ACTIVATE
MISSOULA 2045

Pedestrian Facilities Master Plan

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Section 1: Introduction

Introduction

A pedestrian is a person who moves from place to place on foot or with some form of assistance, such as a wheelchair or a guide dog. All people are pedestrians. Drivers exit their cars to get to their final destination, transit users travel to and from bus stops, and bicyclists need to walk to and from bicycle parking at each end of a trip. Many people may not be able or have access to drive a vehicle, such as some older adults, children, or persons with disabilities. It is only by providing safe, accessible, and connected pedestrian facilities that a city can truly ensure mobility for all.

The Pedestrian Facilities Master Plan (PFMP) seeks to develop a strategy for providing a connected, safe, and accessible pedestrian network for users of all ages and abilities within the Missoula urban area. The plan includes a detailed assessment of Missoula's existing pedestrian network and anticipated needs, as well as evaluation of project prioritization processes and funding recommendations.

In addition to planning for future infrastructure improvements, the PFMP serves as an asset management plan for pedestrian facilities such as sidewalks, curb ramps, and crossing safety improvements. While the existing pedestrian network is made up of primarily sidewalks and shared-use paths, the plan is encompassing of many facility types such as transit and bicycle facilities, streetscape amenities such as furniture and boulevard trees, or other components of connectivity such as ditch crossings or Safe Routes to School (SRTS).

Importance of Pedestrian Facilities

Health

Walking is a low impact form of physical exercise, and when appropriate facilities are accessible it is also one of the most cost-effective. In the field of public health there is growing interest in walkability and creating walkable places as a means for better health outcomes, specifically with respect to obesity, heart disease, and mental health. In fact, for people who walk for any purpose at a level corresponding to World Health Organization (WHO) recommendations of 150 minutes/week (approximately 20 minutes/day), mortality risk for all causes decreases by 10 percent.[1] It's particularly important to provide safe and comfortable facilities for children, since walking or bicycling to school is related to higher overall physical activity throughout life.[2]

Safety

Safety concerns can strongly influence a person's decision to walk, especially for children. Reasons individuals choose not to walk include crossing or walking adjacent to busy roads, high traffic speeds, fear of assault particularly on quiet or dark streets, or discomfort with cracked or uneven surfaces.[3] For most pedestrians, the presence of quality infrastructure increases the convenience and comfort of walking. Not only does it affect perceived safety, but it can also reduce the risk of pedestrian-related crashes.

Quality of Life & Economic Development

People want to live in spaces that are safe and walkable. Studies demonstrate that more people are interested in walking when destinations are within walking distance and the routes to reach those destrinations have appropriate facilities.[4]

Walking and walkable environments also support the local economy. The most successful commercial district in Missoula, the central business district (CBD) or downtown, is also arguably the most walkable area of Missoula, and sees the largest number of pedestrians on a daily basis. Enhanced walkability helps create economic development that benefits property and business owners, as well as area residents.[4] Walkable spaces are attractive to both employees and employers when choosing where to locate businesses. Places with vibrant and walkable spaces attract tourism and bring additional financial resources into communities.

Environment

Providing transportation alternatives to single occupancy vehicles (SOVs) helps to reduce greenhouse gas emissions. Since walking relies on human power and has negligible environmental impact, quality pedestrian facilities contribute to a culture of walking and help to make sustainable options a viable choice. Walkable environments go hand-in-hand with improved air quality, healthy trees, and green spaces.

Social Equity

Walking is the only form of transportation that is universally affordable but also contributes to the success of the rest of the transportation system. Everybody is a pedestrian at some point during every trip they make, even if it is by car, bike, or transit. Although particularly important to individuals who don't drive or have access to a vehicle, pedestrian facilities provide everyone access to jobs, recreation, community services, and other goods. By providing safe, comfortable, and convenient pedestrian facilities, it allows for equitable opportunities for access to all residents.

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1 Moving Toward Active Transportation: How Policies Can Encourage Walking and Bicycling. Active Living Research. Research Review. 2016.

2 Active Transportation: Making the Link from Transportation to Physical Activity and Obesity. Active Living Research. Building Evidence to Prevent Childhood Obesity and Support Active Communities. 2009.

3 Moving to Healthier People and Healthier Places. Sitlington, Jenny. VicHealth. Factors Influencing Transport Choice. Nov 1999.

4 Walkable Neighborhoods: An Economic Development Strategy. Bliesner, Bouton, and Schultz. JB&F Consulting. AARP. 2010.

Background

In 2015, the City of Missoula adopted a new Growth Policy, *Our Missoula*, that has six key focus areas, each of which addresses the need and desire for active transportation as a means of supporting community health, environmental protection/preservation, economic development, job access, and community livability and design. At the same time, Missoula County adopted a 20-year vision for growth, *Shaping Our Place, Charting Our Future.* In this plan, the core guiding principles, goals, and objectives emphasize the need to provide adequate infrastructure, including pedestrian facilities and to promote healthy and sustainable communities.

Following the adoption of *Our Missoula*, in 2016 the Missoula MPO adopted *Activate Missoula 2045*, a 4-year update to the Long Range Transportation plant (LRTP). Named "Activate Missoula" in recognition of Missoula's long-standing commitment to and investment in active transportation, the signature outcome of the plan was the adoption of the first-ever mode split goal for the Missoula Urban Area (Figure 2). The adopted mode split goal, otherwise known as the percentage of people using a various travel mode, calls for a decrease in single-occupancy vehicle commutes from approximately 70.1% to 34% by 2045 through a combination of increased active transportation infrastructure and transportation and land-use related policy. The adopted walk mode share goal aims to increase the percentage of walking-commuters from approximately 6.4% to 18% within Missoula's Urbanized Area (Figure 1).

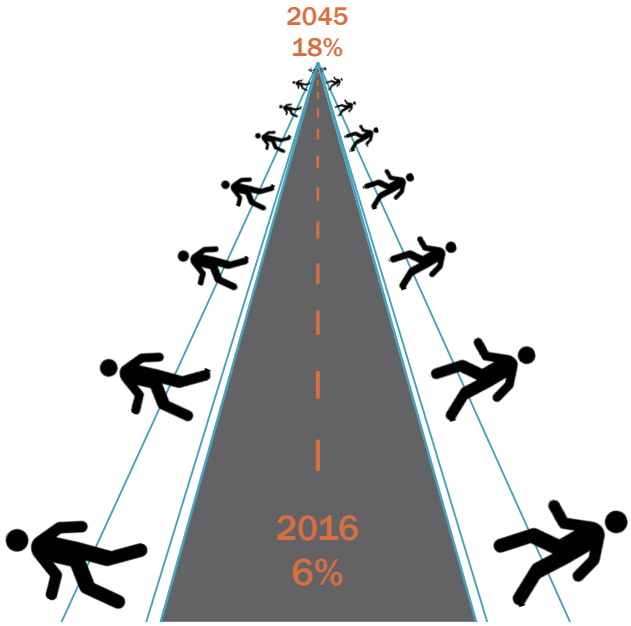


Figure 1. Walk Mode Share Goal

The LRTP update also included a new goal promoting transportation system improvements that support community health and social equity. Missoula Invest Health, a 2016 grant from the Robert Wood Johnson Foundation, bolstered this goal by bringing community development and health partners together to develop innovative ways to support health and wellbeing in Missoula neighborhoods. The work conducted by this partnership further established a linkage between neighborhoods lacking transportation infrastructure, particularly sidewalks, and higher rates of poverty and health disparities. The Invest Health team continues to focus on the correlation between health outcomes and transportation choice, access, and safety.

Shortly after the adoption of the LRTP, Missoula City Council adopted an update to the Complete Streets Policy (Resolution #8098), revising the original policy from 2009. The original resolution promoted the increased usability of all streets for all modes of travel for citizens of all ages and abilities in Missoula. After 7 years of the initial policy's guidance, City Council directed staff to review its effectiveness and propose updates to the policy as needed. This review resulted in a number of changes that clarified and strengthened the commitment to making safe, reliable, efficient, integrated, accessible, convenient, desirable, and connected streets for all users.

The 2016 Complete Streets Policy establishes pedestrians as the primary and most important user citywide.

The *Missoula Active Transportation Plan* (ATP), adopted in 2011, supports the Complete Streets Policy, while acting as an additional policy-level document. The ATP provides guidance for the public and private development of active transportation facilities and acts as an umbrella policy document to support infrastructure planned within the PFMP and the Bicycle Facilities Master Plan (BFMP).

All of these plans and policies set the stage for City Council's request that MPO staff initiate an update to the *Master Sidewalk Plan* (MSP), last updated in 2012, including a comprehensive public process. The new PFMP will function as a tool for sidewalk project prioritization, improving and providing further analysis on priority areas established in the MSP and expanding the geographic region to include the entire Missoula urbanized area (Figure 2).

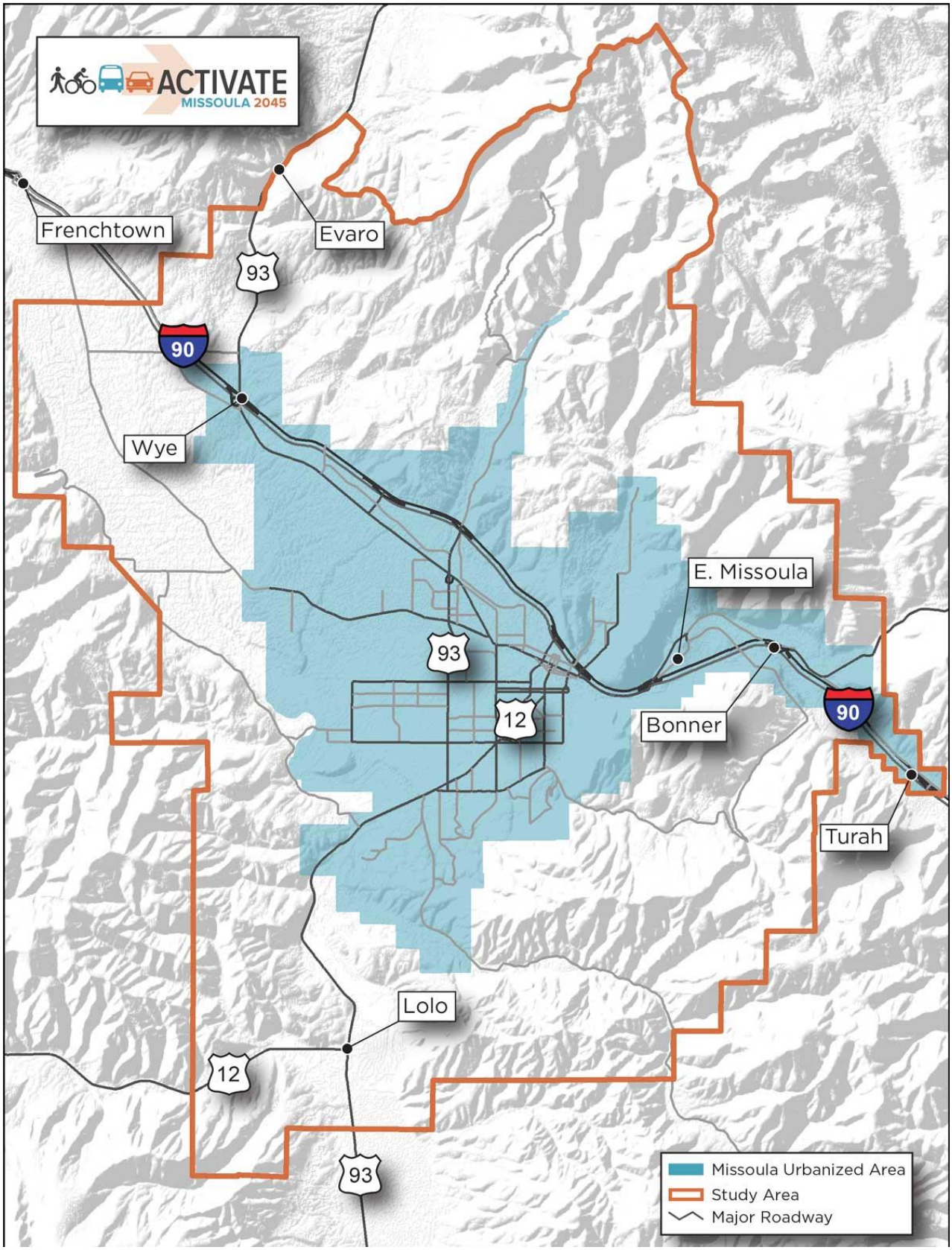


Figure 2. Missoula Urbanized Area boundary

Moving forward, the PFMP will provide guidance on supplementing the regional focus of the LRTP and ATP and enhance the City's previous sidewalk plan through a complete, data-driven assessment of pedestrian needs. The PFMP includes public input and outreach as a centerpiece of the plan and works with residents and community partners to better prioritize areas for pedestrian improvements throughout the City of Missoula and its urban fringe area within Missoula County.

Goals and Guiding Principles

The PFMP is an infrastructure and facility-level plan that is intended to support the goals and objectives of Missoula's other regional plans through strategic investments in pedestrian infrastructure. Through the careful review of these existing plans, as well as a series of public outreach activities, data analysis, and peer city research, the following goals and guiding principles were established in order to advise the development and review of the PFMP.

Goals

Existing regional plans guide the goals, prioritization of infrastructure investments, and recommended implementation policies of the PFMP. Plan goals and how they are supported and relate to existing plan goals are listed in Table 1.

