San Diego Bicycle Master Plan (2013) examines existing conditions and bicycle while providing a summary of other relevant planning and policy documents from the San Diego Association of Governments (SANDAG). The vision for San Diego is “a city where bicycling is a viable travel choice, particularly for trips of less than five miles”. This vision also incorporates safety, environmental quality, recreation, and health aspects. An important element of San Diego achieving their bicycling vision is the regional bicycle system plan “Riding to 2050” (SANDAG), which established goals, standards, and projects for the city to use to develop a complete network. Planning for a more bicycle friendly city has addressed multiple issues from traffic congestion, air quality, climate change, public health, and livability by creating a strong network. Each of these plans is updated regularly, with SANDAG currently working on a new active transportation plan and the City working on community and quick build plans.

Strategies Utilized

- Educational programs – Education for bicyclists, pedestrians, and motorists helps everyone understand how to travel safely. Education programs are available in an array of forums from long-term courses with detailed instruction to single session workshops focusing on a specific topic.
- Public awareness campaigns/Marketing – Raising awareness of street safety impacts the attitudes and behavior of the public. Public awareness campaigns are high profile efforts that rely on materials, media outreach, and special events to convey a clear message aimed at promoting bicycling and/or improving safety.
- Encouragement programs – By encouraging people to bicycle more for transportation rather than just recreation, SANDAG hopes to increase the desire for bicycle trips by providing incentives, recognition, or services that make bicycling a more convenient transportation mode.
- Enforcement programs - Targeting unsafe motorist and bicyclist behaviors improves safety for all users of the facilities.
- Evaluation and Committees – Bicycle advisory committees along with evaluating local jurisdictions of the region’s progress toward becoming bicycle-friendly is critical to ensuring that programs and facilities are effective and to understanding changing needs.



SAN DIEGO REGIONAL BICYCLE PLAN

What Are They Doing Well?

The City of San Diego continues to excel in local and regional agency It focuses on prioritizing safety, equity, and quick-build implementation through the City's Sustainable Transportation for All ages and Abilities Team (STAT). The team focuses on implementing quick build bikeways via roadway resurfacing and pavement maintenance operations.

Goals

- Significantly increase levels of bicycling throughout the San Diego Region.
- Improve bicycling safety.
- Encourage the development of complete streets.
- Support reductions in greenhouse gas emissions.
- Increase community support for bicycling.

Funding

One source of funding for developing bicycle programs and projects in the region has been the TransNet Active Transportation Program, which funds bicycle, pedestrian, and neighborhood safety (traffic calming) projects and programs. Additionally, the Transportation Development Act (TDA) and several state funding opportunities exist. Two state funding sources are the Active Transportation Program, which releases grants every other year, and the Bicycle Transportation Account (BTA), which is a statewide program to fund bicycle related projects. Grants from the accounts fund up to $7 million annually to cities/counties/local jurisdictions. The state also funds transit-oriented development through the Affordable Housing and Sustainable Communities program.

Project Spotlight: Imperial Avenue Bikeway

The Imperial Avenue Bikeway project, which began construction in 2023, will enhance connectivity between Downtown San Diego, Southeastern San Diego, and the Encanto neighborhoods.

IMPERIAL AVENUE BIKEWAY

Funded through a state Active Transportation Program grant and an Affordable Housing and Sustainable Communities grant, this is one of several regional bikeway projects comprising the Regional Bike Plan Early Action Program. The Imperial Avenue Bikeway, along with the other bikeway projects in the Program, are designed to be supplemented by local city projects. The Bikeway will be comprised of three miles of bikeways that link key community destinations, promote active living and healthy communities, and make streets safer and more comfortable for people who bike, walk, drive, and take transit. The Bikeway will feature high-visibility crosswalks, curb extensions, separated bikeways, buffered bike lanes, bike boxes, bus islands, cycle track bus stops, bend-outs, and other walking and biking treatments.

Barcelona, Spain

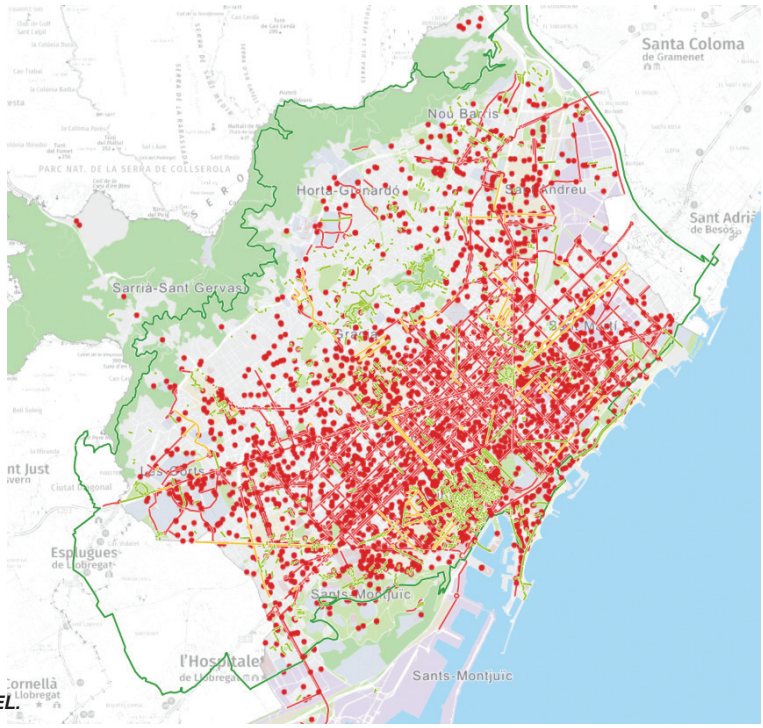
What Are They Doing?

The Barcelona Bicycle Promotion Plan promotes the use of bicycles as a sustainable mode of transportation. Barcelona aims for the bicycle to become a safe, attractive, and effective means of transportation that coexists alongside pedestrians and other modes. The bicycle network fits into the larger mobility model proposed in the Urban Mobility Plan which "aims to guarantee the right and access to mobility of all citizens in an equitable manner, orienting the modal distribution towards sustainable and healthy ways of moving."

The Urban Mobility Plan responds to three main challenges:

- Ensuring people's health and safety.
- Combating the climate crisis and improving air quality.
- Contributing to the recovery of economic activity in Barcelona.

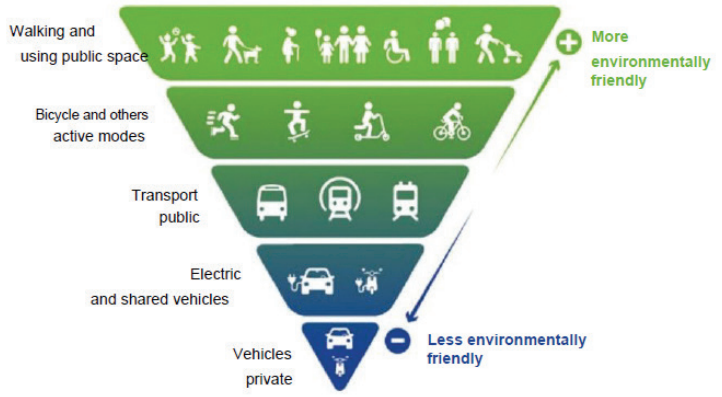
Through all the existing mobility-related plans, including those Europe-wide, Catalonia-wide, and Barcelona-specific, Barcelona is working towards European-wide transport goals related to reducing carbon emissions and achieving Vision Zero (zero road deaths by 2050).



Bicycling-Related Policies

- Achieve an inclusive transport system that incorporates gender and social equity policies.
- Continue to see an increase in the growing trend of the bicyclist mode of transportation in the city.
- Manage mobility with modal transfer as a priority.
- Have a secure and well-connected mobility infrastructure network.
- Create a sustainable mobility network using the inverted pyramid model which states that the most environmentally friendly forms of travel will be preferred and given priority (people on foot, followed by bicycles and scooters).

THE INVERTED PYRAMID MODEL.



THE INVERTED PYRAMID MODEL

What Are They Doing Well?

Barcelona is approaching and advertising active transportation from a vast range of angles. Health and safety, sustainability, equity, and efficient mobility indicators are all part of the plan to increase active transportation and improve the active transportation mobility network. In addition to the traditional approaches to promoting active transportation, Metropolis Women, the strategic network run by the Barcelona's Department for Feminism and LGBTQ, is working to mainstream the gender perspective within the World Association of the Major Metropolises, which has 138 member cities around the world.

Barcelona is also actively promoting biking as a means of transportation among municipal workers. The "Bike Friendly Building" certification is being implemented to improve the ease of traveling to and from work by bike. In a recent mobility survey, results showed that 13% of City Council members bike to and from work.

Finally, Barcelona is using a "superblock" approach to achieve a 15-minute city network. A superblock consists of nine blocks clustered together that are closed off to through-traffic. Currently, the urban mobility plan calls for 503 superblocks, which will help to increase the percentage of trips made by active and public transportation. To successfully implement the superblock approach, Barcelona is seeking public feedback and is making widespread urban greening efforts to improve neighborhood livability.

Funding

Most funding for the bicycle network comes from a 32-million-euro ($34.7 million USD) investment by the municipal government. This fund is used to support 76 projects around the city, with project selection and prioritization determined via a participatory budgeting strategy.

Project Spotlight: A Gender-Focused Approach to Urban Mobility

Barcelona is committed to including the gender perspective in mobility planning and policies. The City aims to achieve a transportation model that focuses on people's daily lives, and they recognize to achieve this the patterns of women's sustainable mobility must be put at the center of decisions.

A sample of the differences between men and women's transport patterns that are considered:

- Women make more trips located in areas of proximity.
- Women experience mobility with a greater sense of insecurity.
- Women avoid public transit more than men. This is likely linked to higher rates of sexual harassment.
- Women begin making trips later in the day than men.

Medellín, Colombia

What Are They Doing?

The City of Medellín city is broken up into ten municipalities with a total of 2.5 million citizens. While not as far along in the development of a cycling network as Bogotá, a city three times its population, Medellín is building a culture of bicycling. Providing the city with a bicycle network is part of Medellín's Integrated Transportation System (SIT). Today, bike trips make up 1% of the total trips in Medellín, with 12% of those trips being commuter trips to and from work. The city has made it a goal to increase the number of trips to 6%.

While off-street/trail bicycling is popular in Medellín due to its Green Corridors program, started in 2016, there is still a push to encourage bicycling for everyday trips. Ciclovia, where main streets are shut down to vehicular traffic, occurs several times a month. This is one way that Medellín is following in the footsteps of Bogotá to encourage bicycling in more urban areas. Ciclovia, in conjunction with planning projects that keep mobility, accessibility, and the gender approach in mind, has allowed the city to take steps toward achieving their mobility goals.

Tools Being Used

- Network Densification – Increasing the number of connected facilities across the region.
- Cycle Route Designation – designating and designing the cycle network to connect to the north and south portions of the city.
- Station Integration – designing stations to be accessible by bike and have integrated technology to meet the needs of multimodal transportation.
- Active Mobility Pilot – creating strategies and networks for areas of the city that have middle to high slope by developing new facilities or using new technologies such as electric bikes.

WALKABLE AND PEDALABLE MEDELLIN
SOURCE: MEDELLIN MAYORS OFFICE

- Electric Bike Pilot – develop parking pilots for electric bikes and to be compatible with other micro mobility needs.
- Public Space Bike Parking – address the need for public bicycle parking by including bike parking racks in public spaces and in heavily commercial areas.
- Encourage Micro mobility – support future micro mobility efforts and ensure its inclusion and regulation into the network.

What Are They Doing Well?

Creating gender conscious design standards and criteria for active mobility, the "Infrastructure for Active Mobility and Gender" program makes it possible to implement infrastructure and public space projects based on inclusion and accessibility, guaranteeing that mobility of Medellín is safe and equitable for all. To enhance accessibility, Medellin also has a free city bikes system comprised of 58 stations, a third of which are located near Medellín Metro stations.

BUFFERED BIKE LANES IN MEDELLIN.

In terms of on-street bike facilities, it is not uncommon for Medellín on-street routes to be buffered or protected from vehicle traffic. Additionally, there are designated bicyclist crosswalks and bicyclist-specific crossing signals at intersections.

Goals

- Maintain the infrastructure of the existing cycling and pedestrian network in order to improve the experience of these modes of transport.
- Densify the city's cycling network by constructing different types of cycling lanes that improve bike accessibility to different areas of the city.
- Improve connectivity for pedestrians, people with mobility impairments and cyclists between the east and west, as well as between the north and south of the city.

Funding

The city of Medellín relies on local tax revenues for most of its projects. Special projects can be initiated by the mayor's office and funded through circulation and transport taxes which charge the owner of private vehicles registered in the District of Medellín.

Project Spotlight: Active Mobility and Gender Approach

The Active Mobility and Gender Approach is a tool that allows for an understanding of the perspectives and situations that different genders face in public spaces. The guide identifies best practices with the goal of developing appropriate recommendations for a variety of contexts across the city. A robust public engagement process allows residents to influence the design of infrastructure projects.

ACTIVE MOBILITY AND GENDER APPROACH GUIDE
SOURCE: MEDELLIN MAYORS OFFICE

OTHER BEST PRACTICES

Outside of the eight selected peer cities, many cities across the country are building successful bike networks. While not included in an in-depth analysis, the following cities are taking action to make cycling safer and more accessible.

Guadalajara, Mexico

- Sister City to San Antonio.
- Built over 70 miles of bike infrastructure to improve safety and access.
- Evaluates **utilization of bike facilities by gender to understand comfor**t.
- Uses **artificial intelligence to rebalance bikeshare** distribution for better access.

Philadelphia, Pennsylvania

- 50% of residents are “interested but concerned” in bicycling.
- The Pedestrian and Bike Plan Progress Report **assesses the distribution of bike network changes across low, below average, average, and above average demographic neighborhoods**.
- Installed 44.5 miles of bike lanes between 2016 and 2021, 5.8 of which were separated bike lanes.
- 20 miles of separated bicycle lanes exist today.
- 2040 vision: High Quality Bicycle Network. The off-street portions of the network make up most of the currently constructed segments. The remaining planned segments are on-street routes.
- The city focuses on making other roadway changes that complement the bike lanes, such as decreasing vehicle speeds and shortening pedestrian/bicyclist crossings.

Milwaukee, Wisconsin

- 2023 Milwaukee Budget Includes $500,000 Protected Bike Lane Fund.
- The **Bike/Walk Sign Manual outlines the protocol for designing a thorough wayfinding** system that will allow bicycle network users to navigate through the on-street network.

Nashville, Tennessee

- The **most common bike lane type added between 2017 and 2021 was protected bike lanes**, followed by regular bike lanes, buffered bike lanes, and then shared lanes.
- This city has a **scoring system for prioritizing bike routes**. Points are assigned based on safety, sidewalk connectivity, access to transit, and health and equity.

Minneapolis-St. Paul, Minnesota

St. Paul

- 54% of residents are “interested but concerned” in bicycling.
- Installed 59 miles of bike lanes between 2015 and 2022.
- Currently have 212 miles of bike lanes, with a goal of 335 miles by 2035.
- The majority of funding comes from the capital improvement budget (CIB) and external grants. **The CIB includes an annually funded bicycle, pedestrian, and traffic safety program**; however, this program is a secondary source and limited in funding.

Minneapolis

- This city has one of the highest commuting by bicycle rates in the country: 4.1% of residents ride a bicycle to work.
- This city **limits their AAA networks to protected bike lanes, trails, and neighborhood greenways**.

Denver, Colorado

- 59% of residents are “interested but concerned” in bicycling.
- 524 on-street miles and 1,646 off-street miles.
- The same percentage of residents who would be comfortable riding on an off-street trail would also be comfortable riding on uni- and bi-directional separated bike lanes on four lane roadways (71%).

SUMMARY AND LESSONS FOR SAN ANTONIO

Each of the eight cities reviewed provides insight into how the City of San Antonio can successfully implement a safe and accessible bike network. Many of the recommendations focus on creating complete streets that meet the needs of pedestrians and cyclists in addition to drivers, with complementary suggestions regarding how to do this.

Summary of Peer City Efforts & Accomplishments:

United States

El Paso, Texas

- Recently adopted the El Paso Complete Streets manual with a framework and implementation strategy.
- Conducting staff training to bring all staff up to date and producing public-facing educational videos regarding new infrastructure.
- Working to supplement federal funding sources with non-traditional funding opportunities

Austin, Texas

- Rapidly and cost effectively expanding network through quick build projects, abbreviated design efforts and field engineering approach.
- Thorough community engagement efforts including calls for projects.
- Funding through a bond initiative.
- Incorporating traffic calming treatments in as bike infrastructure.

Dallas, Texas

- Adopted a Complete Streets Manual and revised the Street Design Manual to set narrower lane minimums.
- Focused on quick build projects that are low cost and high impact.

United States

Charlotte, North Carolina

- Implements projects using public and private funding to build out the network.
- Have a policy to implement bicycle facilities on all new or reconstructed roadways and resurfacing projects.
- Incorporate the greenway system as part of the transportation network and provide first / last mile connections.

Phoenix, Arizona

- Installing new bike facilities through reconstruction and resurfacing programs.
- Built over 220 miles of new bicycle facilities from 2016 to 2022; goal to build 1,080 miles in by 2050.
- Key Corridors Master Plan identifies context sensitive roadway typologies which guide cross section development and multimodal facility selection.

San Diego, California

- Funds bike projects through local sales tax and state and federal grant programs, including combining bike infrastructure with affordable housing projects.
- Prioritizes building quick build bike infrastructure through roadway resurfacing projects.

International

Barcelona, Spain

- Actively promoting bicycling and bike projects from a variety of perspectives, including health, safety, sustainability, and mobility.
- Created super-blocks of nine blocks clustered together that are closed off to vehicle traffic.
- Prioritizes walking and biking over driving single occupancy vehicles.

Medellin, Colombia

- Focused on network densification, which increases the number of connected biking facilities to improve access.
- Utilizing engagement to understand differences in perceptions regarding comfort for people of different genders in public spaces and modifying transportation design to address the differences.

Lessons Learned for San Antonio

The following elements synthesize the best practices learned from the collection of all peer cities reviewed. These lessons have potential to be applied directly to San Antonio through integration into the BNP process and recommendations.

Planning

- **Identify funding sources.** It is necessary to identify multiple potential funding sources and implement project phasing based on the availability and timeline of funds.
- **Identify priority routes.** Most of the cities have a system for prioritizing where new bike lanes should be installed in the near future.

Design

- **Link on-street and off-street systems.** Complementary urban and on-street trails can provide a more comprehensive network.
- **Prioritize separated bike lanes when possible.** Separated bike lanes provide increased safety and levels of comfort for bicyclists.
- **Prioritize safety.** Consider focusing on network quality rather than quantity. It is not recommended that safety be sacrificed to compete with the number of miles present in other cities. While San Diego has six times as many of miles of trails compared to San Antonio, their percent of trips taken by bike is only three times as much. Part of this may be due to a significant number of unprotected bike lanes.
- **Gender-conscious and accessible design.** Using a gender-conscious approach to multi-modal infrastructure that designs for lower-confidence users will increase participation in biking.
- **Network Densification.** Providing redundancy in the bike network can help provide options for people to ride, reduce out of direction travel, and allow users alternative routes during flood events.

Implementation

- **Consider quick build implementation.** These reversible, adjustable traffic safety improvements can be installed relatively quickly and allow for faster cost-saving implementation without sacrificing safety. This can be implemented through regular pavement maintenance projects to expedite network growth.
- **Evaluate and streamline the permitting / review process.** A streamlined design and review process can help speed up the implementation process. Strategies like field engineering can help streamline the process and allow for context-specific design changes.

Policy

- **Update documentation.** Frequently updating plans and documentation allows for thorough consideration of changing trends and patterns. Updated documentation also keeps the public informed and may yield more feedback from City residents.
- **Quantify goals.** Providing concrete goals can help to determine progress over time.

Programs

- **Educational programs.** Make rider-education easily accessible for riders of varying levels of experience. This may mean offering courses or events that cover a variety of street safety topics.
- **Pilot programs.** Pilot programs can help gauge user interest and engagement for a variety of bike facilities. Electric bike rebates, bike-specific signals, and mobile bike parking are all pilot programs happening among the peer cities.

CHAPTER 5. EXISTING ROADWAY CONDITIONS

ROADWAY CHARACTERISTICS

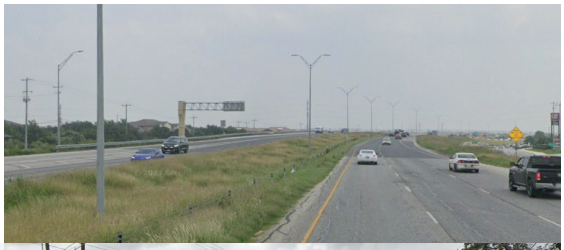
Understanding San Antonio's roadway network is critical to determining appropriate locations for different types of facilities for the bike network. The following section summarizes typical characteristics of existing roadway conditions and characteristics in the planning area.

Major Travel Corridors

Travel corridors connect communities, land uses, employment centers, and link people to goods and services. Traditionally, roadways are grouped into a hierarchical classification, which helps identify the roadway's function, design, speed limits, access control, and adjacent land use development. Understanding roadway classification is imperative when planning an active transportation network. Vehicle volumes, number of lanes, lane width, road condition, and speed limits impact pedestrian and bicyclists' level of comfort. As illustrated in Figure 5.1, within San Antonio there is a mixture of roadways, including:

Freeways/Expressways

Controlled access roadway that provides regional connections. Typically have high speeds and high traffic volumes make it unfavorable for pedestrian and bicycle usage.



Arterial

Major roadways with multiple travel lanes and higher traffic volumes and speeds. Typically, these roadways are lined with commercial and retail land uses and major destinations. Arterials connect regional destinations and communities. Traditional painted bike lanes may be accessible to experienced cyclists only.

Collector

Larger corridors that have moderate traffic volumes and speeds. Distributes traffic from local roads and neighborhoods to arterials. With proper facilities, a low-stress pedestrian and bicycle network can be achieved.

Local

Minor roadways with lower traffic volumes and speeds. Provides direct access within a neighborhood. Provides a low stress facility for all users to walk and bike.

Due to high traffic volumes, arterials traditionally have numerous businesses, commercial services, transit stops, and other major destinations that attract pedestrians and bicyclists and, in turn, potentially create conflicts with motorists, particularly at intersections. Greater separation between the vehicle lanes and bicycle infrastructure is desirable along arterials. Typically, on lower classification roads such as collectors and local streets, bicyclists feel more comfortable sharing lanes = because of the lower traffic volumes and more frequent crossing opportunities.

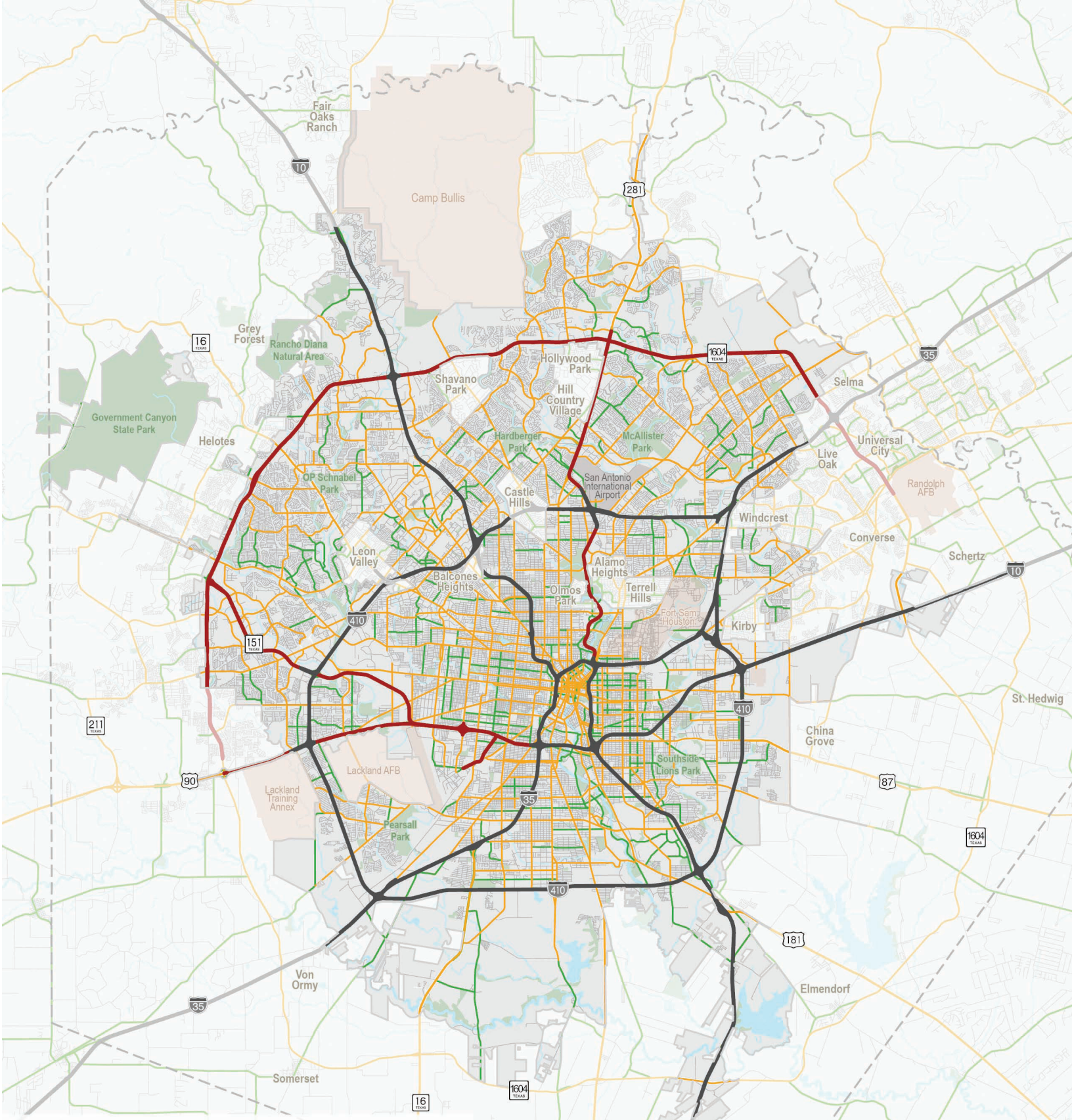


Figure 5.1. Functional Classification

- Interstate
- Freeway or Expressway
- Arterial
- Collector
- Local
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

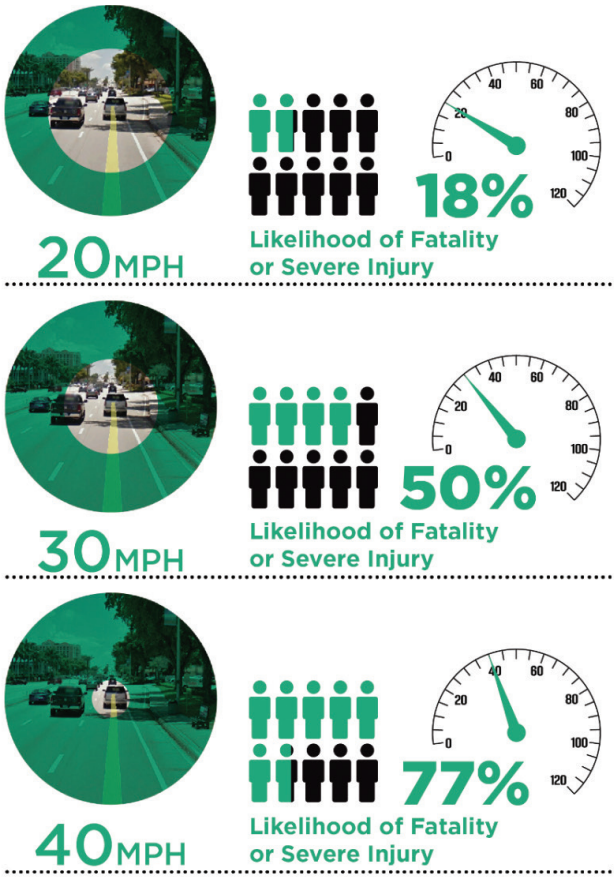
0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

ROADWAY SPEED LIMITS

A variety of factors impact safety and comfort for people walking, but interaction with vehicles is one of the most critical. As driving speed increases, a driver's line of sight of the roadway and its surroundings is also impacted. Research shows that when driving at a higher speed, the driver naturally focuses on objects further away. The driver's peripheral vision is reduced, meaning that people driving at faster speeds are less likely to notice a person biking or waiting to cross the street while people driving at slower speeds are more likely to have better awareness of people around them.

Figure 5.2 illustrates posted speed limits in San Antonio. Under Texas state law, all residential streets are 30 mph unless otherwise posted. In San Antonio, major destinations and employment centers are typically on arterial corridors with speeds of 35 MPH or greater, making it uncomfortable for people to walk or bike in mixed traffic.



SOURCE: IMPACT SPEED AND A PEDESTRIAN'S RISK OF SEVERE INJURY OR DEATH. BRIAN TEFFT, AAA FOUNDATION FOR TRAFFIC SAFETY, 2011

Vehicle Volumes

Traffic volume is also important when considering multimodal comfort, as higher vehicle volumes can reduce comfort for people biking, especially when there is little or no separation between people driving and biking. Figure 5.4 illustrates traffic volumes.

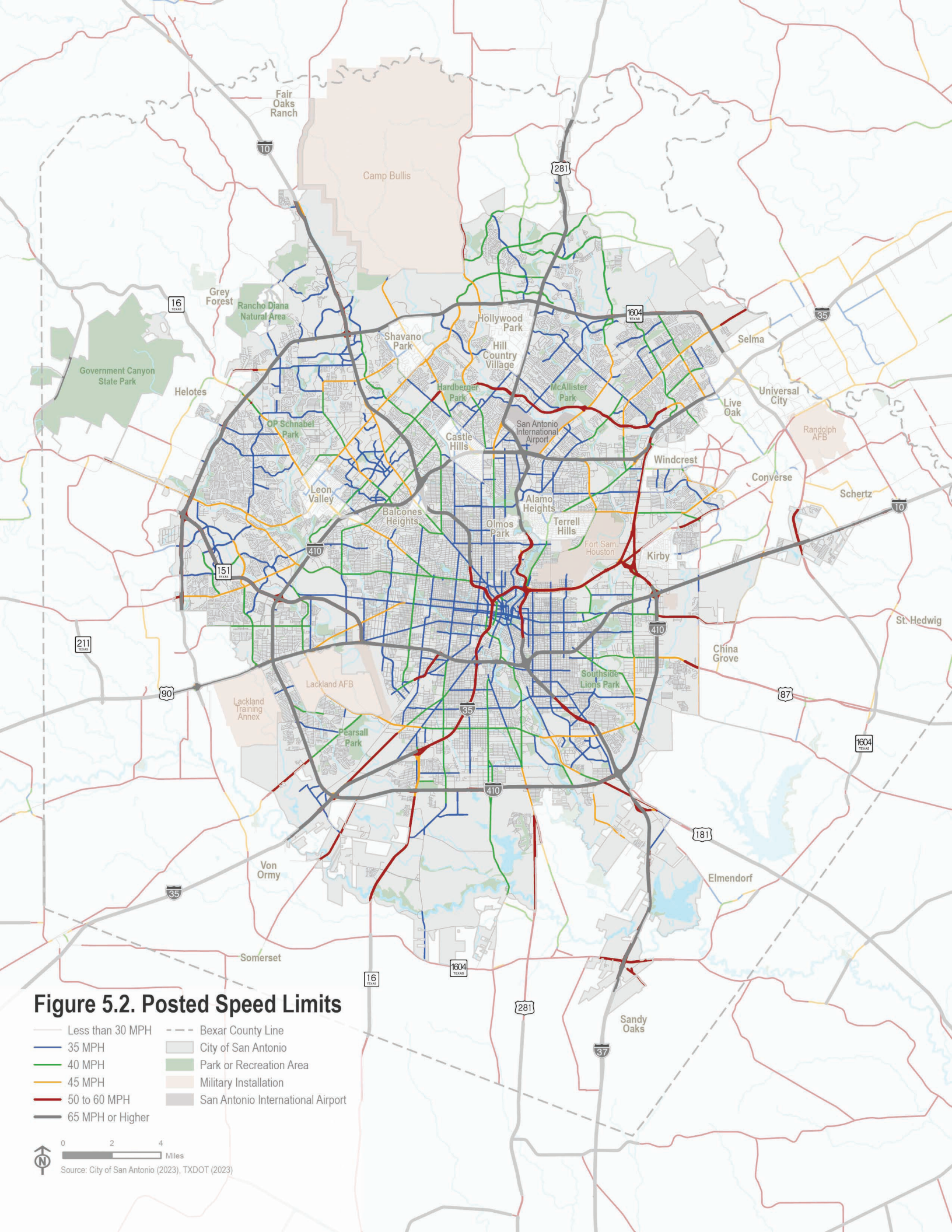
Vehicle Sizes

According to the Insurance Institute for Highway Safety (IIHS), vehicles with a hood height of 40 inches or more are 45% more likely to cause fatalities in pedestrian or bike crashes compared to cars with a hood height of 30 inches or less[30]. Texans love their trucks and SUVs, which is why greater separation between vehicles traffic and bikes is necessary.

Number of Lanes

Travel lane characteristics, in conjunction with available right-of-way, play a key role in the expansion potential of bicycle facilities. The number of lanes and their widths are integral in determining the stress level for people biking. Figure 5.3 illustrates the current number of travel lanes. The number of travel lanes constructed is often determined based on existing or projected vehicle volumes, but sometimes streets are built with more lanes than needed. During future phases of the BNP, corridors will be evaluated to determine whether it is feasible to repurpose a vehicle travel lane for multimodal use.

30. Monfort, Samuel S. / Mueller, Becky C. (2020). Pedestrian injuries from cars and SUVs.


Fair Oaks Ranch
Camp Bullis
Grey Forest
Rancho Diana Natural Area
Government Canyon State Park
Helotes
Shavano Park
Hollywood Park
Hill Country Village
Hardberger Park
McAllister Park
San Antonio International Airport
Castle Hills
OP Schnabel Park
Leon Valley
Balcones Heights
Olmos Park
Alamo Heights
Terrell Hills
Fort Sam Houston
Kirby
Windcrest
Converse
Universal City
Live Oak
Selma
Schertz
Randolph AFB
St. Hedwig
China Grove
Southside Lions Park
Lackland AFB
Lackland Training Annex
Pearsall Park
Von Ormy
Somerset
Elmendorf
Sandy Oaks
10
16
35
37
87
90
151
181
211
281
410
1604
Figure 5.2. Posted Speed Limits
Less than 30 MPH
35 MPH
40 MPH
45 MPH
50 to 60 MPH
65 MPH or Higher
Bexar County Line
City of San Antonio
Park or Recreation Area
Military Installation
San Antonio International Airport
0
2
4
Miles
Source: City of San Antonio (2023), TXDOT (2023)

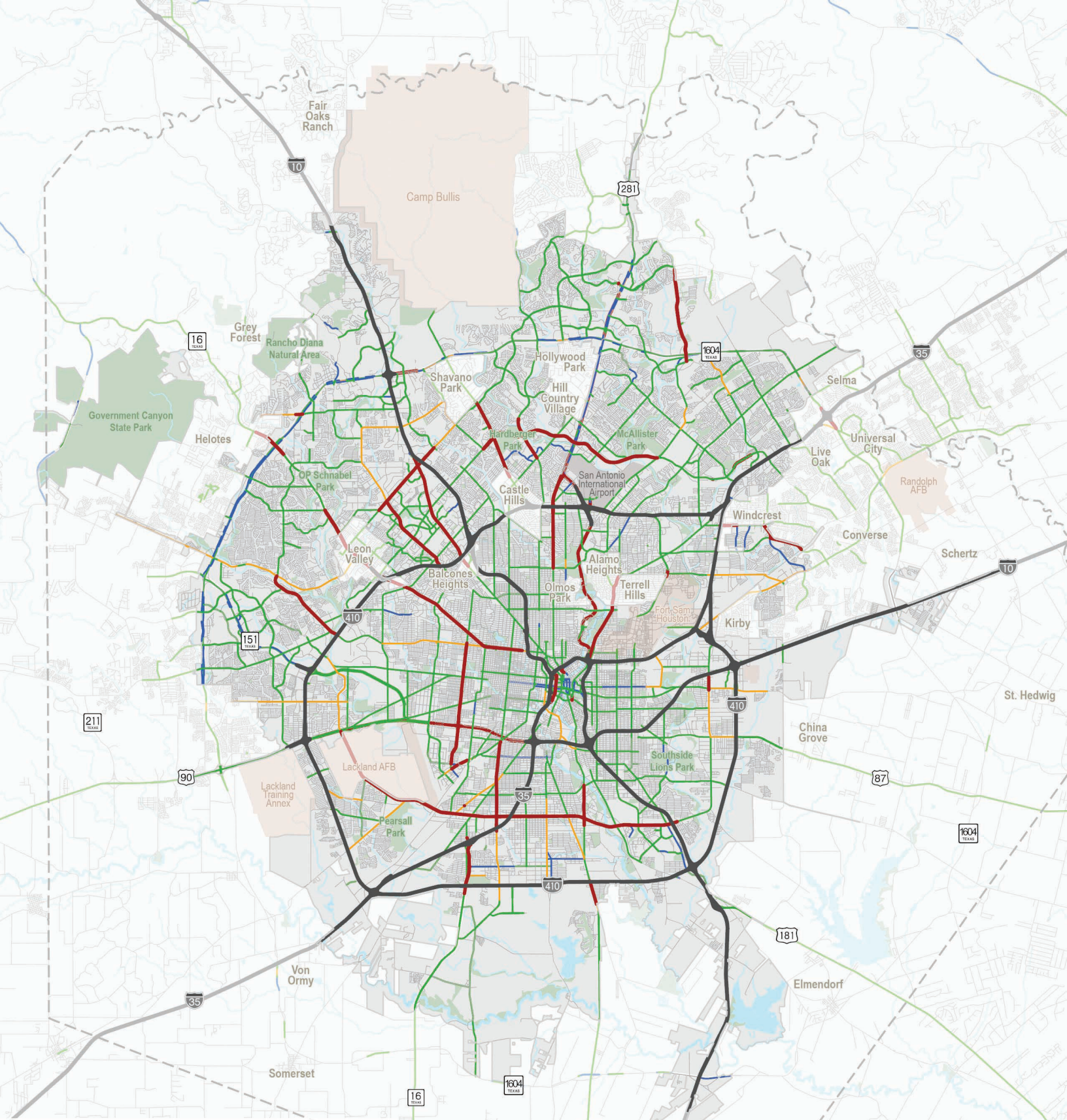


Figure 5.3. Number of Lanes

- Interstate
- 2 Lanes or Less
- 3 Lanes
- 4 Lanes
- 5 Lanes
- 6 Lanes or More
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

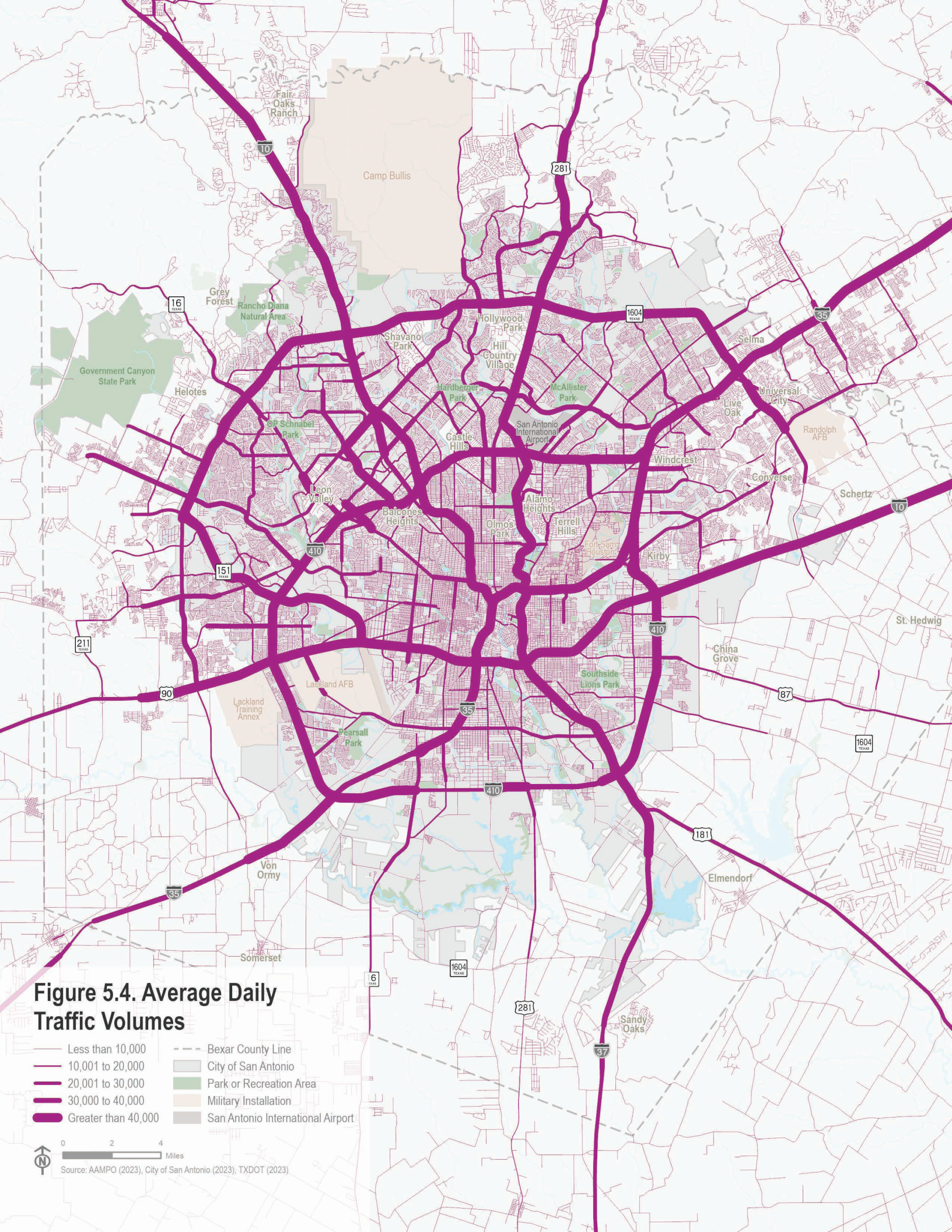


Figure 5.4. Average Daily Traffic Volumes

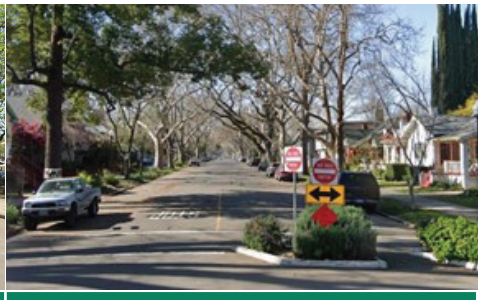
Source: AAMPO (2023), City of San Antonio (2023), TXDOT (2023)

Traffic Calming Devices

San Antonio has been working to calm traffic along neighborhood streets. The City has a community driven request process for traffic calming and adopted a Neighborhood Traffic Calming Toolbox in 2020 outlining potential strategies for local streets. The streets with traffic calming improvements can be seen in Figure 5.5. Types of traffic calming techniques are listed below.

Pedestrian Refuge Islands provide a protected space for people walking to cross half of the roadway at a time instead of all at once.

Curb Extensions / Bulb-Outs / Neckdowns extend the sidewalk or curb line out into the travel or parking lane, which reduces the width pedestrians have to cross.



Diverters prohibit drivers from going through an intersection. while allowing pedestrians and cyclists to cross.

Median Islands provide a protected space in the center of the street to facilitate pedestrian and bicycle crossings.

Chicanes create a curvy pathway in an otherwise straight road to encourage vehicles to slow.

Speed Humps and Speed Tables are elevated bumps in the roadway intended to slow traffic.

Raised Crosswalks elevate the crosswalk to sidewalk level, providing a level path for people to cross. This technique encourages vehicles to slow and increases visibility for everyone.

Roundabouts/Traffic Circles are circular intersections where traffic flows uninterrupted in one direction around a center island. Traffic approaching the roundabout yields to traffic within the intersection.

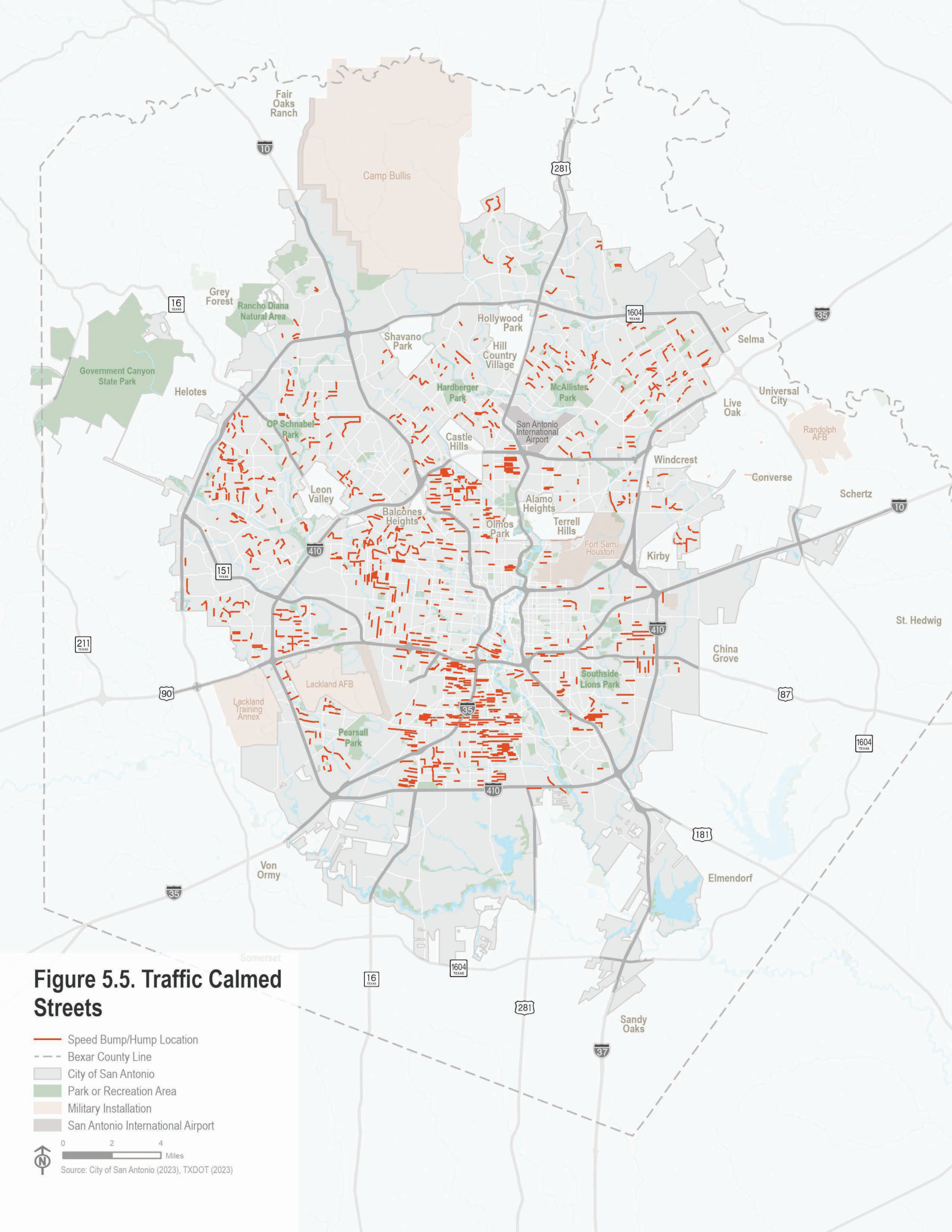


Figure 5.5. Traffic Calmed Streets

- Speed Bump/Hump Location
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

TRANSIT CONDITIONS

Understanding the location of transit routes and stops is critical when developing a bike network because almost every transit trip begins or ends with walking or biking. Often people who could potentially utilize transit choose to drive because no transit stops are conveniently located near their starting points or final destinations. Placing biking facilities along “first and last mile” paths can expand a person’s transportation choices by making transit more accessible. Integrating bike facilities and transit also helps to create a balanced and efficient multimodal transportation network that makes transportation affordable, convenient, and flexible for all users regardless of their age, ability, or socioeconomic status.

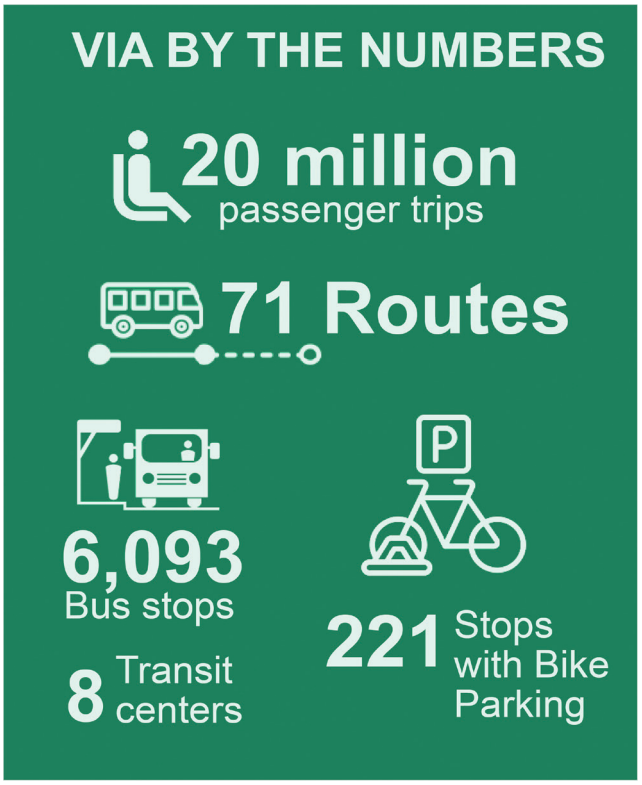
In the San Antonio, VIA Metropolitan Transit (VIA) provides regional public transportation services. VIA buses operate seven days a week from 4 a.m. to 1 a.m. There are 6,093 bus stops along 96 bus lines, which are divided into five service categories: frequent, metro, express, skip, and downtown circulator. Existing transit service routes within the study area are shown in Figure 5.5.

Ridership

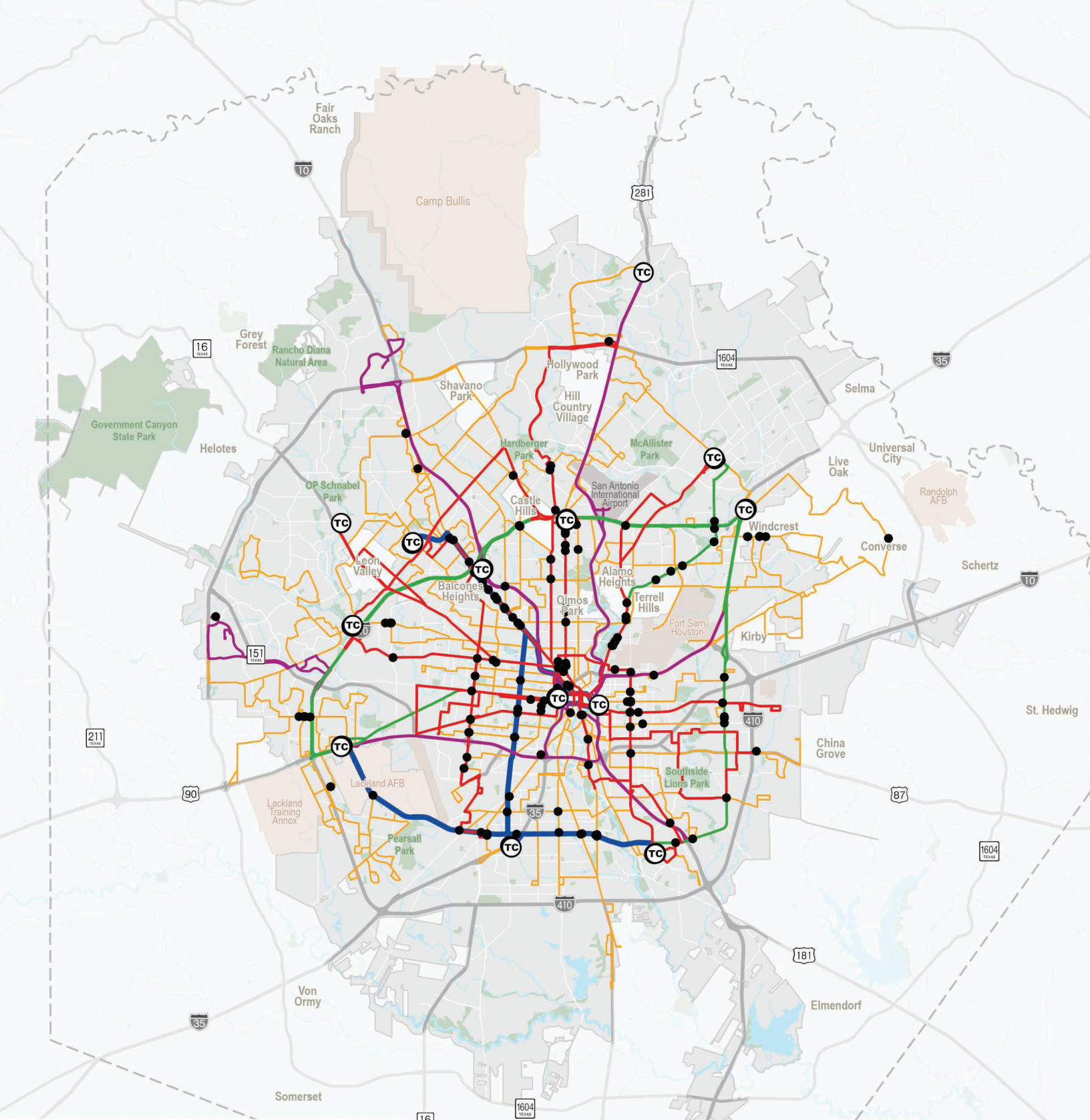
Ridership information provides important information on where people are accessing transit. **Error! Reference source not found.** illustrates high ridership bus routes and stops. Key neighborhoods across the city with higher-than-average weekday transit ridership include Downtown, Midtown, Westside, Eastside, Near North, North Central, Medical Center, Southwest, Brooks, UTSA, among others.

Advanced Rapid Transit

In 2021, VIA began implementing a Bus Rapid Transit (BRT) line that connects the San Antonio International Airport area, along San Pedro Avenue, through Downtown, and south to the Missions area. The project, which will include dedicated transit lanes, bike parking, and transit signal priority, will start construction in 2024. Providing comfortable bicycle connections to the North/South Corridor project can help increase transportation options for residents and visitors to access employment, education, services, and goods.



PROPOSED ADVANCED RAPID TRANSIT NORTH/SOUTH CORRIDOR PROJECT SOURCE: VIA 2023


Fair Oaks Ranch
Camp Bullis
Grey Forest
Rancho Diana Natural Area
Government Canyon State Park
Helotes
Hollywood Park
Shavano Park
Hill Country Village
Hardberger Park
McAllister Park
OP Schnabel Park
Castle Hills
San Antonio International Airport
Selma
Universal City
Live Oak
Randolph AFB
Windcrest
Converse
Schertz
Leon Valley
Balcones Heights
Olmos Park
Alamo Heights
Terrell Hills
Fort Sam Houston
Kirby
St. Hedwig
China Grove
Lackland AFB
Lackland Training Annex
Southside Lions Park
Pearsall Park
Von Ormy
Elmendorf
Somerset
Sandy Oaks
TC
10
16
35
37
87
90
151
181
211
281
410
1604
Figure 5.6. VIA Transit Routes
Frequent Service
Skip Service
Metro Service
Express Route
VIA Primo
Transfer Center
Bus Stop with Bike Rack
Bexar County Line
City of San Antonio
Park or Recreation Area
Military Installation
San Antonio International Airport
0
2
4
Miles
Source: VIA (2023), City of San Antonio (2023), TXDOT (2023)

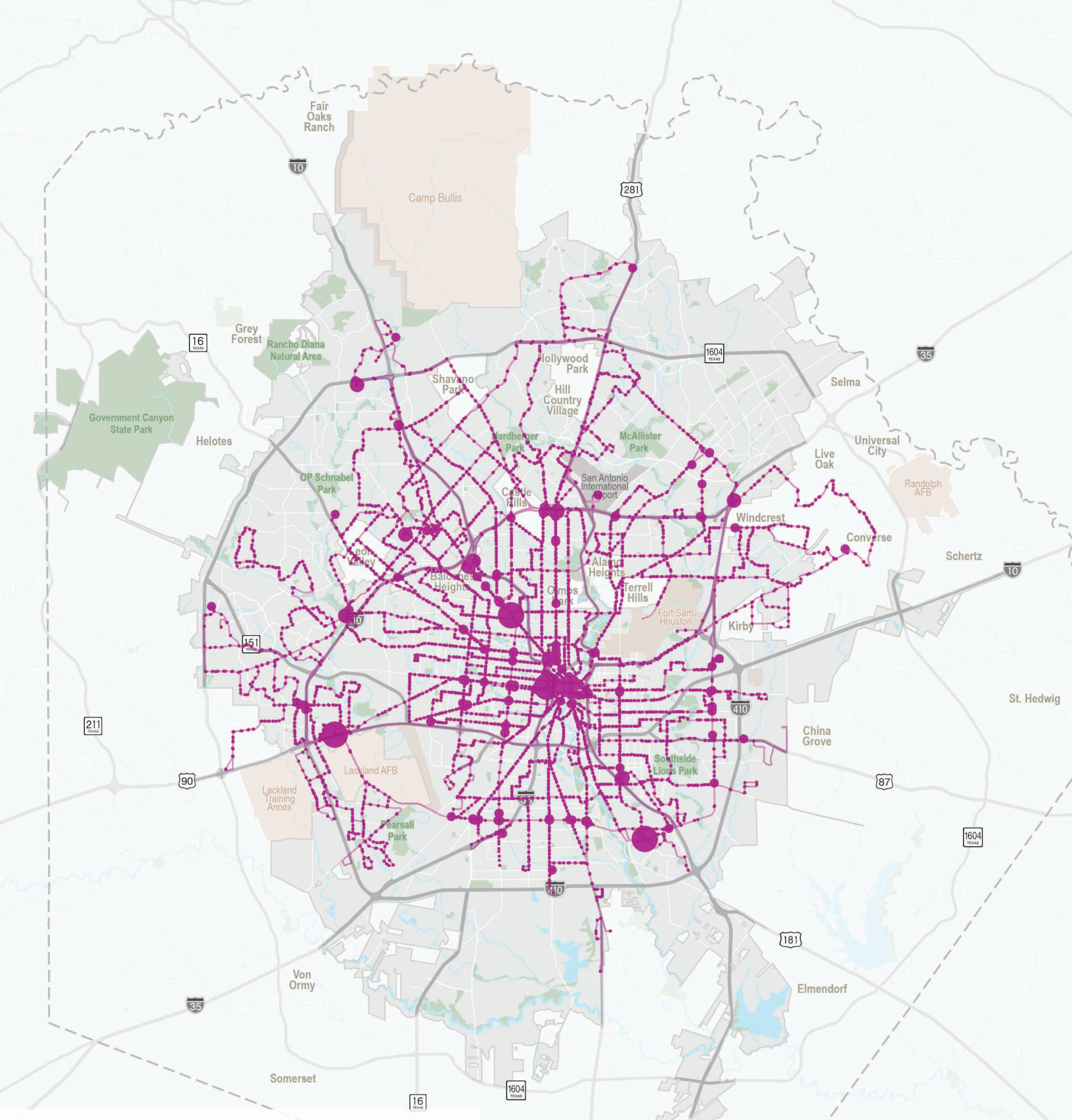
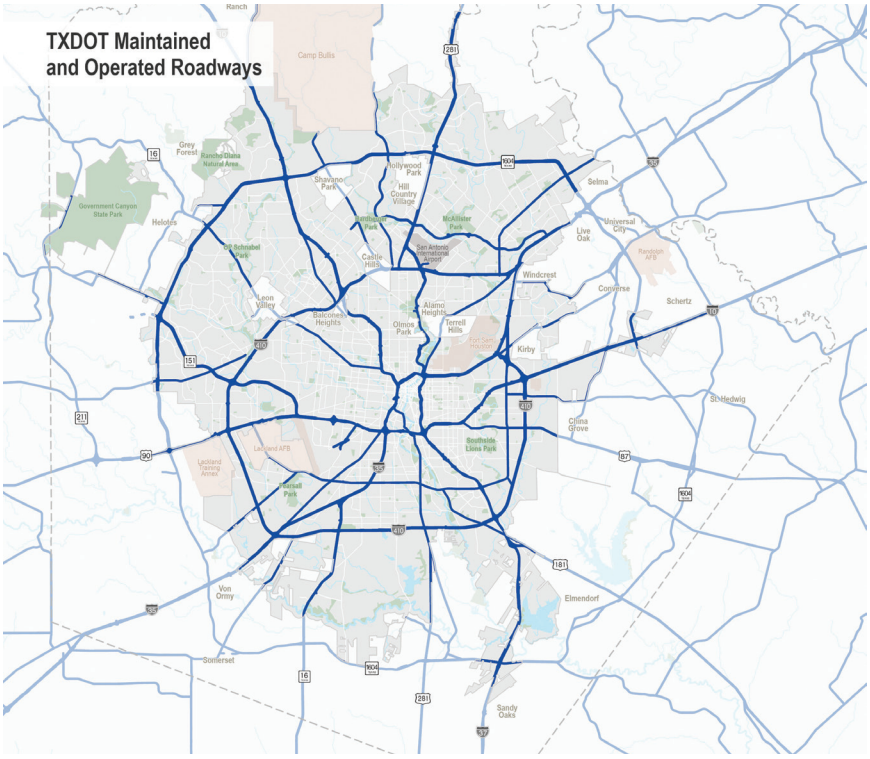


Figure 5.7. High Ridership VIA Stops

TEXAS DEPARTMENT OF TRANSPORTATION

The Texas Department of Transportation (TxDOT) operates and maintains a variety of roadways in San Antonio, including Bandera Road, Blanco Road, Broadway, Culebra Road, Wurzbach Parkway, Potranco Road, and additional arterial, highways, and freeway overpass and underpasses. TxDOT roadways play a critical role in the bicycle network as they are often high speed and volume roadways that are barriers to people on bikes, but also provide direct access to key destinations people want to travel to. It is essential that the City and TxDOT positively collaborate on the designs of these roadways to achieve a high-quality bike network, while acknowledging that TXDOT roadways typically have different context, constraints, scopes, available funding, timeline, and public process.



FLOODING AND DRAINAGE CONCERNS

Flooding has plagued the San Antonio River Basin for generations, causing severe flooding on San Antonio's streets and greenways. These rain events inhibit bicycling and cause specific challenges, including:

- **Road and Trail Closures.** Road closures and high-water may limit a bicyclist's access and connectivity. Greenways are designed to flood in the event of large rainstorms, rendering them unusable by cyclists.
- **Debris in on-street bicycle facilities.** Streets are typically designed with a "crown," or a high point sloping down to curbs at either side. Most bike lanes are located at the curb in an area referred to as "the gutter". Like the gutter along the side of a roof, street gutters (and thus bike lanes) become clogged with debris carried by draining stormwater.
- **Puddles and slippery surfaces.** Imperfections in pavement or simply high-intensity rain result in large puddles, which are difficult to bike through and can be dangerous when unexpected. Utility structures ("manholes," handholes, and catch basins) are often located within bike space and can be a slipping hazard when wet.
- **The splash zone**. Bike lanes near vehicle travel lanes, curbside or otherwise, leave people biking vulnerable to unsolicited showers from their fellow road users.

Figure 5.7 illustrates corridors and locations that historically have experienced flooding and drainage concerns. During the BNP, a close assessment will be conducted of drainage constraints and potential bicycle facility design options and treatments.

CHAPTER 6. BIKING IN SAN ANTONIO TODAY

BIKING IN SAN ANTONIO

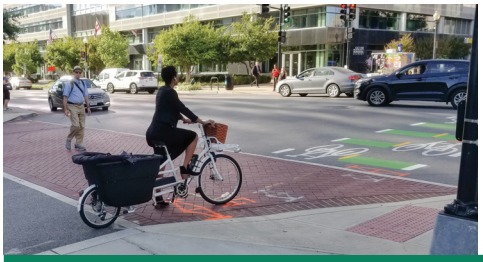
Since the 2014 Bike Network Plan, San Antonio has made progress been working to build out a complete bike network, including the Howard W. Peak Greenway Trail and an on-street bike network. Expanding the network with safe and comfortable facilities, closing gaps, and connecting the on-street network to the Greenway System can help to provide new options for everyone to move around San Antonio.

Who Are We Planning For?

We plan for everyone, and we know people experience environments in different ways based on their knowledge/ experience level, trip purpose, age, gender, background, and other factors. Understanding who is riding, why they are riding, and the user experience helps identify gaps and needs in the network. The BNP examines facility needs to accommodate all user types and levels of comfort.

Types of Users

Generally, people who walk and bike in San Antonio can be categorized into the following, recognizing people may fit into multiple categories:



Utilitarian. People who walk or bike for everyday errands like shopping, medical appointments, to visit friends/family, etc.

Commuters. People who walk or bike to work or school, including those who bike for work or walk or bike to access transit.

Kids & Families. Parents and children (under 16) who walk or bike, often to parks, schools, or neighborhood destinations.

Riders with Disabilities. People who use assistive devices.

Sports & Fitness. People who bike for sport, generally at higher speeds and longer distances.

Road Enthusiasts. People who prefer to bike in the street in mixed traffic.

Tourists. Visitors who choose to bike or walk and who may or may not regularly do so at home.

On Small Wheels. People who use scooters, skateboards, and other small devices.

Recreational. People who walk or ride for fun, generally on the trail network.

User Needs

Each of these groups has different needs to be comfortable walking or biking, generally summarized below:

Need	Description	Level of Need: Utilitarian	Commuters	Kids & Families	Riders with Disabilities	Sports & Fitness	Road Enthusiasts	Tourists	On Small Wheels	Recreational
Desire for Separation from Vehicle Traffic	Separation from traffic can be in the form of barriers, landscaped strips, or other elements.									
Sensitivity to Network Gaps	Gaps in infrastructure at intersections or along segments may require users to ride or walk in mixed traffic.									
Need for Bike Parking	Secure, convenient, and visible bike parking at destinations enables users to comfortably access destinations.									
Desire for Direct Connections to Destinations	Even small detours may add significant time to a trip for people walking or biking.									
Desire for Access to Trails	On street connections are often needed to access a trail from homes or businesses.									
Sensitivity to Distance	Some users may choose not to walk or bike if a destination is too far away.									
Importance of Perception of Safety	While every user cares about safety, some users are more sensitive to things like lighting, crossings, and vehicle separation.									
Space Requirements	Users require more space for groups or for different vehicle types, like cargo bikes.									
Sensitivity to Path Quality	Users with smaller wheeled devices require smooth paths with limited obstructions.									
Level of Experience	The level of experience or knowledge someone has about the rules of the road or trail.									

Low Need Medium Need High Need

INVENTORY OF BIKE FACILITIES

To understand what it is like to bike (and walk) today, it is important to understand what types of facilities exist. Prior to this study, San Antonio did not have a complete and up-to-date inventory of sidewalks, bike facilities, and crossings. To address this, a comprehensive mapping exercise and inventory was completed. The inventory goals include:

- Form a comprehensive understanding of the current state of the City's bike network.
- Create a comprehensive geospatial inventory of bicycle facilities, bicycle boulevards, designated bike routes, shared use paths and trails.
- Identify gaps in the active transportation network within the City, between adjacent jurisdictions, and major activity centers.

The following facilities were identified in the inventory and are described further on the following pages:

Facilities for People Biking

These include linear infrastructure designated for multimodal travel. Elements collected include the physical location, jurisdiction, surface type, facility width, presence, and type of separation from other travel modes, facility condition, presence of on street parking, and other elements. While the general focus of this inventory was on bike facilities, locations of sidewalks were also collected.

Street Crossings for People Biking

Locations and types of crossings for multimodal travel were recorded to gain a better understanding of where and how people can cross the street. Information collected includes the physical location, jurisdiction, location type (intersection or mid-block), presence and type of signalization, presence and type of crossing markings, and other treatments such as bike facilities or raised elements.

Off Street Paths and Trails

When bicycle and pedestrian facilities are connected to recreational areas they act as an extension of the transportation system. Connecting parks and other recreational facilities via bicycle and pedestrian facilities is a way to make parks more accessible and provide a safe and convenient means for residents to explore the recreational system. San Antonio has an enviable trail system that includes over 110 miles of the Howard W. Peak Greenway Trail System. The four major segments of the Greenway are the Leon Creek Greenway, the Salado Creek Greenway, the Westside Creeks, and the Medina River Greenway each offering several miles of uninterrupted trails. In addition, the Greenway trails connect dozens of local parks and consist of approximately 1,600 acres of creek-side open space and natural areas. Figure 6.1 illustrates the locations of the Greenway system in relation to on-street bike facilities.

Facilities for People Biking

The following are examples of facilities for biking currently provided by the City of San Antonio. With over 490 centerline miles of bike facilities in the City of San Antonio today, bike facilities in San Antonio vary greatly by location and context. Bike lanes make up the majority of on-street facilities, with over 190 roadway centerline miles of bike lanes present today. On the other hand, protected and buffered bike lanes only account for 29 roadway centerline miles of facilities. Figure 6.1 illustrates the bike facilities in San Antonio today.[31]

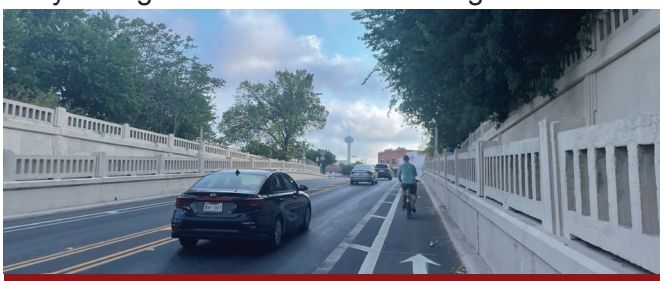
Examples of Facilities in San Antonio Today

Shared Lanes or Roads for Bikes

Signed routes where the travel lane is shared by drivers and people biking are generally only comfortable for confident riders. These may be on local streets or wider roads and generally include wayfinding and shared lane markings.

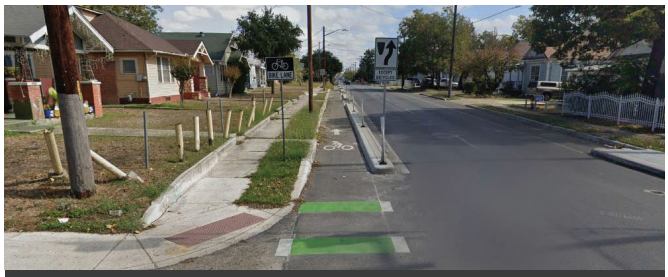
Bike Lane

Striped lane with pavement markings and signs that designated an exclusive lane for bicycle use. Bike lanes can be comfortable for users depending on roadway speeds, volumes, and number of lanes.



Buffered Bike Lane

A bike lane with a painted buffer provides further separation between vehicles or parking lanes.



Protected Bike Lane

A protected bike lane is physically separated from motor traffic and distinct from the sidewalk and may serve one or two-way bike traffic. Protected bike lanes are comfortable for most users.

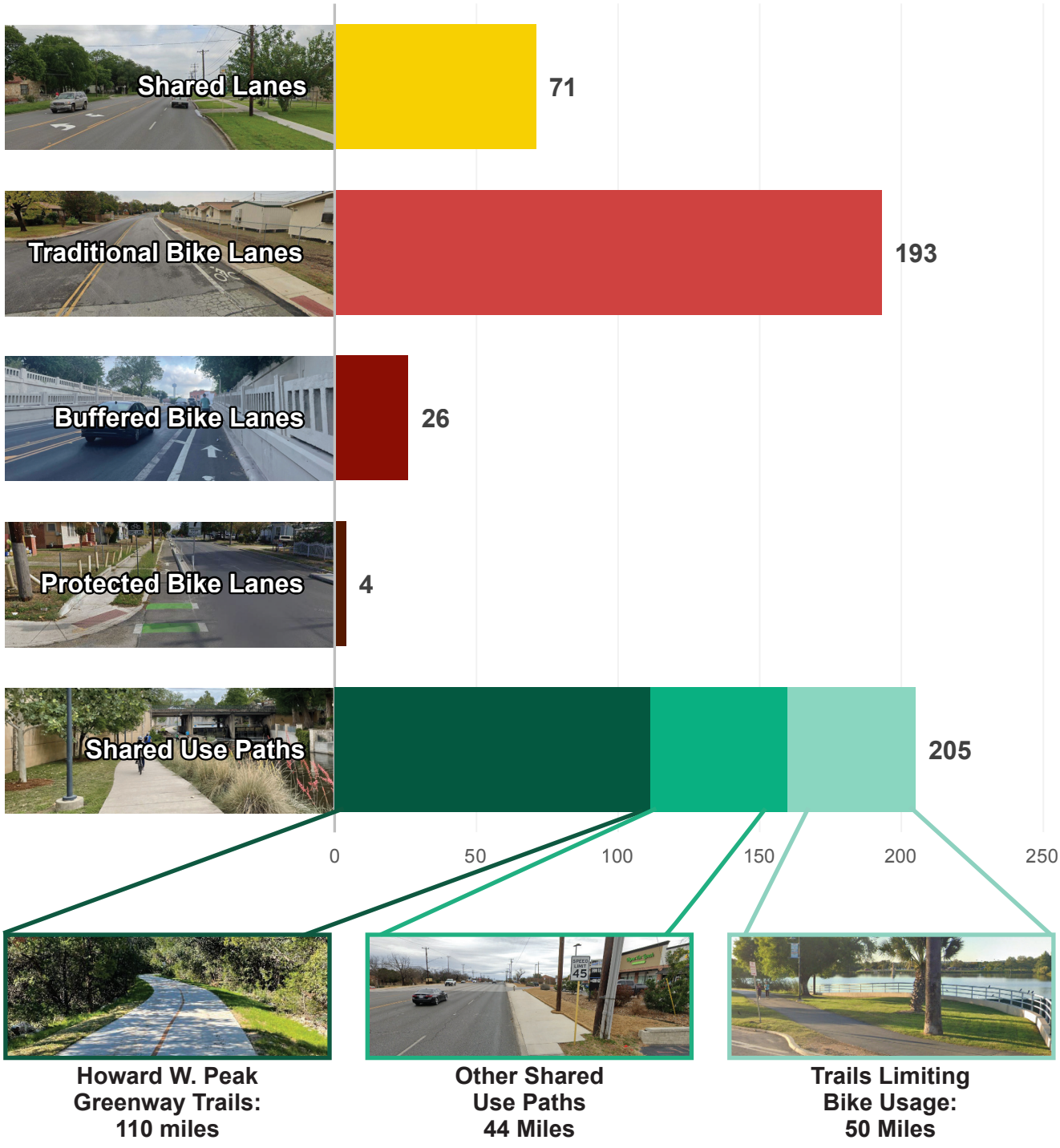
Shared Use Path / Side Path

Off-street facilities are separated from motorized travel both inside and outside the ROW that are shared between bikes and pedestrians. Shared use paths run independent of roadway facilities and side paths run along roads.

31 Mileage noted in this report include only those within the City of San Antonio's city limits and are attributed to the centerline of the roadway facility on which they exist. Previous bike facility mileage totals have included roadways outside the city limits, counted in a different manner.

Facility Type	San Antonio	Other	Total
Bike Route	71.2	1.6	72.8
Bike Lane	193.1	63.7	256.8
Buffered Bike Lane	25.6	2.3	27.9
Protected Bike Lane	3.4	0.0	3.4
Shared Use Path	44.2	25.0	69.3
Shared Use Path – HWP	110.4	0.0	110.4
Shared Use Path – Park	50.1	6.5	56.5
Two-Way Cycle Track	5.9	1.2	7.1
TOTAL	504.0	100.3	604.3

Bike Facility Centerline Miles



Howard W. Peak Greenway Trails: 110 miles

Other Shared Use Paths 44 Miles

Trails Limiting Bike Usage: 50 Miles

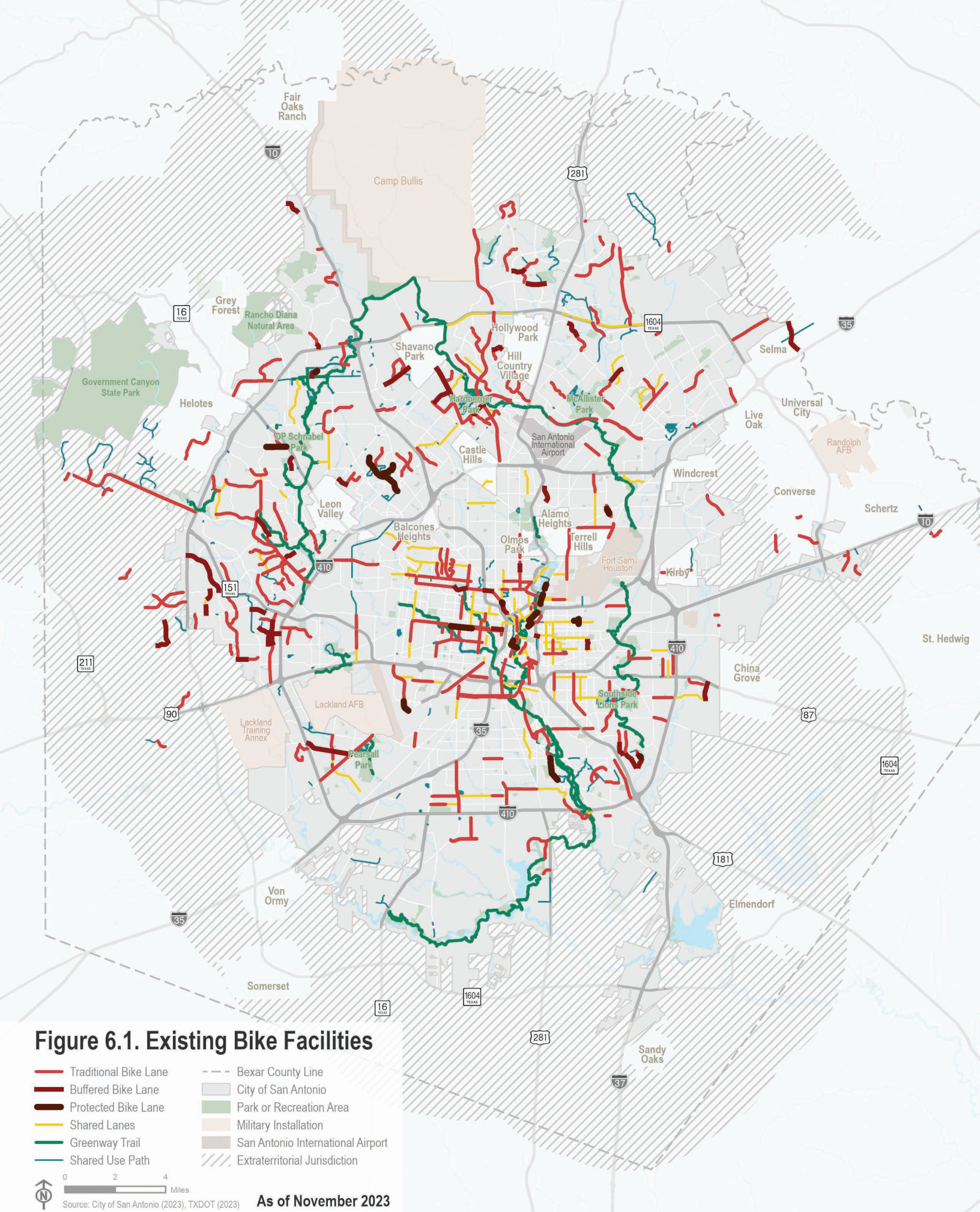
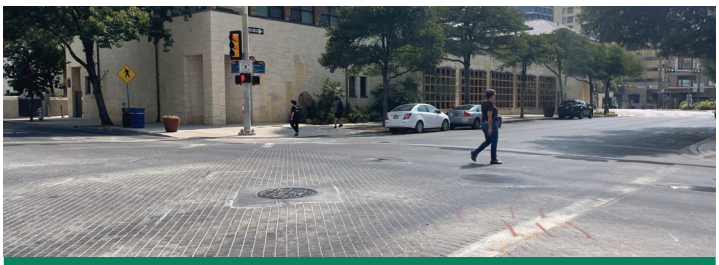


Figure 6.1. Existing Bike Facilities

Street Crossings for People Walking and Biking

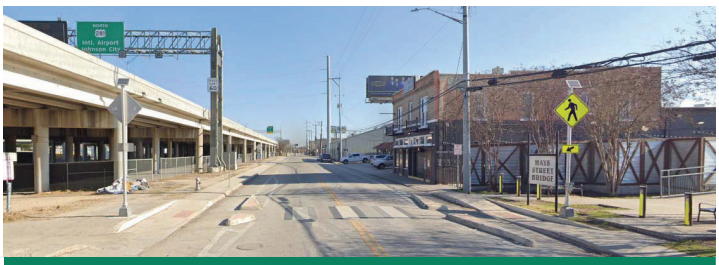
One of the most significant barriers to walking and biking is how frequently and comfortably someone can cross the street to get to their destination. Having frequent crossings can significantly decrease the distance needed to walk or bike to a destination, and intersections can be designed to enhance safety and comfort for people biking. The following types of crossing treatments exist in San Antonio:

Examples of Crossing Facilities in San Antonio Today



Signalized Intersection

An intersection with a traffic signal; may or may not include marked crosswalks or all way crossings (pictured) and additional features to prioritize people walking and biking.