Table 1. PFMP Goals

Goal	Objectives	Related Plan Goals
Improve pedestrian safety	Provide a pedestrian network that is safe for users of all ages and abilities. Identify and correct existing unsafe conditions using the 4E approach to focus on Education, Enforcement, Engineering and Emergency Medical Services.	• All local plans, including Missoula's Community Transportation Safety Plan (CTSP), Our Missoula Growth Policy, the Long Range Transportation Plan (LRTP), the Missoula Active Transportation Plan (ATP), and the Urban Forestry Master Plan (UFMP) aim to increase overall safety for all modes and work towards the Montana Department of Transportation's (MDT) Vision Zero goals.
Achieve mode split goals adopted in the LRTP	Increase non-motorized trips and the percentage of residents and visitors who choose non-motorized modes of transportation for work and school commutes, social, and recreational trips. Meeting the goal of 18 percent of trips to work or school taken by foot in 2045 will require ambitious investment and policies to ensure that people of all ages and abilities have access to facilities for walking.	• Our Missoula Growth Policy aims to encourage healthy lifestyles, support pedestrian-scale design, and accommodate diverse transportation options by promoting active transportation and reducing reliance on automobiles. • The LRTP supports the need to maintain and create additional options for better connections of all modes. • The ATP plans to increase non-motorized trips and the number of individuals who choose to take non-motorized trips, for both commuting, social, and other types of recreational trips.
Improve public health and equity outcomes	Enable people to make healthy, active transportation choices such as walking to work or school by providing safe, accessible, and connected pedestrian facilities, particularly in neighborhoods with persistent poverty and health disparities. Improve pedestrian transportation options to destinations like schools, parks, and jobs to help reduce transportation costs for people in low-income neighborhoods, as well as those who are unable to drive or don't have access to a motor vehicle.	• Our Missoula Growth Policy states the importance of encouraging healthy lifestyles, maintaining a clean and healthy environment, and promoting personal health and safety for everyone. • The LRTP promotes community health and social equity through transportation options. • The ATP aims to connect and maintain trails to public open spaces and waterways. • The UFMP highlights the mental and physical public health benefits of maintaining treed communities and expanding the urban forest.
Emphasize pedestrian connectivity that is accessible for all users	Support a range of transportation options that provide safe, universally accessible, comfortable, and efficient access to goods and services. Emphasis will be placed on ensuring that existing neighborhoods have access to local goods and services such as schools, parks, jobs, healthcare, transit and food.	• Our Missoula Growth Policy discusses the importance of accessibility to amenities and services for a growing population with diverse characteristics and needs that also provides safe, sustainable, and multi-modal options. • The LRTP addresses the need to maintain our existing transportation system, including and emphasizing important connections for all modes. • The ATP aims to increase non-motorized connections that are accessible for all users, while also preserving non-motorized transportation corridors for future development.

Goal	Objectives	Related Plan Goals
Support economic growth and vitality	Missoula's pedestrian network should support the region's economic vitality, especially through new and existing commercial and industrial centers by providing a full range of transportation options for residents, businesses, and visitors. Future development should provide pedestrian transportation options to a mix of land uses, services, and recreation opportunities.	• Our Missoula Growth Policy discusses the need to build and maintain core transportation facilities to contribute to Missoula's economic advantages and to plan proactively for future infrastructure. • The LRTP aims to support economic vitality through ensuring access for multiple modes of transportation • The UFMP emphasizes the economic benefit of treed pedestrian areas within business districts (i.e. increased commerial activity) and neighborhoods (i.e. increased property values).
Increase sustainability efforts	Maintain and improve existing infrastructure and ensure that new development provides appropriate pedestrian infrastructure or pays the full cost of transportation services, especially sidewalk connectivity. Reduce reliance on single-occupancy vehicles by ensuring a close connection between the transportation system and development patterns.	• Our Missoula Growth Policy intends to build and maintain sustainable infrastructure and promote local decisions that mitigate and plan for the effects of climate change. • The ATP promotes consistency between land use and transportation plans with an emphasis on the "Focus Inward" approach to decrease the length of trips and provide a range of transportation options.
Utilize land use and community design to support pedestrian-scale infrastructure	Ensure that existing neighborhoods and transportation corridors provide safe, accessible and connected pedestrian transportation options through replacing and retrofitting existing facilities, and ensure the design of new and reconstructed facilities meets or exceeds national design standards for accessibility wherever site conditions make it possible. Support pedestrian-scale design and land uses that encourages non-motorized transportation, and retrofit existing corridors that are currently auto-oriented.	• Our Missoula Growth Policy emphasizes close connection between development patterns, infrastructure, and the environment, while also supporting development that enhances Missoula's unique character, ensuring a variety of land uses, and ensuring all residences are within close proximity of a pedestrian system. • The LRTP discusses the benefits of consistency between land use and transportation plans. • The ATP addresses using the 4E approach of Education, Enforcement, Engineering and Emergency Medical Services to decrease the number of areas experiencing unsafe conditions or design.

Guiding Principles

To help achieve these goals, guiding principles of the PFMP provide support to policymakers, elected officials, and staff for the discussion and overseeing of applicable projects and policy decisions. Guiding principles differ from the aforementioned goals in that they take policy-level goals and put them into practice as a tool for decision-making. In cooperation, goals and guiding principles help to communicate and execute language and priorities set out in the PFMP. The following guiding principles provide guidance on investment of limited funding capacity and staff hours, feasibility, and the expectation that the PFMP addresses language from existing community plans.

Figure 3. Guiding Principles

Section 2: Existing Conditions

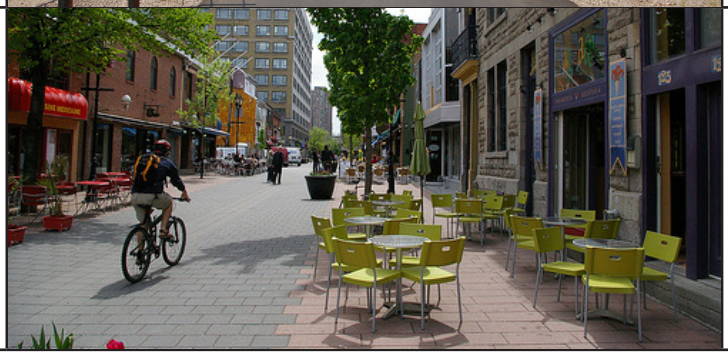
Existing Conditions

Walking is a very popular activity in Missoula. According to the household travel survey conducted in 2015, more than 87 percent of Missoula area residents used pedestrian facilities at some point within the previous month. Popularity may be attributed to a number of community characteristics such as physical infrastructure such as side-walk location and condition, as well as social norms and perceptions of safety. The following sections outline available data used to analyze and better understand the current state of the pedestrian environment in the Missoula Urbanized Area.

Facility Types

The current Missoula Urban Area pedestrian network utilizes a few different types of pedestrian facilities (Table 2). The most common are sidewalks, but there are a variety of other infrastructure types currently being utilized, as well as additional alternatives that may be considered in the future (see Appendix E).

Table 2. Facility Types

Facility Type	Image	Description
Sidewalks		Paved facility dedicated to pedestrians. Sidewalks are the most common type of pedestrian infrastructure in Missoula.
Shared-Use Paths/Trails		Facility that supports multiple forms of non-motorized transportation including walking, bicycling, skateboarding, and wheelchair use for both recreation and transportation purposes.
Shared Spaces/ Woonerfs		Roadways that are shared with both vehicular traffic and non-motorized traffic. Slow design speeds and the predominance of non-motorized modes characterize such spaces.

Sidewalk Condition

An effective pedestrian network consists of a variety of connections to ensure it is comprehensive, integrated, and accessible. In Missoula, the most widespread type of pedestrian infrastructure is sidewalks; however some neighborhoods have a more complete network than others. For example, Upper Rattlesnake, South 39th street, and Two Rivers are missing the largest percent of sidewalks, while Marshall Canyon and University District have the most complete networks by percentage (Figure 4). Some neighborhoods may not require a full sidewalk network based on unique characteristics or traffic conditions, so neighborhood needs should be assessed on an individual basis.

To evaluate the condition of Missoula's pedestrian facilities, volunteers were recruited to collect and record information on sidewalk condition, ADA facilities, and issues or barriers to accessing sidewalks. Volunteers collected sidewalk condition data only for existing sidewalks, however, the inventory also notes locations that are "missing" sidewalks.

The rating system used for sidewalk assessment covered a range of potential conditions, such as spalling, heaving, cracking, and other types of physical deterioration (see Appendix D). Sidewalk condition was assessed across an entire block face, with an average rating assigned. For example, a "Fair(+)" rating involves minimal displacement over 50 percent of the block, less than 25 percent with moderate cracking, more than 50 percent of the block with spalling, and some overgrowth of vegetation. The assessment system includes rating values from 1 ("Failing") to 10 ("New Sidewalk").

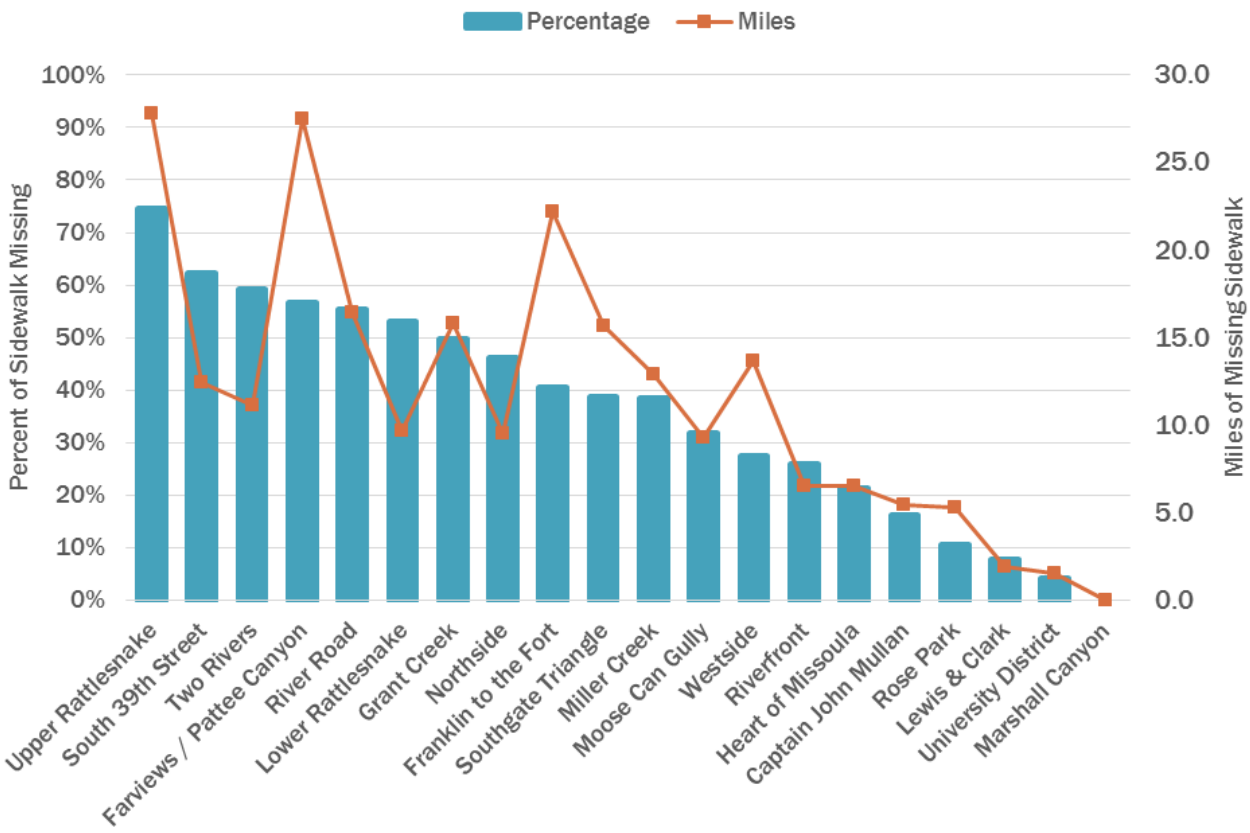


Figure 4. Missing Sidewalks by Neighborhood

Volunteers and staff evaluated nearly 420 miles of existing sidewalks. Throughout all neighborhoods in the City of Missoula, 12.9 percent of blocks have sidewalks with an average rating of 'Excellent' or 'New', 69.1 percent averaged 'Good' or 'Very Good' and 17.6 percent averaged a rating of 'Fair'. Less than 1 percent of assessed blocks had an average rating of 'Poor' or 'Failing'

Neighborhoods with the highest rates of lower quality sidewalk conditions include Two Rivers (3 percent poor or failing and 13 percent fair), Upper Rattlesnake (39 percent fair), and Franklin to the Fort (1 percent poor or failing and 34 percent fair). Conversely, neighborhoods such as Marshall Canyon and Captain John Mullan, contain more new developments and correspondingly have very high percentages of sidewalks rated good or excellent (Figure 5).

Volunteers also collected locations of curb ramps throughout the city and Urbanized Area. A key challenge of the PFMP will be how the community addresses these accessibility issues while also continuing to fill in missing sidewalks. Several notable locations have large gaps in curb ramps such as Lewis & Clark, Rose

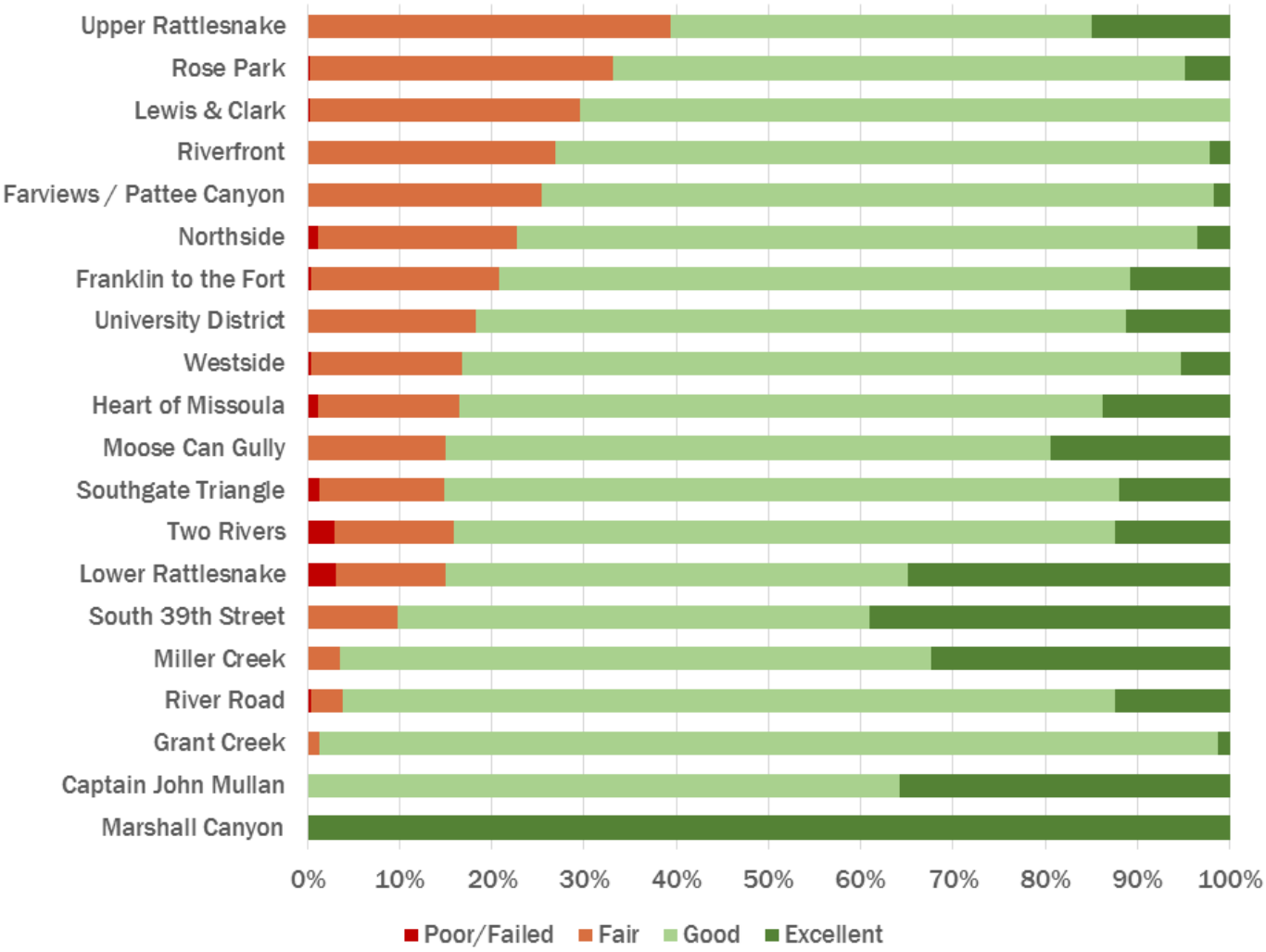


Figure 5. Sidewalk Condition by Neighborhood

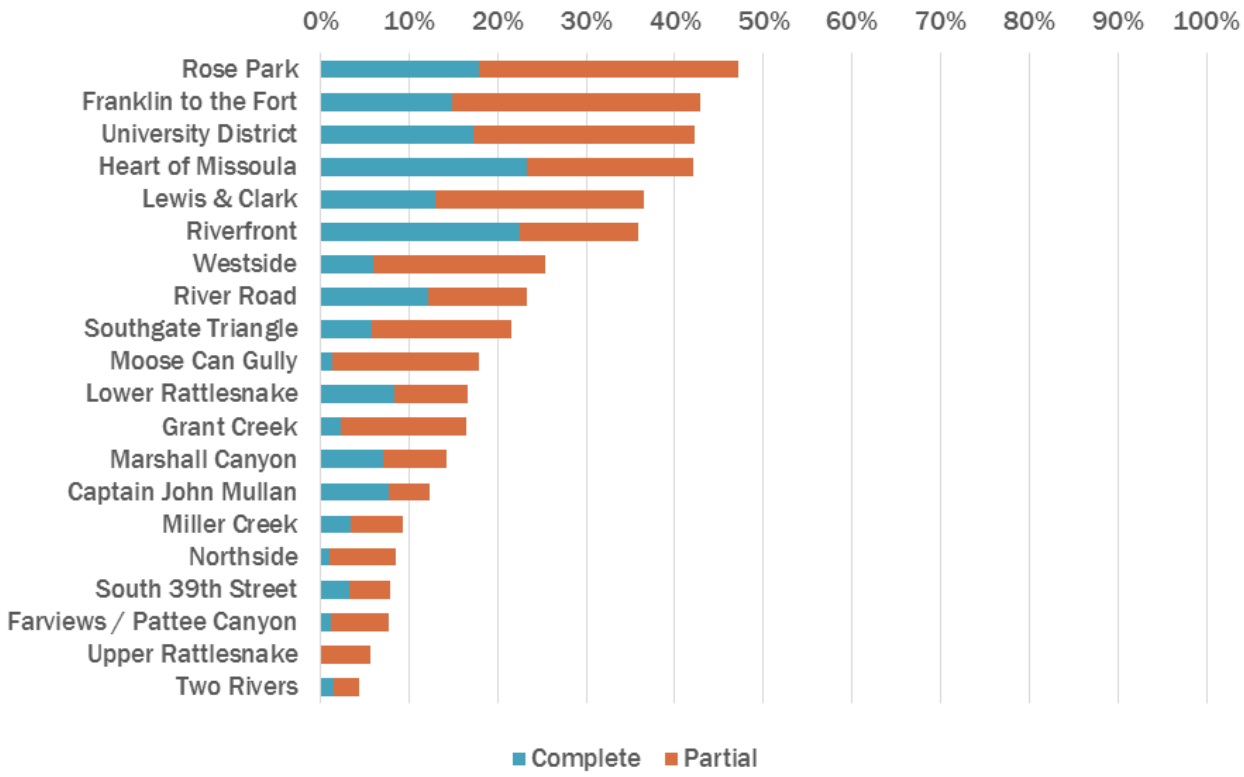


Figure 6. Estimated Intersections with Updated ADA Curb Ramps by Neighborhood

**Updated ADA ramps include truncated domes, but are not necessarily fully compliant with the most current standards*

Park, Upper Rattlesnake, Pattee Canyon and Two Rivers neighborhoods (Figure 6). Additional data was collected on the curb ramp types, such as presence of truncated domes or other tactile warnings. The Heart of Missoula, Riverfront, and Rose Park neighborhoods exhibit the largest percentage of ADA compliance, while still only at 42, 35, and 33 percent respectively. The ADA Transition Plan discusses challenges and implementation strategies to reach maximum ADA compliance (Section 4).

The last set of information collected were barriers or other issues with current pedestrian facilities. Volunteers were asked to note locations of particular features, such as vegetation, mailboxes, gaps, or any other notable barriers. They collected photo documentation at geographically located points, so staff can evaluate those barriers and issues at different spatial scales.

Pedestrian Safety

Locations for all crashes within the Missoula Urbanized Area involving a pedestrian between 2007 to 2017 are mapped (Figure 7). Pedestrian crashes tend to concentrate in areas with higher traffic (both vehicular and pedestrians), as well as along Missoula's higher speed and volume roadways, such as Brooks, Reserve, Russell, and Downtown. Further analysis of crash rates will be necessary to determine particularly dangerous locations; however, those rates are difficult to calculate due to lack of good pedestrian trip or miles traveled data at specific locations in Missoula.

The primary crash data tracked for state and federal performance measures are pedestrian fatalities and incapacitating injuries. The trend for both crash types is generally downward, and incapacitating injuries appear

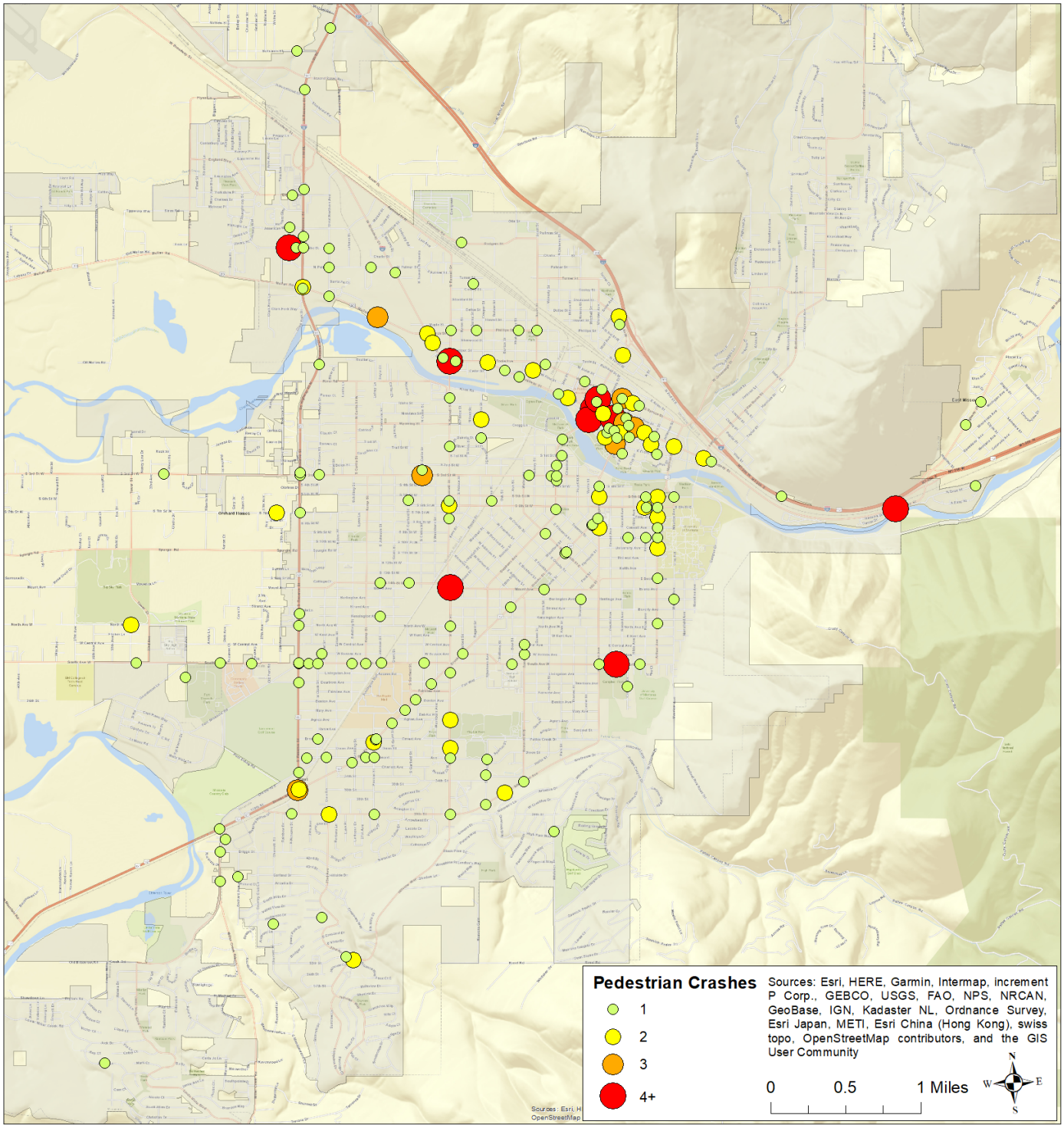


Figure 7. Pedestrian-Involved Crash Locations

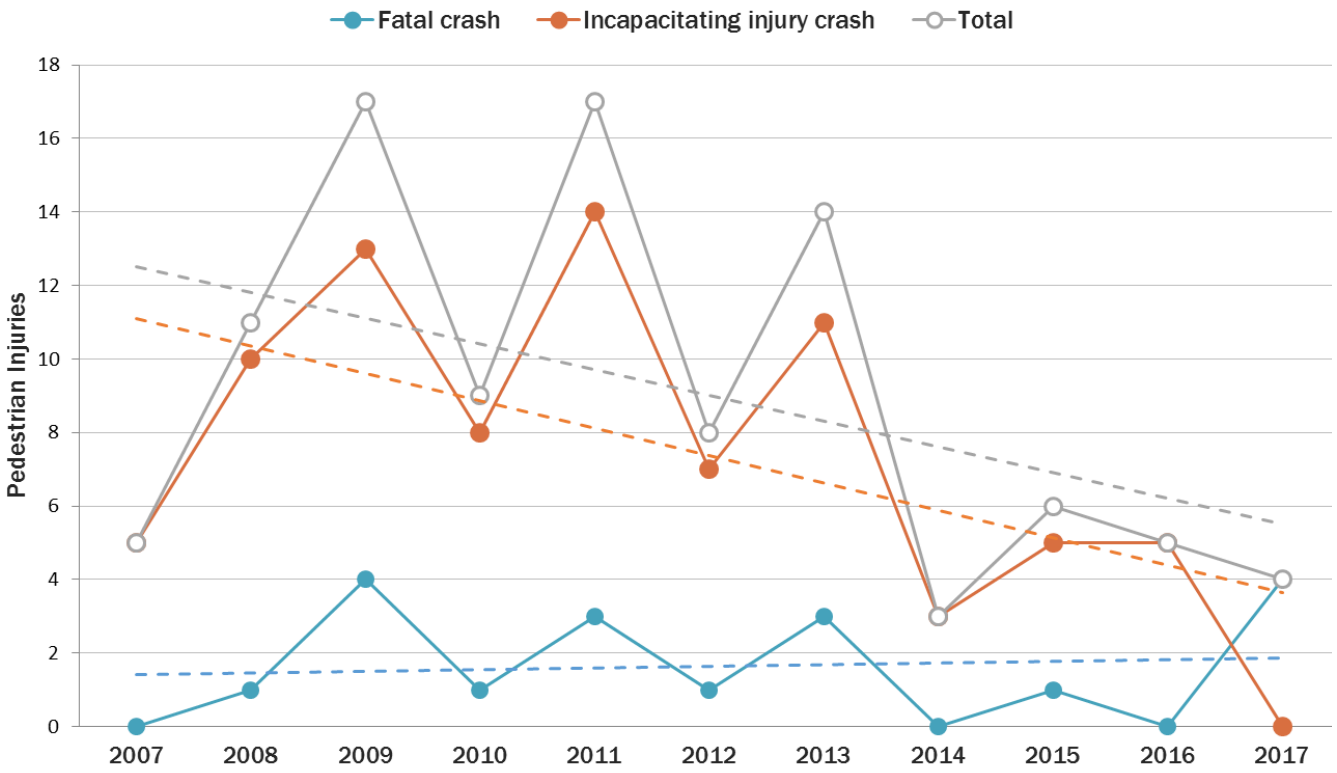


Figure 8. Pedestrian-Involved Crash Trends

to be decreasing at a higher rate than fatalities (Figure 8). However, it is important to acknowledge that due to the relatively low frequency of crashes that involve a pedestrian fatality, it is difficult to quantify changes over time, so trends and comparisons with other datasets should be viewed accordingly.