Rapid Rectangular Flashing Beacon (RRFB)

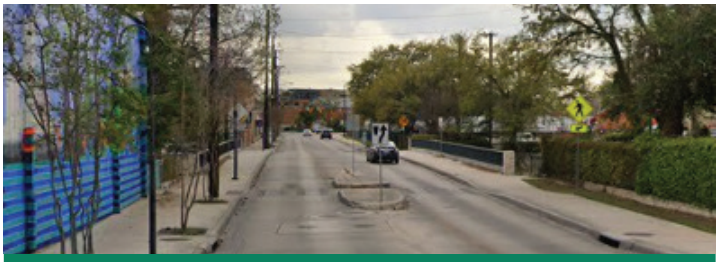
Crosswalks with flashing signs to alert drivers to people crossing.

Pedestrian Hybrid Beacon (PHB)

A traffic control device which is activated by pedestrians and uses a sequence of lights to stop traffic.

Signalized Midblock Crossing

A fully signalized crossing outside of an intersection which is generally activated by pedestrians.



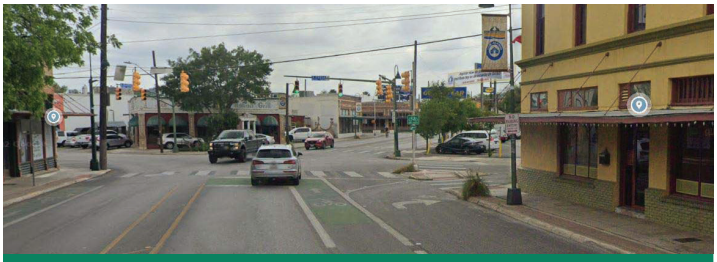
Unsignalized Midblock Crossing

A marked crosswalk outside of an intersection.

Bicycle Crossing Treatments

Conflict Markings Through Intersection / Driveway

Markings indicating the path of bike travel through an intersection or driveway, raising visibility for all roadway users and indicating to a driver to watch for people biking.



Conflict Markings Leading to Intersection

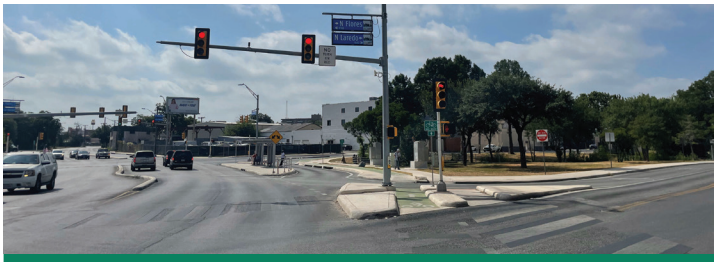
Markings indicating the path of bike leading to an intersection, generally intended to raise visibility for all users, but are targeted to alerting the bike user that they are entering mixed traffic.

Bike Box

A designated area in the front of the traffic lane at a signalized intersection to provide bicyclists a safe way to get ahead of traffic during the red light.

Two-Stage Left-Turn Queue Box

A designated queue space for people biking outside of the traveled path of motor vehicles at a signalized intersection.



Protected Intersection

An intersection with physical separation between people biking and motor vehicles; may also include bike signals.

Missing Facilities

In addition to the facilities described previously, there are also some challenges for people who walk and bike:

- Bike facilities which end prior to an intersection, leaving people biking to share the road with vehicular traffic.
- Signalized intersections with no crosswalks.
- Gaps in the network.

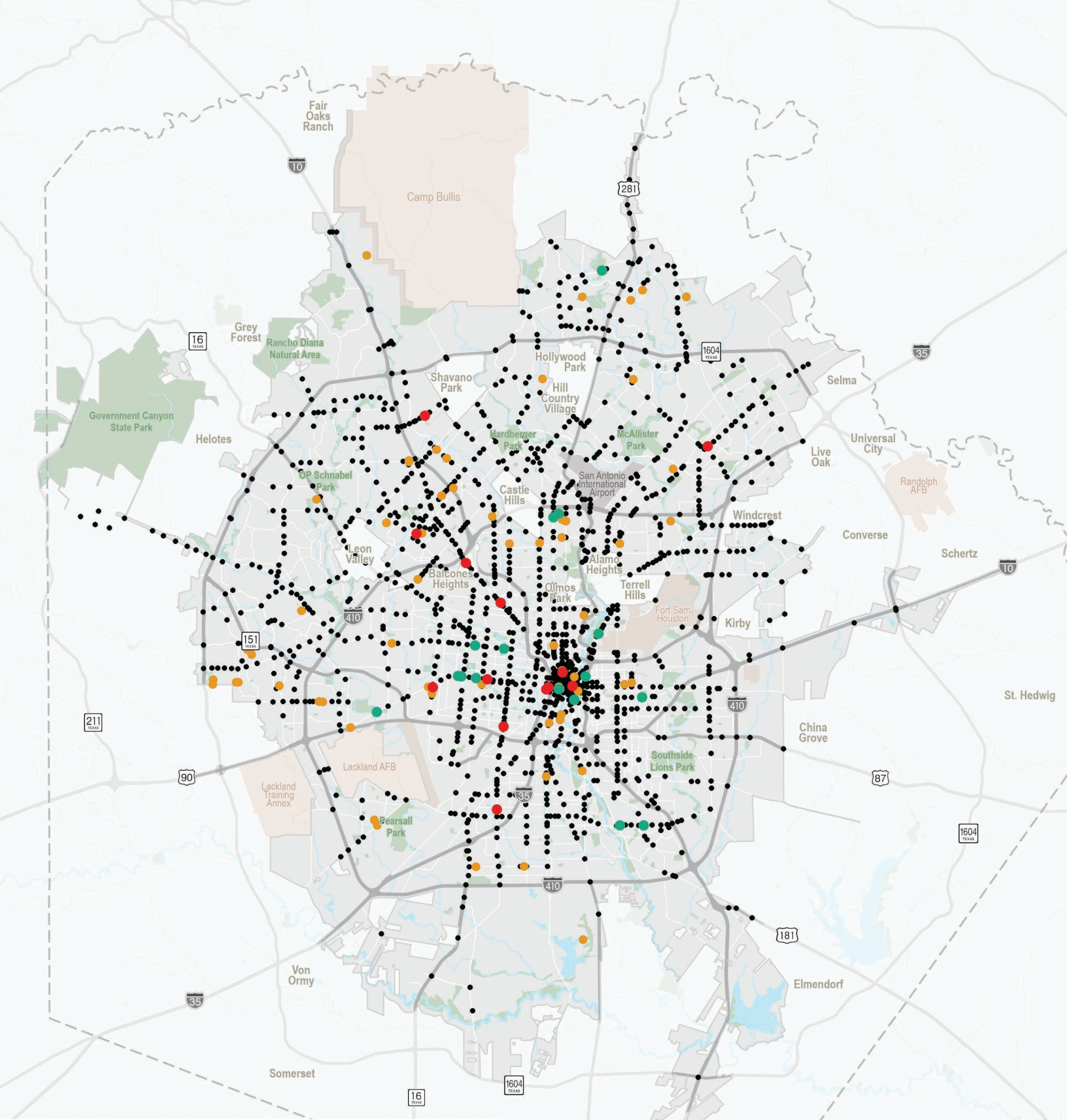


Figure 6.2. Road Crossings

- Pedestrian Hybrid Beacon (PHB)
- Rapid Rectangular Flashing Beacon (RRFB)
- Mid-Block Crossing
- Signalized Intersection
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

B-CYCLE BIKE SHARE

San Antonio's bike share program, known as B- Cycle, provides opportunities for residents and visitors to rent an electric, pedal assist bicycle for traveling within and exploring San Antonio. Building off an established bike share program, B-Cycle maintains and operates over 60 docking stations and over 730 bikes. B-Cycles are available to unlock at designated docking stations via a mobile application. Individual rides cost $1 to unlock and $.0.2 cents per minute to ride, but monthly and annual passes are also available. To return the bike, riders must return the B-Cycle to any station to stop charges.

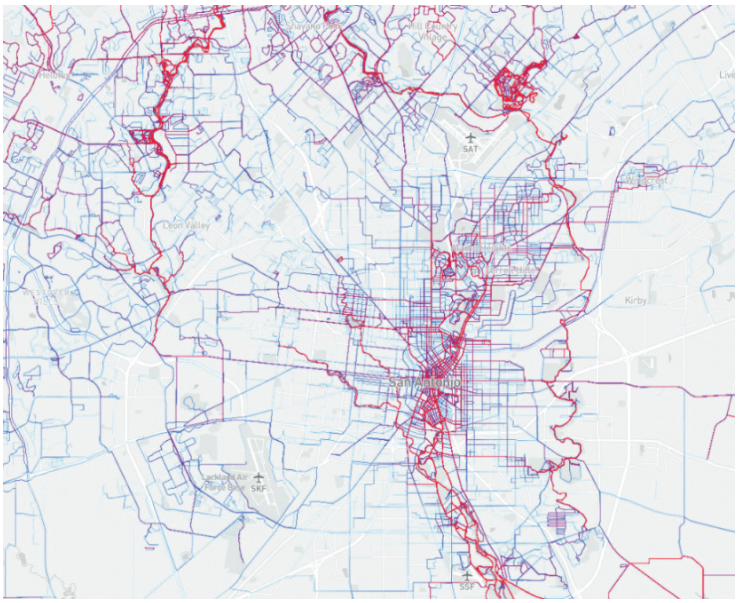
Table 6.1 outlines the top 10 busiest B-Cycle stations from January 1, 2023, to June 29, 2023. Largely, the B-Cycle stations that experience the most checkouts are located along the Riverwalk and provide direct connections to key tourist centers. Overall, in 2023, the B-Cycle program averages 2.29 checkouts per day and 78.73 checkouts per dock

Table 6.1. B-Cycle Docking Station Checkouts

Kiosk	Current Dock Count	Checkouts	Checkouts Per Dock	Average Checkouts Per Day	Average Checkouts Per Dock Per Day
Mission San Jose	22	5435	247.05	14.89	0.68
Blue Star	22	4030	183.18	11.04	0.50
Mission San Juan	22	3729	169.50	10.22	0.46
Mission Concepcion	18	3715	206.39	10.18	0.57
Mission Espada	22	2659	120.86	7.28	0.33
Concepcion Park	10	2299	229.90	6.30	0.63
423 Blue Star	14	1549	110.64	4.24	0.30
Pearl @ Hotel Emma	14	1509	107.79	4.13	0.30
Witte @ Parking Garage	14	1476	105.43	4.04	0.29

WHERE ARE PEOPLE BIKING TODAY?

Strava is a useful tool to understand where people bike. Advertised to recreational and sports riders, the data collected is from a self-selecting pool. Even so, a recent study determined that while Strava data is not representative of the demographics of the population as a whole, it still provides an accurate estimation of where people of all income levels, races, genders, and skill levels bike to. As illustrated on the right, areas with the highest bicycle use are along the greenways, the downtown core, and along major roads that provide direct access to destinations.



Existing Bike Programs and Events

Education, encouragement, and promotion of bicycling are important elements of getting San Antonians on bicycles. San Antonio has promoted bicycling as a form of recreation, transportation, and a component of community health through various initiatives, programs, and events. Bike shops, bike groups, and community organizations have also been influential in coordinating and supporting these efforts, making their partnerships essential to reach the general population. Key bike programs and events in San Antonio includes:

- Síclovía is a free event organized by the YMCA of Greater San Antonio that encourages residents and visitors to get out, get active, and explore San Antonio through car-free streets.
- Bike-to-Work Day encourages commuters to bike to work by providing “energizer stations” that provide riders with bike accessories, breakfast tacos, and win prizes on their morning commute.
- The Bike Safety Expo couples experienced cyclists with children and inexperienced riders to educate them on gear adjustments, participate in adventure courses, and promote safe bicycle practices.
- The Mayor’s Fitness Council is a community-wide collaborative to reduce obesity in San Antonio by promoting physical activity and healthy eating.
- Camino Verde is a mayoral initiative to activate San Antonio’s greenways through walking and biking as a community.
- AAMPO’s Street Skills class is a free, hour-long program for adults and teens to learn important street riding information in a classroom-style session. The class provides real-life examples of city bicycling scenarios and how best to handle them so that you enjoy pleasant, stress-free rides.
- Bicycle Rodeos are held by schools throughout San Antonio.

32. Fischer, Jaimy, Trisalyn Nelson, and Meghan Winters. 2022. “Changes in the Representativeness of Strava Bicycling Data during COVID-19.” Findings, March. https://doi.org/10.32866/001c.33280

HOW SAFE ARE OUR STREETS?

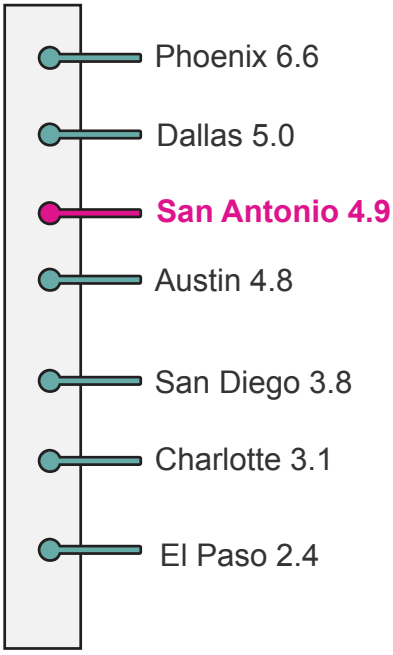
San Antonio began its mission to eliminate all traffic fatalities and serious injuries through its Vision Zero Action Plan in 2015. Achieving a bicycle network that is connected, accessible, and safe moves the city closer to its Vision Zero goals. To achieve Vision Zero, there must be an understanding of the current state of bicycle and pedestrian crashes. This includes understanding where they happen, when they happen, and how they happen. Analyzing crash data will help San Antonio select bicycle facilities and safety treatments, as well as decide how to prioritize implementation.

Nationwide Crash Statistics

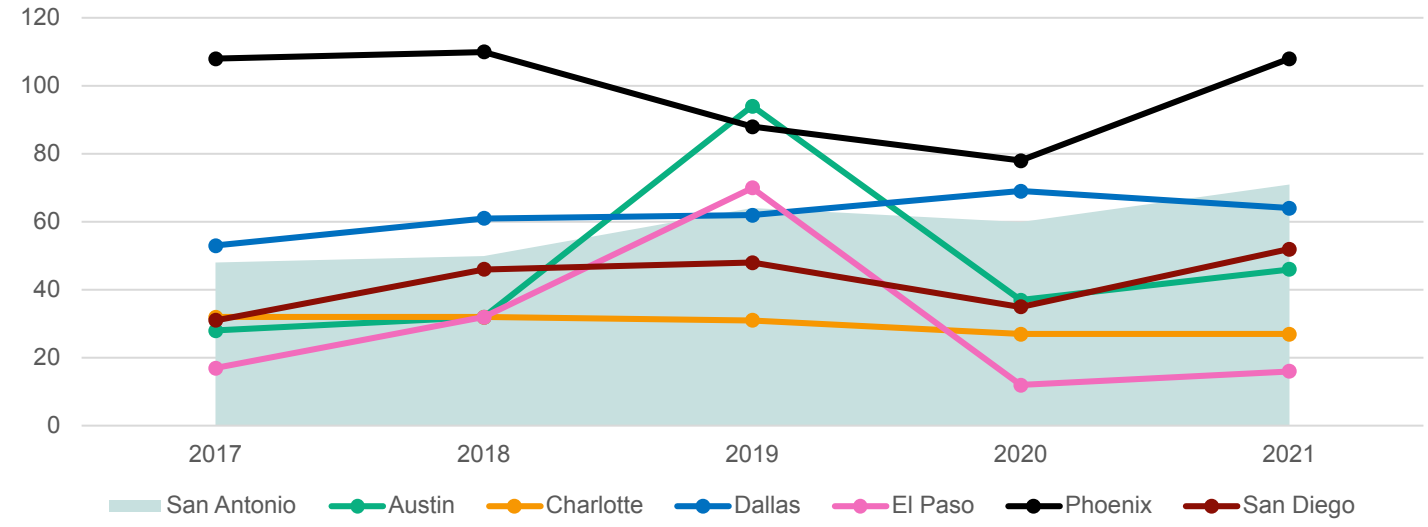
Nationwide, pedestrian and bicyclist fatalities are on the rise, and they continue to comprise larger proportions of the nation's annual traffic fatalities. The following sections introduce trends in transportation safety that have occurred in San Antonio from 2017 to 2022 and compares those trends to what is happening to peer cities throughout the nation. Understanding these larger trends helps to identify the critical factors impacting transportation safety that need to be addressed.

As illustrated below, San Antonio has historically had significantly fewer crashes than Phoenix, but far more than Charlotte and San Diego. When compared to total population, however, has San Antonio's pedestrian and bicycle fatality rates per 100,000 population are on par with Austin and Dallas.

Pedestrian and Bicycle Fatalities Per 100,000 Population (2017-2021)



Peer City Pedestrian and Bicycle Fatalities (2017 – 2022)



CRASH AND SAFETY TRENDS

Following the national trend, Texas has also seen an uptick in pedestrian and cyclist fatalities, with a 24% increase in statewide fatalities between 2019 and 2021.

Between 2018 and 2022, a total of **5,486 pedestrian and bicyclist crashes** occurred in San Antonio. This roughly equates to a bicycle crash every one to two days, and a fatal or serious injury bicycle crash every two weeks. The following section outlines key crash characteristics to help better understand the "who," "what," "when," "where,", and "how" of transportation safety in San Antonio

Fatal and severe injury pedestrian and bicycle crashes are increasing.

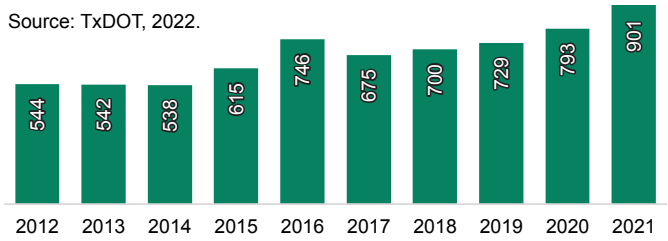
Fatal and Severe Injury Crashes

Of the 5,486 pedestrian and bicyclist crashes from 2018 - 2022, there were **331 fatal injury crashes** and **580 serious injury crashes**. This means that on average, 160 people walking and 22 people bicycling have lost their lives or are seriously injured in a crash each year. In recent years, the number of these crashes have been trending upward, with more than 175 fatalities in 2022. From 2020 to 2022 fatal and serious injury bicycle crashes increased by 127%.

Figures 6.3 and 6.4 illustrate the location of bicycle and pedestrian involved fatal and severe injury crashes, respectfully.

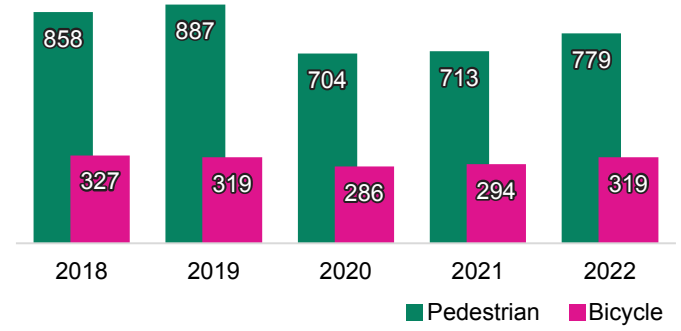
Statewide Pedestrian and Cyclist Fatalities

Source: TxDOT, 2022.



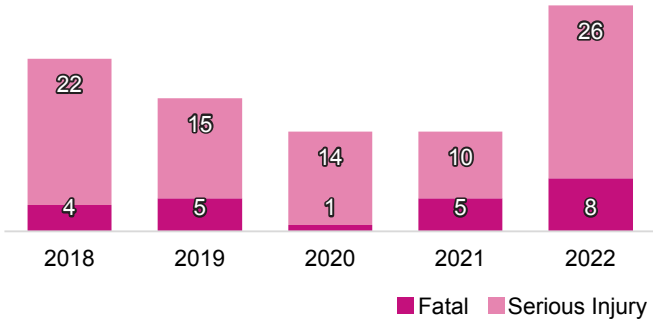
San Antonio Pedestrian and Bicycle Involved Crashes

Source: TxDOT, 2022.



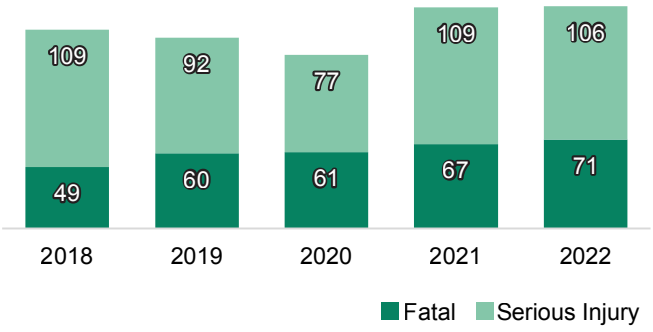
Fatal and Serious Injury Bicycle Crashes

Source: TxDOT, 2022.



Fatal and Serious Injury Pedestrian Crashes

Source: TxDOT, 2022.



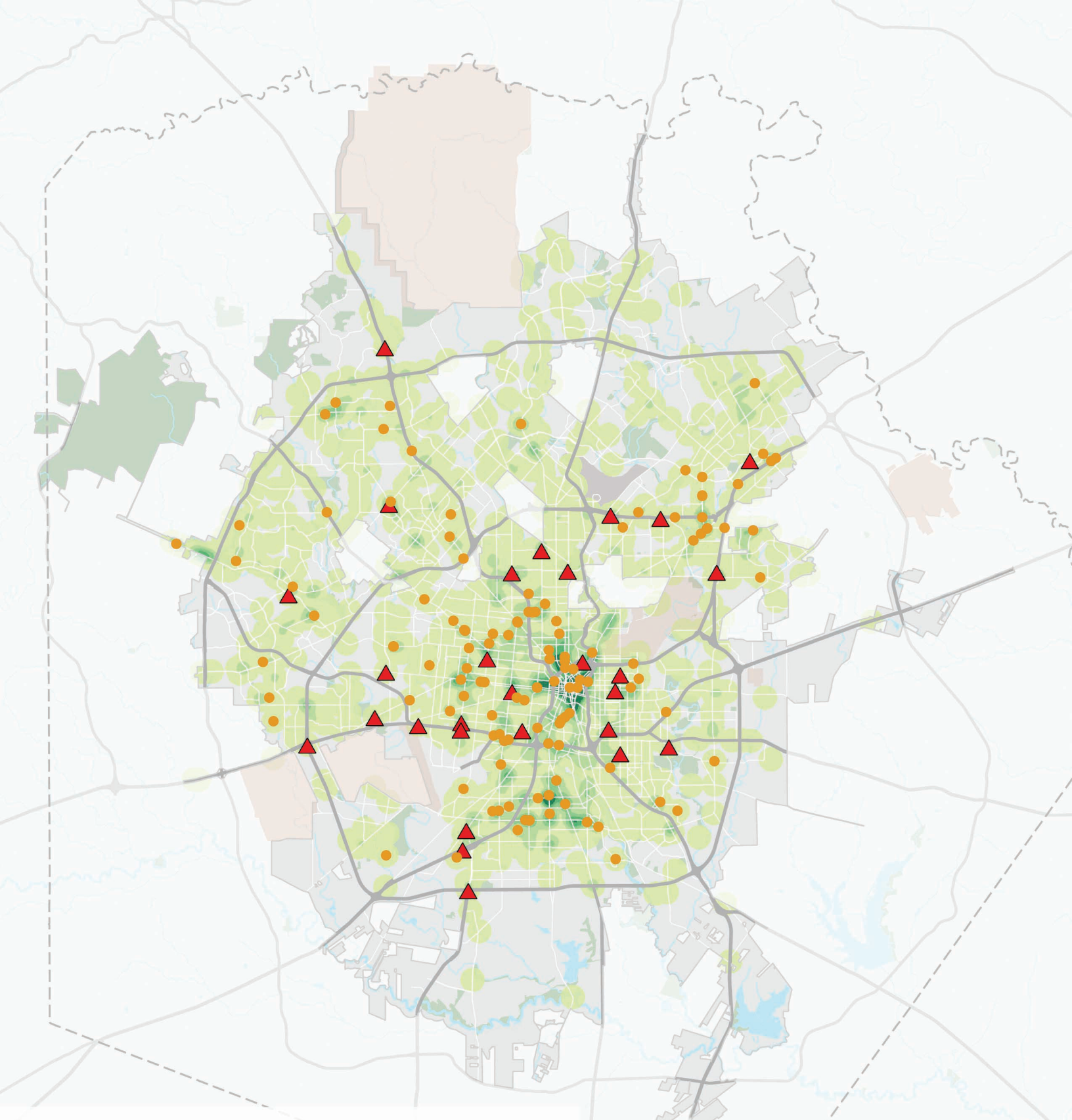


Figure 6.3. Bicycle-Involved Crashes (2018-2022)

Source: Crash Records Information System (CRIS), City of San Antonio (2023), TXDOT (2023)

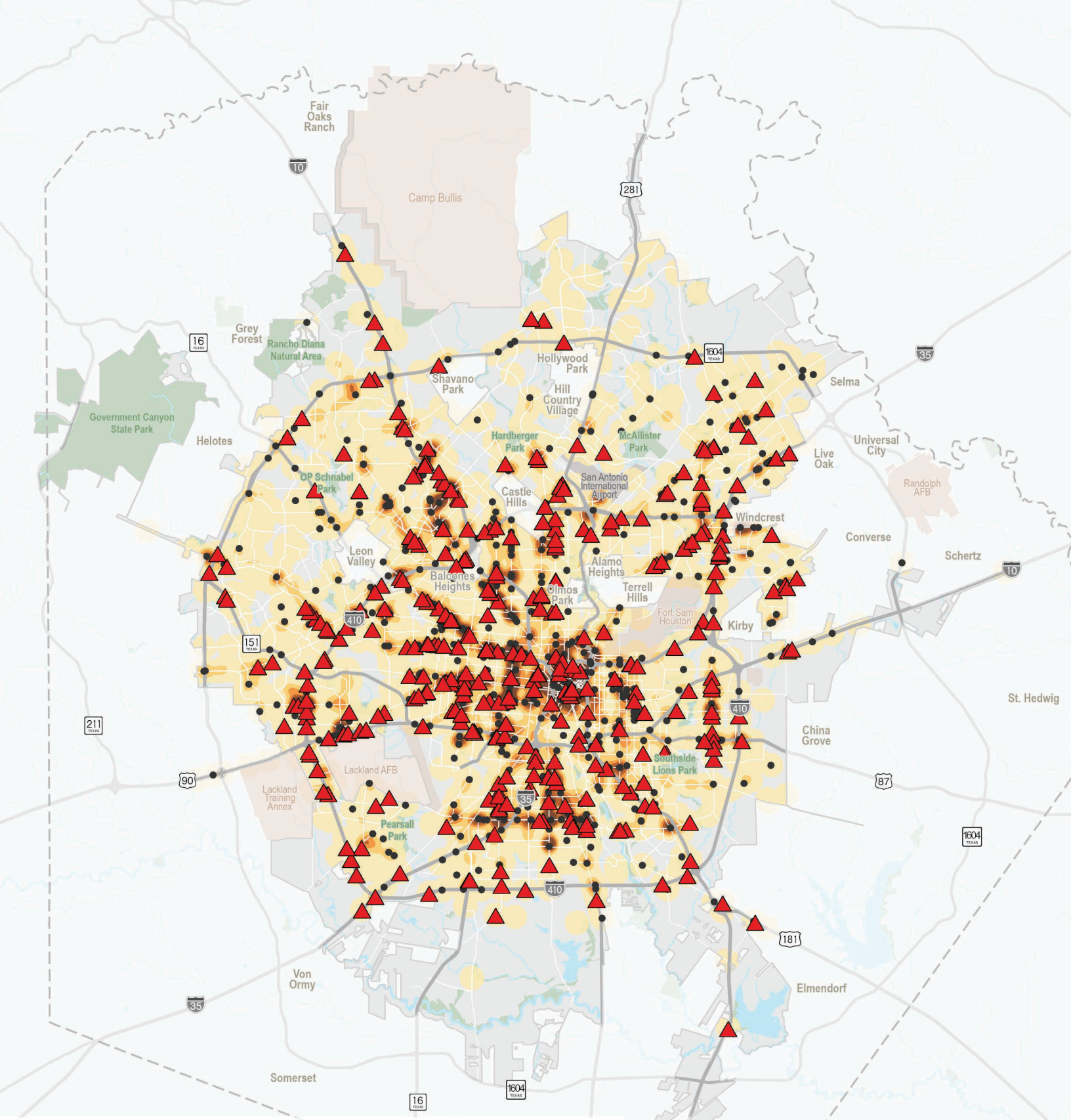


Figure 6.4. Pedestrian-Involved Crashes (2018-2022)

- Fatal Crash
- Serious Injury Crash
- Low Density of Pedestrian Involved Crashes
- High Density of Pedestrian Involved Crashes
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: Crash Records Information System (CRIS), City of San Antonio (2023), TXDOT (2023)

When Are Crashes Happening?

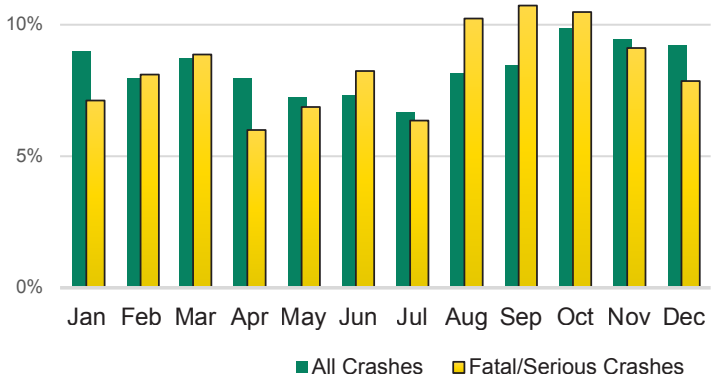
Evaluating time of day, day of the week, and month crashes occurred can help identify contributing factors such as motor vehicle volumes and street lighting.

Time of Year

More than 30% of the fatal and serious injury pedestrian crashes occurred in August, September, and October. Fatal and serious injury bicycle crashes saw different peak crash months, with nearly 15% of the crashes occurring in September, and an additional 12% occurring in June.

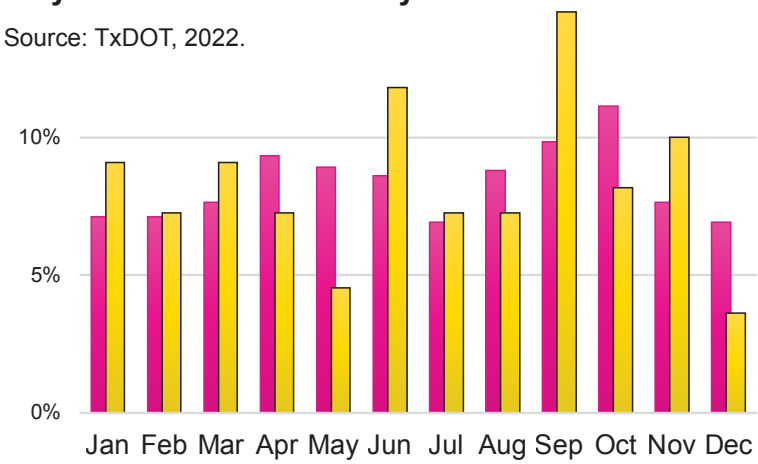
Pedestrian Involved Crashes by Month

Source: TxDOT, 2022.



Bicycle Involved Crashes by Month

Source: TxDOT, 2022.

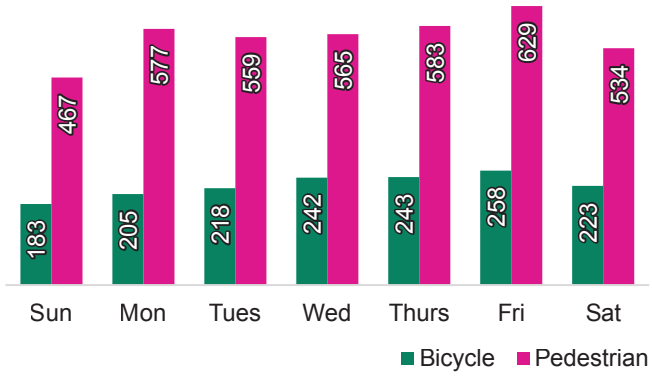


Day of Week and Time of Day

As shown below, Saturday and Sunday historically have experienced the lowest number of crashes. Fatal and serious injury crashes follow a similar trend, with lower total serious and fatal crashes occurring on Saturday and Sunday. Peak pedestrian and bicyclist crashes were from 7 to 9 AM and 4 to 7 PM. When looking at fatal and serious injury crashes only, crashes peaked from 7 to 11 PM. This is likely due to lower lighting conditions during these hours.

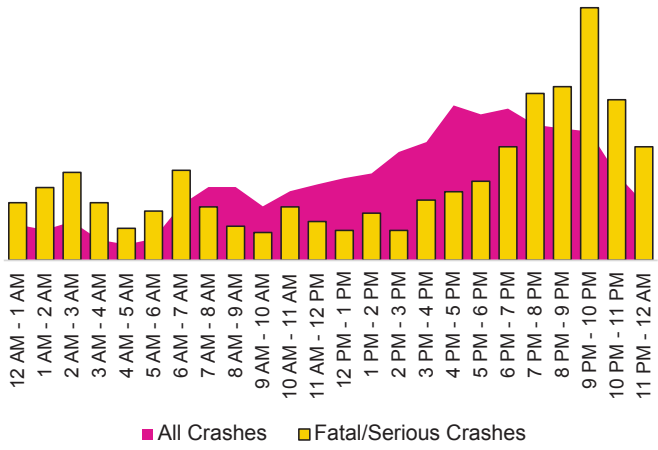
Bicycle and Pedestrian Involved Crashes by Day of Week

Source: TxDOT, 2022.



Fatal and Serious Injury Pedestrian and Bicycle Involved Crashes by Time of Day

Source: TxDOT, 2022.



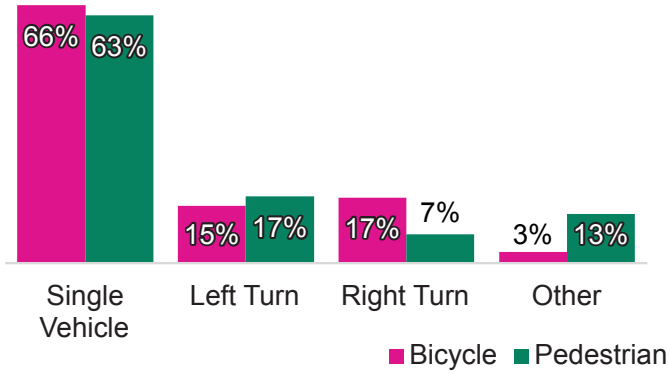
What Crashes Are Happening?

While every crash is unique, they are often categorized according to the circumstances of the crash. Each vehicle crash can be grouped into different collision types, including rear-end crashes, angle crashes, left/right hand turn crashes, and head on crashes. Each crash type can indicate a particular problem that may be addressed through a targeted engineering, enforcement, or behavioral countermeasure.

As illustrated on the right, the majority of crashes were reported as single vehicle crashes with the driver traveling straight. Pedestrian and bicycle crashes involve only one motor vehicle. Left turn and right turn lanes were reported for 31% of bicycle crashes. Compared to pedestrians, bicyclists have a much higher rate of being hit by a vehicle turning right.

Bicycle and Pedestrian Involved Crashes by Type of Crash

Source: TxDOT, 2022.

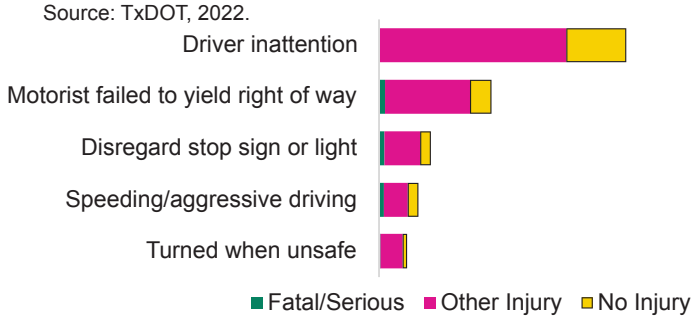


What are Leading Causes of Crashes?

Identification of actions that led to a crash, as classified in crash database, provides information about conditions contributing to crashes. The crash database has a variety of categories to classify crash causes. Examples of contributing actions include failing to yield the right of way, motorist inattentive or distracted, chemical impairment, or disregarding a traffic control device. Driver inattention was largely cited as the leading cause of pedestrian and bicycle involved crashes, with failing to yield as the second leading cause. More than 40% of the fatal and seriously injured pedestrian and bicyclist crashes involved the pedestrian or bicyclist failing to yield to the right of way of the vehicle.

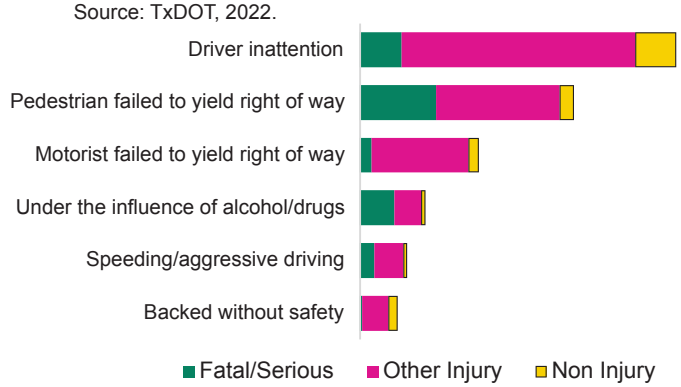
Bicycle Involved Crashes by Contributing Factor

Source: TxDOT, 2022.



Pedestrian Involved Crashes by Contributing Factor

Source: TxDOT, 2022.



Where Are Crashes Happening?

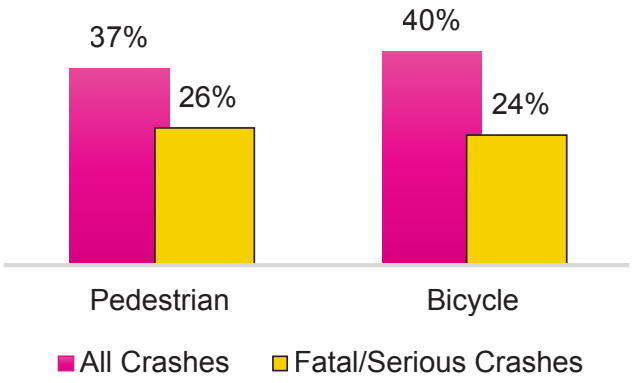
Understanding the locational context of crashes is an important step in identifying location specific safety issues that may be addressed through targeted engineering, enforcement, or behavioral countermeasures. On San Antonio streets, crash reports indicate a disproportionate split between crashes occurring at intersections and along corridors, with 40% of all bicycle and 37% of pedestrian crashes occurring at intersections.

How do Road Conditions Play a Role?

As reported in the TXDOT Crash Records Information System, the majority of bicycle crashes occurred on roadways with speeds higher than 50 MPH, whereas the majority of pedestrian involved crashes occurred on roads with speeds between 30 – 35 MPH. Most of the fatal and serious injury crashes occurred along roadways with posted speeds ranging from 30 MPH to 45 MPH.

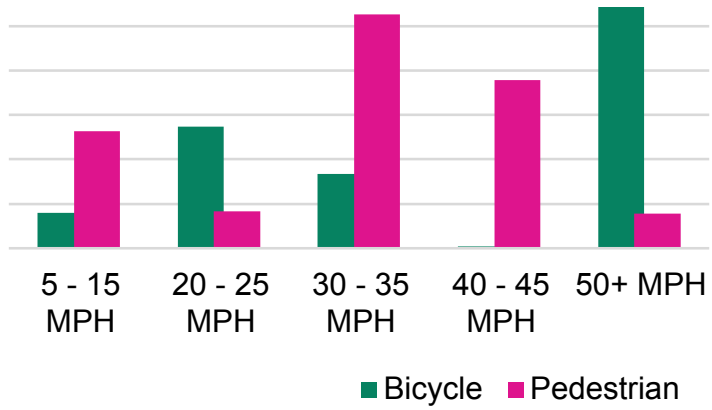
Intersection Related Bicycle and Pedestrian Crashes

Source: TxDOT, 2022.



Bicycle and Pedestrian Crashes by Roadway Posted Speed Limit

Source: TxDOT, 2022.



Safety Summary

The total annual number of pedestrian and bicyclist crashes is increasing, as is the number of fatal and serious injury crashes. The following summary documents the findings of the detailed crash analysis.

All Pedestrian and Bicycle Involved Crashes

- **October** was the peak month for pedestrian and bicyclist crashes.
- **Friday** was the peak weekday for pedestrian crashes.
- **Tuesday** was the peak weekday for bicycle crashes.
- More than 60% of the crashes involved a **straight-traveling vehicle**.
- There was a higher proportion of crashes involving **left-turning vehicles** than right-turning vehicles.
- One-third of pedestrian crashes and one-half of bicycle crashes occurred at an **intersection**.
- **Daylight and dry roadway surface** were the most common environmental conditions.
- 63% of crashes occurred on roadways with posted speeds ranging from **30 to 35 MPH.**

Fatal and Serious Injury Pedestrian and Bicycle Involved Crashes

- **August through October** were the peak months for pedestrian FSI crashes.
- **July and September** were the peak months for bicyclist fatal and serious injury crashes.
- **Friday** was the peak weekday for fatal and serious injury crashes.
- More than 60% of the fatal and serious injury crashes involved a **straight-traveling vehicle**.
- Within fatal and serious injury crashes, bicyclists were hit by **right-turning vehicles** at a higher rate than pedestrians.
- One-fourth of pedestrian crashes and one-half of bicycle fatal and serious injury crashes occurred at an **intersection**.
- 44% of the fatal and serious injury crashes involved **pedestrians/bicyclists not yielding** to vehicle right of way.
- 26% of the fatal and serious injury crashes involved **driver inattention**.
- Darkness with streetlights was the most common lighting condition.
- Dry was the most common roadway surface condition.
- Most fatal and serious injury crashes occurred on **city streets** and on roadways with posted speeds ranging from **30 to 45 MPH**.
- 16% of fatal and serious injury crashes occurred on roadways with a posted speed of **at least 50 MPH.**

CHAPTER 7. SYSTEM ASSESSMENT

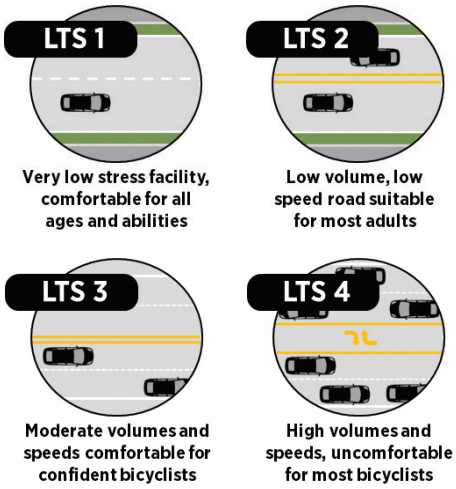
HOW DO WE DETERMINE THE BICYCLE NETWORK?

A complete, connected bike network that is comfortable and safe for people of all ages and abilities is critical to making biking a viable transportation option for travel in San Antonio. Expanding and enhancing the bicycle network can also help reduce congestion and stress on the City's streets, as people can choose to bike rather than drive. While San Antonio has developed an expansive network of bicycle facilities and paths that serve as a foundation for a connected network, a lot still needs to be done.

This chapter includes a comprehensive analysis of how existing bicycle infrastructure characteristics and conditions influence and shape bicycle ridership in San Antonio. As illustrated on the right, comprehensively assessing the current state of San Antonio's bicycle network incorporates a variety of factors including, levels of traffic stress, results of the safety assessment, accessibility to key destinations, and equity and public health implications. Combined with feedback from stakeholders and community members, this assessment will later be used to address key gaps in network performance and systemwide inequities to provide safe and comfortable facility recommendations for all ages and abilities.

HOW COMFORTABLE ARE OUR STREETS?

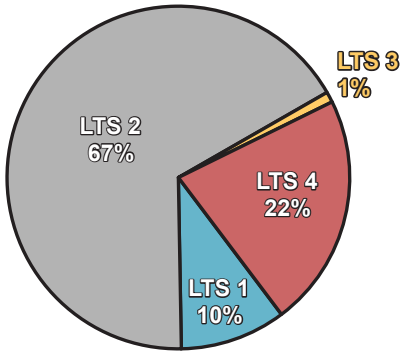
Bicycle Level of Traffic Stress (LTS) is a method of quantifying the perceived sense of comfort associated with biking along a given roadway. Whether a rider feels comfortable on a street depends on factors such as the speed and volume of traffic, presence and type of bicycle infrastructure, and the design of the road and intersections. As illustrated on the right, LTS ranges from low-stress streets (LTS 1 and LTS 2) to high-stress streets (LTS 3 and LTS 4). LTS 1 is considered an all ages and ability facility and is comfortable for families and children; whereas LTS 4 is high-stress and may only be used by the most confident bike rider. Depending on a person's skill level, roads with high LTS scores may deter potential bicyclists from riding, leading them to choose a different mode of transportation or forcing them to make lengthy detours to avoid high-stress streets. Figure 7.1 illustrates the LTS scores for streets in San Antonio based on the LTS criteria used in Table 7.1.



While local and neighborhood roadways with lower speeds and fewer lanes, make up the majority of the network, 23 percent of San Antonio's owned or maintained streets are considered high-stress (LTS 3 or LTS 4). As shown in Figure 7.1, islands of low-stress facilities are located throughout San Antonio; however, higher LTS roads create physical and perceived barriers to bicycle ridership, as it makes it difficult for users to cross major roads along low-stress routes. In later phases of the BNP, close attention will be given to seek opportunities to minimize or eliminate these high stress barriers, such as:

- Identify enhancements and upgrades to roads that have the greatest local and regional connectivity benefit to the low-stress network.
- Improving high-stress arterial crossing to integrate signals, protected crossings, or other treatments; and
- Develop a complete and connected network of low-stress facilities that supports local and regional travel in the City.

Level of Traffic Stress Distribution on San Antonio Owned or Maintained Streets*

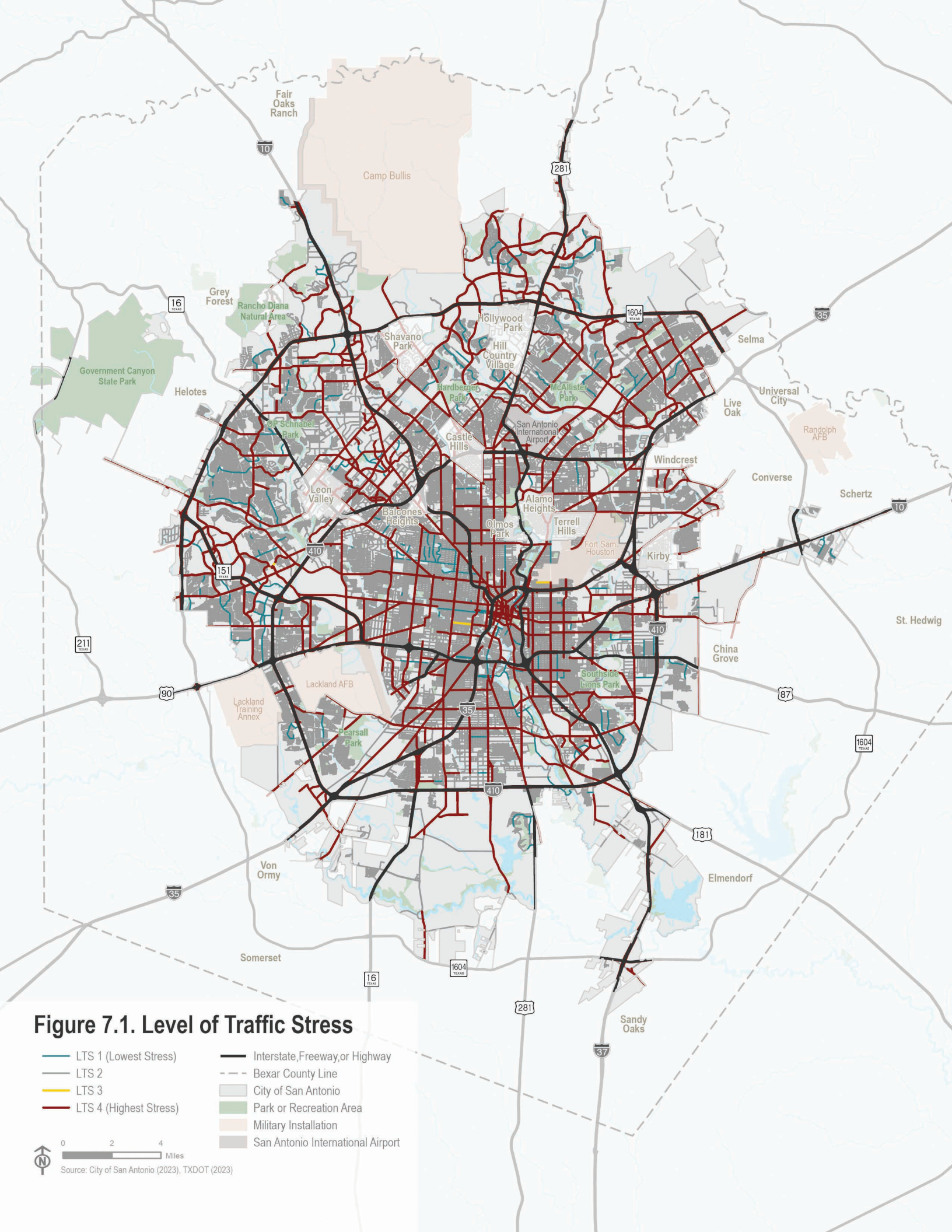


**Does not include TXDOT maintained roads, greenway trails, or streets owned and maintained by other jurisdictions.*

Table 7.1: Level of Traffic Stress Criteria for Streets in San Antonio

Posted Speed Limit	Number of Lanes	Bicycle Boulevards	Mixed Traffic / Bike Routes	Striped Bike Lane		Buffered Bike Lane		Protected Bikeway	Shared Use Path
				No Adjoining Parking	Adjoining Parking	No Adjoining| Parking	Adjoining Parking		
30 MPH or Lower	2 Lanes	LTS 1	LTS 2	LTS 1	LTS 2	LTS 1	LTS 1	LTS 1	LTS 1
	3 Lanes	LTS 3	LTS 3	LTS 1	LTS 2	LTS 1	LTS 1	LTS 1	LTS 1
	4-5 Lanes	LTS 4	LTS 4	LTS 3	LTS 4	LTS 2	LTS 3	LTS 1	LTS 1
35 MPH	2-3 Lanes	LTS 4	LTS 4	LTS 2	LTS 3	LTS 1	LTS 2	LTS 1	LTS 1
	4-5 Lanes	LTS 4	LTS 4	LTS 4	LTS 4	LTS 2	LTS 3	LTS 1	LTS 1
	6+ Lanes	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 3	LTS 1
40 MPH or Greater	2-3 Lanes	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 2	LTS 1
	4-5 Lanes	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 2	LTS 1
	6+ Lanes	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4	LTS 3	LTS 1

LTS 1 LTS 2 LTS 3 LTS 4


Fair Oaks Ranch
Camp Bullis
Grey Forest
Rancho Diana Natural Area
Government Canyon State Park
Helotes
Shavano Park
Hollywood Park
Hill Country Village
Hardberger Park
McAllister Park
San Antonio International Airport
Castle Hills
OP Schnabel Park
Leon Valley
Balcones Heights
Alamo Heights
Olmos Park
Terrell Hills
Fort Sam Houston
Windcrest
Selma
Universal City
Live Oak
Randolph AFB
Converse
Schertz
Kirby
St. Hedwig
China Grove
Southside Lions Park
Lackland AFB
Lackland Training Annex
Pearsall Park
Von Ormy
Somerset
Elmendorf
Sandy Oaks
10
16
35
37
87
90
151
181
211
281
410
1604
Figure 7.1. Level of Traffic Stress
LTS 1 (Lowest Stress)
LTS 2
LTS 3
LTS 4 (Highest Stress)
Interstate,Freeway,or Highway
Bexar County Line
City of San Antonio
Park or Recreation Area
Military Installation
San Antonio International Airport
0
2
4
Miles
Source: City of San Antonio (2023), TXDOT (2023)

HOW MANY DESTINATIONS CAN YOU REACH RIDING A BIKE?

The layout of the street network dictates the directness and convenience of every trip we make, whether driving, walking, or biking. A street grid with shorter block lengths and four-way intersections maximizes access to destinations, minimizes trip distances, and increases the possible number of routes from Point A to Point B. By creating a complete and convenient bicycle network, people riding bicycles can easily and safely travel to where they need to go.

Bicycle Accessibility

One indication for a successful bicycle network is how far a person riding a bicycle can travel within 15 minutes using only low-stress (LTS 1 and LTS 2) streets. To quantify how far the average bike rider in San Antonio can travel today, a bicycle accessibility assessment was conducted using these steps:

1) Key activity centers and destinations that San Antonio residents and/or visitors may want or need to bike too were identified (as illustrated on the right).

2) Using LTS 1 and LTS 2 streets, a "Low Stress Network" was established that included low-stress intersections and crossings.

3) Barriers to connectivity, such as unsignalized crossings and high-stress streets (LTS 3 or 4) were identified.

4) Using the results of Steps 2 and 3, "bikesheds" were created for each of the key activity centers identified in Step 1. Bikesheds represent how far a typical bicycle rider traveling 8 MPH, or up to 2 miles, can reach within 15-minutes. It's important to note that people riding electric bikes and athletic riders may be capable of higher average speeds can likely access more destinations than the typical rider; however, using the typical rider allows the sheds to reflect a greater portion of the biking population.

5) A 0.25-mile grid of the city was developed to illustrate at a citywide level, areas that have high or low levels of access via a 15-minute bike ride.

6) Using Census Block data, population estimates were calculated to estimate how many residents reside within each bikeshed.

Figure 7.3 illustrates how accessibility varies in San Antonio with today's low-stress network. Bicycle accessibility today is fairly low throughout the City today.

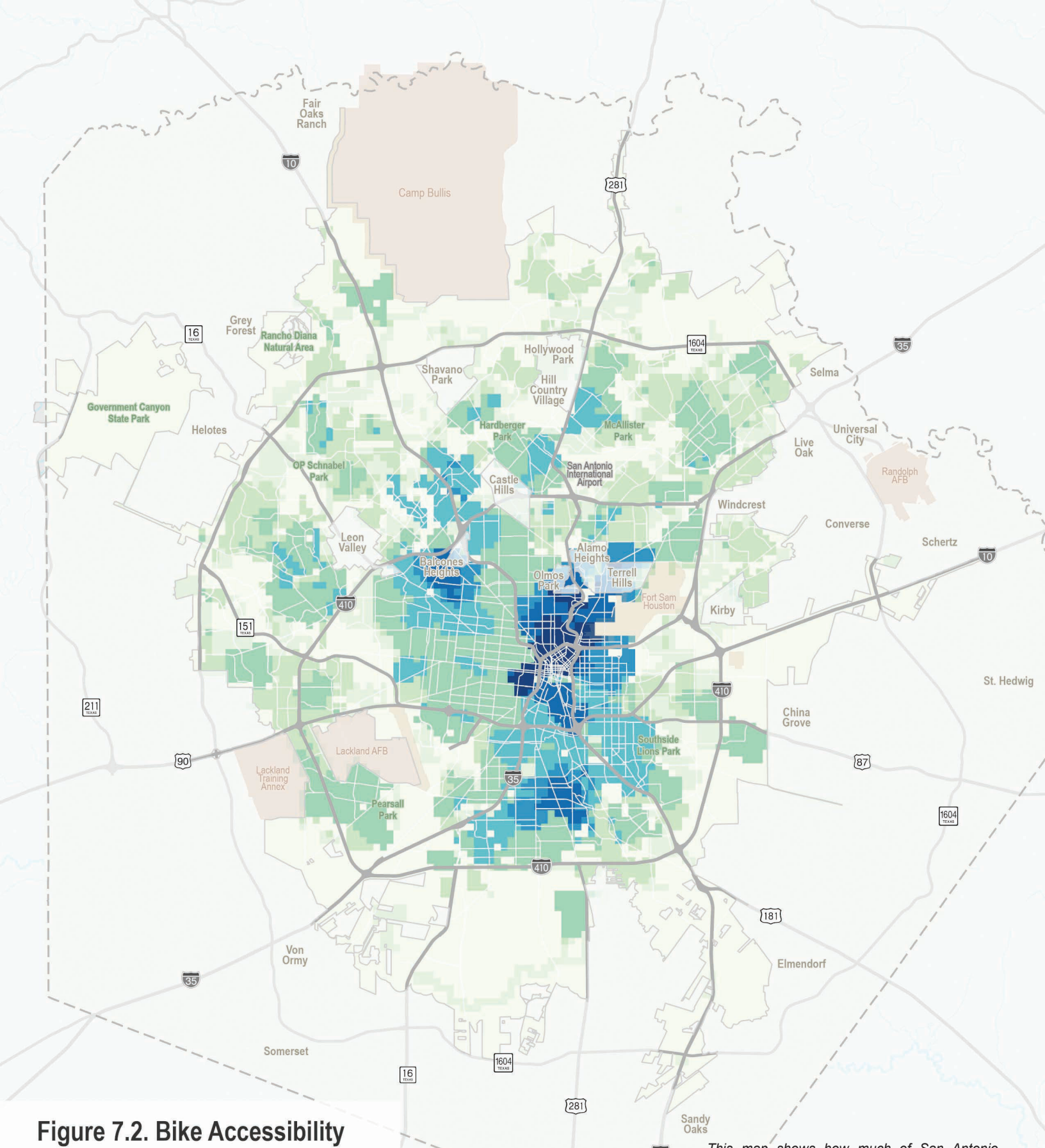


Figure 7.2. Bike Accessibility

This map shows how much of San Antonio can be accessed within a 15-minute bike ride using only existing "low stress" bicycle facilities. Blue areas indicate areas of the City that are accessible via bike, while the yellow areas less accessible via bike.

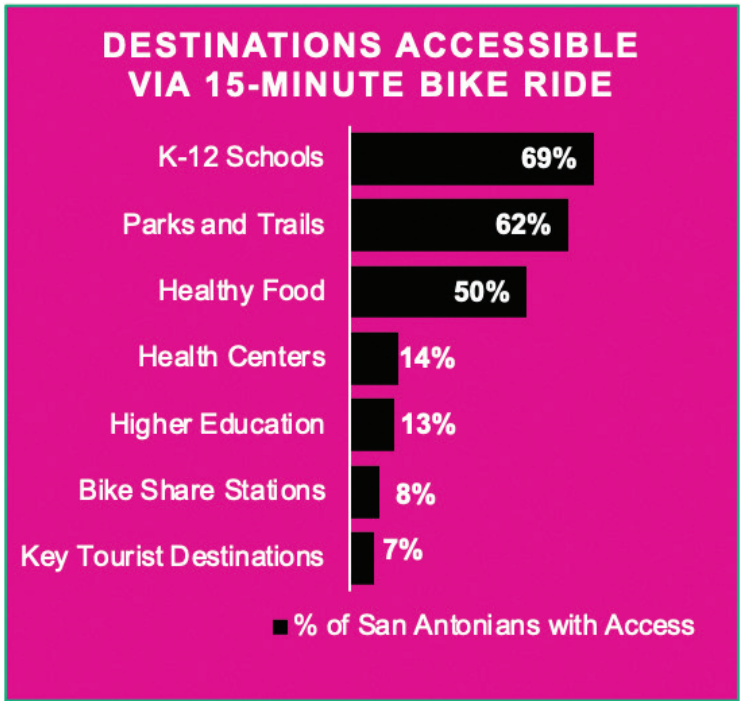
Key Takeaways and Observations

Due to existing street patterns, block lengths, roadway conditions, and accessibility issues, connectivity within the City is challenging. The more destinations that people can access, the more competitive biking becomes a realistic alternative to the car. It is important to note that both the overall availability of bicycle infrastructure and land use play a key role in determining whether destinations are accessible via bike or not.

Key finding from the bicycle accessibility analysis, includes:

- While the majority of San Antonians can reach at least one destination by bike, nearly 1 in 4 San Antonians cannot reach any destination at all.
- Islands of low-stress connectivity are located throughout the City; however, access between “low-stress islands” is limited.
- While the San Antonio’s greenway trail system provides a comfortable, off-street biking experience, gaps in the network and limited connections to low-stress streets limit access.

24% **of San Antonio residents cannot reach any destination via a 15-minute bike ride**



~2% **of San Antonians can access the same destinations by bike as they would be able to by car**

Everyday Needs:

- Only 2% of San Antonians can access the same destinations by bike as they would be able to by car.
- In addition to shelter, access to food and healthcare services are some of the most fundamental human needs. In the City of San Antonio, only 10% of residents can access both grocery stores and healthcare services by bike.
- Fewer than 8% of San Antonians live within a bikeable distance from a B-Cycle Bike Share Station making the current iteration of bike share an unpractical transportation solution as most daily transportation trips end at home.

Education Opportunities:

- Only 13% of San Antonians have biking access to colleges and universities, limiting opportunities to higher education.
- K-12 schools can be found throughout San Antonio and are often embedded within residential neighborhoods, making them more likely to be accessible using local, low-stress roadways whether bike infrastructure is present or not. However, even if there are some San Antonians who have access to a school via bike, there is no guarantee it is their school.
- Increasingly, K-12 schools are being built in suburban areas that have limited bicycle infrastructure connections or only arterial access.

Recreation and Fun:

- Like schools, parks and trailheads are dispersed throughout the city creating greater opportunity to bike to these destinations over other destinations. However, the availability of amenities, upkeep, and perception of safety may not make these parks or trailheads desirable for some users.
- Very few people living in San Antonio (7%) can bike to key tourist destinations that people travel across the country to visit.
- Additionally, even if residents live within a 15-minute bike ride to a park, they might not have adequate infrastructure to safely access them.
- While the City of may be car-dependent, pockets of connectivity do exist and the city has unrealized potential for future bicycle networks through the greenway system, utility corridors, and along existing streets.

HOW EQUITABLE IS OUR SYSTEM?

Historic land use patterns that provided denser living, more neighborhood commercial services, and more frequent local, low-stress streets have provided some parts of underserved areas such as in the Eastside, Near Southwest, and the South with better biking accessibility than it's high-resourced counterparts; however, significant inequities exist. Areas identified by the City as an "High Equity Concern Area" faces significant challenges to biking including disproportionally fewer investments in biking infrastructure, higher rates of bike and pedestrian injuries and fatalities, and more barriers to biking.

Inequities in Accessibility

Those living in High Equity Concern Areas—representing populations that have high representation of both people of color and those living in poverty—overall have better access to most destinations than those living in Low Equity Concern Areas. This is due in part to High Equity Concern Areas typically comprising of older neighborhoods that were built with a higher density of four-way intersections, lower stress, local roadways, and more integration between residential and commercial uses. However, significant disparities still exist.

- **People of color have less access to health care (13.6%)** and access to key tourist destinations (6.8%).
- Disparities in accessibility are seen most acutely by families with children that do not have access to a vehicle.

Families with Children Lack Access

Children—which make up nearly a quarter of San Antonio's population—and by relation the adults that take care of them, have the least access to daily needs and destinations compared to other groups.

- **Healthcare**. Families with children, and those that are 65 and older, typically have higher need for healthcare services than other age groups. Unfortunately, children have the least access to healthcare in San Antonio compared to other age groups with **only 11% of children living in a bikeable distance to a Healthcare Center.**
- **Higher Education**. While children may not be taking higher education courses, the adults that care for them may. Education is a critical way for people to get the skills they need to advance their careers. Only 10% of children—and by proxy their guardians—have access to higher education.
- **Other Needs**. Children are also the least likely to be able to bike from a bikeshare station to their home (6.8%) and to be able to enjoy a key tourist destination by bike (5.4%).

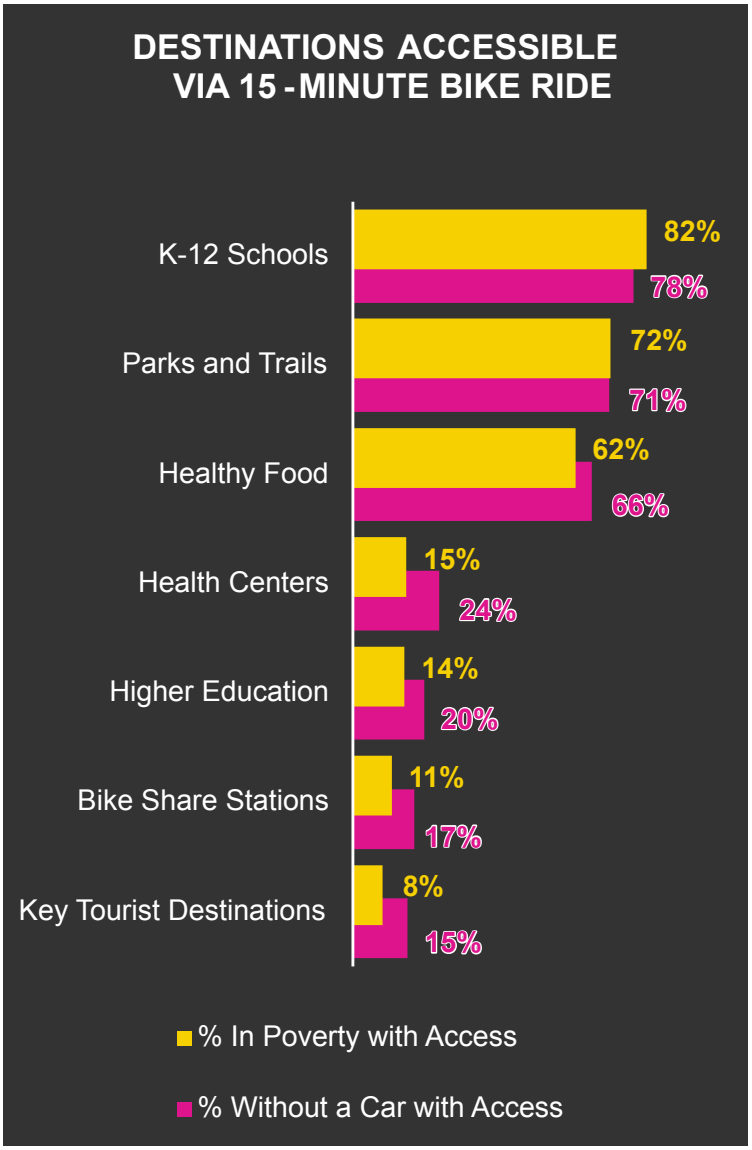
Living with Transportation Insecurity

The financial burden of owning a car is a major barrier for many households to fully participate in the same social and economic opportunities as those who own a car. Those living without a car have greater need to access destinations by alternative means to the car including by bike, the most affordable form of transportation besides walking. These populations may even take greater risks and bike on high stress roadways to access destinations despite feeling uncomfortable or unsafe, as it may be their only viable option. Today, those living in poverty or without access to a vehicle have limited connectivity to key destinations within a 15-minute bike ride:

- 85% of those living below the poverty level cannot access a health center within 15 minutes of biking.
- 34% of those without access to a car cannot reach a grocery store within 15 minutes of biking.
- 22% of those without access to a car cannot reach a K-12 school within 15 minutes of biking.

Though some people living in poverty may have access to a vehicle, they are less likely to be transportation secure, meaning one car crash, unexpected car maintenance, or a missed car payment can cause them to lose access to a personal vehicle. In addition, those living in poverty are more likely to share one vehicle among multiple driving-aged members of a household. For these reasons, it is critical that those living in poverty have safe, convenient, and viable alternatives to reach their destinations, including by bike.

17% of San Antonians are living below the poverty level



Safety Inequities

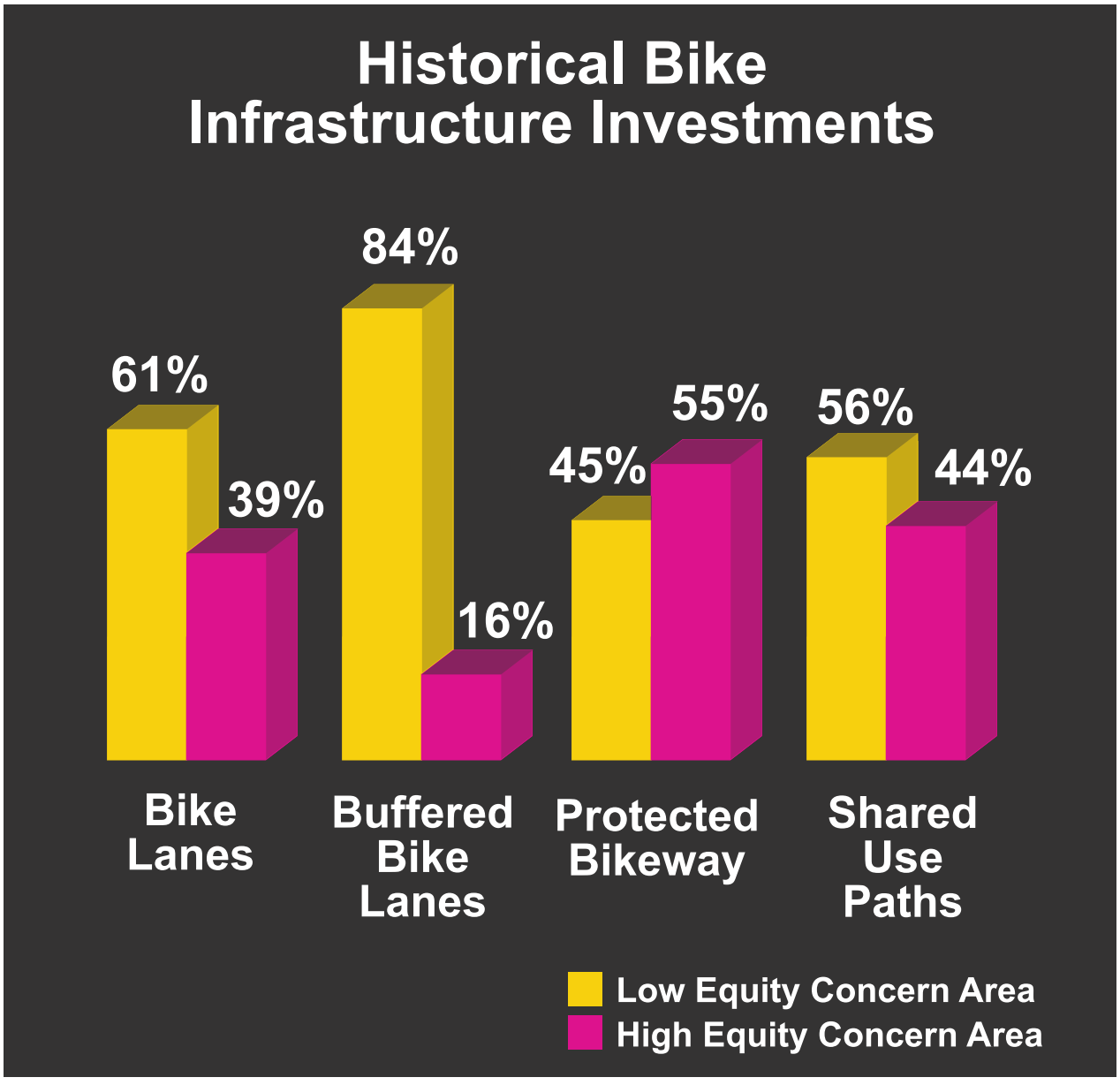
Despite areas with having the same percentage of San Antonio residents in areas with low equity concerns, people living in areas with high equity concerns have significantly higher rates of bicycle and pedestrian crashes. In fact, there are 113% more bike and pedestrian crashes in areas with equity concerns.

	Areas of High Equity Concern	Areas of Low Equity Concern
% of Total Bike and Pedestrian Crashes	47%	13%
% of Bike and Pedestrian Serious Injuries	47%	14%
% of Bike and Pedestrian Fatalities	44%	15%
% of Roadways with Consistent Severe Crashes	53%	30%
% of Tier 1 Roadways with Consistent Severe Crashes	68%	20%

Historical Bicycle Investments

Historically, Low Equity Concern Areas have seen a higher investment of bike infrastructure in comparison to areas of High Equity Concern. Areas of Low Equity Concern have more bike lanes, more buffered bike lanes, and more shared use paths compared with High Equity Concern Area. While High Equity Concern areas have 19% more protected bikeways; fewer than four miles of protected bikeways exist in the City in total.

65% More bike infrastructure investment in **Low Equity Concern Areas** historically



WHAT CONSTRAINTS AND OPPORTUNITIES EXIST?

Using the data analyzed in this document, in addition to public and stakeholder feedback, is critical to understanding current constraints and opportunities to improve San Antonio's bike network. The following sections outline some key considerations that will be incorporated into upcoming phases on the Bike Network Plan.

Example Bike Facility Constraints

High Speed Residential Roads

Residential roadways, like Hazel Street, make up the largest part of the low stress bike network despite not having designated facilities. However, many local roads have speeds greater than 30 MPH which may not be comfortable for all ages and abilities.

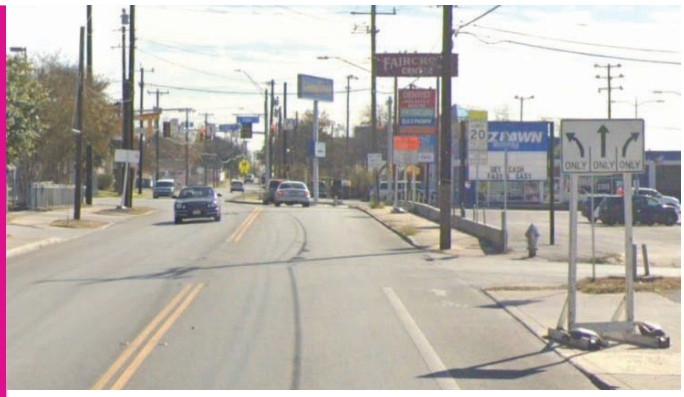
In school zones, high speed limits mixed with "End Bike Lane" sign up on a corridor heavily used by people and children biking. *Example on Timber Path between Lloyd M. Knowlton Elementary School and HB Zacary Middle School.*

Conflicts with Drivers

Narrow bike lanes that conflict with residential traffic backing out of driveways. *Example on Malone Avenue.*

Conflict markings indicate that people riding in the bike lane must navigate space with right turning cars permitted to travel 40 MPH. *Example on Blanco Road.*

Bike Facility Terminations

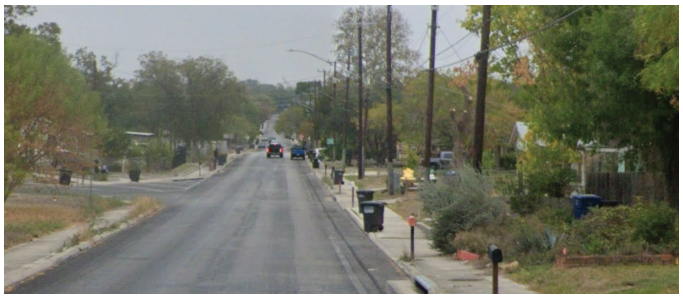


Bike lane terminates with no alternative bike facility for someone biking to use. *Example on Gevers Street.*

Bike lanes terminate before and do not continue through intersections without warning. *Example on Wells Boulevard at the HWY 281.*

Facility Conditions

Poor asphalt conditions or landscaping overgrowth in the bikeway create uncomfortable riding conditions for people biking. Such deterioration may also encourage people to bike in the car travel lane to avoid potentially hazardous pot holes. *Example on Hamilton Avenue.*



Faded bike lane stripping may make it challenging for people driving and biking to differentiate between vehicle travel lanes and bike lanes. *Example on Woodlawn Avenue.*

Refuse bins and cars block the bike lanes in both directions. *Example on Pine Street.*

4-foot bike lanes may not provide enough separation from fast-traveling vehicles for people of all ages and abilities to bike along this 35MPH roadway. *Example on Gillette Boulevard.*

Example Bike Facility Opportunities

Improved On-street Bikeways

Physically separated bike lanes (or cycle track). Example on Floyd Curl Drive.

Buffered bike lanes and traffic calming measures to create low-stress connections. *Example on Pickwell Drive.*

Off-street Bike Highways

San Antonio's Greenways provide comfortable connections throughout the city, but there is limited access to them by bike. For example, the Riverwalk connects people walking and biking from 8 miles south and 4 miles north to Downtown San Antonio, but people living nearby often have to cross high stress roads to access it. *Entrance to the San Antonio Riverwalk Trail on Mission Parkway.*

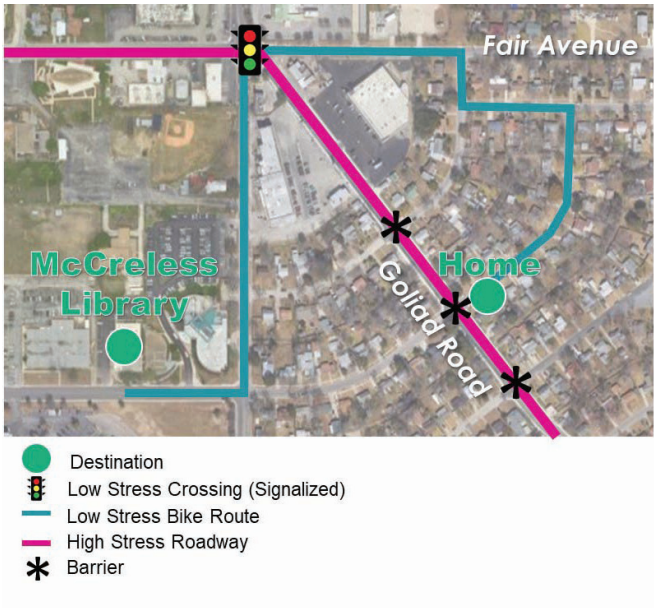
Person biking along the San Pedro Creek Greenway, a dedicated pathway for people walking and biking.

Addressing Crossing Barriers

High stress streets are major barriers to people biking. Not only are these streets uncomfortable for most people, but they may also prevent someone riding along a low stress roadway from continuing along their path if there is no safe or comfortable way to cross. These barriers force people biking to use circuitous routes to stay on low-stress routes.

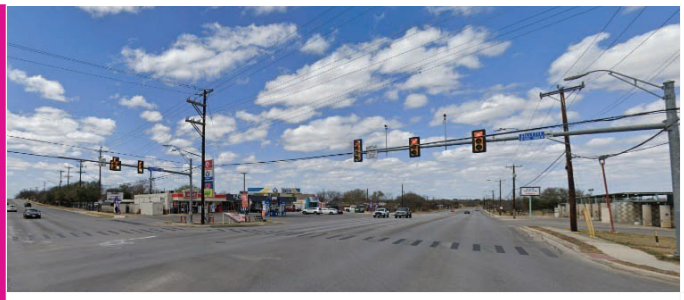
While signalized intersections provide a means of crossing these high stress roads, they often lack dedicated bike infrastructure. Intersections without dedicated bike facilities may cause people biking to dismount to cross, to share the roadway with vehicle traffic, to choose an alternative route, or to not to bike at all. The following provides examples of some crossing constraints and opportunities in San Antonio today.

60% Of all City of San Antonio crossing barriers are in areas with High Equity Concerns



Example Bike Crossing Constraints

No Bike Accommodations at Intersections



While bike lanes are present, bike lanes do not continue through the intersection nor provide any conflict striping. *Example on Gillette Boulevard and Zarzamora Street*

Crossings provide no indication to drivers that people biking may cross. Cyclists can travel significantly faster than people walking and may not be expecting faster cross traffic. *Example on Southside Lions Park Trail across Hiawatha Street*

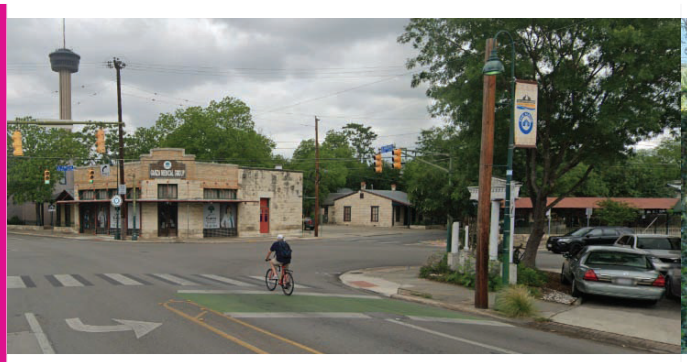
Right Turns Conflicts

Bike lane stripping breaks to allow vehicular traffic to turn right. Parked cars and refuse bins also create barriers to people biking and driving and reduces intersection visibility. *Example at the intersection of Cincinnati Avenue and Elmendorf Street.*

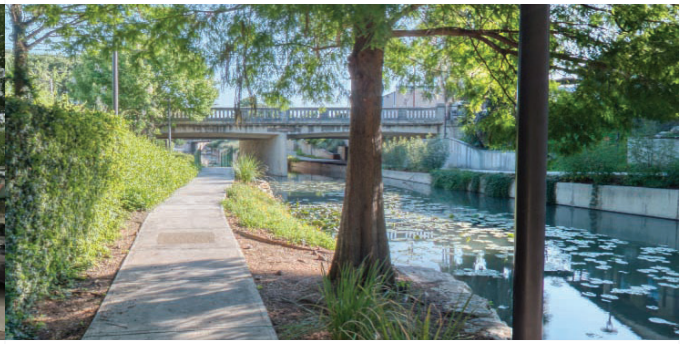
Right slip-lane allows cars to cut across the bike lane. *Example at the intersection of Fredericksburg Road and Cincinnati Avenue.*

Example Bike Crossing Opportunities

Improved Crossings



Bike box at the intersection of Alamo Street and Presa Streets positions people biking in front of car traffic which increases cyclist visibility and safety.



Underpasses, such as those along the Riverwalk allow people walking and biking to travel without interacting with high stress roadways.