Streets with higher vehicle speeds (35 mph or greater) account for 18 percent of all crashes but more than 60 percent of all fatalities. Approximately 60 percent of all pedestrian-involved crashes occur at intersections or are intersection-related, including 58 percent of all incapacitating injuries. Low numbers of annual pedestrian-related crashes makes analysis challenging; however, existing data shows that 50 percent of incapacitating injuries occur on arterials, which account for less than 5 percent of all roadways. The remaining 50 percent occur at or along collector and local streets. Unlike fatalities, most incapacitating injury crashes happen on streets with speed limits of 30 mph or less.

Pedestrian Demand

In order to understand how and where people use pedestrian facilities, a variety of sources were examined: the US Census American Community Survey (ACS), a yearly estimate of different commute-to-work/school choices; volunteer counts conducted in the spring and fall each year, which are used to estimate an average annual daily trip count for both bicyclists and pedestrians at numerous locations throughout the urban area; and, automated counters on shared-use paths. Each of these count methods comes with limitations on how we can interpret the data but together paint a useful picture of trends on how pedestrians are moving around Missoula.

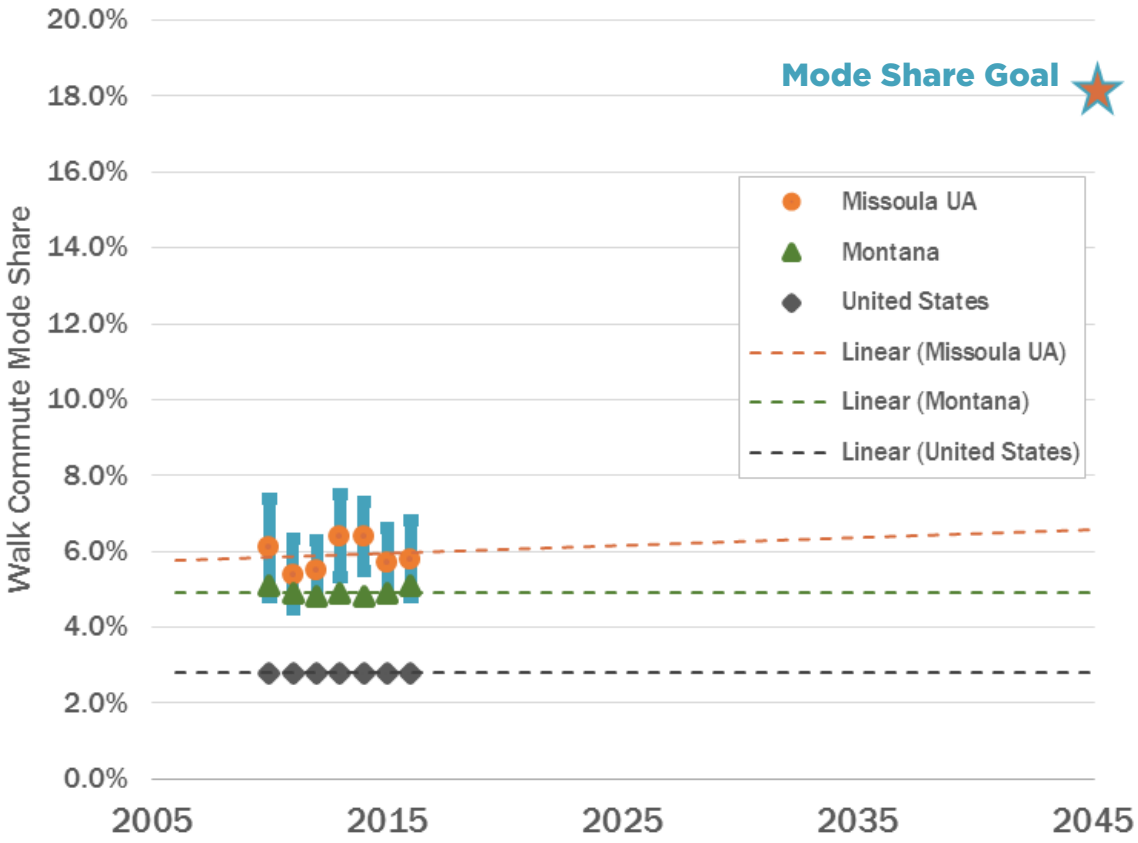


Figure 9. Walk Commute Mode Share Trends

The 2012-2016 ACS 5-year estimate of pedestrian commutes shows continuation of a steady upward trend in the number of people choosing to commute to work or school via walking (Figure 9). At just over 6 percent, Missoula continues to outpace both Montana and United States averages. Despite a trend upwards, the current rate of increase does not appear to be great enough to achieve the 'Ambitious' goal of 18 percent established by the LRTP.

The MPO also conducts a 2-hour bicycle and pedestrian count in May and September, capturing a snapshot of pedestrian activity at 19 annual and 11 biennial locations. The 2-hour counts provide information about pedestrian volumes at key intersections throughout the city and identify annual trends in rush hour pedestrian activity. Figure 10 depicts the number of pedestrians counted each year at our annual count locations between 2012 and 2017. After a slight drop in counts from 2012 to 2013, annual totals continued to increase until 2016, the year with the largest number of observed pedestrians. In 2017, 2-hour pedestrian counts decreased; despite this reduction, the overall trend depicts a yearly increase in pedestrian activity.

In addition to volunteer-based counts, the MPO uses automated counters at 8 locations around the Missoula Urban Area. Automated counters focus primarily on commuter trails such as the Bitterroot and Milwaukee Trail systems. For example, the intersection of the Bitterroot Trail and Russell Street sees an average of 125 pedestrians/day on weekends and 129 pedestrians/day on weekdays, while the intersection of the Milwaukee Trail and Hickory Street sees an average of 337 pedestrians/day on weekends and 341 pedestrians/day on weekdays.

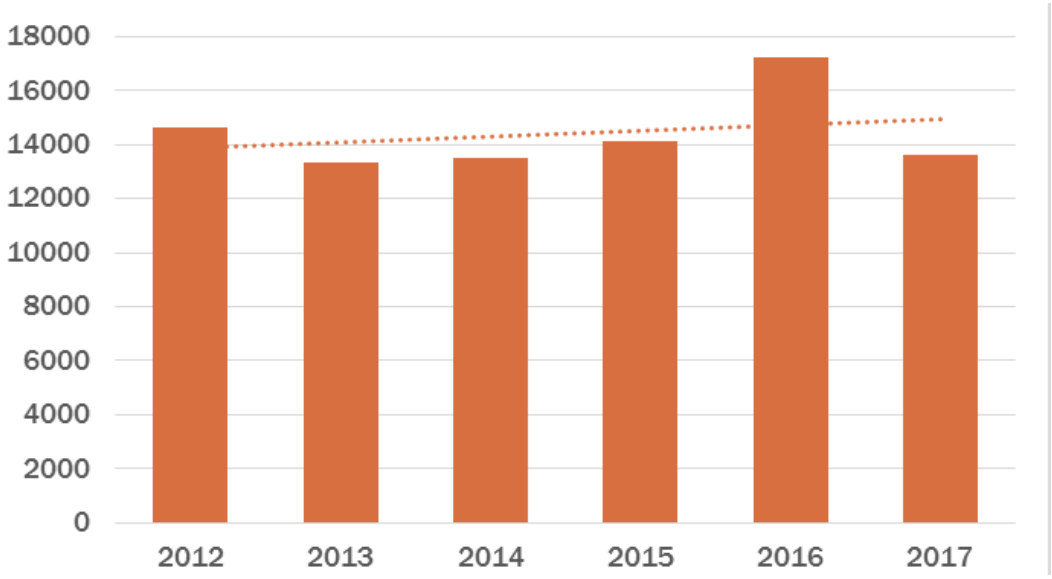


Figure 10. Bi-Annual Pedestrian Count Summary

Pedestrian Surveys

Staff conducted an informational survey from August through October of 2017 to better understand community perceptions of the pedestrian environment in Missoula.

The purpose of the survey was to begin to identify the most important issues associated with pedestrian facilities and pedestrian perceptions of travel in Missoula. It asked participants two major questions: 1) What are the largest barriers to being a pedestrian in Missoula and 2) What are the most important places to address pedestrian facilities in Missoula (See Appendix A). Responses to this survey acknowledged the public's priorities while assessing the needs of the current pedestrian network.

Surveys were available in both online and paper format and distributed through multiple platforms. The online version was located on the City of Missoula website and links were included in multiple newsletters and listserv emails. An article about the PFMP process was published in The Missoula Current News, which also solicited a number of online responses. Staff attended Missoula Downtown Association's 'Downtown Tonight' and 'Out to Lunch' events to collect responses, as well as answer any additional questions about the transportation planning process. Paper surveys were also distributed at the front desk of the Missoula Food Bank for individuals to complete during the intake process.

The MPO received 559 surveys total. According to responses, the top three barriers to being a pedestrian in Missoula are people driving too fast on busy streets, not having enough safe places to cross busy streets, and sidewalks/walking paths missing on busy streets. The three highest ranked places to address/improve for pedestrians in Missoula are streets where pedestrians have been injured or killed, areas that serve low-income and transit-dependent populations, and streets connecting family and children to schools.

The 2015 Missoula Transportation Survey addressed funding opportunities and questioned participants on their willingness to pay more taxes for transportation-specific improvements. For example, a plurality of adult residents of the Missoula metropolitan planning area (48 percent) supported paying more taxes or fees if the fees were spent only on transportation system improvements while 29 percent of respondents opposed paying more taxes or fees.

The 2015 Transportation Survey found that overall, County residents were less inclined to support paying increased transportation-specific taxes than City residents, and found that City residents were generally more interested in investments in bicycle and pedestrian facility improvements than County residents.

When asked "If taxes or fees were raised to improve transportation in the Missoula area, what would you want to see the additional revenues used for?" only 4.3 percent chose the option to improve pedestrian facilities. Based on tax-related questions from this survey, funding sources other than raising taxes were favored for the establishment and maintenance of pedestrian facilities.

Health and Social Equity

One of the goals of the LRTP is to promote health and equity through the transportation system (Goal 8). In order to better understand how pedestrian infrastructure impacts health and equity in and around Missoula, staff compared existing sidewalk infrastructure to six demographic measures from US Census ACS data: poverty, disability, households with zero vehicles, people under 18 years of age, people over 65 years of age, and adult obesity. These six measures provide context for how the lack of pedestrian infrastructure may be adversely affecting particularly at-risk populations.

Health and social equity comparison maps can be found in Appendix B. While the data may not necessarily establish causal factors for how pedestrian transportation facilities impact health and equity, it does provide context for why providing sidewalks or other facilities in particular neighborhoods may have greater health or equity benefits. The data also provides useful information on funding and prioritization decisions. It will affect different neighborhoods and vulnerable populations and agrees with research conducted through Missoula community partners working with Invest Health that supports investment in sidewalks in neighborhoods with higher percentages of poor health determinants.

Section 3: Priority Pedestrian Needs Analysis

Priority Pedestrian Needs Analysis

As Missoula grows and develops, the need for additional pedestrian facilities and continued maintenance/improvement of existing infrastructure increases, as does the need to maximize funding resources to keep up with increased demand. Missoula's initial document that addressed pedestrian facilities, the Missoula Sidewalk Plan (MSP), prioritized sidewalk installation and repair first along the arterial and collector roadway system and then in priority areas ranked by pedestrian activity using generators such as commercial centers and the university and current traffic estimates. The MSP guided sidewalk project selection for the City of Missoula over the previous 20 years, resulting in near completion of sidewalks along arterials and collectors in the City's core, as well as significant progress filling in sidewalks in its highest priority area. The City has also made progress replacing existing deteriorated sidewalk sections within that priority area.

Acknowledging continued growth in the Urbanized Area, the Missoula City Council expressed growing interest in an update to the MSP which would refocus how the City prioritizes sidewalk funding. Since the old priority zones focused solely on physical and geographical attributes, the new iteration of the PFMP should explore the possibility of a more holistic approach to prioritizing pedestrian needs.

Around this time, the Missoula Invest Health team was formed through a grant from the Robert Wood Johnson foundation to create innovative ways to support health and well-being in Missoula neighborhoods. The Missoula Invest Health team and their partners released research that identified areas of persistent economic and health disparities within Missoula. Given the demonstrated need for community partners to address public health and infrastructure planning in a more concerted manner, the team helped create the impetus for the consideration of new measures for pedestrian infrastructure and funding prioritization.

Additionally, the Census tract which covers most of the West Side and North Side neighborhoods where much of the Invest Health work has been focused, has been designated as an "Opportunity Zone" through the Tax Cuts and Jobs Act of 2017. "Opportunity Zones" are economic development tools which provide tax incentives for investment in new and expanding businesses within low-income communities. This program is likely to work hand-in-hand with the PFMP and Invest Health goals to meet the need for sufficient pedestrian facilities in the areas that need it most.

Moving forward, the planning process to draft a PFMP did not just consider the City of Missoula, but rather the entire Missoula Urbanized Area. When working toward mode split and other LRTP goals such as health, equity, and multi-modal connectivity, it was important to look beyond the urban core, and strive for regional success. Thus, the plan outlines additional methods for prioritizing regions and facility types beyond the city limits based on the individual characteristics of those areas.

The following sections summarize the process to develop a system to prioritize pedestrian facilities in both the City and urbanized portions of Missoula County.

Methods

The PFMP based prioritization of new sidewalk facilities on analysis of geographic data to determine where investments in new infrastructure will have the highest impact on achieving plan goals and guiding principles. The data used falls within two primary classes: social demographic data such as obesity, disability, and low-moderate income, and built environment data like bus stops, parks, schools and grocery stores. The datasets used in the priority needs analysis are from several sources including City of Missoula, Missoula Metropolitan Planning Organization, Mountain Line, and U.S. Census American Community Survey datasets specifically created for this prioritization analysis (grocery stores, independent living, emergency services, and religious/civic centers).

Field surveys using the methodology contained in Appendix D collected spatial data for missing and existing sidewalks, curb ramps, and other pedestrian features. Existing sidewalk data maintained by the City of Missoula was updated and verified and facility conditions were added. City of Missoula GIS staff will continue to maintain and update the sidewalk data.

The sidewalk prioritization methodology was developed to establish a consistent, unbiased system to determine the highest priority needs for sidewalk installation, using an analytic, objective, and data-driven approach. Sidewalk priority areas use census blocks as the base geography in order to accommodate both demographic and physical built environment datasets. Scoring for each census block used a scale of 0-100 points for the social demographics and the physical built environment elements and then multiplied by the weighting factor for each.

For social demographic measures, each census block was scored based on whether or not it fell within an area with high rates of the following measures: low/moderate income households, adult obesity, zero car households, disability, and people over the age of 65. These health and equity measures make up 70 percent of the total sidewalk priority needs score (Table 3).

Physical built environment features include popular pedestrian destinations or attractors and density of development. Attractors include high-ridership transit stops, parks, schools, commuter paths, grocery stores, post offices, medical clinics, independent living centers, emergency/support services (food, shelter, and substance abuse), and religious/civic community centers. Each census block that is within ¼ mile of these received points for priority scoring. Census blocks also received points for residential densities above 4 or 7 households/acre and for employment density of 12 jobs/acre or greater. The physical built environment accounts for 30 percent of the priority needs score for each block (Table 4).

Values were assigned to physical locations and used to determine the final scoring based on a complete geographical analysis. The weighting factors of 70 percent for social demographics and 30 percent for physical built environment were based on public input and are intended to reflect the importance of community goals. The final sidewalk priority needs score was derived using the following formula with a total possible score of 100:

Table 3. Social Demographic Scoring

Element	Criteria	Points	Points out of 100
Demographics	Low/moderate income households	20	20 * LMI (%)
	Adult obesity	20	20
	Zero car households	20	20
	Persons with a disability	20	20
	Persons aged 65+	20	20

Table 4. Physical Environment Scoring

Element	Criteria	Points	Points out of 100
Attractors (within 1/4 mile)	Schools	7.5	50
	Transit stops (high ridership)	7.5	
	Grocery stores (large, not convenience markets)	7.5	
	Parks	7.5	
	Commuter paths	7.5	
	Post offices	2.5	
	Medical clinics	2.5	
	Independent Living Services	2.5	
	Emergency/support services (food, shelter, substance abuse)	2.5	
	Religious/Civic	2.5	
Density (Residential/ Employment)	Residential (> 7 households/acre or > 4 households/acre)	25 or 12	50
	Employment (> 12 jobs/acre)	25	

70% Demographic Score + 30% Physical Score = Priority Needs Score (100 points max.)

Equation 1: Priority Pedestrian Needs Equation

Pedestrian Priority Needs Assessment Map

The pedestrian priority needs assessment score is intended to allow for objective grouping of missing sidewalks into general classifications relative to other locations in the City of Missoula or surrounding areas. The range of scores between 0 and 100 are divided into three classes, creating a Pedestrian Priority Needs Assessment map of the Missoula region (Figure 11). While each census block within the Missoula Urbanized Area was scored for the purposes of new sidewalk construction, prioritization using the scoring system will occur primarily within the City of Missoula due to funding limitations outside city limits.

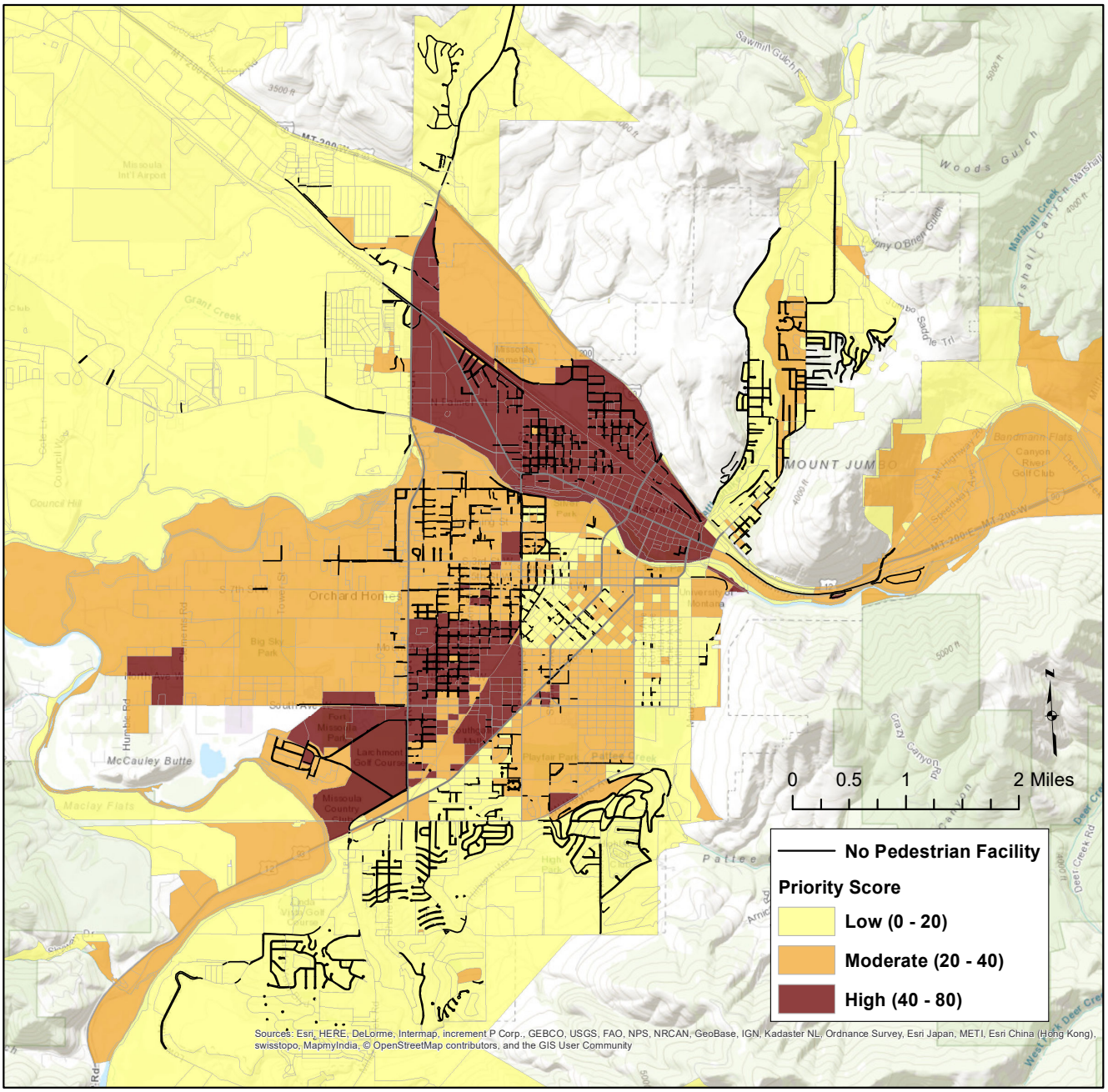


Figure 11. Priority Pedestrian Needs Map

Although the pedestrian needs assessment is a tool to prioritize new sidewalks funded through the City's Annual Sidewalk Installation and Replacement Program or to prioritize sidewalk needs for grant funding, this does not mean that each missing sidewalk is not a necessary component of a complete pedestrian network. Nor is it intended to mean that missing sidewalks and other ADA facilities such as curb ramps are not critical to an accessible pedestrian network. All new private and public development, redevelopment, and capital improvement projects within the urbanized area should include ADA compliant sidewalks and/or urban shared-use paths (where appropriate) along all roadways, consistent with the City of Missoula's Complete Streets Policy and Missoula County's adopted policies and standards.

Safety/Intersections

Intersection safety and accessibility is critical to a complete pedestrian network. If people are unable or unwilling to cross busy streets, due either to safety concerns or lack of accessibility features such as tactile warnings, curb ramps, and signals, then the pedestrian network is not really complete. In order to identify intersections with greater need, or rather intersections that lack appropriate safety and accessibility improvements, an objective analysis compared roadway speeds, volumes, and lanes with existing intersection improvements.

The literature and research on pedestrian safety focuses risk on three primary factors: speed of a roadway, number of automobile travel lanes, and traffic volume.

Non-signalized crosswalk in Downtown Missoula

As vehicle speeds increase above 20 mph, the chances of a pedestrian fatality increase exponentially. Additional risks to pedestrians arise from multiple vehicle lanes, such as the "double threat" where vehicles in one lane yield for the pedestrian, but those in the second have reduced visibility of the pedestrian and don't stop. The more traffic there is along a roadway, the greater the chance of vehicle/pedestrian conflicts.

Many strategies exist to mitigate these risks, such as enhanced crossings with marked crosswalks, raised medians, rapid flashing beacons, pedestrian hybrid beacons, modern roudabouts and lane reconfigurations, or other signals. These features help to raise awareness of the presence of pedestrians, and provide varying cues for motor vehicles to stop and yield for a pedestrian crossing at an intersection or mid-block.

An analysis of all intersections within the Urbanized Area compared pedestrian risk factors (Table 5) with improvements (Table 6). Intersection scoring used the following formula and matrices, with higher scores equaling greater potential risk to a pedestrian:

Table 5. Risk Scoring

Speed (mph)	Points	Volume (AADT)	Points	Lanes	Points
25	1	0 - 3,000	1	2	1
30	2	3,001 - 9,000	2	3	2
35	3	9,001 - 15,000	3	4	3
40	4	15,000+	4	5+	4
45+	5				

Risk - Improvements = Risk Score

Equation 2: Risk Equation

Table 6. Improvement Scoring

Improvement Type	Points
Traffic signal	8
Roundabout	8
RRFB/ped signal	7
Marked crosswalk	3
Median refuge	3
Curb extension	2
Traffic circle/calming feature	2

The results from the intersection analysis are shown in Figure 12. Prioritization of intersection improvements should consider the scoring for relative risk as well as other factors such as: the pedestrian facilities needs assessment area (low, medium or high priority areas); connections to destinations such as transit stops, parks, schools, and the primary commuter path network; and priorities identified in the Community Transportation Safety Plan. Intersection improvements at the higher risk locations should be considered when located within other roadway improvement projects.