High-visibility green conflict markings at the intersection of Buena Vista Street and Trinity Street help increase the visibility of people biking.

Roundabouts, such as at the intersection of Sid Katz Drive and Ewing Halsell Drive, can help reduce the number of conflicts between all modes of traffic at intersections, including for people biking.

IMAGE FROM VIRGINIA DEPARTMENT OF TRANSPORTATION.

Two-stage turn box simplifies the left turn movement for people biking by providing a designated place for them to wait to turn left.

IMAGE FROM VIRGINIA DEPARTMENT OF TRANSPORTATION.

Protected intersections are designed to maintain separation for people biking from vehicle traffic as they travel through the intersection.

APPENDIX A. BIKE ACCESS ASSESSMENT

ACCESS ASSESSMENT METHODOLOGY

One indication for a successful bicycle network is how far a person riding a bicycle can travel within 15 minutes using only low stress streets. The methodology used to identify the comfort of someone biking on a street or bike facility is Level of Traffic Stress (LTS) and is fully addressed in **Chapter 7: Table 7.1**. LTS scores of 1 and 2 are streets and facilities considered safe and comfortable for most people to bike on regardless of their skill or ability.

The following snippet from **Chapter 7** discusses the methodology used for developing the bike sheds which determine access:

To quantify how far the average bike rider in San Antonio can travel today, a bicycle accessibility assessment was conducted using these steps:

1) *Key activity centers and destinations that San Antonio residents and/or visitors may want or need to bike too were identified* (as illustrated on the right).

2) *Using LTS 1 and LTS 2 streets, a "Low Stress Network" was established that included low- stress intersections and crossings. LTS methodology and calculations can be found in* ***Chapter 7****.*

3) *Barriers to connectivity, such as unsignalized crossings and high-stress streets (LTS 3 or 4) were identified.*

4) *Using the results of Steps 2 and 3, "bikesheds" were created for each of the key* activity centers identified in Step 1. Bikesheds represent how far a typical bicycle rider traveling 8 MPH, or up to 2 miles, can reach within 15-minutes. It's important to note that people riding electric bikes and athletic riders may be capable of higher average speeds can likely access more destinations than the typical rider; however, using the typical rider allows the sheds to reflect a greater portion of the biking population.

5) *A 0.25 mile grid of the city was developed to illustrate at a citywide level, areas that have high or low levels of access via a 15-minute bike ride.*

6) *Using Census Block data, population estimates were calculated to estimate how many residents reside within each bikeshed.*

The following figures shows the sheds that were developed for each of the destination types identified.

- **Figure A.1** shows the bikeshed when all destinations are added to the analysis. This shed represents access for San Antonio residents to have access at least one destination.
- **Figure A.2** provides a bikeshed to Bike Share Stations. This bikeshed is used to estimate how many people can bike to their home from a Bike Share Station.
- **Figure A.3** provides a bikeshed to major Healthcare Centers.
- **Figure A.4** provides a bikeshed to Healthy Food sources such as grocery stores.
- **Figure A.5** provides a bikeshed to Key Tourist Destinations.
- **Figure A.6** provides a bikeshed to Parks and Trailheads.

- **Figure A.7** provides a bikeshed to K-12 Schools including charter schools.
- **Figure A.8** provides a bikeshed to colleges and universities.
- **Figure A.9** provides a bikeshed to all transit stops.

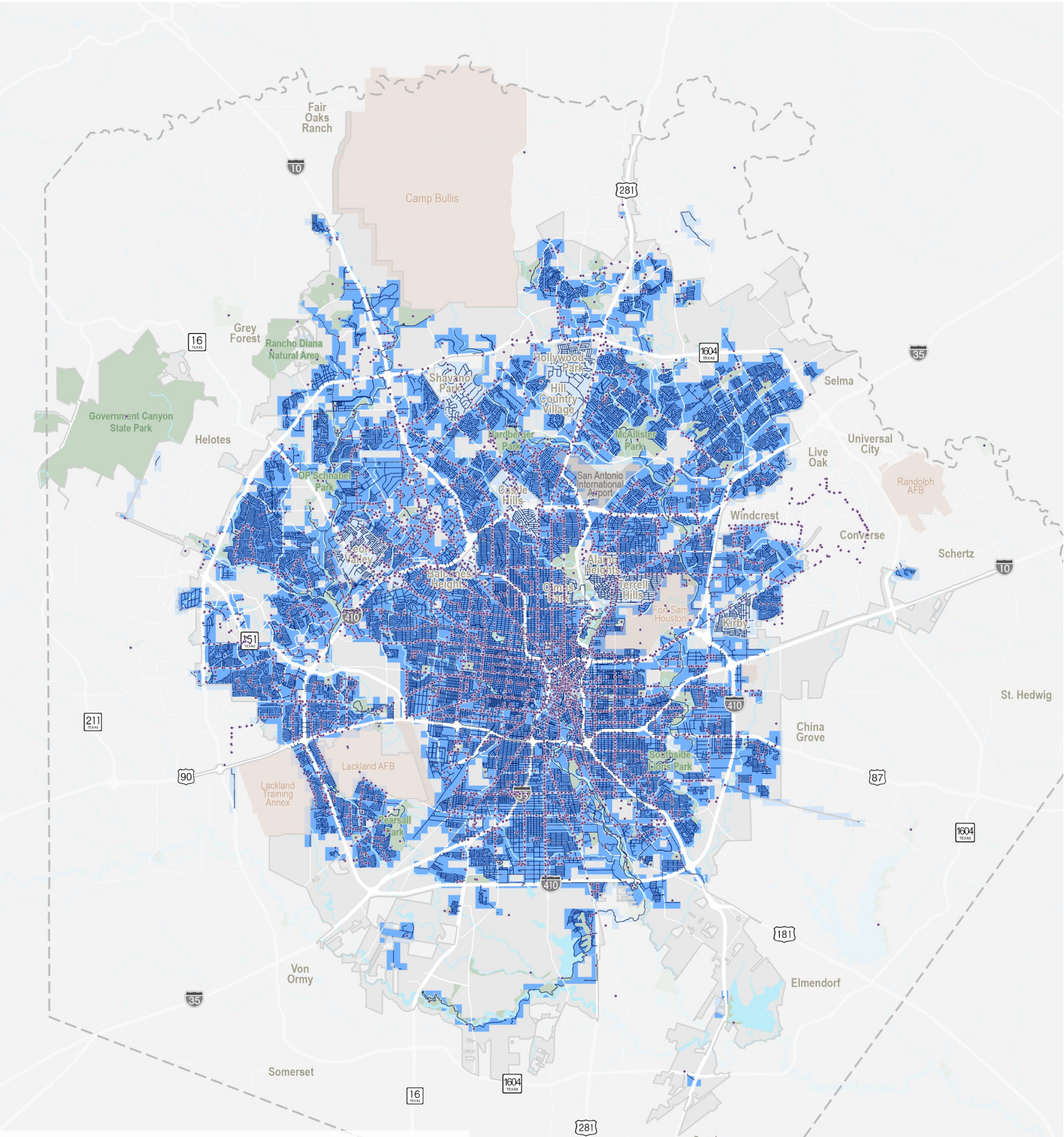


Figure A.1. Bikeshed - All Destinations

- Key Destination
- Low Stress Bike Network
- 15-minute Bikeshed
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

Bike Network Plan

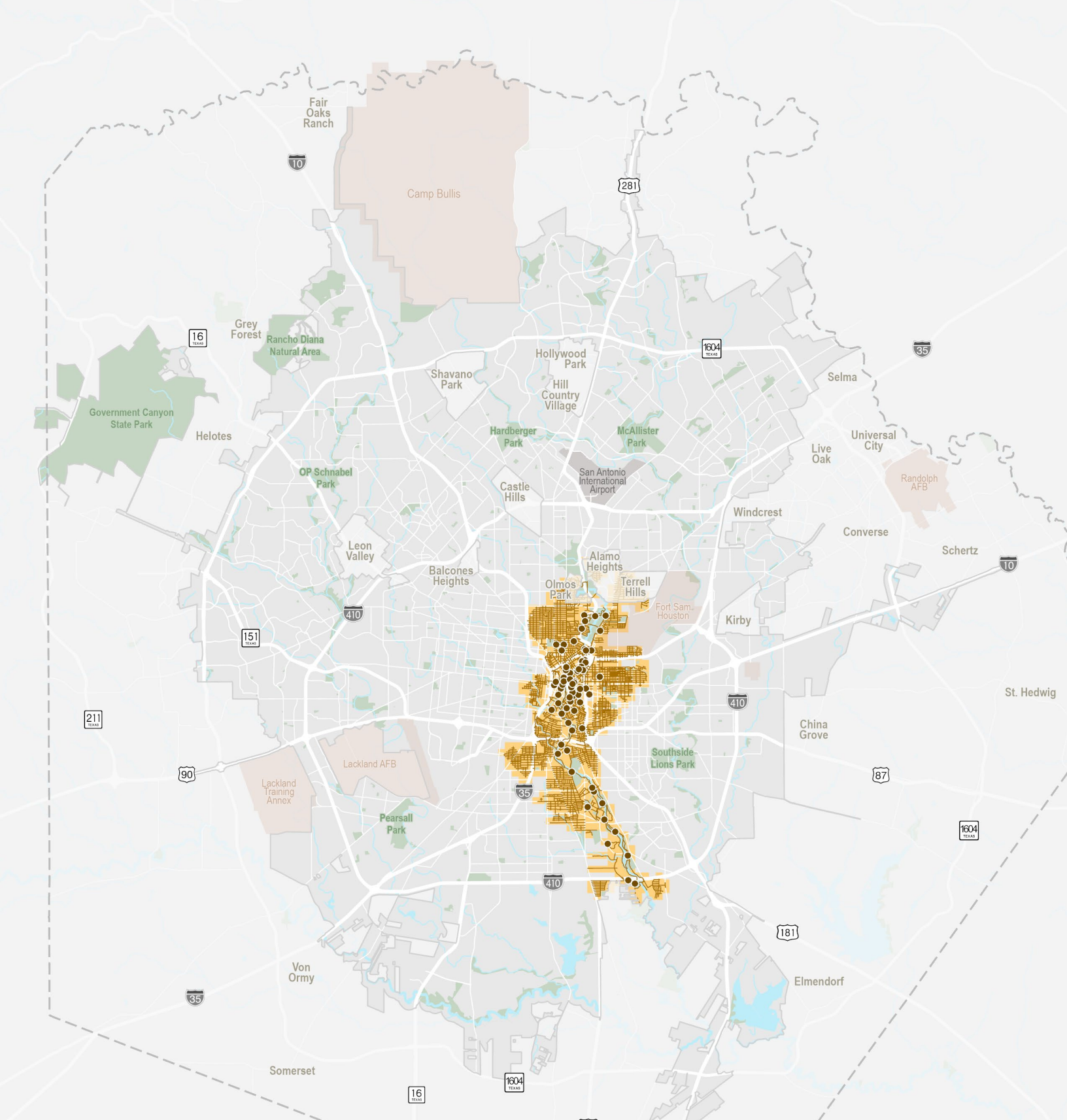


Figure A.2. Bikeshed - Bike Share Stations

- Bike Share Station
- Low Stress Bike Network
- 15-minute Bikeshed
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

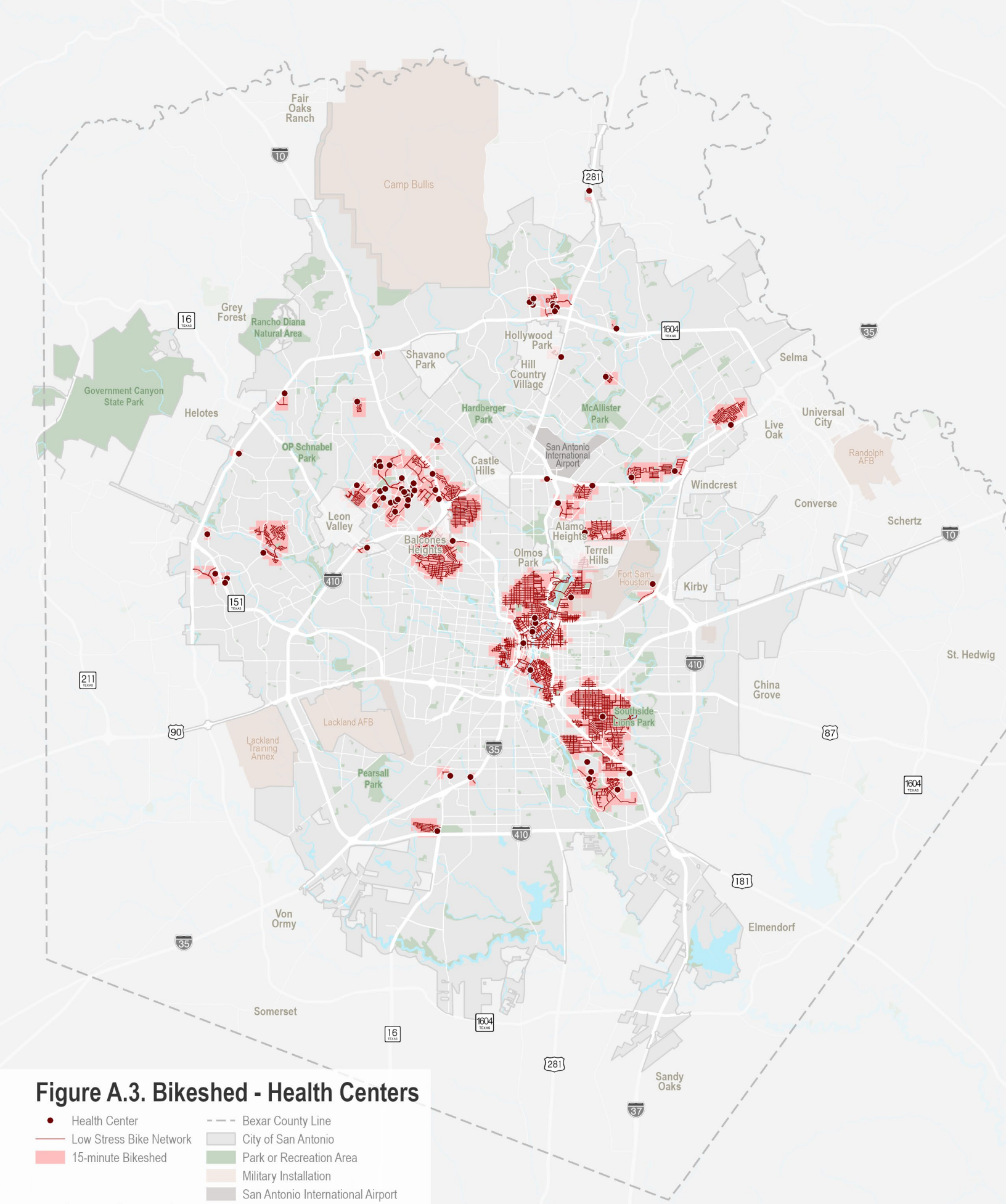


Figure A.3. Bikeshed - Health Centers

- Health Center
- Low Stress Bike Network
- 15-minute Bikeshed
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

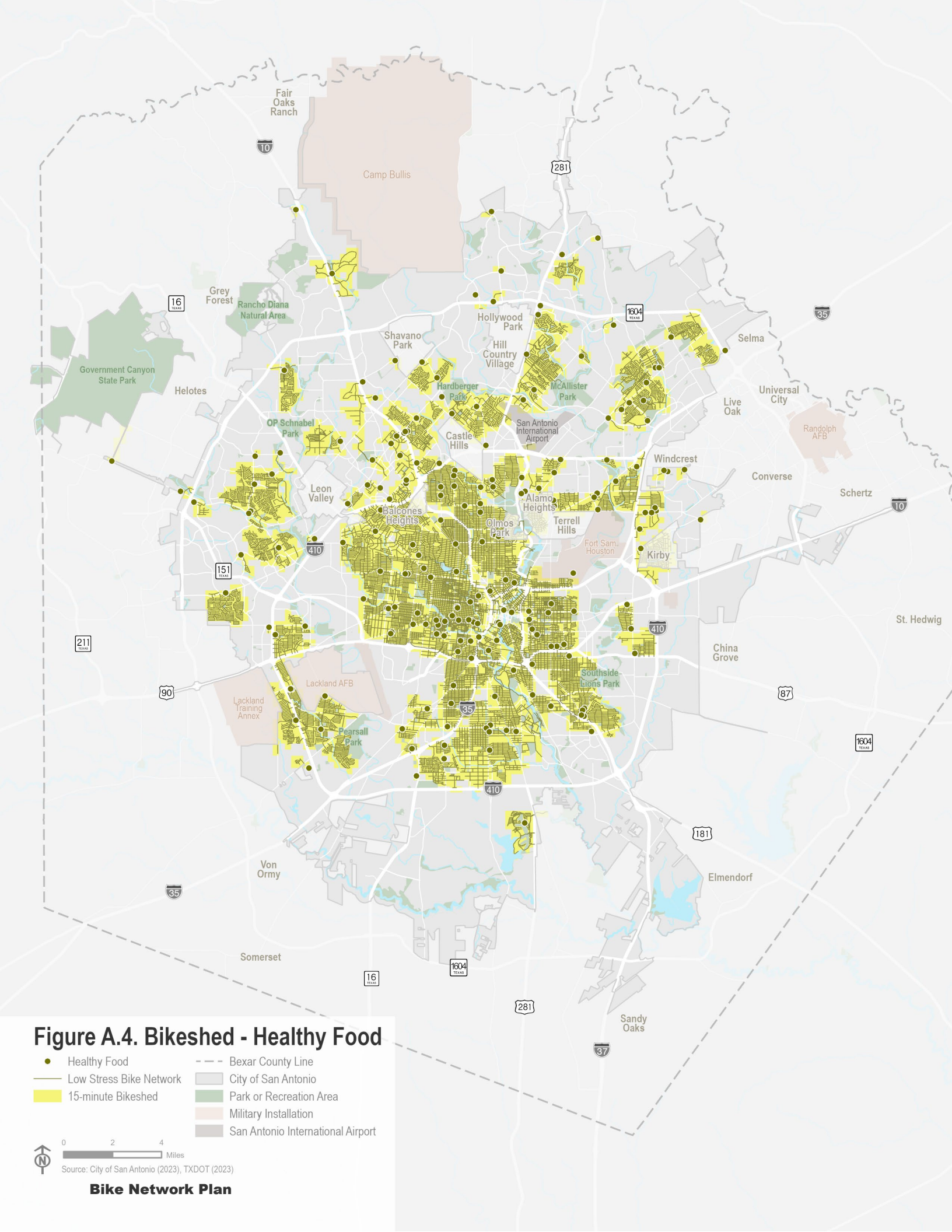


Figure A.4. Bikeshed - Healthy Food

Bike Network Plan

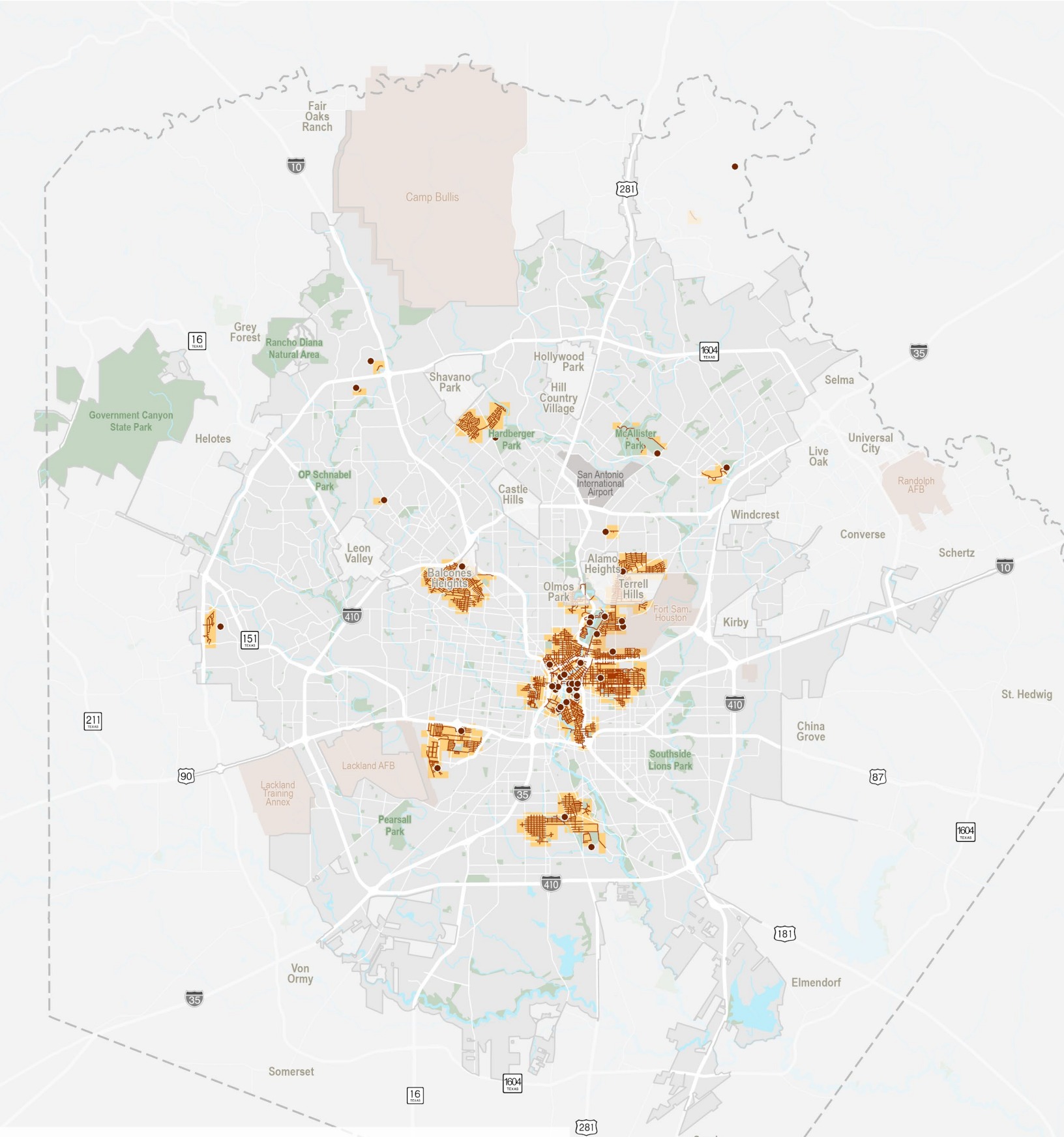


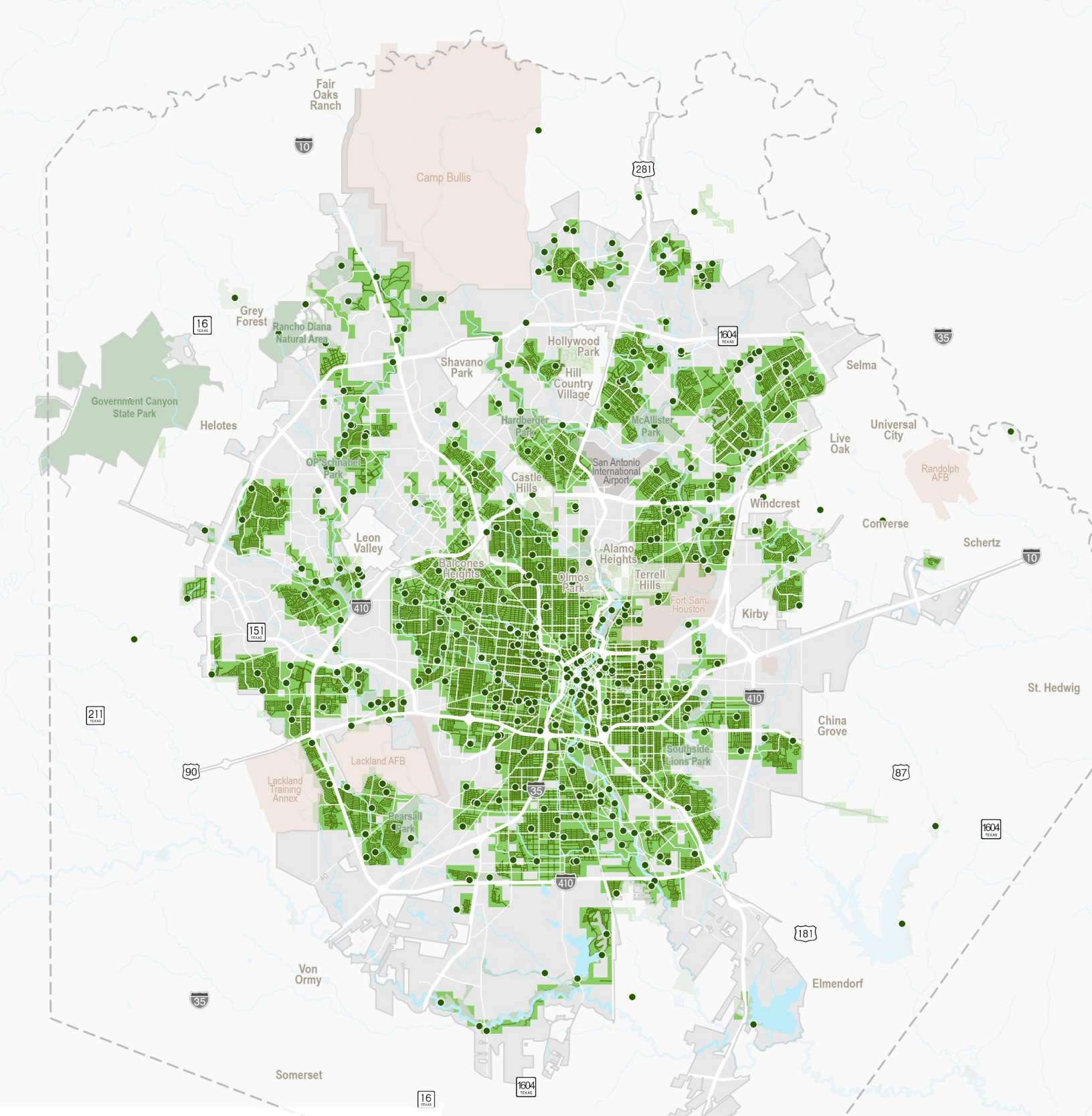
Figure A.5. Bikeshed - Key Tourist Destinations

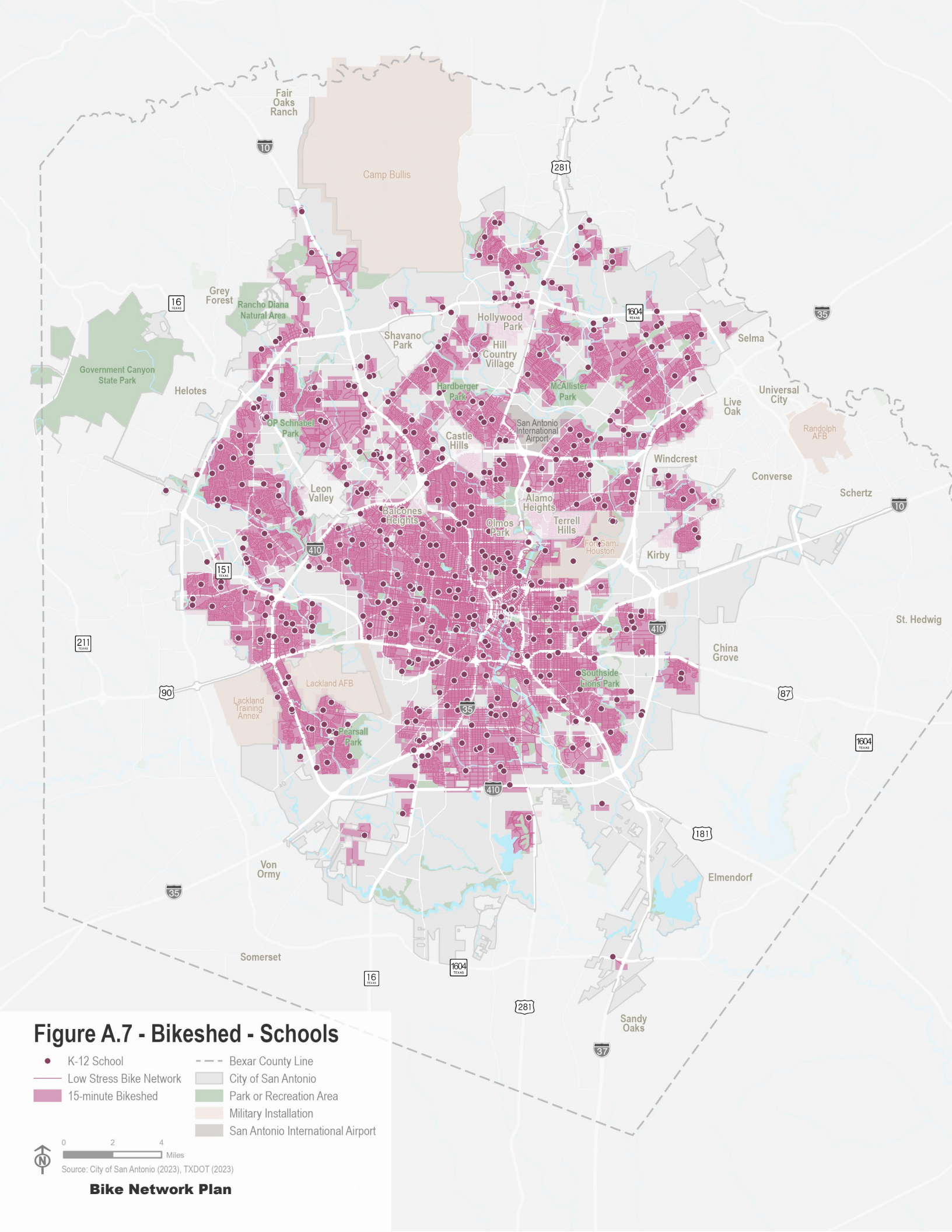
- Key Tourist Destination
- Low Stress Bike Network
- 15-minute Bikeshed
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

Bike Network Plan


Fair Oaks Ranch
Camp Bullis
Grey Forest
Rancho Diana Natural Area
Government Canyon State Park
Helotes
Shavano Park
Hollywood Park
Hill Country Village
Hardberger Park
McAllister Park
San Antonio International Airport
Castle Hills
OP Schnabel Park
Leon Valley
Balcones Heights
Olmos Park
Alamo Heights
Terrell Hills
Fort Sam Houston
Windcrest
Selma
Universal City
Live Oak
Randolph AFB
Converse
Schertz
Kirby
St. Hedwig
China Grove
Lackland AFB
Lackland Training Annex
Pearsall Park
Southside Lions Park
Von Ormy
Elmendorf
Somerset
Sandy Oaks
10
16
35
37
87
90
151
181
211
281
410
1604
Figure A.6 - Bikeshed - Parks and Trailheads
Park or Trailhead
Low Stress Bike Network
15-minute Bikeshed
Bexar County Line
City of San Antonio
Park or Recreation Area
Military Installation
San Antonio International Airport
0
2
4
Miles
Source: City of San Antonio (2023), TXDOT (2023)


Fair Oaks Ranch
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Olmos Park
Alamo Heights
Terrell Hills
Fort Sam Houston
Windcrest
Live Oak
Universal City
Randolph AFB
Converse
Schertz
Selma
Kirby
St. Hedwig
China Grove
Southside Lions Park
Lackland AFB
Lackland Training Annex
Pearsall Park
Von Ormy
Somerset
Elmendorf
Sandy Oaks
Figure A.7 - Bikeshed - Schools
K-12 School
Low Stress Bike Network
15-minute Bikeshed
Bexar County Line
City of San Antonio
Park or Recreation Area
Military Installation
San Antonio International Airport
0 2 4
Miles
Source: City of San Antonio (2023), TXDOT (2023)
Bike Network Plan

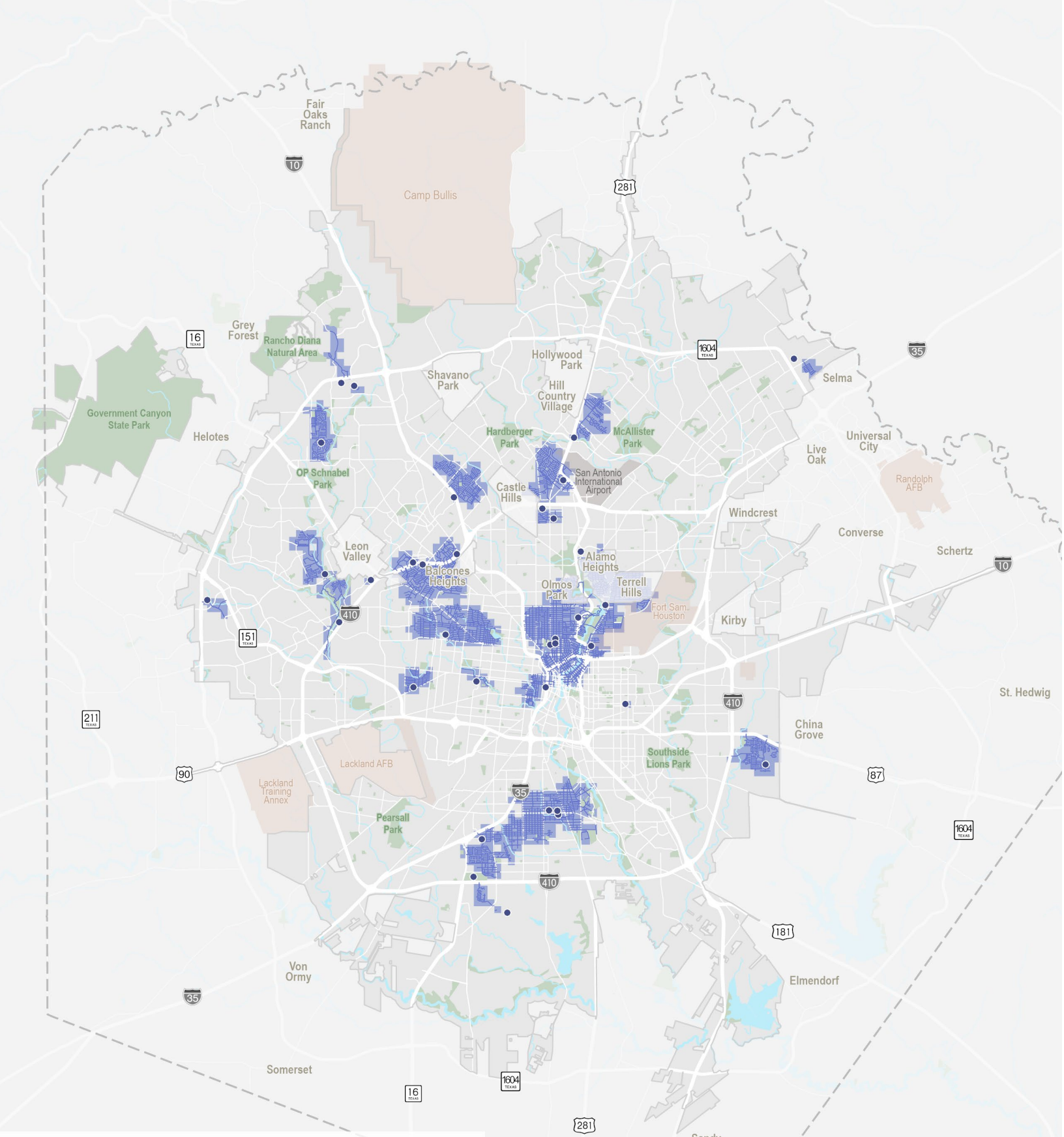


Figure A.8. Bikeshed - Higher Education

- College or University
- Low Stress Bike Network
- 15-minute Bikeshed
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

APPENDIX B. SAFETY ASSESSMENT

HOW SAFE ARE OUR STREETS?

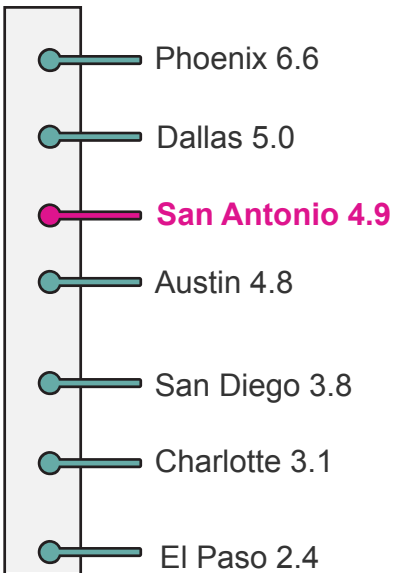
San Antonio began its mission to eliminate all traffic fatalities and serious injuries through its Vision Zero Action Plan in 2015. Achieving a bicycle network that is connected, accessible, and safe moves the city closer to its Vision Zero goals. To achieve Vision Zero, there must be an understanding of the current state of bicycle and pedestrian crashes. This includes understanding where they happen, when they happen, and how they happen. Analyzing crash data will help San Antonio select bicycle facilities and safety treatments, as well as decide how to prioritize implementation.

Nationwide Crash Statistics

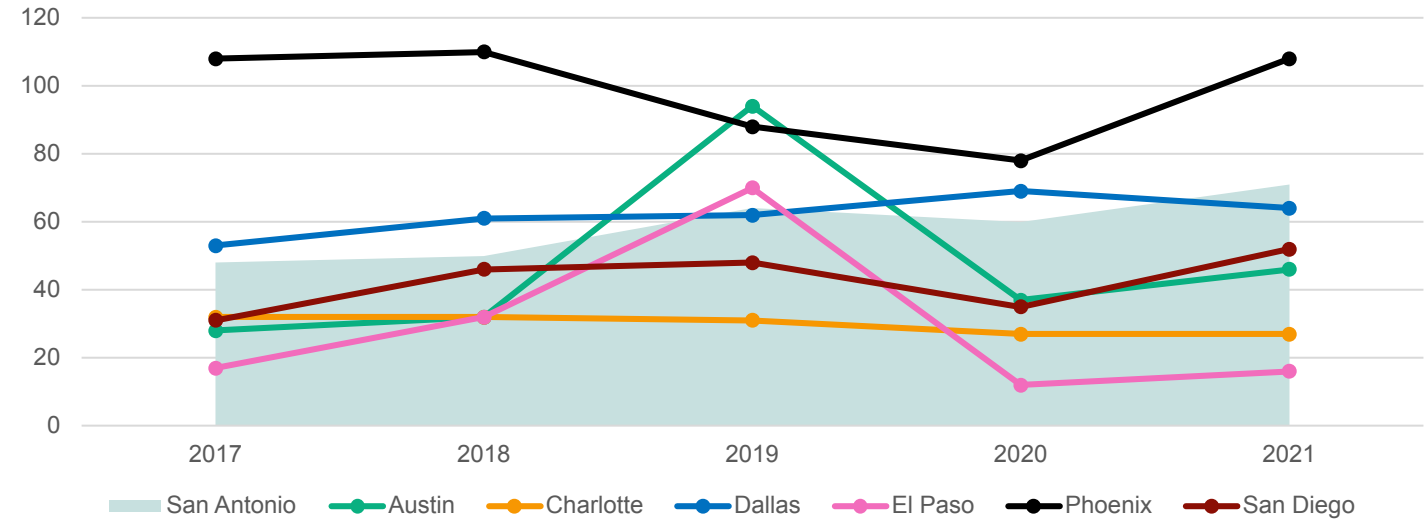
Nationwide, pedestrian and bicyclist fatalities are on the rise, and they continue to comprise larger proportions of the nation's annual traffic fatalities. The following sections introduce trends in transportation safety that have occurred in San Antonio from 2017 to 2022 and compares those trends to what is happening to peer cities throughout the nation. Understanding these larger trends helps to identify the critical factors impacting transportation safety that need to be addressed.

As illustrated below, San Antonio has historically had significantly fewer crashes than Phoenix, but far more than Charlotte and San Diego. When compared to total population, however, has San Antonio's pedestrian and bicycle fatality rates per 100,000 population are on par with Austin and Dallas.

Pedestrian and Bicycle Fatalities Per 100,000 Population (2017-2021)



Peer City Pedestrian and Bicycle Fatalities (2017 – 2022)



CRASH AND SAFETY TRENDS

Following the national trend, Texas has also seen an uptick in pedestrian and cyclist fatalities, with a 24% increase in statewide fatalities between 2019 and 2021.

Between 2018 and 2022, a total of **5,486 pedestrian and bicyclist crashes** occurred in San Antonio. This roughly equates to a bicycle crash every one to two days, and a fatal or serious injury bicycle crash every two weeks. The following section outlines key crash characteristics to help better understand the "who," "what," "when," "where,", and "how" of transportation safety in San Antonio

Fatal and severe injury pedestrian and bicycle crashes are increasing.