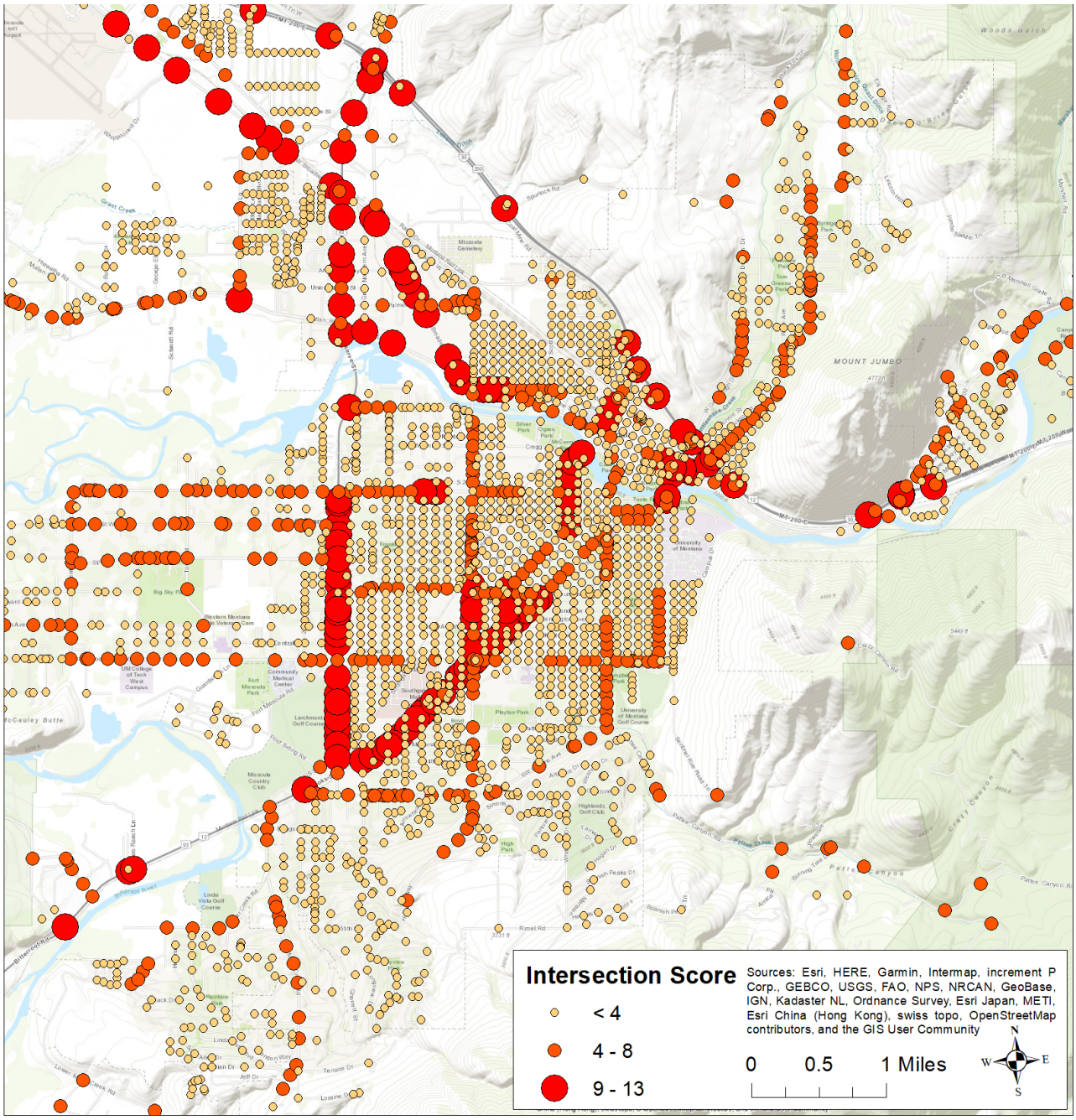


Figure 12. Priority Intersections Map

The Federal Highway Administration (FHWA) has developed a field guide which suggests utilizing roadway configuration, speed limits, and volume (AADT) to determine potential treatments for uncontrolled crossings. Based on these measures, several crossing treatments are recommended as possible feasible countermeasures.

Local characteristics were utilized to modify the FHWA field guide and identify which safety treatments may be feasible under certain local traffic conditions in uncontrolled crossing environments throughout the Missoula Urbanized Area. Table 7 shows the resulting recommendations.

Table 7. Recommended Countermeasures for Uncontrolled Intersections

Roadway Configuration	Speed Limit (mph)											
	≤30	35	≥40	≤30	35	≥40	≤30	35	≥40	≤30	35	≥40
	<3,000 AADT			3,000 - 9,000 AADT			9,000 - 15,000 AADT			>15,000 AADT		
2 lanes (one lane in each direction)	N/A	N/A	N/A	**1 2 3 4 5**	**1 2 4 5 6**	**1 2 4 5 6**	**1 2 3 4 5**	**1 2 4 5 6**	**1 2 4 5 6**	**1 2 3 4 5 6**	**1 2 4 5 6**	**1 2 4 5 6**
3 lanes (raised median, one lane in each direction with left turn lanes)	N/A	N/A	N/A	**1 2 3 4**	**1 2 4 6**	**1 2 4 6**	**1 2 3 4 6**	**1 2 4 6**	**1 2 4 6**	**1 2 3 4 6**	**1 2 4 6**	**1 2 4 6**
3 lanes (no raised median, one lane in each direction with two-way left turn lanes)	N/A	N/A	N/A	**1 2 3 4 5 6**	**1 2 4 5 6**	**1 2 4 5 6**	**1 2 3 4 5 6**	**1 2 4 5 6**	**1 2 4 5 6**	**1 2 3 4 5 6**	**1 2 4 5 6**	**1 2 4 5 6**
4+ lanes (raised median, 2+ lanes in each direction)	N/A	N/A	N/A	**1 2 4**	**1 2 4 6**	**1 2 4 6**	**1 2 4 6**	**1 2 4 6**	**1 2 4 6**	**1 2 4 6**	**1 2 4 6**	**1 2 4 6**
4+ lanes (no raised median, 2+ lanes in each direction)	N/A	N/A	N/A	**1 2 4 5 6 7**	**1 2 4 5 6 7**	**1 2 4 5 6 7**	**1 2 4 5 6 7**	**1 2 4 5 6 7**	**1 2 4 5 6 7**	**1 2 4 5 6 7**	**1 2 4 5 6 7**	**1 2 4 5 6 7**

Possible Treatments:

1. High visibility crosswalk markings, parking restriction on crosswalk approach, adequate night time lighting levels
2. Advanced yield to pedestrians sign and marked line
3. In-street pedestrian crossings sign
4. Curb extension
5. Pedestrian refuge island
6. Pedestrian hybrid beacon/flashing beacon
7. Road diet

Note: Bold white text signifies the safety treatment should always be considered, but not mandated or required, based on engineering judgement. Other numbers noted signify the safety treatment is a candidate but does not always need to be considered. Crossing treatments are unnecessary for most intersections below 3,000 AADT. (Adapted from the FHWA: https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/pocket_version.pdf)

County Prioritization

Funding and pedestrian facility types outside the City of Missoula will follow a different process and prioritization due to different development patterns and overall density. Many of the neighborhoods outside city limits have different characteristics, and in many cases existing development densities will not support the need or cost of full sidewalk, curb and gutter along all roadways. Rather, the need for pedestrian facility type and location will depend on the localized neighborhood characteristics. The following is an overview of the primary neighborhoods within the urbanized area outside the City of Missoula and the anticipated needs for pedestrian facilities within each. Resources such as the Small Town and Rural Design Guide should be utilized to determine appropriate pedestrian solutions based on an areas unique challenges.[1]

Target Range/Orchard Homes

The predominant development pattern in the Target Range/Orchard Homes area is suburban or rural suburban. Most streets have few if any curbs, gutters or sidewalks and block lengths are quite long. Most pedestrian traffic is accommodated by shared-use paths or shoulders adjacent to one or both sides of the roadway. Examples include Clements Rd and South Ave. In many cases, local roads have little to no traffic, so on-road space such as signed and striped shoulders may be appropriate. As funding becomes available, the priority in this region of Missoula will be to provide additional shared-use path connections along the collectors and arterials. As new development occurs and densifies particular locations to urban levels, sidewalks, curb and gutter should be considered at the time of development approval.

1 Alta Planning + Design. "Small Town and Rural Design Guide: Facilities for Walking and Biking." Rural Design Guide, 2018, ruraldesignguide.com/.

Widened shoulder as a designated walkway near Spurgin Rd

East Missoula/Bonner/Milltown

In East Missoula, development has resulted in a denser urban grid pattern, with Highway 200 cutting through the center of the community as a main street. Depending on the desires of the community, sidewalk construction should be prioritized along Highway 200 first, to create a complete street along the urban arterial roadway. For other streets that are residential and lower in volume, sidewalks may still be appropriate but narrow right-of-way and other constraints may be a factor in final design.

Low speed, low volume roadway in E Missoula

Bonner and Milltown also have characteristics of urban development patterns, such as higher density and a gridded street network with smaller blocks. Some streets in these neighborhoods have sidewalks, and portions of the regional trail network are in place along Highway

200. Extensions of the Milwaukee/Kim Williams Trails may serve these neighborhoods in the future. If additional development occurs in this area at urban densities, consideration should be given to sidewalk requirements with new development. Existing streets should be upgraded to complete streets if the communities express desire or safety of pedestrians becomes a greater concern due to increased traffic conflicts.

Mullan west of Reserve

Ongoing planning processes will determine the future of this area. It is currently characterized by a mix of suburban residential development patterns, with curb, gutter and sidewalks installed along with other roadway infrastructure at the time of development. If this area continues to develop at higher densities to accommodate future growth in the region, streets should be constructed as complete streets with sidewalks, preferably with a boulevard and trees. Additional pedestrian connectivity should be provided through additional shared-use path access to the Milwaukee and Grant Creek Trails, providing regional commuter and recreational opportunities.

ADA Facilities

In addition to prioritizing new sidewalks, both the City and County should maintain or expand current programs aimed at upgrading existing facilities to meet or exceed ADA requirements. Additional information on the barriers, strategies, and implementation can be found in Section 4 of this plan.

Non ADA-compliant pedestrian infrastructure along Spruce St

Applying Analyses to Project Selection

Given limited funding capacity, pedestrian infrastructure construction and maintenance must be well-organized and prioritized, while remaining flexible enough to take advantage of nearby projects or new development which may decrease overall costs or have the ability to meet pedestrian needs more efficiently. The analyses outlined throughout Section 3 should be used by Engineering staff to develop a list of recommended projects with the caveat that it is often to take advantage of opportunities to minimize construction costs and enhance the connectivity and accessibility of the overall system to the largest degree possible.

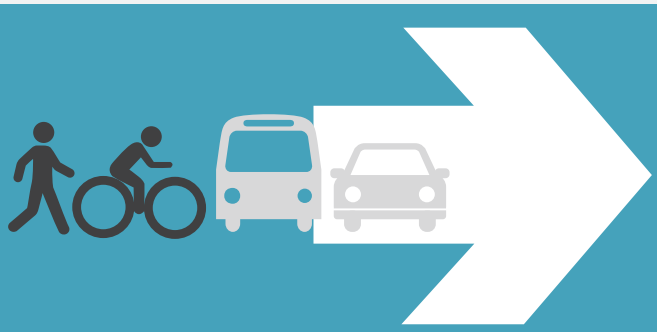
Alongside professional judgment and the most recent design guidlines, project selection should begin with the Priority Pedestrian Needs Map and focus in areas of the highest priority. Missing sidewalks and sidewalk condition data should be used in conjunction with the map to determine projects that are within a high priority area, but also do not have an existing facility or have a facility of low quality that may require replacement or maintenance. Projects that help fill gaps in existing connections or help to connect major corridors may be identified as a top priority project. Additionally, projects that help achieve the goals of tha ADA Transition Plan (Section 4) by the completion of pieces of the ADA network may be prioritized more quickly.

The “Priority Intersections Map” may be used in one of two ways. The first is to acknowledge which intersections may require improvements while also showing how far away other safe crossings are; the second is to locate existing safe crossings in the pedestrian network and to focus pedestrian connections around infrastructure and conditions that already provide adequate options for users. This map can be used with the Priority Pedestrian Needs Map to also determine which crossings are located within the highest pedestrian priority areas.

Since the needs analyses is most applicable to areas within or near city limits, the County Prioritization section outlines important guidelines for addressing specific characteristics of neighborhoods located within the County. It’s crucial that a one size fits all approach is avoided throughout the entire Urbanized Area, but especially in areas of the County for which traditional sidewalk design and prioritization tactics may not be appropriate.

Construction of the Grant St Community Development Block Grant (CDBG) Project

Section 4: ADA Transition Plan



ADA Transition Plan

The Americans with Disabilities Act of 1990 provides comprehensive civil rights protections to persons with disabilities, and Title II (28 CFR Section 35) requires state and local entities develop an ADA Transition Plan addressing the entities' facilities. Specific to the PFMP, if a public entity has responsibility or authority over streets, roads, or walkways, its transition plan shall include a schedule for providing curb ramps or other sloped areas where pedestrian walkways cross curbs, giving priority to walkways serving entities covered by the Act. This also includes State and local government offices and facilities, transportation, places of public accommodation, and employers, followed by walkways serving other areas.

The ADA Transition Plan is an evolving document for planning and monitoring of ADA improvements. It identifies barriers that prevent persons with disabilities from accessing public facilities. The goal of the ADA Transition Plan is to provide quality access to the maximum extent feasible. At a minimum, this plan should:

- Identify physical obstacles in the public entity's facilities that limit the accessibility of its programs or activities to individuals with disabilities;
- Describe in detail the methods that will be used to make the facilities accessible;

Pedestrian with a visual impairment using a crosswalk

- Specify the schedule for taking the steps necessary to achieve compliance with this section, and if the time period of the transition plan is longer than one year, identify steps that will be taken during each year of the transition period; and
- Indicate the official responsible for implementation of the plan.

Barriers to Accessibility

The presence of truncated domes and quality curb ramps at street crossings is a crucial, yet incomplete, picture of an accessible and connected ADA network. Challenges such as poor sidewalk and path conditions due to cracking, spalling, or exposed tree roots and incomplete snow removal pose problems to safe and comfortable travel. Slopes that are too steep, lack of communication devices and tactile warnings, and uncontrolled vegetation all create barriers to the accessibility of public spaces. Physical barriers such as construction zones, parking lots and blocked alleyway crossings, and on-street parking should be addressed prior to construction of all pedestrian facilities and right of way issues, but ADA needs should be properly and individually addressed. Additionally, reasonable access to public buildings and bus stops is necessary to ensure there are no major barriers to daily trips.

Strategies for Removing Barriers

In order to remove existing barriers to accessibility, the following strategies should be considered:

- Coordinate with streets and other construction projects for the construction and retrofit of curb ramps.
- Construct, remove, replace, and continue to maintain sidewalks as necessary.
- Identify ADA compliance needs during scheduled maintenance activities.
- Implement Missoula's Complete Streets Policy.
- Continue the Vegetation Management Program.
- Perform field inspections and GIS inventory updates.
- Ensure all projects included in the LRTP, TIP, and CIP meet accessibility requirements when built.
- Adopt Public Rights-of-Way Accessibility Guidelines

(PROWAG), as it provides the greatest guidance in ensuring accessibility of all facilities in the public right-of-way.