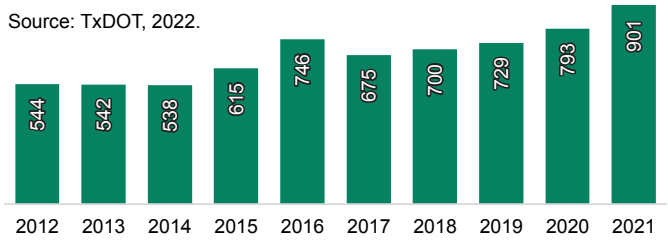
Fatal and Severe Injury Crashes

Of the 5,486 pedestrian and bicyclist crashes from 2018 - 2022, there were **331 fatal injury crashes** and **580 serious injury crashes**. This means that on average, 160 people walking and 22 people bicycling have lost their lives or are seriously injured in a crash each year. In recent years, the number of these crashes have been trending upward, with more than 175 fatalities in 2022. From 2020 to 2022 fatal and serious injury bicycle crashes increased by 127%.

Figures 6.3 and 6.4 illustrate the location of bicycle and pedestrian involved fatal and severe injury crashes, respectfully.

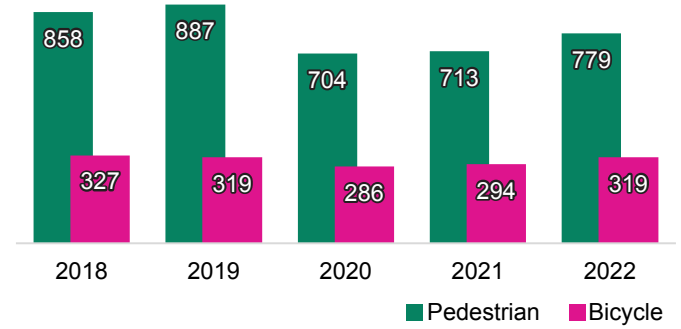
Statewide Pedestrian and Cyclist Fatalities

Source: TxDOT, 2022.



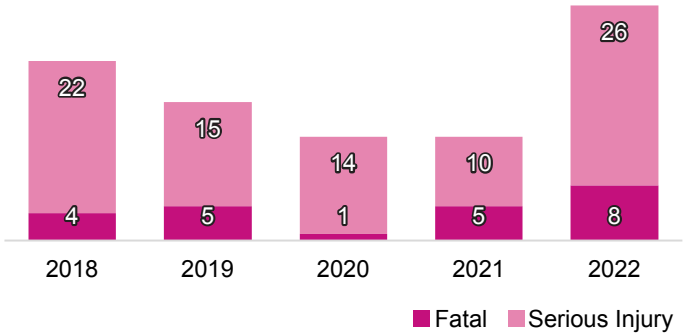
San Antonio Pedestrian and Bicycle Involved Crashes

Source: TxDOT, 2022.



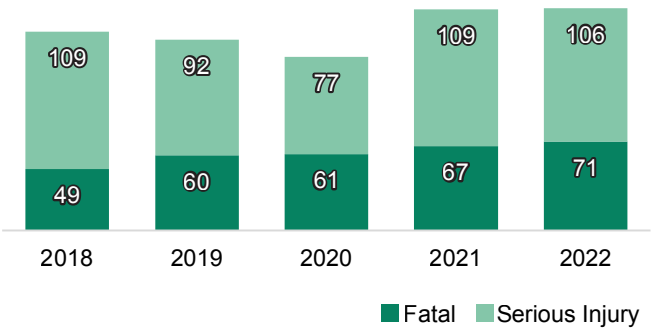
Fatal and Serious Injury Bicycle Crashes

Source: TxDOT, 2022.



Fatal and Serious Injury Pedestrian Crashes

Source: TxDOT, 2022.



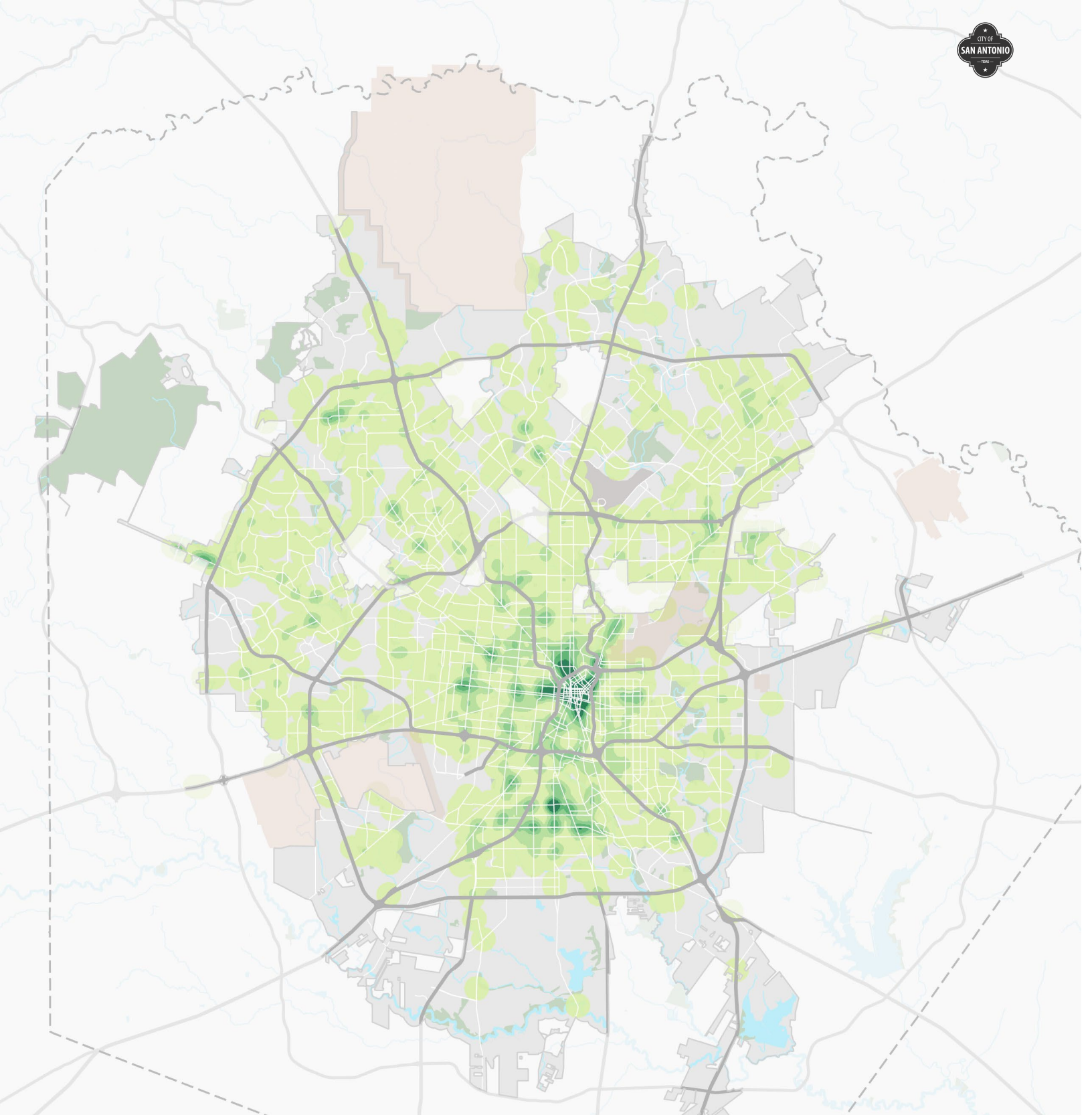


Figure B.1. Bicycle-Involved Crashes (2018-2022)

Source: Crash Records Information System (CRIS), City of San Antonio (2023), TXDOT (2023)

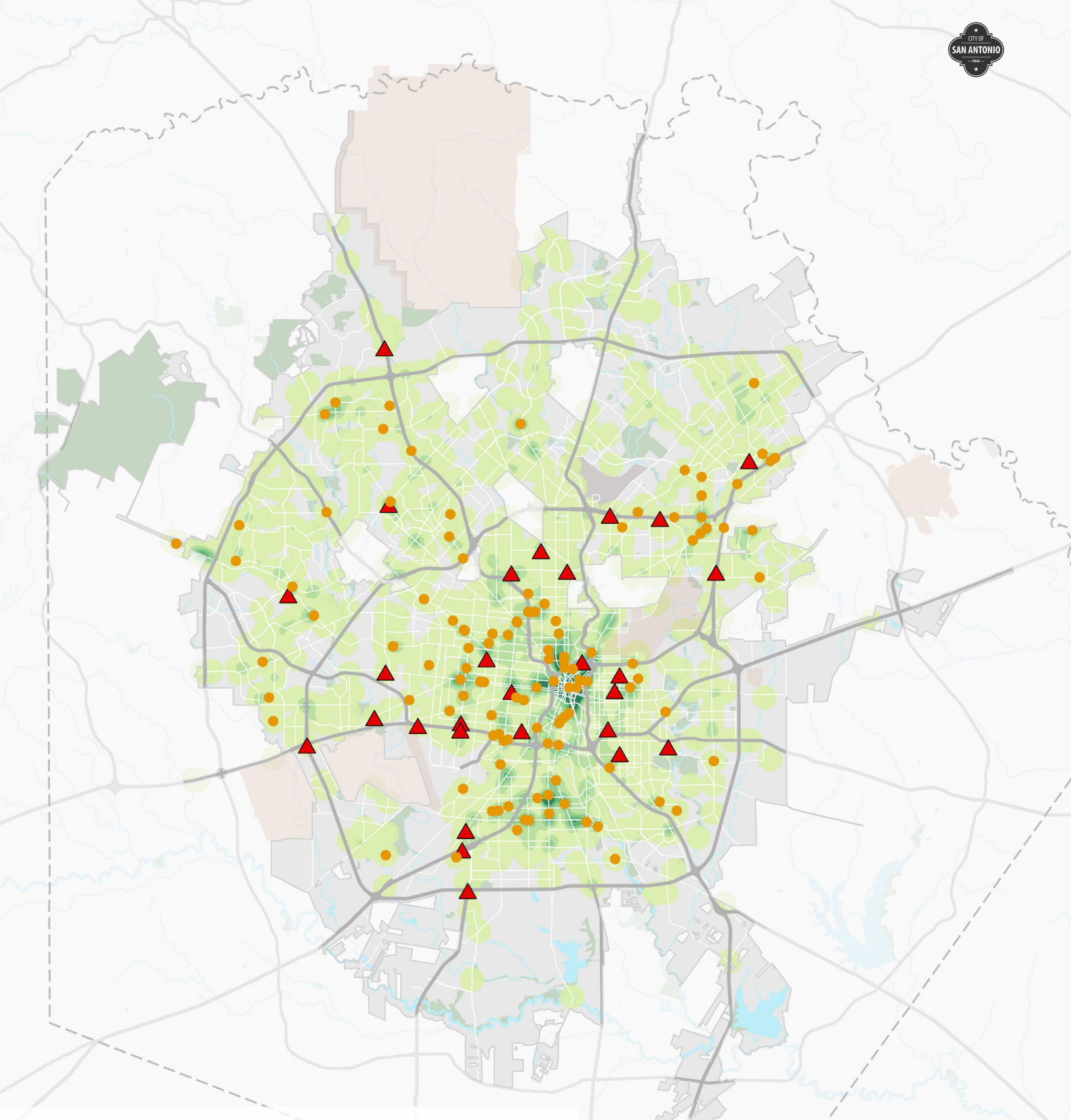


Figure B.2. Bicycle-Involved Crashes (2018-2022)

Source: Crash Records Information System (CRIS), City of San Antonio (2023), TXDOT (2023)

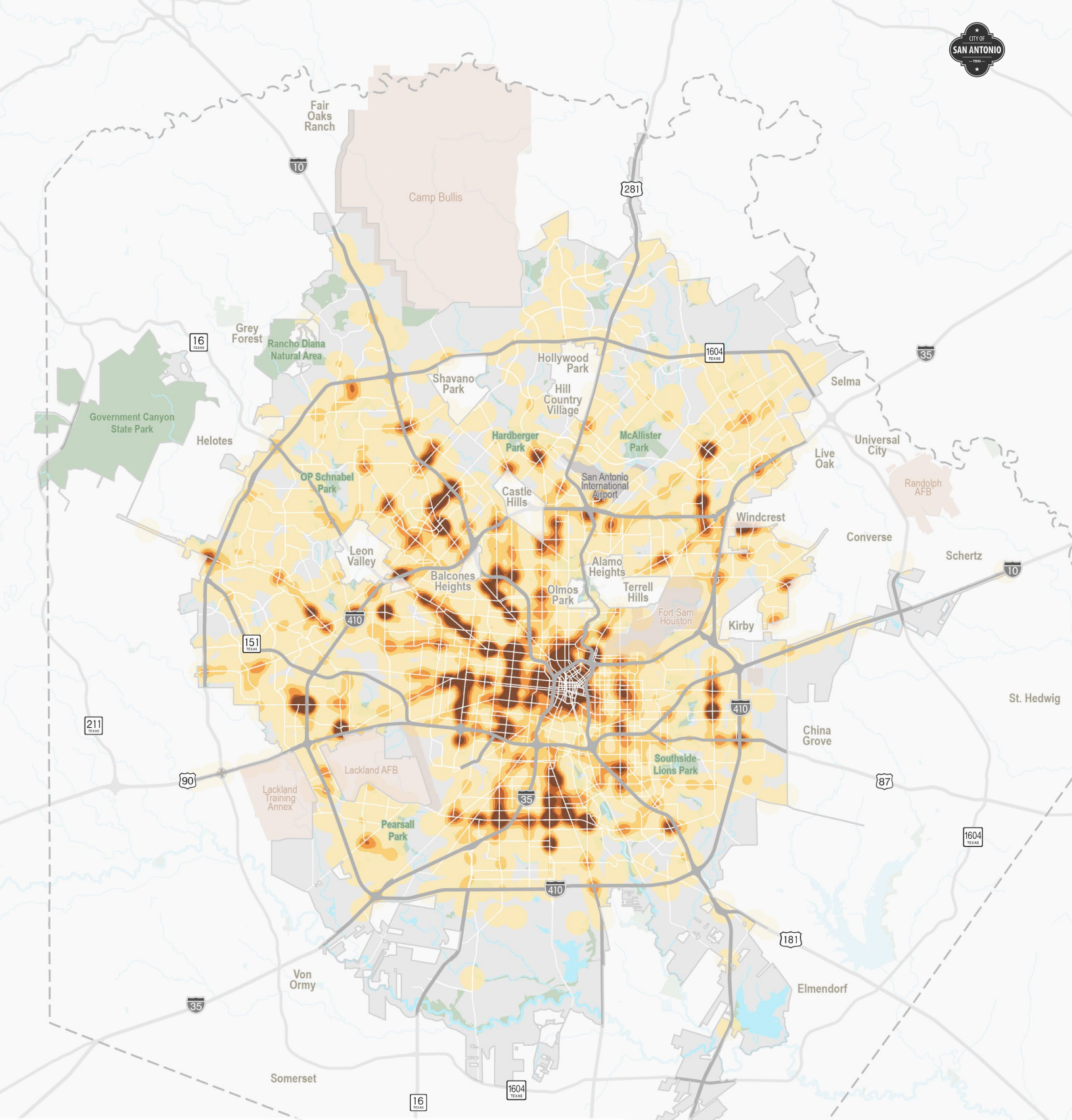


Figure B.3. Pedestrian-Involved Crashes (2018-2022)

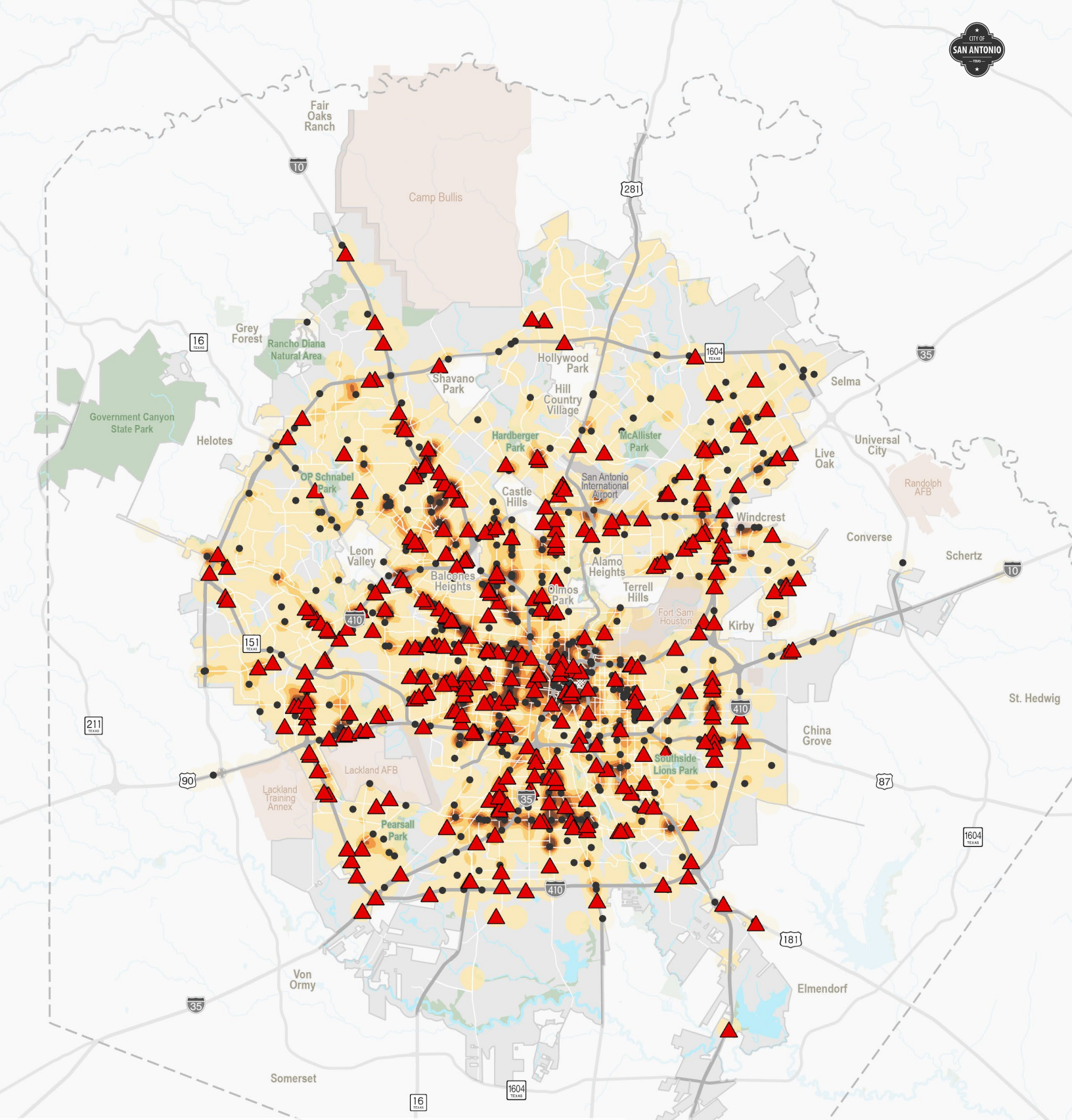


Figure B.4. Pedestrian-Involved Crashes (2018-2022)

WHEN ARE CRASHES HAPPENING?

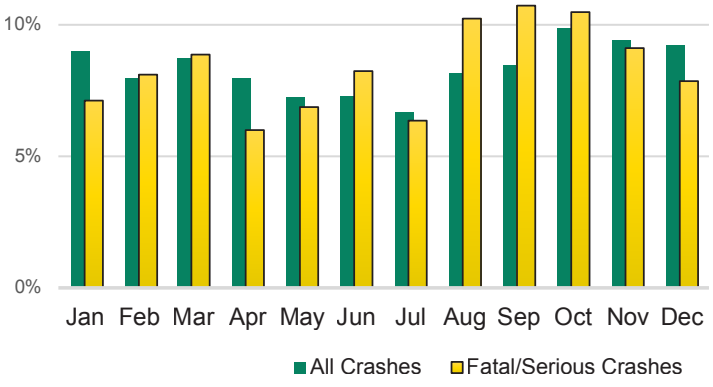
Evaluating time of day, day of the week, and month crashes occurred can help identify contributing factors such as motor vehicle volumes and street lighting.

Time of Year

More than 30% of the fatal and serious injury pedestrian crashes occurred in August, September, and October. Fatal and serious injury bicycle crashes saw different peak crash months, with nearly 15% of the crashes occurring in September, and an additional 12% occurring in June.

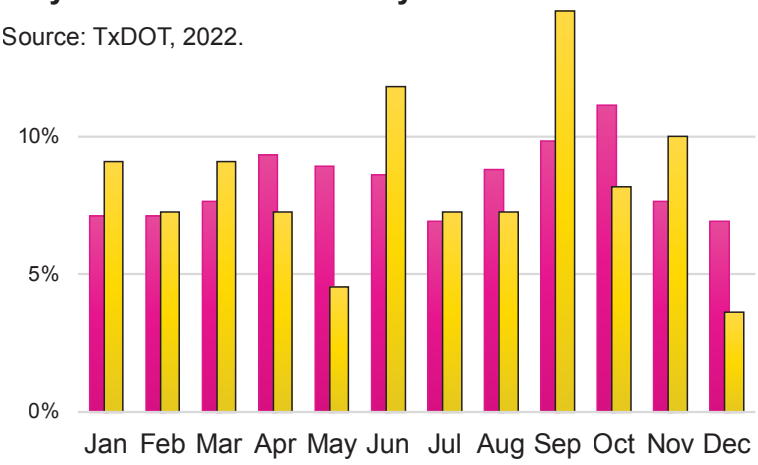
Pedestrian Involved Crashes by Month

Source: TxDOT, 2022.



Bicycle Involved Crashes by Month

Source: TxDOT, 2022.

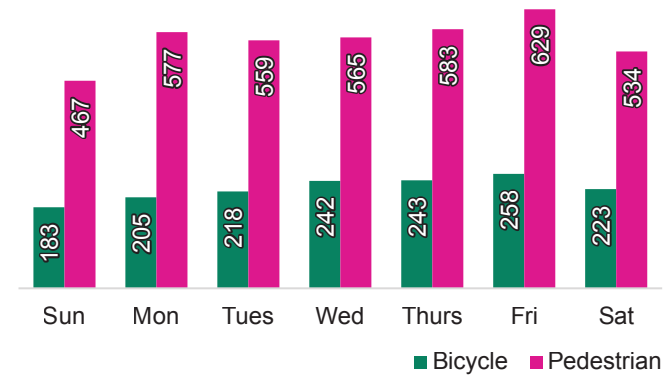


Day of Week and Time of Day

As shown below, Saturday and Sunday historically have experienced the lowest number of crashes. Fatal and serious injury crashes follow a similar trend, with lower total serious and fatal crashes occurring on Saturday and Sunday. Peak pedestrian and bicyclist crashes were from 7 to 9 AM and 4 to 7 PM. When looking at fatal and serious injury crashes only, crashes peaked from 7 to 11 PM. This is likely due to lower lighting conditions during these hours.

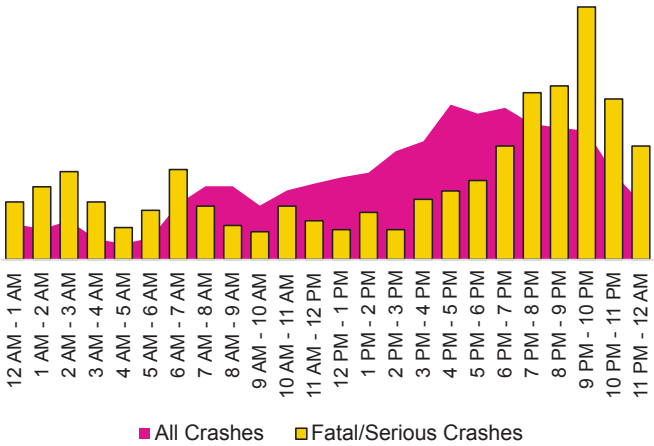
Bicycle and Pedestrian Involved Crashes by Day of Week

Source: TxDOT, 2022.



Fatal and Serious Injury Pedestrian and Bicycle Involved Crashes by Time of Day

Source: TxDOT, 2022.



What Crashes Are Happening?

While every crash is unique, they are often categorized according to the circumstances of the crash. Each vehicle crash can be grouped into different collision types, including rear-end crashes, angle crashes, left/right hand turn crashes, and head on crashes. Each crash type can indicate a particular problem that may be addressed through a targeted engineering, enforcement, or behavioral countermeasure.

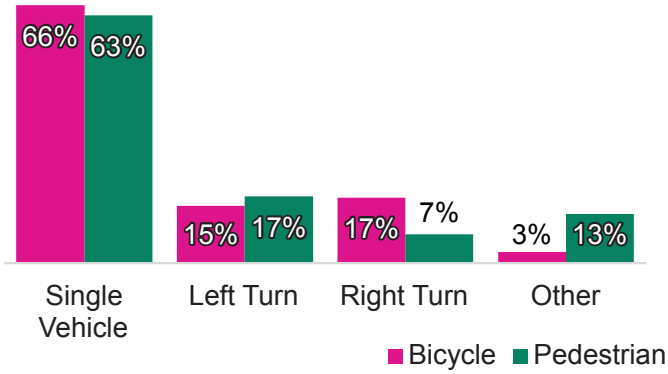
As illustrated on the right, the majority of crashes were reported as single vehicle crashes with the driver traveling straight. Pedestrian and bicycle crashes involve only one motor vehicle. Left turn and right turn lanes were reported for 31% of bicycle crashes. Compared to pedestrians, bicyclists have a much higher rate of being hit by a vehicle turning right.

What are Leading Causes of Crashes?

Identification of actions that led to a crash, as classified in crash database, provides information about conditions contributing to crashes. The crash database has a variety of categories to classify crash causes. Examples of contributing actions include failing to yield the right of way, motorist inattentive or distracted, chemical impairment, or disregarding a traffic control device. Driver inattention was largely cited as the leading cause of pedestrian and bicycle involved crashes, with failing to yield as the second leading cause. More than 40% of the fatal and seriously injured pedestrian and bicyclist crashes involved the pedestrian or bicyclist failing to yield to the right of way of the vehicle.

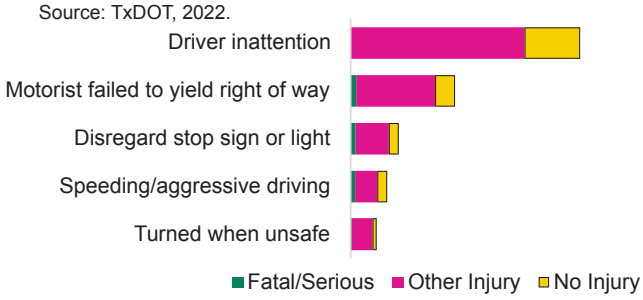
Bicycle and Pedestrian Involved Crashes by Type of Crash

Source: TxDOT, 2022.



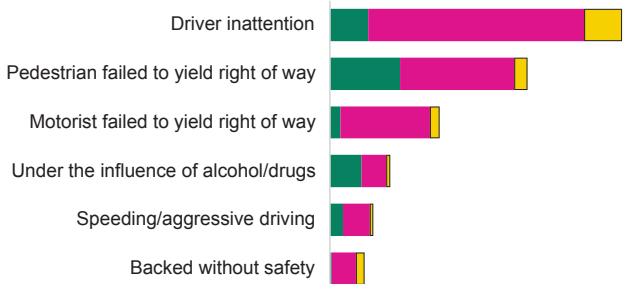
Bicycle Involved Crashes by Contributing Factor

Source: TxDOT, 2022.



Pedestrian Involved Crashes by Contributing Factor

Source: TxDOT, 2022.



Where Are Crashes Happening?

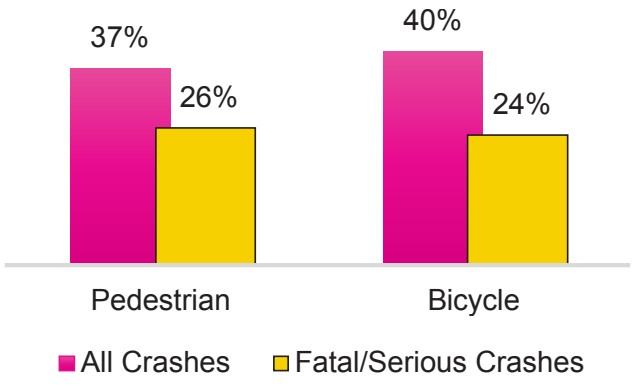
Understanding the locational context of crashes is an important step in identifying location specific safety issues that may be addressed through targeted engineering, enforcement, or behavioral countermeasures. On San Antonio streets, crash reports indicate a disproportionate split between crashes occurring at intersections and along corridors, with 40% of all bicycle and 37% of pedestrian crashes occurring at intersections.

How do Road Conditions Play a Role?

As reported in the TXDOT Crash Records Information System, the majority of bicycle crashes occurred on roadways with speeds higher than 50 MPH, whereas the majority of pedestrian involved crashes occurred on roads with speeds between 30 – 35 MPH. Most of the fatal and serious injury crashes occurred along roadways with posted speeds ranging from 30 MPH to 45 MPH.

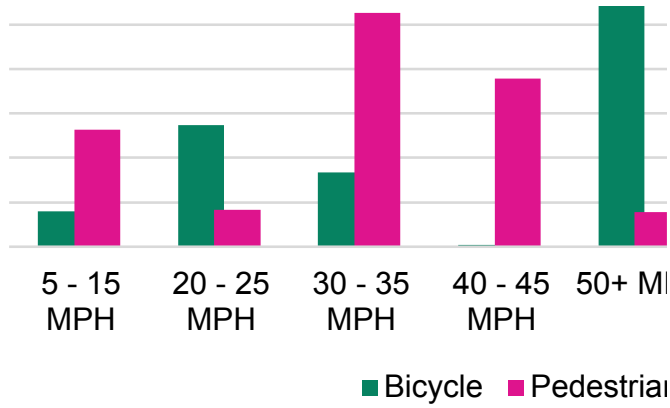
Intersection Related Bicycle and Pedestrian Crashes

Source: TxDOT, 2022.



Bicycle and Pedestrian Crashes by Roadway Posted Speed Limit

Source: TxDOT, 2022.



Safety Summary

The total annual number of pedestrian and bicyclist crashes is increasing, as is the number of fatal and serious injury crashes. The following summary documents the findings of the detailed crash analysis.

All Pedestrian and Bicycle Involved Crashes

- **October** was the peak month for pedestrian and bicyclist crashes.
- **Friday** was the peak weekday for pedestrian crashes.
- **Tuesday** was the peak weekday for bicycle crashes.
- More than 60% of the crashes involved a **straight-traveling vehicle**.
- There was a higher proportion of crashes involving **left-turning vehicles** than right-turning vehicles.
- One-third of pedestrian crashes and one-half of bicycle crashes occurred at an **intersection**.
- **Daylight and dry roadway surface** were the most common environmental conditions.
- 63% of crashes occurred on roadways with posted speeds ranging from **30 to 35 MPH.**

Fatal and Serious Injury Pedestrian and Bicycle Involved Crashes

- **August through October** were the peak months for pedestrian FSI crashes.
- **July and September** were the peak months for bicyclist fatal and serious injury crashes.
- **Friday** was the peak weekday for fatal and serious injury crashes.
- More than 60% of the fatal and serious injury crashes involved a **straight-traveling vehicle**.
- Within fatal and serious injury crashes, bicyclists were hit by **right-turning vehicles** at a higher rate than pedestrians.
- One-fourth of pedestrian crashes and one-half of bicycle fatal and serious injury crashes occurred at an **intersection**.
- 44% of the fatal and serious injury crashes involved **pedestrians/bicyclists not yielding** to vehicle right of way.
- 26% of the fatal and serious injury crashes involved **driver inattention**.
- Darkness with streetlights was the most common lighting condition.
- Dry was the most common roadway surface condition.
- Most fatal and serious injury crashes occurred on **city streets** and on roadways with posted speeds ranging from **30 to 45 MPH**.
- 16% of fatal and serious injury crashes occurred on roadways with a posted speed of **at least 50 MPH.**

PEDESTRIAN AND BICYCLE FREQUENT CRASH ROADS

This section describes the network screening and systemic evaluation of the City's roadway network. For the purposes of this analysis, the BNP network was utilized which includes all arterials, collectors, and local streets of significance. Freeways, ramps, and state highways were excluded from the analysis; however, frontage roads were included as they serve as local connections. Crashes were geocoded and stratified as either intersection related or roadway segment crashes and tagged to the BNP roadway network.

Equivalent Property Damage Only (EPDO)

The Equivalent Property Damage Only (EPDO) performance measure was used to assign weight to individual crashes based on the severity of the crash. The weighting is based on the cost of a property-damage-only (PDO) crash, giving each crash a relative severity score in terms of a PDO crash. The weighting factors used for the network screening are based on the National Safety Council's average comprehensive cost by injury severity scale. This cost includes wage and productivity losses, medical expenses, administrative expenses, motor-vehicle damage, and employers' uninsured costs. Table. B.1 illustrates the crash cost for each crash severity type and the corresponding EPDO weights. The weights generally reflect an order of magnitude

Table B.1. Crash Costs and Weights by Severity

Crash Severity Type	Crash Cost	EPDO Weights
Fatal	$12,474,000	733.765
Severe Injury	$1,016,000	59.765
Minor Injury	$221,000	13.000
Possible Injury	$120,000	7.059
No Injury	$17,000	1.000

Weighted Frequent Crash Network Segments

The EPDO score for roadway segments was calculated by multiplying the number of crashes for each severity type with the corresponding weights and aggregating the results using the formula below:

Priority Crash Segments

Figure B.5 illustrates the Weighted Frequent Crash network and Tier I segment throughout the City. Table B.2 lists the top 30 high priority crash segments in the City based on their EPDO score.

Table B.3. Top 30 Segments by EPDO Score

Segment	Fatal	Serious Injury	Moderate Injury	Minor Injury	No Injury	Total Crashes	EPDO Score	Owned/ Maintained
Fredricksburg Rd: Spencer Ln to Babcock Rd	2	0	1	0	0	3	296.1	San Antonio
Thousand Oaks: East of Park Crossing Dr to Nacogdoches Rd	2	0	1	0	0	3	296.1	San Antonio
Austin Hwy: Lanark Dr to Walzem Rd	1	3	0	0	0	4	182.6	TXDOT
Fredricksburg Rd: Spencer Ln to Babcock Rd	1	0	1	1	0	3	150.8	San Antonio
Bandera Rd: Evers Rd to Broadview Dr	1	0	1	0	0	2	149.4	San Antonio
Bandera Rd: East of Lingustrum to Embassy	1	0	1	0	0	2	149.4	San Antonio
Bandera Rd: Willard Dr to Cheryl Dr	1	0	1	0	0	2	149.4	TXDOT
Blanco Rd: Northcrest Dr to Thames Dr	1	0	1	0	0	2	149.4	TXDOT
Huebner Rd: USAA Blvd to North of Expo Blvd	1	0	1	0	0	2	149.4	San Antonio
Thousand Oaks: East of Park Crossing Dr to Nocogdoches Rd	1	0	1	0	0	2	149.4	San Antonio
Blanco Rd: Northcrest Dr to Thames Dr	1	0	0	1	0	2	148.2	San Antonio
Babcock Rd: Medical Dr to Beverly Mae Dr	1	0	0	0	0	1	146.8	San Antonio
Bandera Rd: Sherril Brook Dr to Bloomfield Dr	1	0	0	0	0	1	146.8	San Antonio
Broadway Rd: Lawndale Dr to Gulfmart Dr	1	0	0	0	0	1	146.8	San Antonio
Culebra Rd: Ingram Rd to Leon Greenway	1	0	0	0	0	1	146.8	San Antonio
Old Highway 90: Arvil Ave to Jerome Rd	1	0	0	0	0	1	146.8	San Antonio
Frio City Rd: Cumberland Blvd to Brazos St	1	0	0	0	0	1	146.8	San Antonio
Huebner Rd: USAA Blvd to North of Expo Blvd	1	0	0	0	0	1	146.8	San Antonio
Judson Rd: Chestnut View Dr to Creekway	1	0	0	0	0	1	146.8	San Antonio
Martin Luther King Dr: Poppy Dr to Aurelita St	1	0	0	0	0	1	146.8	San Antonio
Moursund Blvd: Anlsey Blvd to South of Mally Blvd	1	0	0	0	0	1	146.8	San Antonio

Segment	Fatal	Serious Injury	Moderate Injury	Minor Injury	No Injury	Total Crashes	EPDO Score	Owned/ Maintained
New Loredo Hwy: North of Cassin Rd to I-35 Access Road	1	0	0	0	0	1	146.8	TXDOT
Nacogdoches Rd: Mac Arthur view to Towne Lake Dr	1	0	0	0	0	1	146.8	San Antonio
Randolph Blvd: East of O'Connor Rd to Judson Rd	1	0	0	0	0	1	146.8	San Antonio
Rigsby Ave: Holmgreen Rd to Jupe Dr	1	0	0	0	0	1	146.8	TXDOT
Roosevelt Ave: March Ave to Woodhill	1	0	0	0	0	1	146.8	TXDOT
Zarzamora: West of Jaguar Parkway to East of Hunters Pond	1	0	0	0	0	1	146.8	San Antonio
Sahara Dr: North Valley Dr to Isom Rd	1	0	0	0	0	1	146.8	San Antonio
San Francisco St: I-10 to Blanco Dr	1	0	0	0	0	1	146.8	San Antonio
SE Military Dr: Pickwell Dr to East of Emory Oak Dr	1	0	0	0	0	1	146.8	TXDOT
Commerce St: East of Tom Slick Ave to East of Western Park	1	0	0	0	0	1	146.8	San Antonio

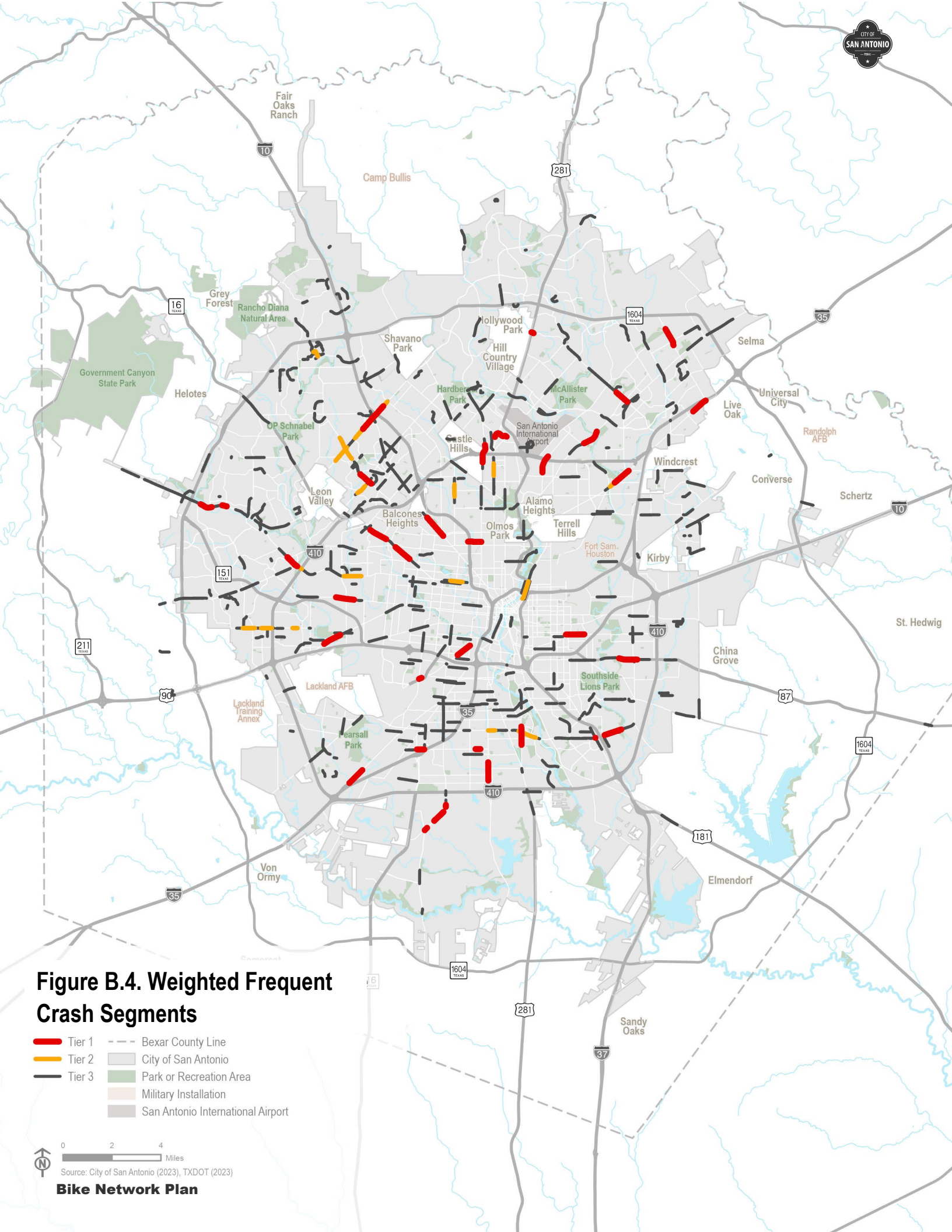


Figure B.4. Weighted Frequent Crash Segments

INTERSECTION SCREENING

This section describes the citywide intersection screening and systemic evaluation. To identify intersection crashes, each crash was first geocoded, and intersection related crashes were identified. A 200 feet buffer around each intersection was used to extract intersection crashes and each crash was then tagged with the corresponding intersection name. This process helped identify the number of crashes at each intersection.

Weighted Frequent Crash Network Segments

Similar to the network screening process, Equivalent Property Damage Only (EPDO) intersection screening was used to identify Weighted Frequent crash intersections. EPDO weights for each crash severity type as illustrated in Table B.1 was utilized. The EPDO score for intersection was calculated by multiplying the number of crashes for each severity type with the corresponding EPDO weights and aggregating the results using the formula below:

EPDO Score = Fatal EPDO Weight x Number of Fatal Ped/Bike Involved Crashes

+ Severe Injury EPDO Weight x Number of Severe Injury Ped/Bike Involved Crashes

+ Minor Injury EPDO Weight x Number of Minor Injury Ped/Bike Involved Crashes

+ Possible Injury EPDO Weight x Number of Possible Injury Ped/Bike Involved Crashes

+ No Injury EPDO Weight x Number of No Injury Ped/Bike Involved Crashes Based on their EPDO score, intersections were prioritized separately into three tiers.

- **Tier** 1= highest priority segments, with an EPDO score of two standard deviations above the mean.
- **Tier 2**= medium priority segments, with an EPDO score of one standard deviation above the mean.
- **Tier 3**= low priority segments that experienced at least one bike/ped involved crash.

Priority Crash Segments

Figure B.6 illustrates the Frequent Crash intersections and Tier I intersections throughout the City, while Table B.4 lists Tier 1, Tier 2, and Tier 3 intersections by City Council District. Table B.4 lists the top 30 high priority crash intersections in the City based on their EPDO score.

Table B.4. Number of Frequent Crash Intersections by Tier

District	Tier 1	Tier 2	Tier 3
District 1	30	21	402
District 2	24	13	229
District 3	21	12	250
District 4	13	3	136
District 5	39	18	333
District 6	19	4	116
District 7	16	6	147
District 8	9	7	127
District 9	3	1	81
District 10	7	5	130
Total	**181**	**90**	**1951**

Table B.5. Top 30 Crash Intersections by EPDO Score

Intersection	Fatal	Serious Injury	Moderate Injury	Minor Injury	No Injury	Total Crashes	EPDO Score	Owned/ Maintained
N Zarzamora / Culebra Rd	2	3	7	1	3	16	349.57	TXDOT
Bandera Rd / Culebra Rd	2	0	4	2	1	9	306.93	TXDOT
S General McMullen / Aldama	2	1	0	0	0	3	305.46	San Antonio
Old Highway 90 / Sw 34Th St	2	0	3	0	0	5	301.30	San Antonio
Old Highway 90 / Monterey St	2	0	1	0	0	3	296.10	San Antonio
San Pedro Ave / Hermine Blvd	2	0	0	0	0	2	293.50	San Antonio
Zachry Dr / Bandera Rd	1	2	4	1	0	8	182.47	TXDOT
Evers Rd / Nw Loop 410 Access Rd	1	1	6	1	3	12	176.32	TXDOT
Blanco Rd / Parliament	1	1	3	0	1	6	166.70	TXDOT
Blanco Rd / Dresden	1	1	0	4	1	7	164.55	San Antonio
Wayne Dr / Rigsby Ave	1	1	1	1	0	4	162.72	TXDOT
Old Highway 90 / Sw 41St St	1	1	1	0	0	3	161.30	San Antonio
Nw 36Th St / Culebra Rd	1	1	1	0	0	3	161.30	San Antonio
Austin Hwy / Rainbow Dr	1	1	0	1	0	3	160.12	TXDOT
Austin Hwy / Harry Wurzbach	1	1	0	1	0	3	160.12	TXDOT
Mccullough Ave / Camden St	1	1	0	1	0	3	160.12	San Antonio
S New Braunfels Ave / Denver Blvd	1	1	0	1	0	3	160.12	San Antonio
Lord Rd / S Ww White Rd	1	0	3	3	2	9	159.19	TXDOT
Austin Hwy / Lanark Dr	1	1	0	0	1	3	158.90	TXDOT
Blanco Rd / Edison Dr	1	1	0	0	0	2	158.70	San Antonio
E Harding Blvd / Roosevelt Ave	1	1	0	0	0	2	158.70	TXDOT
Hazel St / S Zarzamora	1	1	0	0	0	2	158.70	San Antonio
Westwood Loop / Leslie Rd	1	1	0	0	0	2	158.70	TXDOT
S Zarzamora / A St	1	1	0	0	0	2	158.70	San Antonio
S Flores St / Beatrice Ave	1	1	0	0	0	2	158.70	San Antonio
Hillcrest Dr / Bandera Rd	1	1	0	0	0	2	158.70	TXDOT
Mccullough Ave / Basse	1	1	0	0	0	2	158.70	San Antonio
W Martin St / N Zarzamora	1	1	0	0	0	2	158.70	San Antonio
S Zarzamora / San Fernando St	1	1	0	0	0	2	158.70	San Antonio
Glenoak Dr / S Ww White Rd	1	1	0	0	0	2	158.70	TXDOT
Nw Loop 410 Access Rd / Fredericksburg Rd	1	1	0	0	0	2	158.70	TXDOT

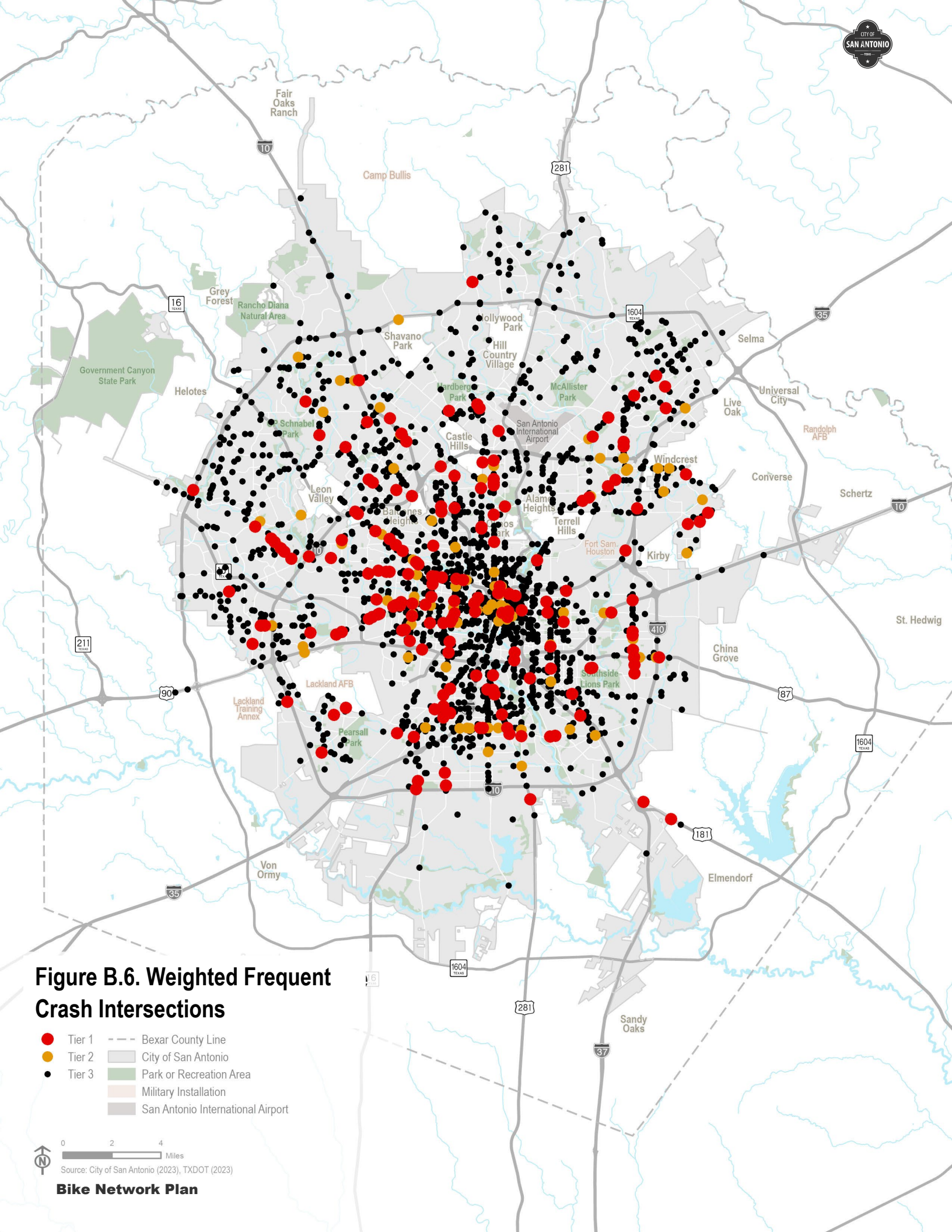


Figure B.6. Weighted Frequent Crash Intersections

Bike Network Plan

APPENDIX C. BIKE INVENTORY

INVENTORY METHODOLOGY

Prior to this study, San Antonio did not have a complete and up-to-date inventory of sidewalks, bike facilities, and crossings. To understand the location and condition of existing active transportation facilities within the study, a comprehensive mapping exercise and inventory was completed. The inventory was designed to achieve several goals:

- Form a comprehensive understanding of the current state of the City's bike network.
- Create a comprehensive geospatial inventory of bicycle facilities, bicycle boulevards, designated bike routes, shared use paths and trails.
- Identify gaps in the active transportation network within the City, between adjacent jurisdictions, and major activity centers.

DATA STRUCTURE

At the onset of the inventory, relevant existing Geographic Information Systems (GIS) shapefiles were collected and reviewed for completeness and accuracy. Data collected included City of San Antonio bicycle facilities, greenway trails, intersections, and sidewalks. The existing data was used as a starting point for identifying the types of data and the characteristics that are necessary to be collected. Working with COSA Transportation and ITSD staff, the study team defined the data structure for the inventory. The study team recorded the following types of features:

- **Sidewalks** – linear paths, usually adjacent to public streets
- **Bicycle Facilities** – linear paths that include cycle tracks, bike lanes, bike routes, shoulder stripes with parking, and paved shoulders
- **Shared Use Paths** – linear paths that are typically physically separated facilities that accommodate pedestrians and bicyclists
- **Crossings** – point locations where pedestrians and bicyclists can cross roads and barriers

For each facility segment/location, additional facility characteristics were recorded to allow for planning level assessments. Tables B.1 - B.4 outline associated characteristics that were identified for each of the above feature types.

Table B.1. Bicycle Facility Inventory Characteristics

Inventory Field	Description	Definition
Road Name	Road Name	Name of the road the facility serves
Neighborhood	Neighborhood Name	Location of the facility segment
Jurisdiction	CoSA	Roadway or facility maintained by City of San Antonio
	Bexar County	Roadway or facility maintained by Bexar County
	TxDOT	Roadway segment or facility maintained by TxDOT
	Verify	Maintenance of facility is unknown
Bike Facility Type	Bike Lane	Striped bike lane adjacent to driving lane with no buffer
	Buffered Bike Lane	Bike lane separated from driving lane with a painted buffer
	Protected Bike Lane	Bike lane physically separated from driving lane (planter, bollard, island, parking)
	Bike Route	Street with signage noting a bike route but no other bike facility
	Shared Lane Marking	Street with a shared lane marking / sharrow
	Two-Way Cycle Track	Physically separated bike facilities that allow bicycle movement in both directions on one side of the road.
	Other	Other type of bicycle facility
Surface Type	Concrete; Asphalt; Gravel; Natural/Dirt; Stabilized; Other	Surface material of the bicycle facility
Bike Facility Width	4; 5; 6 - 7; 8+	Aerial measurement of the typical width of the bikeway from the edge of the pavement in feet (for shared lanes, this should be the width of the travel lane)
Separation Type	Planter; Bollard; Island; Parking, Stripe; Other	Type of separation if bikeway is protected
Separation Width	#	With of separation in feet if bikeway is protected
Condition	Good to Fair	Subjective assessment utilizing Google Street View, surface conditions appear to be in good to fair condition
	Poor	Subjective assessment utilizing Google Street View, poor pavement conditions, dirt/ debris, or other surface issues are present
Curb and Gutter	Yes; No	Curb and gutter present on roadway

Inventory Field	Description	Definition
On Street Parking	Inside - Buffered	On street parking is located between bikeway and curb or edge of pavement with painted buffer between the bikeway and parking
	Inside - Protected	On street parking is located between bikeway and curb or edge of pavement with physical separation between the bikeway and parking
	Inside	On street parking is located between bikeway and curb or edge of pavement with no buffer or barrier between the bikeway and parking
	Outside - Buffered	On street parking is located between driving lane and bikeway with painted buffer between the bikeway and parking
	Outside - Protected	On street parking is located between driving lane and bikeway with physical separation between the bikeway and parking
	Outside	On street parking is located between driving lane and bikeway with no buffer or barrier between the bikeway and parking
	No	No on street parking provided next to bikeway
Side of Road	Left	Bikeway is located on left (west, north) side of road
	Right	Bikeway is located on left (east, south) side of road
Comments		
Verify in Field	Yes/No	Choose yes if unable to verify an attribute using aerials/street view. Add in comments what need to be verified

Table B.2. Shared Use Path Facility Inventory Characteristics

Inventory Field	Description	Definition
Road/Path Name	Road / Path Name	Name of the road the facility serves or name of path if not adjacent to roadway
Neighborhood	Neighborhood Name	Location of the facility segment
Jurisdiction	CoSA	Roadway segment or facility maintained by City of San Antonio
	Bexar County	Roadway segment or facility maintained by Bexar County
	TxDOT	Roadway segment or facility maintained by TxDOT
	SARA	Roadway segment or facility maintained by San Antonio River Authority
	Verify	Maintenance of facility is unknown
Path Type	Shared Use Path - Paved	Paved, off-road path for nonmotorized travel
	Shared Use Path - Unpaved	Unpaved, off-road path for nonmotorized travel
	Sidepath - Paved	Paved, street-adjacent path designed for shared use nonmotorized travel (not sidewalk)
	Sidepath - Unpaved	Unpaved, street-adjacent path designed for shared use nonmotorized travel (not sidewalk)
	Other	Other types of facilities
Surface Type	Concrete; Asphalt; Gravel; Natural/Dirt; Stabilized; Other	Surface material of the path
Width	<8; 8-9; 10-11; 12; >12	Aerial measurement of the typical width of the path in feet
Buffered	Yes; No; N/A	Buffer is/is not provided between path and roadway if adjacent to roadway, N/A if not
Buffer Width	#; N/A	With of separation in feet if buffer is provided if adjacent to roadway, N/A if not
Buffer Type	Landscaped Buffer; Rocks or Dirt; Barrier Wall; Ditch; Other	Type of landscaping located within the buffer if buffer is provided
Condition	Good to Fair	Subjective assessment utilizing Google Street View, surface conditions appear to be in good to fair condition
	Poor	Subjective assessment utilizing Google Street View, poor pavement conditions, dirt/ debris, or other surface issues are present

Inventory Field	Description	Definition
On Street Parking	Yes - Buffered	On street parking is provided and a buffer is located between parking and the path (buffer width reflected previously)
	Yes	On street parking is provided with no buffer between parking and the path
	No	No on street parking provided next to path
	N/A	Path is not located adjacent to road
Side of Road	Left	Path is located on left (west, north) side of road
	Right	Path is located on left (east, south) side of road
	N/A	Path is not located adjacent to road
Comments		
Verify in Field	Yes; No	Choose yes if unable to verify an attribute using aerials/street view. Add in comments what need to be verified

Table B.3. Crossing Inventory Characteristics

Inventory Field	Description	Definition
On Road	Road Name	Name of the road the facility serves
Crossing Road	Road Name	Name of the road the facility serves
Neighborhood	Neighborhood Name	Location of the facility segment
Jurisdiction	CoSA	Roadway segment or facility maintained by City of San Antonio
	Bexar County	Roadway segment or facility maintained by Bexar County
	TxDOT	Roadway segment or facility maintained by TxDOT
	Verify	Maintenance of facility is unknown
Location	Intersection; Mid-Block	Crossing located at intersection or mid-block
Signalization	Type of signalization	Full Signal; RRFB; HAWK; Other; None
Side of Intersection	North; South; East; West; N/A	Location in intersection, N/A if mid-block
Crosswalk	Yes; No	Crosswalk present
Raised Crosswalk	Yes; No	Raised Crosswalk Present
Bike Facilities Provided	Conflict Markings Through Intersection	Conflict markings present through intersection
	Conflict Markings Leading to Intersection	Conflict markings present leading to intersection but do not continue within intersection
	Bike Box	Note direction if provided
	Two-stage Left-Turn Queue Box	Note direction if provided
	Protected intersection	Physical protection provided
	None	No bike facility through the intersection but bikeway present
	N/A	No bikeway present
Comments		
Verify in Field	Yes; No	Choose yes if unable to verify an attribute using aerials/street view. Add in comments what need to be verified

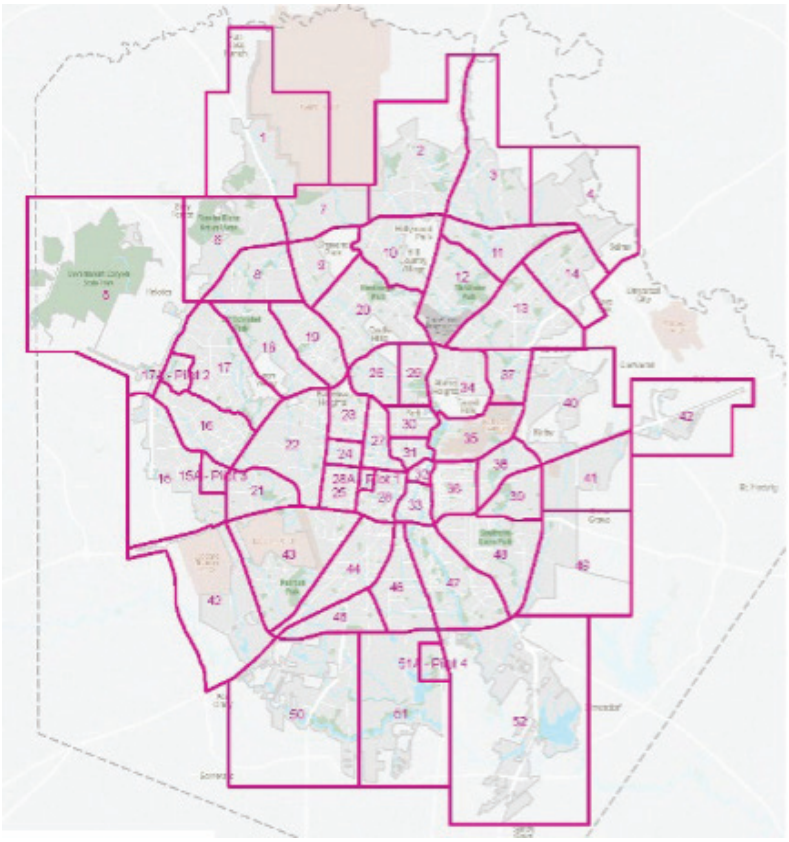
Table B.4. Sidewalk Inventory Characteristics

Inventory Field	Description	Definition
Sidewalk Status Update	Existing, Non-Existing, Other	Sidewalk present
Comments		
Verify in Field	Yes; No	Choose yes if unable to verify an attribute using aerials/street view. Add in comments what need to be verified

DATA COLLECTION

The inventory and data collection process utilized the Texas DOT aerial imagery to identify the locations of pedestrian and bicycle facilities. Using Esri ArcGIS software, the data collection team reviewed all the roadways within the study area to digitize in sidewalks, bicycle facilities, shared use paths, and crossings. Once the data was digitized, an integrated Google Street View tool allowed the data collection team to seamlessly open a street view of the facility to assess condition information and populate the attribute table.

The City was divided into 57 tiles and each tile was assigned to a team member. After digitizing all the features in a tile, a second team member would review the tile for accuracy and completeness. A final, automated check was performed to verify topology.

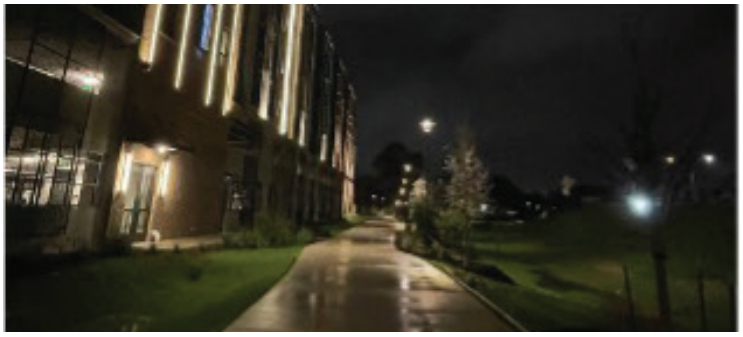


EXAMPLE OF HOW SURVEY DATA TILES WERE UTILIZED TO CONDUCT THE COMPREHENSIVE DATA INVENTORY.

FIELD ASSESSMENT

To develop an accurate inventory and conditions assessment of the inventory, a field assessment was conducted to verify that conditions generated through aerial review were reflective of real-world conditions.

As noted above, much of the existing conditions inventory was produced using publicly available aerial imagery and Google Street View. However, given the scale of the Study area, many aerial and Street View images were out of date. Cross referencing outdated imagery with known on going roadway projects, the study team created a running list of locations to visit and confirm the existence and quality of a bike facility. Single team members were deployed to 29 different locations throughout San Antonio to verify attributes obtained via the aerial assessment and include facilities not seen through publicly available imagery, such as the two multi-use paths shown below, at South Flores and US-281.



BICYCLE FACILITY INVENTORY

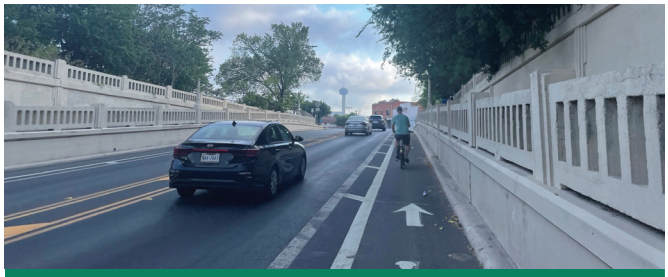
The following are examples of facilities for biking currently provided in San Antonio. With over 480 miles of bike facilities in the City of San Antonio today, bike facilities in San Antonio vary greatly by location and context.

Bike lanes make up the majority of on-street facilities, with over 170 centerline miles of bike lanes present today. On the other hand, protected and buffered bike lanes only account for 22 centerline miles of facilities. Figure C..1 illustrates the existing bike facilities in San Antonio today.

Examples of Facilities in San Antonio Today

Bike Lane

Striped lane with pavement markings and signs that designated an exclusive lane for bicycle use. Bike lanes can be comfortable for users depending on roadway speeds, volumes, and number of lanes.



Buffered Bike Lane

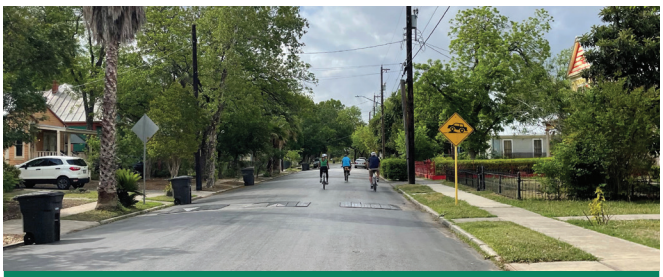
A bike lane with a painted buffer provides further separation between vehicles or parking lanes.

Protected Bike Lane

A protected bike lane is physically separated from motor traffic and distinct from the sidewalk and may serve one or two-way bike traffic. Protected bike lanes are comfortable for most users.

Shared Use Path / Side Path

Off-street facilities are separated from motorized travel both inside and outside the ROW that are shared between bikes and pedestrians. Shared use paths run independent of roadway facilities and side paths run along roads.



Bike Boulevard / Local Street

Local streets with low traffic speeds and volumes can be comfortable for people to bike on. Bike Boulevards include wayfinding additional features to manage vehicle speeds and volumes. For the purposes of the existing conditions analysis, traffic calmed local streets were identified as Bike Boulevards.

Bike Route

Signed routes where the travel lane is shared by drivers and people biking. These may be on local streets or wider roads and generally include wayfinding and shared lane markings.

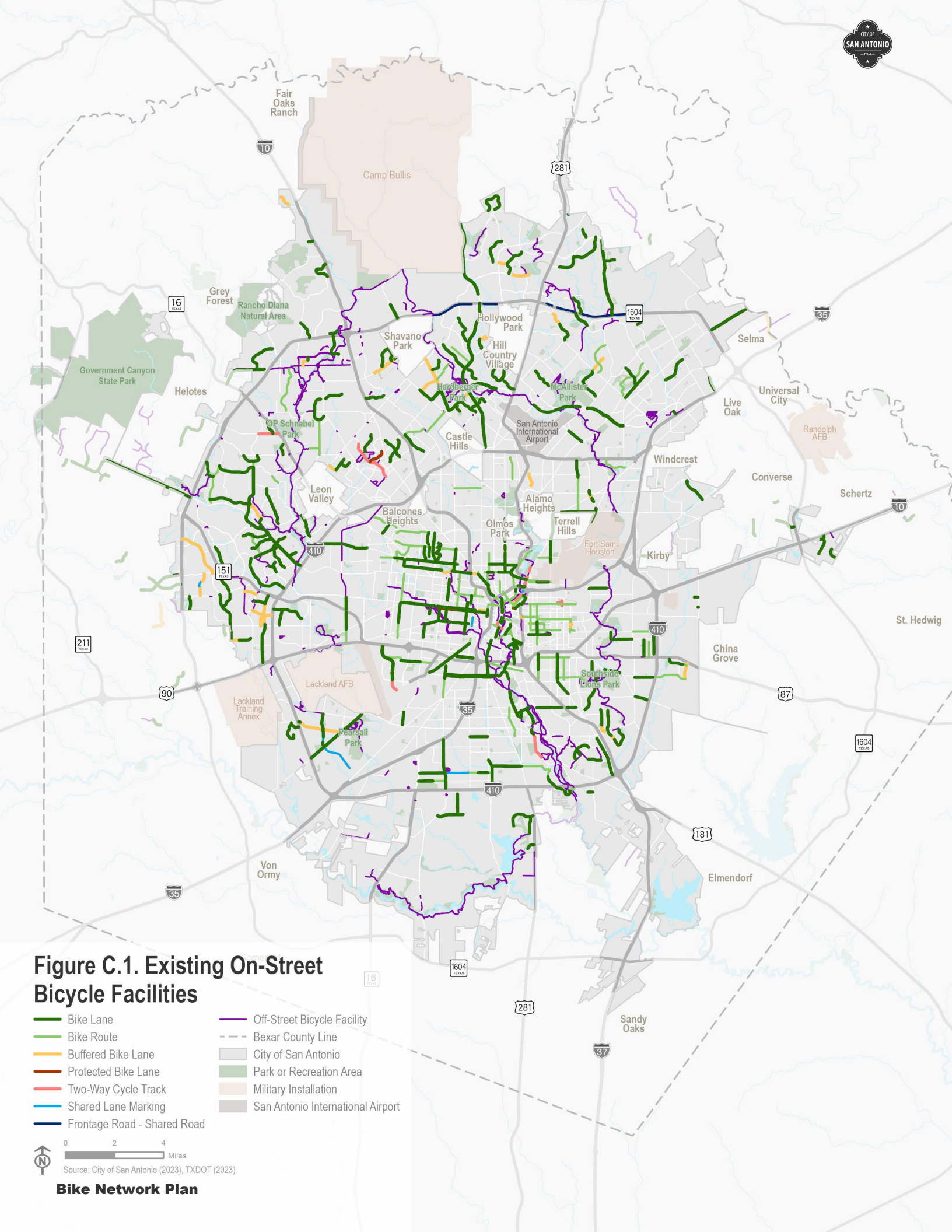


Figure C.1. Existing On-Street Bicycle Facilities

Bike Network Plan

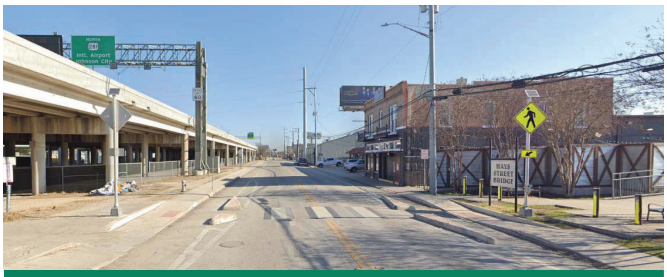
CROSSING INVENTORY

One of the most significant barriers to walking and biking is how frequently and comfortably someone can cross the street to get to their destination. Having frequent crossings can significantly decrease the distance needed to walk or bike to a destination, and intersections can be designed to enhance safety and comfort for people biking. The following types of crossing treatments exist in San Antonio:

Examples of Crossing Facilities in San Antonio Today

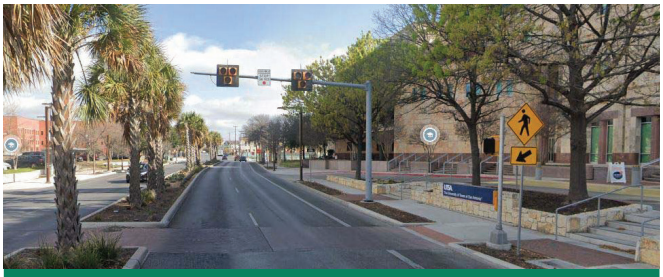
Signalized Intersection

An intersection with a traffic signal; may or may not include marked crosswalks or all way crossings (pictured) and additional features to prioritize people walking and biking.



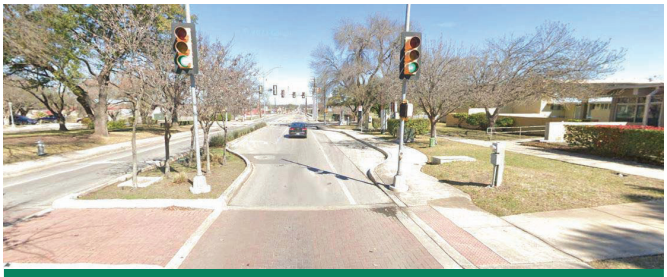
Rapid Rectangular Flashing Beacon (RRFB)

Crosswalks with flashing signs to alert drivers to people crossing.



Pedestrian Hybrid Beacon (PHB)

A traffic control device which is activated by pedestrians and uses a sequence of lights to stop traffic.



Signalized Midblock Crossing

A fully signalized crossing outside of an intersection which is generally activated by pedestrians.

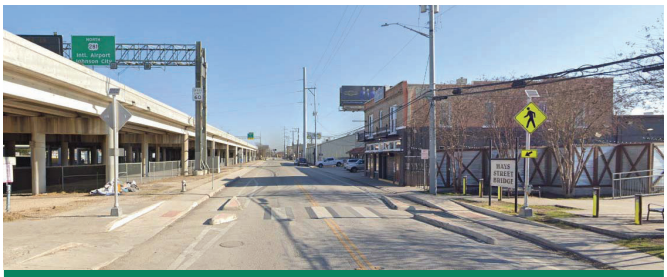
Unsignalized Midblock Crossing

A marked crosswalk outside of an intersection.

Bicycle Crossing Treatments

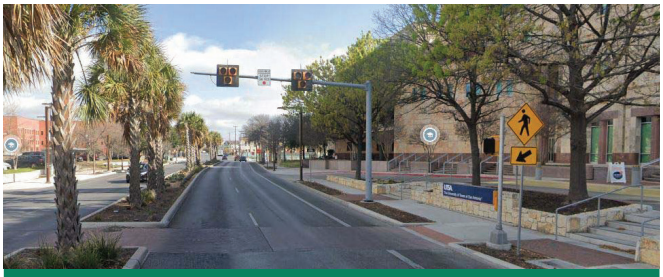
Conflict Markings Through Intersection / Driveway

Markings indicating the path of bike travel through an intersection or driveway, raising visibility for all roadway users and indicating to a driver to watch for people biking.



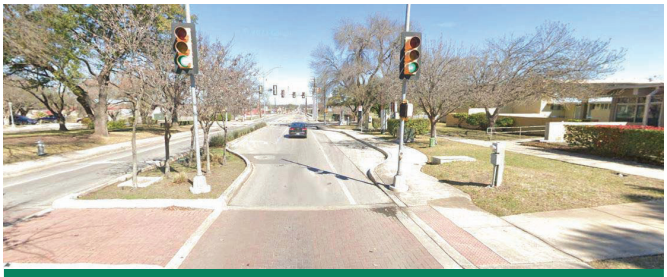
Conflict Markings Leading to Intersection

Markings indicating the path of bike leading to an intersection, generally intended to indicate raise visibility for all users but more targeted to the person biking.



Bike Box

A designated area in the front of the traffic lane at a signalized intersection to provide bicyclists a safe way to get ahead of traffic during the red light.



Two-Stage Left-Turn Queue Box

A designated queue space for people biking outside of the traveled path of motor vehicles at a signalized intersection..

Protected Intersection

A intersection with physical separation between people biking and motor vehicles; may also include bike signals.

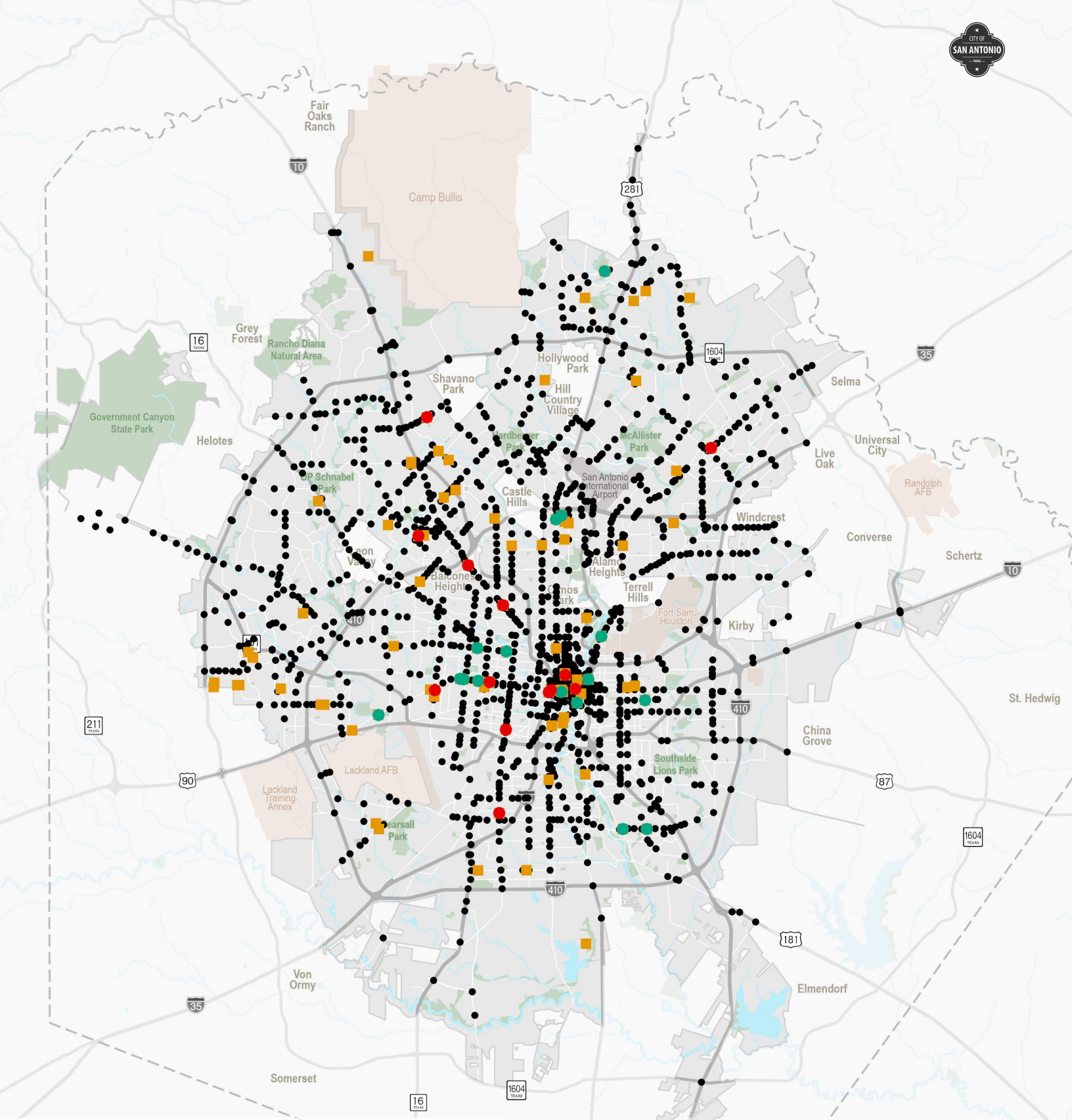


Figure C.2. Crossings for People Biking

Bike Network Plan

SIDEWALK INVENTORY

Sidewalks provide a place for people to walk for commuting or recreational purposes; they are especially important for providing independence to the mobility impaired or persons without access to a vehicle. In addition to sidewalks, pedestrian facilities such as crossings, curb ramps, curb extensions, traffic calming features, and other improvements help create a more comfortable walking environment. Figure C..3 illustrates the location and width of pedestrian sidewalks. Sporadic corridor and business development has caused gaps in San Antonio's existing pedestrian network, which creates barriers to pedestrian travel.

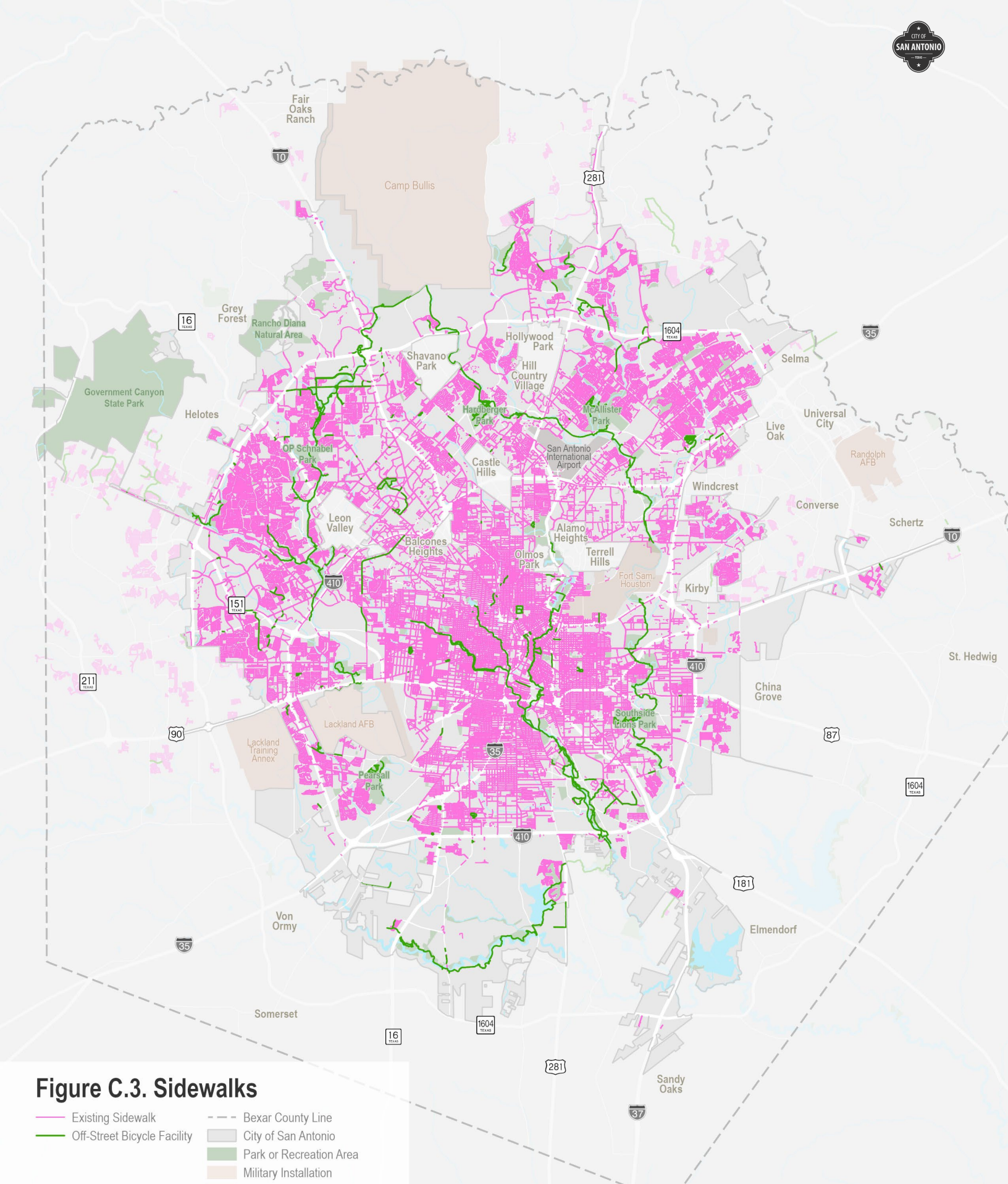


Figure C.3. Sidewalks

- Existing Sidewalk
- Off-Street Bicycle Facility
- Bexar County Line
- City of San Antonio
- Park or Recreation Area
- Military Installation
- San Antonio International Airport

0 2 4 Miles

Source: City of San Antonio (2023), TXDOT (2023)

Bike Network Plan

APPENDIX D. A BRIEF HISTORY OF BIKES IN SAN ANTONIO

San Antonio has a storied history with bikes. The first bicycle in San Antonio was built in 1869[1]. Rather than resembling common bikes today, this was a velocipede, a heavy machine with two different sized wheels made of wood and metal tires. Ten years later, "safety bicycles" were developed in England, altering the design of the velocipede to include two wheels of the same size and unlike the previous iteration - allowed the rider to brake[2].