Strategies Specific to Vision Impairments:

- Construct straight line facilities, with clear and defined edges.
- Consider wayfinding, which includes installing truncated domes or other tactile cues in a consistent manner, to orient pedestrians in a straight line toward opposing sidewalk ramp.
- Investigate innovative wayfinding methods such as app-based beacons and other technology to identify key locations for pedestrians with a vision related disability.
- Utilize signals and other improvements at roundabouts to accommodate individuals with vision impairments.
- Train staff with walking audits to ensure projects meet the needs of pedestrians with blindness or other vision impairment. Examples of issues to be evaluated include signal timing, push button locations, wayfinding and orienteering at intersections/other crossings and point-to-point accessibility.

Strategies Specific to Mobility Impairments:

- Consider point-to-point access in terms of right-of-way/sidewalks to front door/destinations.
- Conduct walking audits of projects to identify issues early in the design process.
- Establish criteria for what makes a route "accessible", then develop communication/route wayfinding.
- Address alley intersections in locations that otherwise have sidewalks and curb ramps. One strategy to address alley crossing is to construct temporary asphalt ramps during alley paving.

Prioritization of Improvements

The City of Missoula currently requires that sidewalk hazards identified through a complaint system be replaced by the property owner. Although the adjacent property owner pays the full cost of sidewalk hazard repair, the City allows payment of the costs to be spread over 8, 12, or 20 years through a property tax assessment. In addition to the hazard mitigation priorities,

Truncated domes on a shared-use path in Orchard Homes

other ADA improvements to the sidewalk system are prioritized using the current draft MSP. The plan ranked areas of the city by location of attractors and generators, such as the University of Montana, commercial centers, and higher density residential development. Funding for sidewalk repairs and ADA improvements are funded in part through a set-aside from the Road District special revenue account, otherwise known as the "sidewalk subsidy" program. This program funds about 60 percent of city-ordered sidewalk projects, with the remainder paid for by the adjacent property owner.

As discussed in the report on the pedestrian priority needs assessment, this planning process resulted in a map with priority areas for sidewalk improvements based on socio-economic characteristics and pedestrian attractors, as well as a general condition assessment for all sidewalks and curb ramps within the Missoula region. Prioritization of ADA improvements will use a combination of the priority map and the existing sidewalk condition assessment. Top priority improvements will be located in areas designated as high priority on the map that are also lacking acceptable ADA components and/or have poor condition assessment ratings. Projects with special requests or complaints will also take priority, and ADA-compliant facilities will continue to be implemented as part of all sidewalk construction or rehabilitation projects. The number of ADA-compliant curb ramps provided annually should meet or exceed the total required for

street projects. Additional crossing improvements, such as communication devices, should be considered in all intersection improvement projects or as identified through the Community Transportation Safety Plan.

ADA-Specific Funding Alternatives

In addition to the pedestrian facility funding alternatives discussed in Section 5, other supplementary funding options may be appropriate for ADA specific projects:

- Commercial Driveway Assessment: Commercial property owners assessed for driveway repairs associated with ADA compliance. Owners may have the option to construct or repair a driveway, or pay a fee over the course of five to ten years.
- Enforcement Fees: Charge added to pedestrian/sidewalk-related or accessible parking violations (failure to yield to pedestrians, blocking a crosswalk/sidewalk, parking in or blocking an accessible parking spot, etc.)
- Transportation Alternatives, ADA specific, or health-related grants: Federal Transportation Alternatives funds focus on pedestrian and bicycle facilities, for which ADA projects are eligible. Targeted grants may also be available for projects providing access for persons with disabilities or increased health incentives from applicable agencies.

Recommendations for Implementation

In conjunction with the implementation strategies for the broader Missoula area pedestrian network, there are multiple ADA-specific recommendations for the execution of the Transition Plan. First, in order to push ADA projects forward and maintain existing infrastructure, stable and adequate funding must be made available. Working with existing funding sources and taking opportunities to explore and take advantage of new additional resources helps work towards the development of a stronger, more connected ADA pedestrian network. In addition to securing appropriate funding, elected officials and staff must be informed and educated on ADA requirements. In doing so, policies and programming that will better support an accessible network, may open up resources for the implementation of additional ADA sidewalk assessment programming. The current sidewalk assessment program should continue to be updated with the help of Engineering and Public Works departments. Since snow and ice are a large barrier to pedestrian activity, especially for persons with disabilities, the amount of ongoing public service announcements on snow removal policies should be increased, along with enforcement of snow removal regulations. Lastly, evaluation of the ADA network should be ongoing, starting with strategies such as an ADA network connectivity analysis.

Responsible Official

For projects located in public right-of-way, the City's Public Works Director, in cooperation with the City Engineer, will be responsible for the implementation of the construction and maintenance of ADA facilities discussed in the ADA transition plan.

ADA Transition Schedule

In order to meet the goals of the plan, the targets in Table 8 are recommended for funding and implementation of sidewalk improvements within the City of Missoula:

Table 8. Transition Plan Schedule

Target	Implementation Schedule (yrs)	Estimated Costs	Cost per year
Install missing ADA facilities for all sidewalk in the highest priority category (Figure 11)	30	$2,457,000	$81,900
Upgrade existing ramps/facilities in the highest priority category	30	$2,905,000	$96,833
Complete 3.33% of citywide ADA facilities each year	30	$17,010,000	$567,000

**All values shown in $2018 and based on adopted 2010 ADA Standards for Accessible Design*

Section 5: Implementation

Implementation

In order to achieve the ambitious pedestrian mode split goal set out in the LRTP of tripling pedestrian commute trips, an ambitious approach toward implementation is necessary. The likelihood of reaching desired outcomes depends heavily on the ways in which funding, policies, and additional strategies work in cooperation with the tools laid out in the PFMP.

Based on the sidewalk condition data and the City's sidewalk and roadway inventories, it is estimated that between 200-300 miles of sidewalk are currently missing. Under the current funding and construction rate, it would take nearly 100 years to complete the sidewalk network for the City of Missoula. The following recommended implementation strategies will help staff and elected officials prioritize projects, design appropriate facilities, and identify funding sources.

Project Selection

In order to be as effective as possible and maximize funding, project development must consider where we can achieve the greatest impact. Utilizing the "Priority Pedestrian Needs Analysis Map" (Figure 11, page 31), staff should consider elevating projects within the high priority areas. Based on the priorities identified during the process of developing this plan, linkages to parks, schools, trails, and transit stops need further consideration during the planning and funding phase of project development. As sidewalk projects or other roadway improvements are planned, staff should evaluate if additional improvements are necessary to reduce intersection crossing barriers identified in Figure 12 (page 34). These intersection crossing measures can often be constructed at little expense, but significantly increase pedestrian connectivity within Missoula.

In addition to new sidewalks constructed as part of the City's annual program, both the City and County should regularly look for opportunities to improve connectivity in other places, such as within unique county prioritization areas, and expand opportunities to implement the ADA Transition Plan.

With limited funding capacity, the need to maximize benefits and decrease construction time may sometimes require the ability to fast track certain projects, while holding off on others. For example, through coupling pedestrian projects with adjacent roadway projects that are currently underway, the speed and cost-effectiveness of projects may improve, and projects lower on the priority map may become low-hanging fruit. Additionally, if a sidewalk or trail project can be combined with bicycle facility maintenance or complete streets project, it may be more beneficial to move the sidewalk project forward in order to maximize funding availability and allow for more immediate implementation.

Funding

Pedestrian infrastructure has historically been funded through special improvement districts (SID), new development, and taxes. Funding provided for sidewalks, curbs, boulevards, and street trees through the City's earliest SIDs contributed significantly to Missoula's existing pedestrian network. Currently, a variety of funding sources exist for the construction and maintenance of pedestrian infrastructure. For example, shared use paths, which form the backbone of Missoula's non-motorized transportation network, primarily via the Milwaukee and Bitterroot Trails, are typically funded through sources such as grants, park impact fees, and private development. Meanwhile, sidewalks, which are the most widespread type of pedestrian infrastructure in Missoula, are funded through a combination of property owner assessments, the road district subsidy program, tax increment financing (TIF), and additional grant funding.

Over the last 5 years, the City of Missoula has completed an average of 3 miles of sidewalk each year through the subsidy program (including property owner assessments) at an average cost of $1.2 million per year. An additional 1.7 miles of sidewalk, on average, are constructed by the Missoula Redevelopment Agency using TIF funds within urban renewal districts, at an average cost of $575,000 per year. Private developers also construct sidewalks as a requirement for building residential or

commercial projects. It is currently unknown how much sidewalk is completed annually via these private development projects, and it is likely significant city-wide. Still, incremental construction through development does not typically create complete connections, unless the project involves multiple properties or blocks.

Infrastructure grants are an attractive option for sidewalk construction. They can be used to offset costs to homeowners and taxpayers and help create much-needed connections. However, with only a few successful requests over the last decade, grant funding potential is limited. The City of Missoula recently completed a sidewalk project using a Community Development Block Grant (CDBG) funding to build connections in neighborhoods identified as having high rates of persistent poverty, adult obesity, and other health disparities. CDBG funds must be used in low to moderate income neighborhoods, and this grant was able to cover the assessed portion of the construction costs, offsetting the costs to property owners in the Westside and Franklin to the Fort neighborhoods. Grants such as these can help Missoula achieve goals related to health and equity while offsetting impacts to residents of low and moderate income neighborhoods.

Table 9. Funding Alternatives

Source	Description
Fee-in-Lieu	The sidewalk Fee-in-Lieu allows for a fee to be paid in lieu of building sidewalks, given the project meets certain criteria. If criteria are met, the responsible party has the option to pay a fee that is set aside in a fund for sidewalk construction (usually within a certain distance from the project at hand).
Public/Private Partnerships	Through establishing strong public-private partnerships, it may be possible to impact sidewalk construction for mutual benefits.
General Obligation Bonds	General Obligation Bonds may be used in conjunction with other funding sources to periodically restore, replace, or expand pedestrian infrastructure or other capital assets around the region.
Trail/Sidewalk Sponsorships	Sidewalks, trails, and other pedestrian infrastructure require reoccurring repairs. Sponsorships may allow for certain corridors to have a set-aside funding source to help cover maintenance costs.
Additional Grants	Ongoing research and outreach regarding new or previously not applied for available grants is crucial in continuing to discover and secure new funding sources.
Sidewalk Alternatives	The use of alternative paving materials or facility designs may lower the cost of the construction and maintenance of pedestrian infrastructure. Examples of possible alternatives to traditional sidewalk materials can be found in Appendix F.
Policies for Non-Traditional Facilities	By redefining policies for sidewalk design and/or requirements, construction costs may be decreased in locations for which a non-traditional facility may be contextually appropriate (i.e. sidewalks on one side of the road, striped pedestrian facilities on low speed/volume streets, etc).
Special Improvement Districts (SID)	A current “Road District” exists that is expected to pay for roadway construction and maintenance, bicycle and pedestrian facilities. A separate, dedicated SID for sidewalks would allow staff to implement the PFMP according to its priorities, while other programmed roadway projects could also help complete the pedestrian facilities network.

Funding Alternatives

In addition to existing funding sources, the alternatives listed in Table 9 may provide either an additional funding source or the ability to lower construction or maintenance costs, freeing up existing funds for additional work.

Implementation Strategies

In order for the PFMP to be a success, it's crucial to take a multifaceted approach to implementation that includes the involvement of multiple agencies, continued assessment, and continued research and creativity with respect to funding. The following strategies (summarized in Figure 13) are helpful in the application of this plan to project selection and the continued evaluation and improvement of Missoula's pedestrian network.

Coordination

Successful implementation of this plan and subsequent pedestrian projects will require coordination at multiple levels. It will be essential for MPO staff to coordinate with City and County departments and agencies to better address pedestrian projects and potential challenges. All roadway construction and maintenance projects within the metropolitan planning area should be evaluated for their potential to improve the pedestrian network and correspondingly leveraged to decrease the costs of pedestrian improvements. Coordinating auto- and pedestrian-oriented transportation projects can have a significant impact on project costs.

Data Management

As improvements continue to be made to the pedestrian network it is essential to maintain accurate data. All pedestrian facility projects, including the construction of new sidewalks and maintenance of the existing network, should be documented and updated within the sidewalk inventory. Documentation of the incremental updates to the pedestrian network will allow the MPO to assess the network at a more refined scale (i.e. sidewalk conditions will be evaluated by parcels rather than blocks). Managing and ensuring the accuracy of data will be an integral component to selecting appropriate projects and improving the overall pedestrian network.

Safety

Preserving and enhancing safety within the pedestrian network will be a critical component to encouraging more people to walk for more trips. Ensuring safety is also a multifaceted challenge which will require education, public commitment, infrastructure improvements, evaluation, and maintenance. It is essential that local agencies and citizens collaborate to ensure that public facilities are properly maintained and serviced, to reduce the risk of injury. Ensuring safety will also require determining and implementing ideal distances between crosswalks in addition to various other infrastructure investments to enhance perceived and actual safety.

Design

Proper facility design begins with official engineering standards but should aim to meet NACTO guidelines and other best practices as outlined in documents such as the Urban Street Design Guide. Accessibility is of the upmost importance and all design standards should be fully compliant with ADA standards, in addition to emphasizing user comfort. When feasible, engineers and planners should go beyond mandatory minimums and design pedestrian facilities that allow for people to walk side by side, increase the likelihood of walking for transportation, and enhance civic life.