Due to unpaved streets and the high cost of equipment, biking was not a practical form of transportation in San Antonio. Although San Antonio had large Black and Mexican-American communities in the early 1900s, existing inequalities meant that few families of color could afford to purchase a bike, which ranged in price between $35 and $803, or $1,300 to $3,000 in 2023 dollars. The activity was also dominated by men, as biking was seen as "unladylike" and long dresses made it difficult to get onto bikes[4]. New step-through bikes were designed for women wearing skirts and dresses, and women even began wearing pants just to ride bikes, shifting societal norms and expectations. Still, "cycling etiquette" was directed at women, and it was looked down on to ride alone, ride in the afternoon, or for a woman to repair her bike herself.[5] In the late 1890s, the San Antonio Jockey Club built a cycling track around their horseracing field to host bike races[6]. As biking grew in popularity, cyclists became some of the first advocates for better streets in San Antonio, and the city responded by building sidewalks and experimenting with new pavement types in the heart of the city. But just as fast as the bike craze began, cycling fell in popularity. By 1933, San Antonio had gone from having 11 bike stores at its peak in 1911 to only one.[7] The 1970s saw a resurgence of interest in cycling as a sport and leisure activity throughout the country. Still, riding a bike was uncommon as a form of a transportation in San Antonio, where roadway designs to accommodate fast-moving motor vehicles made the activity dangerous and inefficient.[8]

It was not until 1995, when the Alamo Area Metropolitan Planning Organization (AAMPO) formed the Bicycle Mobility Advisory Committee (BMAC), that San Antonio began building a strategy for accommodating bike users on streets through the first group tasked with studying bike use in the San Antonio area[9]. In 1997, the City of San Antonio's adopted Master Plan Policies included Urban Design Policy 5h to "Promote the safe use of bicycles as an efficient and environmentally sound means of recreation and transportation by encouraging a citywide network of lanes, trails, and storage facilities", which provided specific goals and metrics for bike usage, community, and safety, and was the first codified reference to promoting the use of bikes and their safety as a priority for the City.[10]

Since then, multiple San Antonio-area mobility plans have been released by AAMPO, the City of San Antonio, and others[11]. In 2022, BMAC merged with the Pedestrian Mobility Advisory Committee to form the Active Transportation Advisory Committee which informed AAMPO's Mobility 2050 Plan – laying out a vision for all modes of transportation in the Alamo City and highlighting a surging interest in biking and the necessity to construct safe facilities for users[12].

1 Hemphill, H. (2015). Bicycles, Velocipedes and High-Wheelers. In San Antonio on wheels: The Alamo City learns to drive (p. 7). essay, Maverick Pub Co.

2 Hemphill, H. (2015). Bicycles, Velocipedes and High-Wheelers. In San Antonio on wheels: The Alamo City learns to drive (p. 11). essay, Maverick Pub Co.

3 San Antonio Bicycle History. History (bicycles) - texas transportation museum. (n.d.). https://classic.txtransportationmuseum.org/history-bicycles.php

4 Hemphill, H. (2015). Bicycles, Velocipedes and High-Wheelers. In San Antonio on wheels: The Alamo City learns to drive (p. 10). essay, Maverick Pub Co.

5 Hemphill, H. (2015). Bicycles, Velocipedes and High-Wheelers. In San Antonio on wheels: The Alamo City learns to drive (p. 10). essay, Maverick Pub Co.

6 Hemphill, H. (2015). Bicycles, Velocipedes and High-Wheelers. In San Antonio on wheels: The Alamo City learns to drive (p. 13). essay, Maverick Pub Co.

7 Hemphill, H. (2015). Bicycles, Velocipedes and High-Wheelers. In San Antonio on wheels: The Alamo City learns to drive (p. 13). essay, Maverick Pub Co.

8 https://www.sanantonio.gov/Portals/0/Files/Planning/NPUD/MTP_1978_DOCUMENT.pdf

9 https://www.alamoareampo.org/AirQuality/Conformity/files/2021-Conformity/Appendicies/12.2_Mobility2045.pdf

10 https://www.sanantonio.gov/Portals/0/Files/Planning/NPUD/master_plan.pdf

11 https://www.alamoareampo.org/Studies/

12 Alamo Area Metropolitan Planning Organization, Mobility 2050, 83 (2022).

In 2015, San Antonio became the first city in Texas to adopt a Vision Zero policy, the movement to reach zero traffic deaths though improved street design, public policy, and education[18]. The City established its own Vision Zero dashboard, and AAMPO began its Street Skills class to educate people who are interested in riding a bike for mobility but concerned about their safety while walking or biking[19]. In every San Antonio Municipal bond since 2007, funding for new bike facilities have been approved by voters and deployed city-wide from redesigning 36th street on the southwest side in 2007 to include bike lanes to the 2017 bond's redesign of the Five Points intersection with protected, roadway separated bike facilities[20].

But progress in cycling safety and accessibility has not always been linear. In 2014, bike lanes were removed from South Flores Street after pushback from community members[21]. In 2019, one of San Antonio's most widely recognized cyclists, Tito Bradshaw, was struck and killed by a drunk driver while riding home at night, creating outrage within the community[22].

2022 was the deadliest year for bike users in San Antonio according to the Texas Department of Transportation's Crash Records Information System[23].

Looking to the past is essential to view the road ahead. When the Bike Master Plan was passed in 2011, there were approximately 209 miles of bike facilities in the San Antonio region - a 6-fold increase from a decade prior[24]. Today there are approximately 520 miles of bike facilities, including the Howard W. Peak Greenway trail network, on street bike lanes and routes, and off-street multi-use paths[25]. With support from a vibrant bike advocacy community made up of groups such as BikeSA, Ghisallo Cycling, ActivateSA, and Black Girls Do Bike, among others, riding a bike in San Antonio can become safer and more accessible to the public[26]. Ongoing planning processes in the City of San Antonio like Vision Zero, SA Tomorrow, and the update to the 2011 Bike Plan will build on past successes to make bike users more connected and integrated in the Alamo Area.

13 Aguirre, P. (2023, February 26). "beautiful vision": San Antonio opens 100th mile on Greenway Trail System. San Antonio opens the 100th mile on Greenway trail system. https://www.mysanantonio.com/lifestyle/outdoors/article/greenway-san-antonio-17805593.php

14 https://www.sanantonio.gov/ParksAndRec/Parks-Facilities/Trails/Greenway-Trails

15 https://www.expressnews.com/news/local/article/1-2-billion-bond-raises-question-San-Antonio-16568964.php

16 https://www.sanantonio.gov/SABikes/BicycleMasterPlan

17 Síclovía. YMCA of Greater San Antonio. (2023). https://www.ymcasatx.org/programs/community/siclovia

18 https://sanantonioreport.org/san-antonio-calls-for-safer-streets-with-vision-zero/

19 Dimmick, I. (2020, January 31). Vision zero initiative calls for reduced speed limits – is San Antonio ready?. San Antonio Report. https://sanantonioreport.org/vision-zero-initiative-calls-for-reduced-speed-limits-is-san-antonio-ready/

20 https://www.sanantonio.gov/2017Bond

21 Davila, V. (2014, May 29). City Council votes to remove bike lanes from South Flores. MySA. https://www.mysanantonio.com/news/local/article/city-council-votes-to-remove-bike-lanes-from-5513851.php

22 Dimmick, I. (2021, October 13). Drunk driver gets 20 days jail time in death of cyclist Tito Bradshaw. San Antonio Report. https://sanantonioreport.org/tito-bradshaw-death-sentencing/

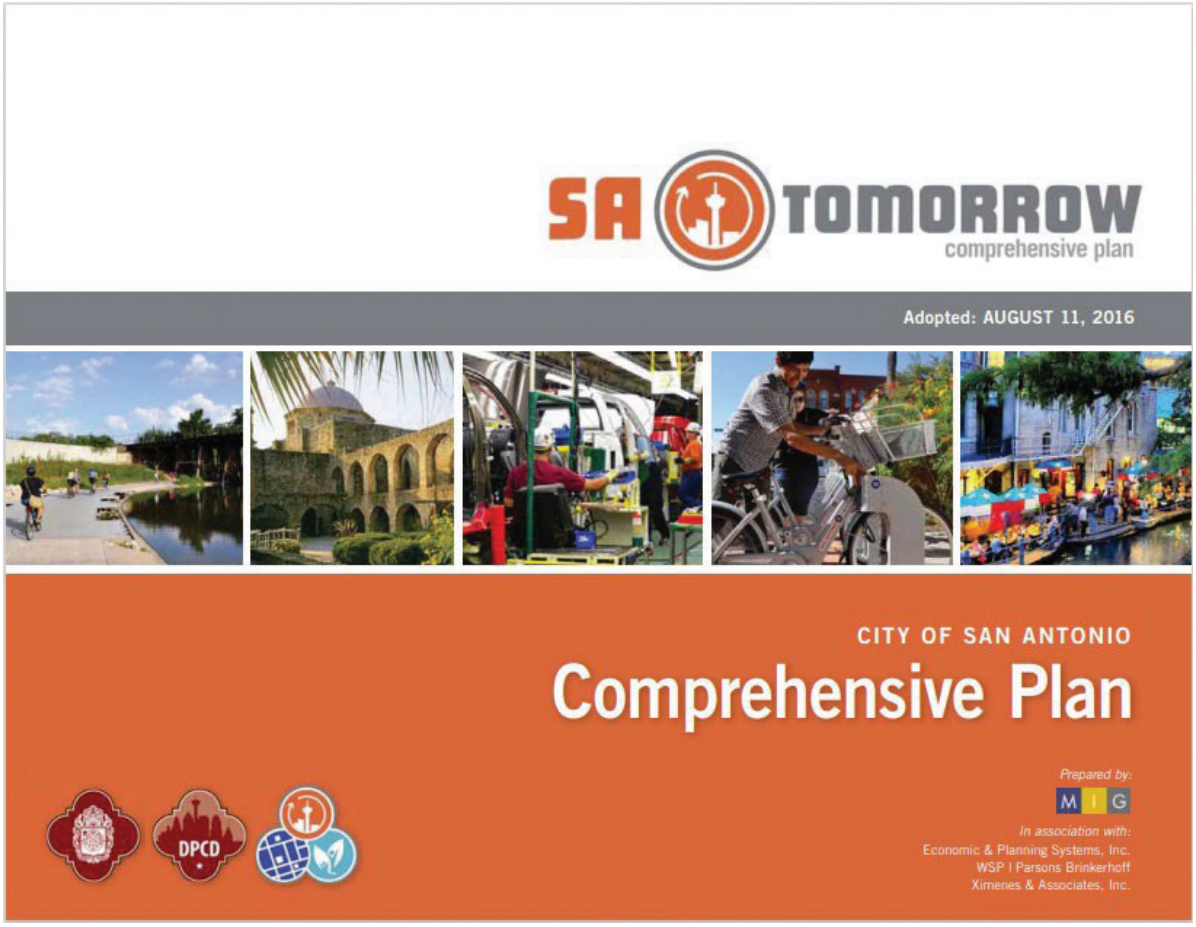
23 https://cris.dot.state.tx.us/public/Query/app/home

24 https://www.sanantonio.gov/Portals/0/Files/SABikes/BicycleMasterPlan/02-ExistingConditions.pdf

25 City of San Antonio Bike Network Plan GIS Analysis. (2023).

26 https://activatesa.org/

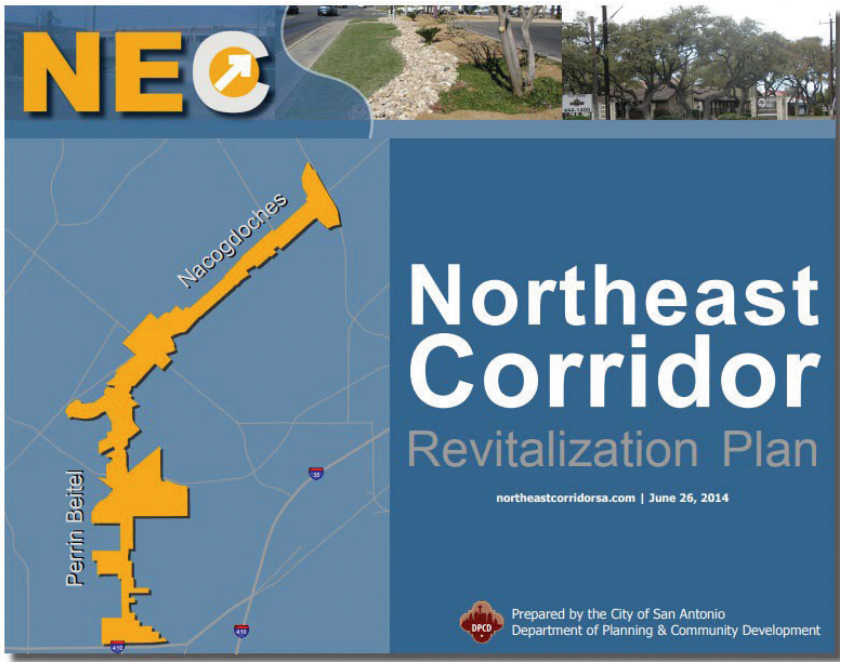
APPENDIX E. REVIEW OF PREVIOUS STUDIES



SA Tomorrow (2016)

Long range planning through the year 2040 addresses overarching principles regarding quality of life in San Antonio and is made up of one Comprehensive Plan and two specified subject area plans, the Multimodal Transportation and Sustainability Plans. The Comprehensive Plan establishes the need to support multimodal transportation to provide equitable access to transportation. The Multimodal Transportation Plan establishes the goal to transition cycling into an equally valued mode of transportation. With the goal to reduce CO2 emissions, the Sustainability Plan proposes quantifiable goals for improving bicycle and pedestrian mobility through the creation of neighborhood bike scores, walking scores, and the implementation of a Bike Facility Action Plan.

San Antonio Regional Centers (2022)



This plan separates the city into sub-areas where there are an equal number of residences to employment opportunities. In general, the plan specifies that bike and pedestrian facilities should connect residences to activity centers like restaurants, shops, and places of work. The plan sets a goal of improving safety for pedestrians and cyclists.

Brooks Area Regional Center Plan (2019) – Based on community feedback, the Plan identified a vision of having safe, environmentally conscious modes of transportation in the Regional Center, including biking.

Midtown Regional Center Plan (2019) -- The Plan identified multimodal transportation access as a priority. Community feedback expressed interest in bike facilities that are aesthetically pleasing, leisurely, and enjoyable by design.

University of Texas – San Antonio (UTSA Regional Center Plan (2019)—The Plan identified the need to close the gaps in disconnected pedestrian and bike infrastructure.

Medical Center Area Regional Center Plan (2019)–The Plan identified the need to develop safe bicycle and pedestrian infrastructure, specifically through buffered separation between cars and bikes/pedestrians.

Downtown Area Regional Center Plan (2019)—The Plan identified the need to develop better infrastructure to accommodate pedestrians and cyclists.

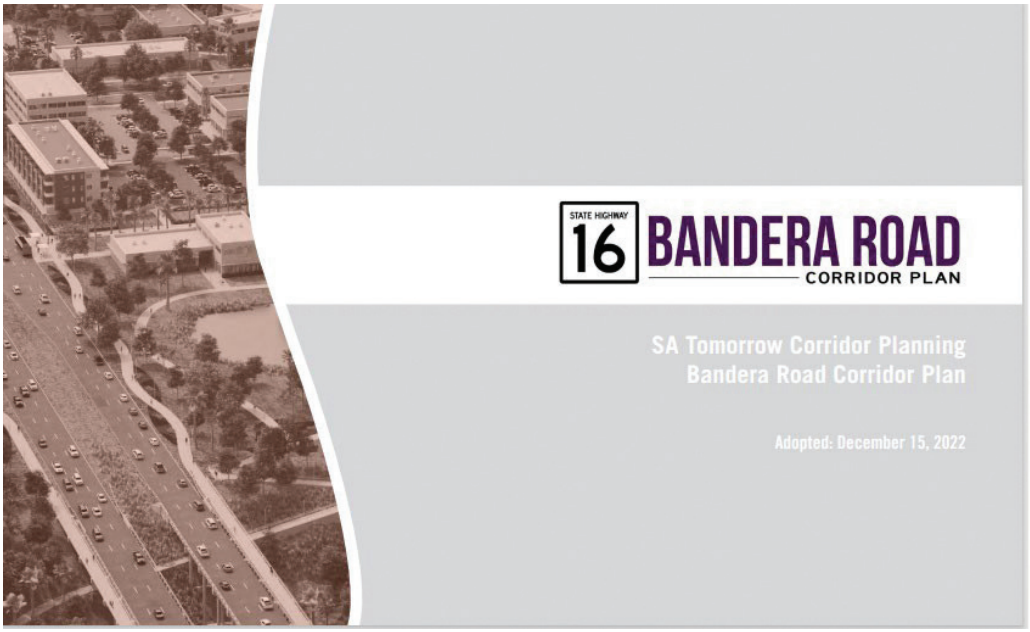
Port San Antonio Regional Center Plan (2021)—The Plan identified several priorities including creating urban trail connections between existing and proposed park systems, creating safe and accessible transportation choices through supporting a range of travel modes, and the continuation of implementing San Antonio's Vision Zero Plan.

Highway 151 and Loop 1604 Regional Center plan (2022)—The Plan identified the goals of continuing the Howard W. Peak Greenway Trail system through Culebra Creek and constructing a multimodal mobility network.

NE I-35 and Loop 410 Regional Center Plan (2022)—The Plan recommended that the City examine options for using greenspace to create new trail connections and construct a multimodal network.

City of San Antonio Northeast Corridor Revitalization Plan (2014)

The Plan identified the lack of bike infrastructure and safe pedestrian facilities on the corridor, though it did not prioritize the construction or rehabilitation of facilities in its recommendations.

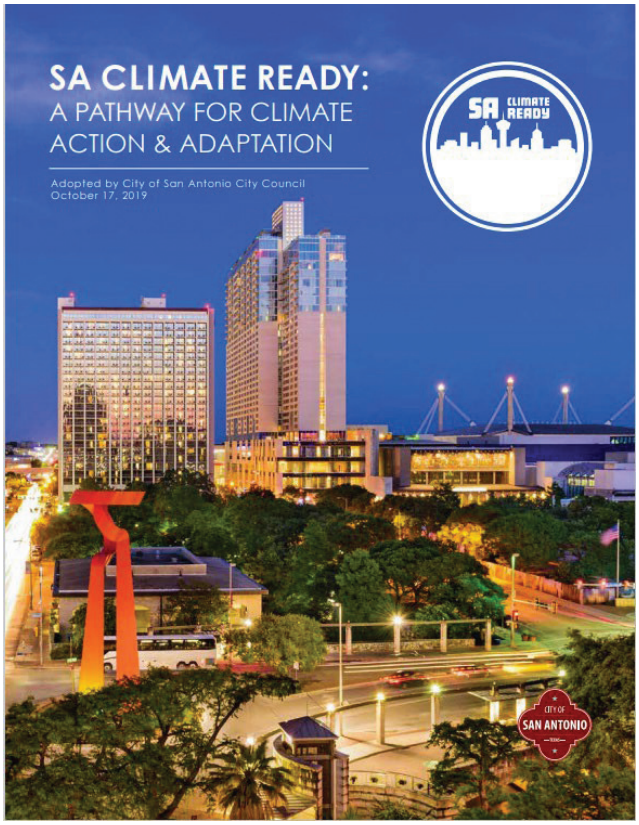


Bandera Road Corridor Plan (2022)

This plan prioritizes safety for all road users by recommending the installation of shared-use paths along the corridor to reach Vision Zero goals. It recommended connecting new public spaces to a network of bike and pedestrian facilities. The Plan referenced the 2011 Bike Master Plan as the design guide for new bicycle facilities.

SA Climate Ready: A Pathway for Climate Action & Adaptation Plan (2019)

The Plan identifies transportation as the second highest emitter of greenhouse gases in the city, with 90 percent of all transportation emissions coming from private transportation. The Plan seeks to reduce transportation emissions by 75 percent by 2040 compared to 2016 levels.



San Antonio Bike Master Plan (2011)

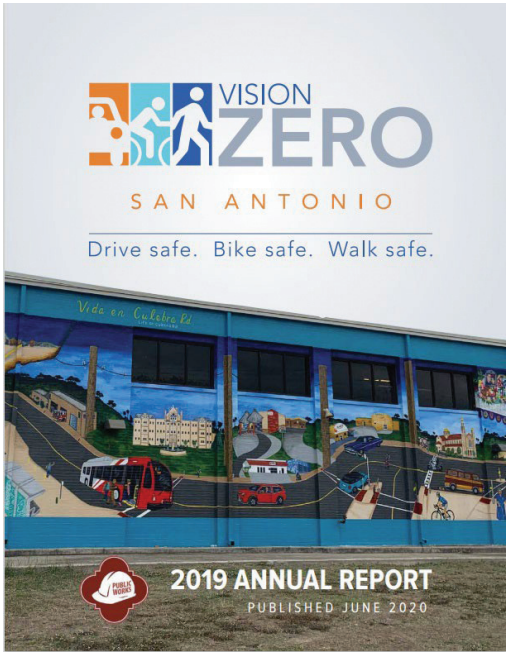
This plan established a vision statement that reads “Our goal is to increase bike ridership for daily travel and improve cycling safety by making our bike network accessible, direct, and continuous.” The plan identified 209 miles of existing bike facilities, categorized by bike lanes, routes, and paths This plan also recommended a variety of on-street bicycle improvements separated into two tiers: tier 1 and tier 2. While a variety of bike facilities were implemented, many of the facilities remain disconnected from a broader network.

San Antonio Capital Projects (2022)

This Plan identifies multiple pedestrian projects for funding and construction. While the plan did not dedicate funding to bike infrastructure, these pedestrian projects will make walking a more viable form of transportation.

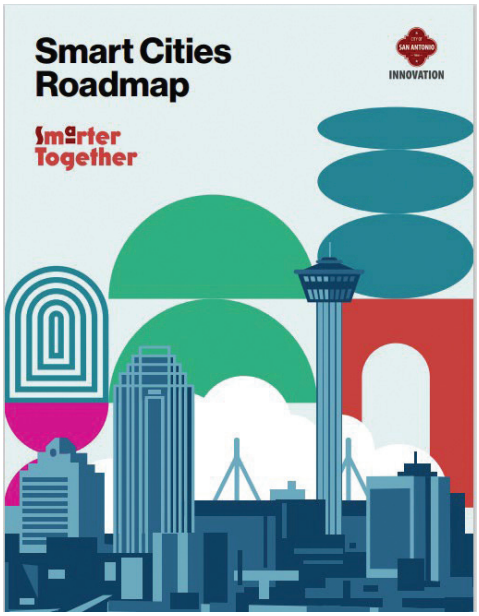
Vision Zero San Antonio (2022)

Vision Zero San Antonio sets standards, goals, and an action plan for reaching zero fatalities for all modes of transportation. Vision Zero reinforces the concept that transportation is not only about moving people between locations, but doing it safely is the most important. The Plan recognizes the need to plan safe facilities not only for cars, but also for cyclists and pedestrians.



Activate SA 2022 Bond Project Proposal (2022)

This is a design-focused Plan that aims to increase connectivity around the greater San Antonio area. The plan describes the importance of connectivity between the 13 Regional Centers by connecting the existing trail network in the city with the proposed connections designed in this plan. Many of the projects are identified as previously supported efforts and continue recommendations from other SA Tomorrow plans.

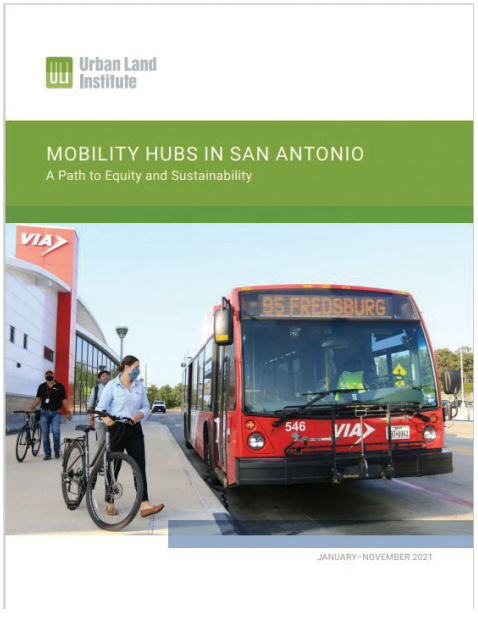


Smart Cities Roadmap (2022)

This Plan includes key short term goals under it's testbed action section on Access to Transportation, including: "Develop a smart intersection or a "mobility hub" in a strategic location. Capture multimodal mobility data, improve curbside management, and develop a data plan for managing connected and autonomous vehicles. Use augmented reality (AR) or virtual reality (VR) technologies to help residents visualize and design complete streets." All these strategies will support the deployment of Safe Bike Infrastructure.

Downtown Tomorrow Strategy (2023)

This Plan establishes the goal to provide more attractive and efficient ways to move people in and around Downtown. Specifically, the plan calls on creating better micro-mobility options and establishing pedestrian priority zones.



Mobility Hubs in San Antonio (2021)

This Plan sought to establish multimodal mobility hubs in San Antonio through connecting other forms of transportation, including biking, to transit service. The Plan identified 13 potential locations for mobility hubs, spanning across the entire city.

TxDOT Projects (2022)

Although the number of bicycle and pedestrian-related projects are limited in this Plan, TxDOT acknowledged the importance of roadway safety for all modes of transportation. The Department made a pledge in 2019 to initiate its campaign to *End The Streak*. The campaign highlights the need to end roadway fatalities – especially for preventable accidents. The goal of ending daily crash fatalities directly impacts safety for bicyclists and pedestrians.

Bexar County Projects (2022)

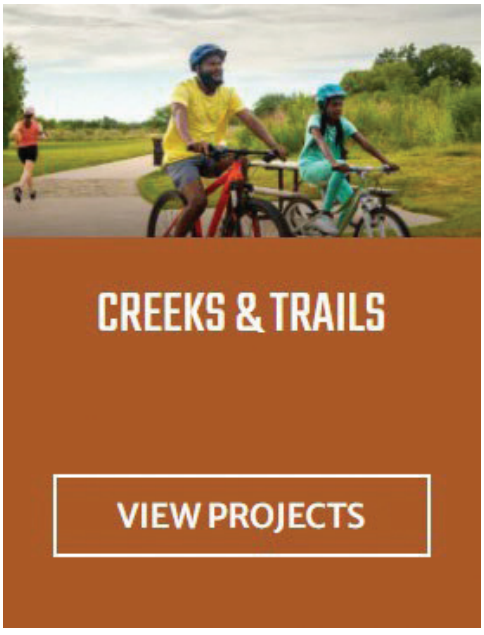
While there were no specific projects for bike infrastructure, these projects support needed bicycle and pedestrian facilities by adding curbs and sidewalks, as well as drainage inlets and pavement.

2022-2027 Bond Program (2022)

There are two projects that directly address pedestrian and bike enhancements. Construction on North Main Avenue & Soledad Street (from Pecan Street to Navarro Street) will add pedestrian amenities. The project is under construction and is expected to be completed in October 2023. Roosevelt Avenue (from US Highway 90 to South Loop 410) is anticipated to be completed in December 2025. This project will expand non-motorized access to transportation.

San Antonio River Authority Projects an Bexar County Creeks & Trails Projects (2022)

Projects included in this Plan are the Escondido Creek Parkway trail, the Culebra Creek Trail extension, Leon Creek Trail extension, Martinez Creek Trail connection, and the extension of the San Pedro Creek. This will create new connections for cyclists, improving safety and mobility in the City.



Trail Design Strategy: San Antonio (2018)

The Trail Design Strategy is a strategic plan focusing on implementing planned trail construction and development. In addition to which design styles should be applied for the trail network, the Strategy outlines *how* and *where* those designs will be applied based on weighted variables. The top two of the fourteen (14) variables – which also have 'High' weights – are if the trails are within a high use area, and if the trails are on an arterial street.

Great Springs Trail Plan (2022)

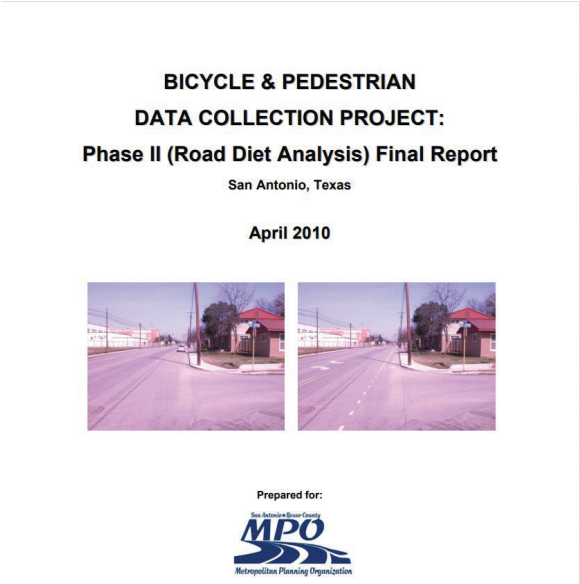
Once implemented, the Great Springs Trails Plan will create a regional connection of trails and paths between four natural springs throughout Central Texas. The corridor will pass through four counties. This Plan will add miles of new trails in San Antonio and make a major impact on regionwide bike facilities.

Ghisallo Railroad Crossings Survey (2021)

The Ghisallo Cycling Initiative conducted a study of railroad crossings to understand how bicycles interact with railroads. The Cycling Initiative aims to identify how safe practices are by measuring the level of safety. The grading system is classified by the angle of bike lanes or roadways intersect the railroad crossings. The grading ranges indicate level of safety and include 'Extremely Dangerous,' 'Very Dangerous,' 'Dangerous,' 'Safe,' 'Very Safe,' and 'Extremely Safe.' San Antonio has 11 railroad crossings have the second highest danger rating for bicycles (which is Very Dangerous), and four (4) of the crossings are 'Extremely Dangerous'.

VIA Metropolitan Transit vision 2040 Long Range Plan (2016)

This Plan highlighted how bike connectivity will improve with a better bus system, (including congestion-proof rapid transit) and strategic partnerships. The Plan also envisioned a coordinated effort for regional plans. It described how transit alternatives should be planned as an extension to VIA's system by making bike lanes and other facilities accessible to VIA's bus stops. Potential partnerships with bike shares should include availability at transit stations.



Bicycle & Pedestrian Data Collection Project – Phase II (Road Diet Analysis) Final Report (2010)

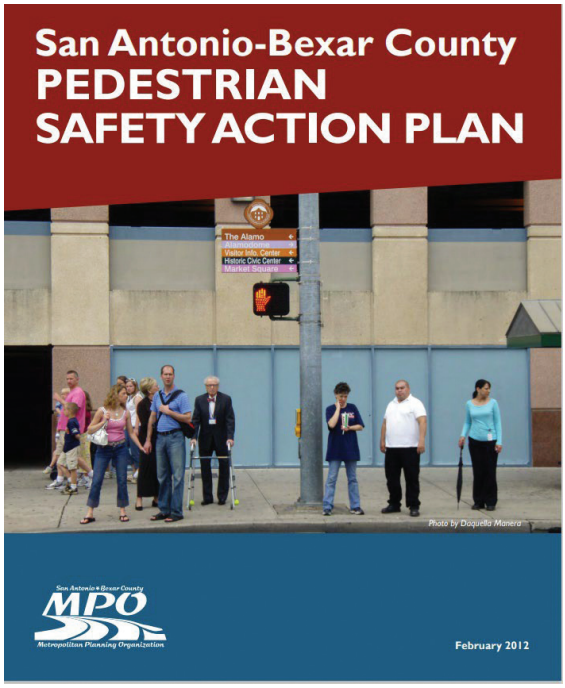
A thorough assessment of existing bicycle facilities was conducted in 2010 by the Alamo Area Metropolitan Planning Organization (AAMPO). The resulting study was the Bicycle and Pedestrian Data Collection Project. Phase II, the Road Diet Analysis, used the data collected from Phase I of the report to evaluate which roads qualify to have reduced road traffic.

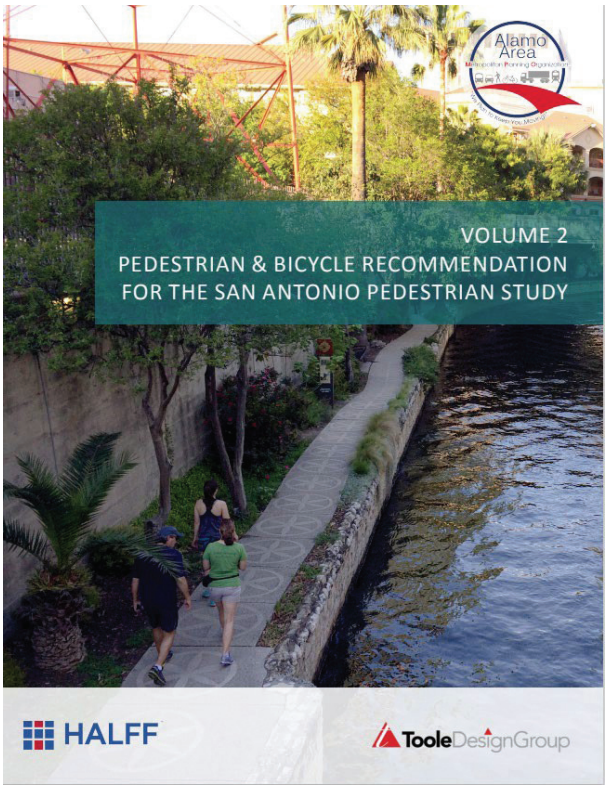
Bicycle Travel Patterns Survey (2010)

The Alamo Area Metropolitan Planning Organization (AAMPO) conducted a regional survey in 2010 to understand how bikes are used. AAMPO collected information on how bicyclists and non-bicyclists interact with bike facilities. In addition to assessing current biking participation, the survey asks why people do not bike. Existing barriers or missing bicycle facilities will help determine how enhancements to existing infrastructure should be prioritized.

Pedestrian Safety Action Plan (2012)

This plan established a vision for pedestrian safety in San Antonio by designing for pedestrians with a range of needs and abilities. The Plan recommended specific design options and examples of 12 safety measures that could be implemented in San Antonio.



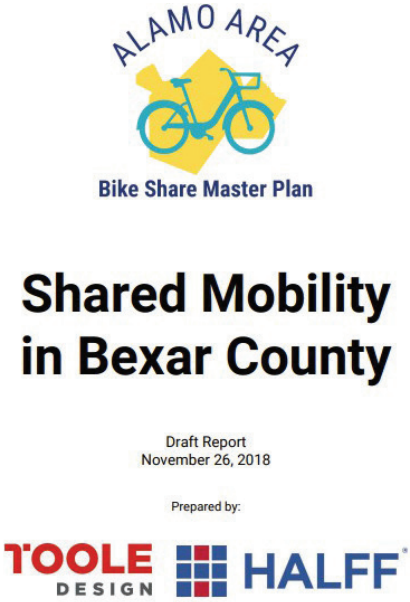


Alamo Area MPO Regional Bicycle and Pedestrian Planning Study (2016)

In this report, the important physical and social impacts of biking and walking were emphasized. The Plan addressed bicycle and pedestrian system improvements and established connections to/between locations of interest. The Plan also emphasized connections to existing greenway trails.

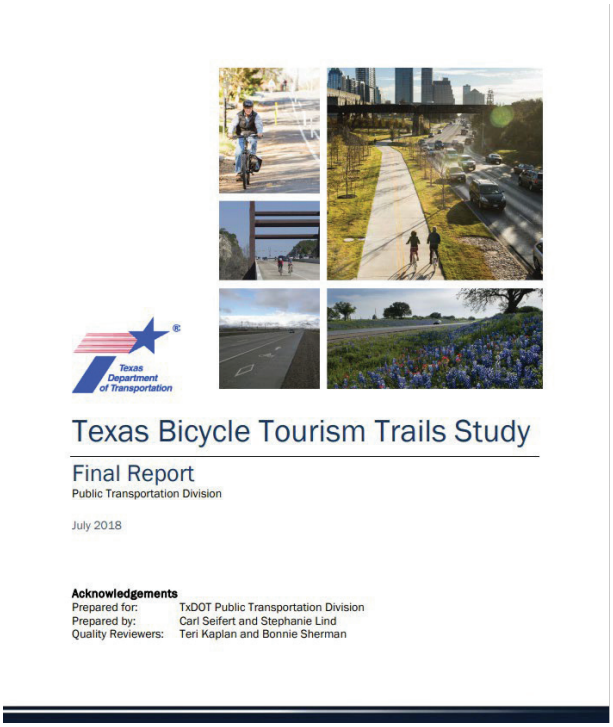
Alamo Area Bike Share Master Plan (2018)

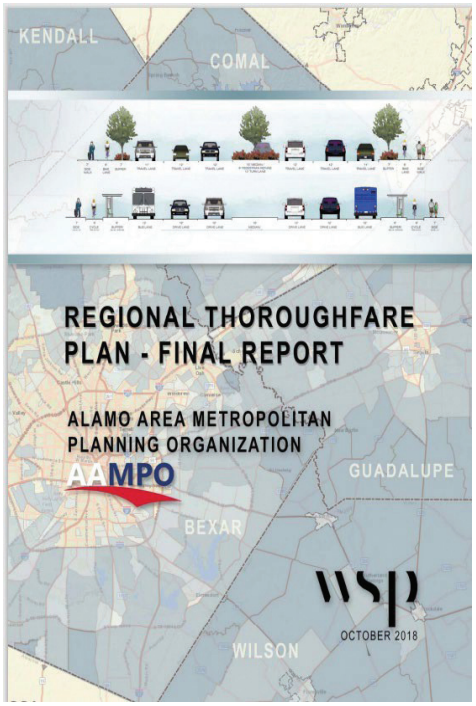
This Plan explored alternatives such as replacing a pedal assist fleet with e-assist bicycles. There are plans to relocate stations not being maximized for use to other locations with greater demand/use. Adjustment of city codes to allow e-scooters will help facilitate the needed addition of twenty-five e-assist bikes to the fleet with financial support of TxDOT grants. Expansion of bike transit planning for the region will add bike racks to decrease the need for "smart" infrastructure over time. An improved bike share program will connect bike share users to dockless bikes. The estimated cost to address bike share needs is about $2 million and will require assistance from third-party vendors.



TxDOT Bicycle Tourism Trails Study (2018)

The Bicycle Tourism Trail Network is a planning study to promote non-motorized tourism throughout the state of Texas and then connect to similar networks in other parts of the United States. The initial goal of the study identified tourism trails from existing regional and statewide facilities suitable for bike use. Specifically, the types of bikeway facilities are prioritized based on recommended use: 1) shared use path/ side path, 2) buffered bicycle lane, 3) bicycle lane, and 4) wide shoulder. Bikeways were categorized as on-road or off-road and connect regional and statewide network trails with existing networks including bike, transit, rail, vehicle, and pedestrian.



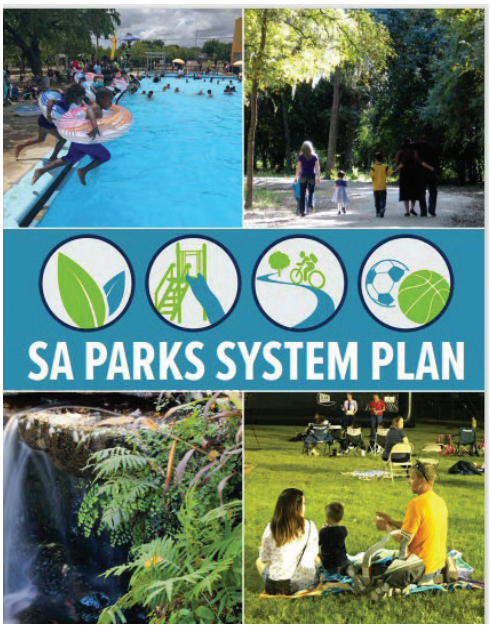


AAMPO Thoroughfare Plan (2018)

The Thoroughfare Plan for the Alamo Area Metropolitan Planning Organization (AAMPO) comprehensively reviewed movement between transit corridors. This plan did not specifically address bike connections.

San Antonio Parks System Plan (2019)

This plan identified the community priority of expanding the greenway bike network to create an interconnected network.



Bexar County Parks & Open Space Master Plan (2008)

This Plan identified the need to connect bike parks and other open spaces through trails. The Plan did not identify specific projects to construct.