Aesthetics and environmental sustainability should remain a focal point for pedestrian facilities in the urban area. These design aspects increase walkability and create a more inviting, comfortable, and oftentimes safer and more accessible walking environment. One way to improve walkability is to plant a variety of street trees; results from a survey conducted during the 2014 2-hour bicycle and pedestrian counts revealed that the most commonly desired improvement among interviewed pedestrians was "more shade trees."[1] The optimal goal for tree canopy cover is between 30 to 40 percent (as outlined in the 2015 *Urban Forestry Master Plan*), but Missoula's current coverage hovers somewhere around

1 2014 Missoula Bicycle & Pedestrian Count Report. Missoula Metropolitan Planning Organization. 2015.

10 percent. To address Goal 6 of the 2015 *Urban Forestry Master Plan*, the City of Missoula has maintained an accurate inventory of public trees, which currently consists of 28,702 unique trees.[2] Planting additional street trees provides benefits such as reduced traffic speeds, protection from roadways and natural elements such as rain and sun, improved air quality, and lower urban temperatures.

Maintenance

In order to create a quality, sustainable pedestrian network, facilities must be properly maintained on a regular basis. It's important to ensure existing infrastructure remains in at least good to excellent condition per Missoula's sidewalk assessment ratings to provide usable and comfortable spaces for users of all abilities. In addition to regular maintenance activities for expected wear and tear, general property maintenance such as vegetation control, snow removal, and de-icing by homeowners provides safe and usable walkways. Public education and programming helps to inform property owners and renters about maintenance requirements, while creating opportunities for neighborhoods to make their spaces safer and more comfortable for everyone. Lastly, alternative maintenance methods for allocating responsibilities should be researched to try and identify new ways to make maintenance tasks easier, more thorough, and less taxing on existing funding sources.

Funding

Given the need for extensive sidewalk construction and maintenance and limited funding capacity, it's crucial to maximize the use of existing dollars. Comparing the marginal cost of pedestrian infrastructure with roadway improvements and parking, an increased walking mode share would already have the potential to decrease overall transportation costs. However, given the existing mode share, in addition to proper design and the continuous search for new funding sources and grant opportunities, it's important to encourage existing relationships and cultivate new public-private partnerships in pursuit of decreasing overall costs and maximizing benefits. Researching certain cost-sharing programs and encouraging pilot pedestrian projects that utilize alternative materials or creative design alternatives to traditional sidewalks (Appendix E) may create opportunities to cut costs and increase the sustainability of the pedestrian network within the Missoula urban area.

Encouragement & Education

By creating vibrant and enticing walking environments, public life is enhanced. However, great spaces aren't the only thing helping to create a healthy and thriving walking culture. It's important to provide education and programming to the public through community events, outreach, workplace incentives, and utilizing Missoula in Motion (MIM) and other community resources and expertise.

Evaluation

To determine the effectiveness and competency of these implementation strategies for moving towards achieving plan goals, certain evaluation steps should be taken on a regular basis moving forward. In doing so, we should continue to track all pedestrian-related crashes in cooperation with MDT while working towards deriving safe pedestrian solutions for certain locations with high crash volumes or other emerging safety issues. We should evaluate Travel Demand Management (TDM) methods and improve how they address pedestrian needs, while also beginning to assess the success of the priority pedestrian needs assessment outlined in this plan. Lastly, an ADA connectivity network analysis should be performed to determine the location of any major gaps in the ADA network to illustrate the shortcomings and priority needs for ADA infrastructure.

2 *2015 City of Missoula, Montana Urban Forest Master Management Plan. Urban Forest Management Plan Working Group. Missoula Parks and Recreation. 2015.*

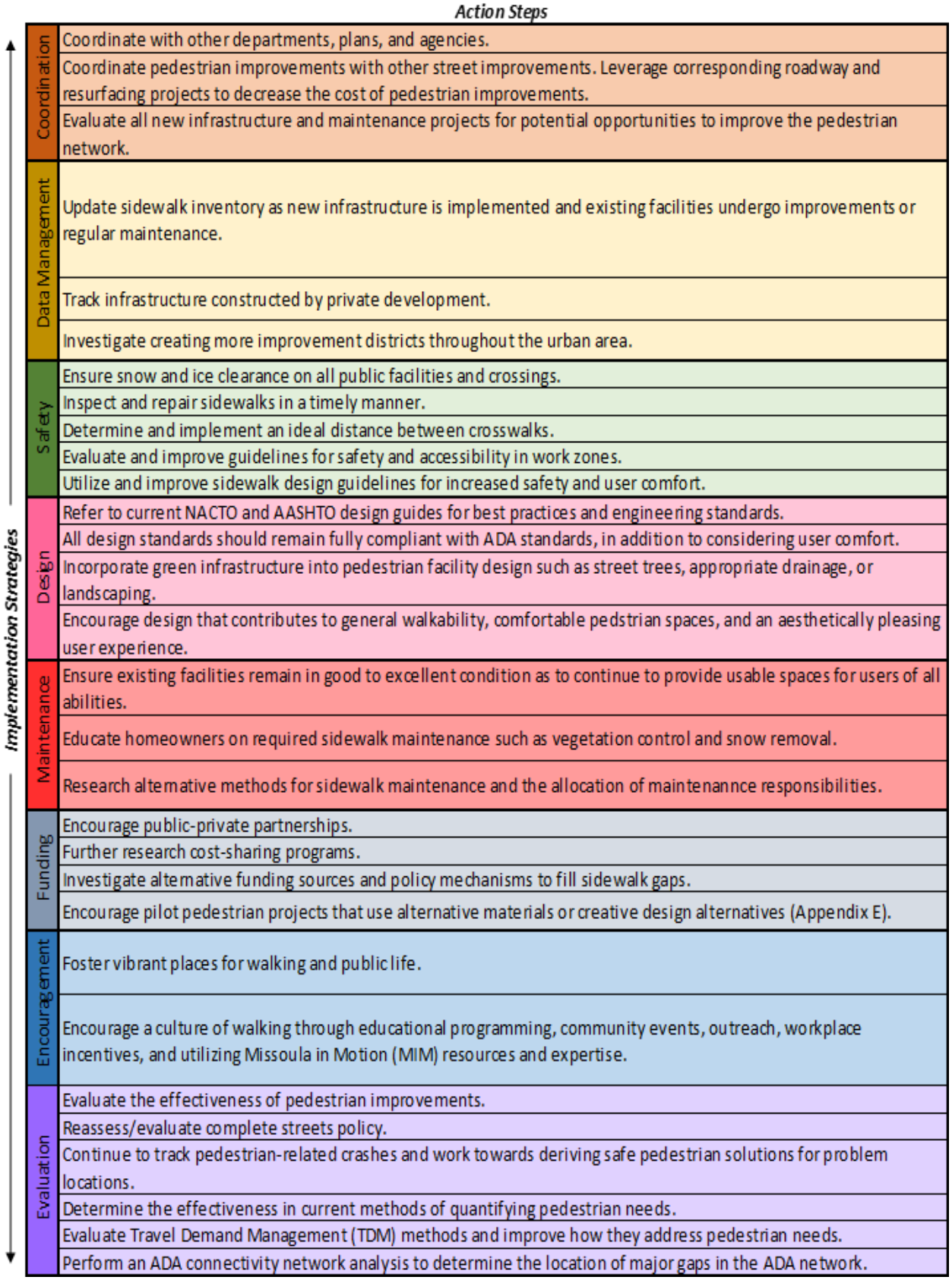


Figure 13. Implementation Strategies Summary

Appendix A: Pedestrian Survey

Missoula Pedestrian Facilities Master Plan 2017 Survey:

How much of a barrier to walking in Missoula, if at all, is poor lighting?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, are sidewalks/walking paths missing on BUSY streets?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, are sidewalks/walking paths missing on RESIDENTIAL streets?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, are people driving too fast on BUSY streets?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, are people driving too fast on RESIDENTIAL streets?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, are drivers not stopping for pedestrians crossing the street?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, is not having enough safe places to cross busy streets?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, are missing curb ramps at intersections?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, are buckled/cracked/uplifted sidewalks, or other tripping hazards?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

How much of a barrier to walking in Missoula, if at all, is not having enough time to cross the street?

- ☐ Not a barrier at all
- ☐ A small barrier
- ☐ A medium barrier
- ☐ A large barrier
- ☐ An absolute barrier

Please list any other challenges associated with walking in Missoula in the space below.

_____

_____

_____

In Missoula, how important is addressing and improving walking on streets connecting families and children to schools?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking on streets connecting people to transit/bus stops?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking in areas that serve low-income and transit-dependent populations?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking on streets where pedestrians have been injured or killed?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking on streets connecting people to neighborhood shops and services?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking in areas where most people live and/or work?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking on streets connecting people to parks?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking on streets connecting people to libraries, community centers, and other community facilities?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking along and across busy streets?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking on residential streets lacking sidewalks or walking paths?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

In Missoula, how important is addressing and improving walking on connections to shared-use paths (for use by pedestrians and cyclists)?

- ☐ Not that important
- ☐ Somewhat important
- ☐ Moderately important
- ☐ Very important
- ☐ Absolutely critical

Please list any other important places to be addressed or improved for walking in Missoula.

_____

_____

_____

What neighborhood do you live in?

_____

_____

What is your age?

- ☐ Under 18
- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65 or older

What is your gender?

- ☐ Female
- ☐ Male
- ☐ Both/transgender/gender non-conforming/other

What is your race or ethnicity? Please select all that apply.

- ☐ African
- ☐ American Indian/Native American/Alaskan Native
- ☐ Asian or Pacific Islander
- ☐ Black/African American
- ☐ Hispanic/Latino
- ☐ Slavic
- ☐ White/Caucasian
- ☐ Middle Eastern
- ☐ Other: _____

Do you live with a disability? Please select all that apply.

- ☐ No
- ☐ Yes, hearing-related
- ☐ Yes, vision-related
- ☐ Yes, mobility-related
- ☐ Yes, cognitively/intellectually-related
- ☐ Yes, other

Appendix B: Socio-Economic Data Maps

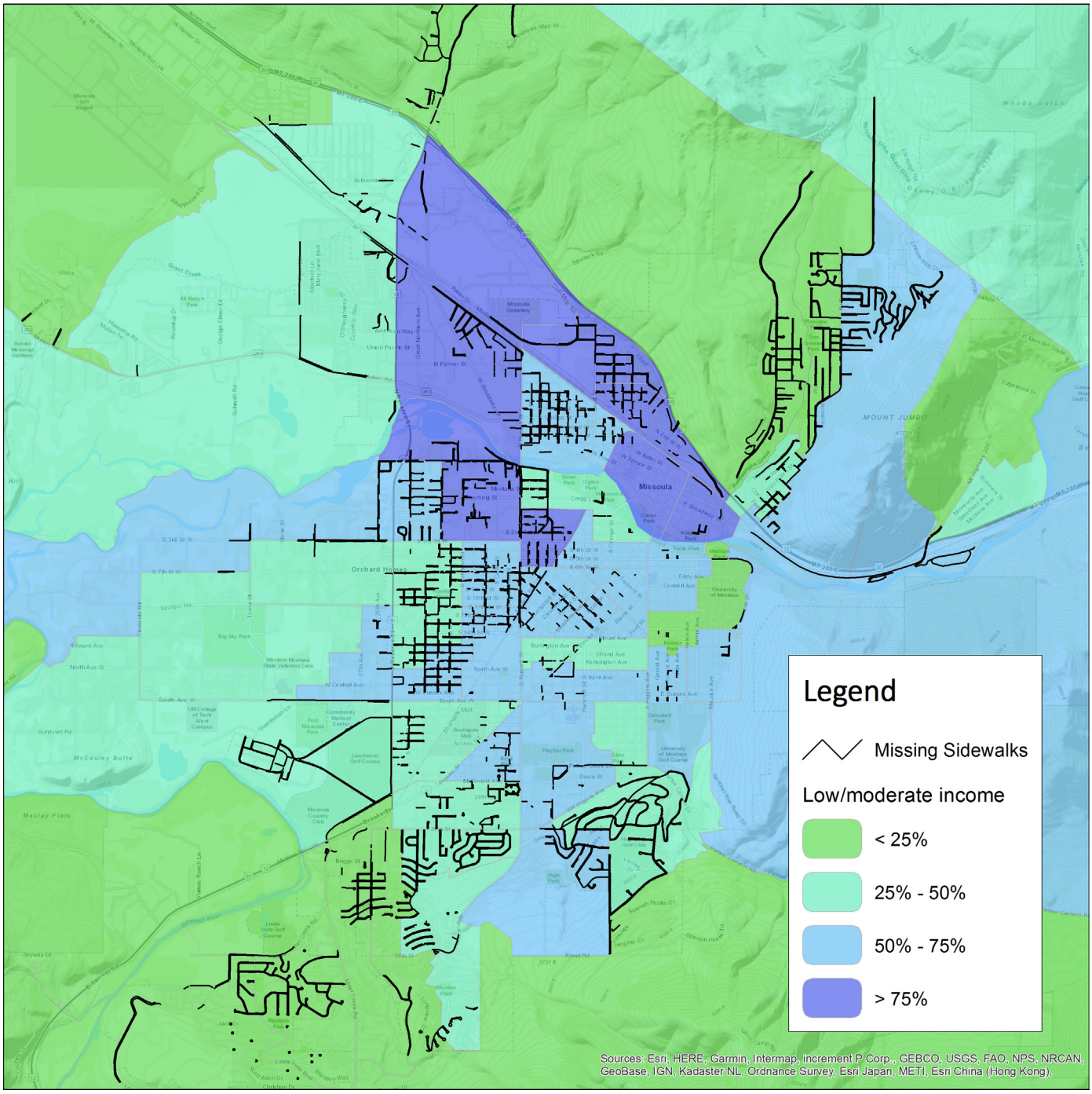


Figure 14. Low/Moderate Income Map

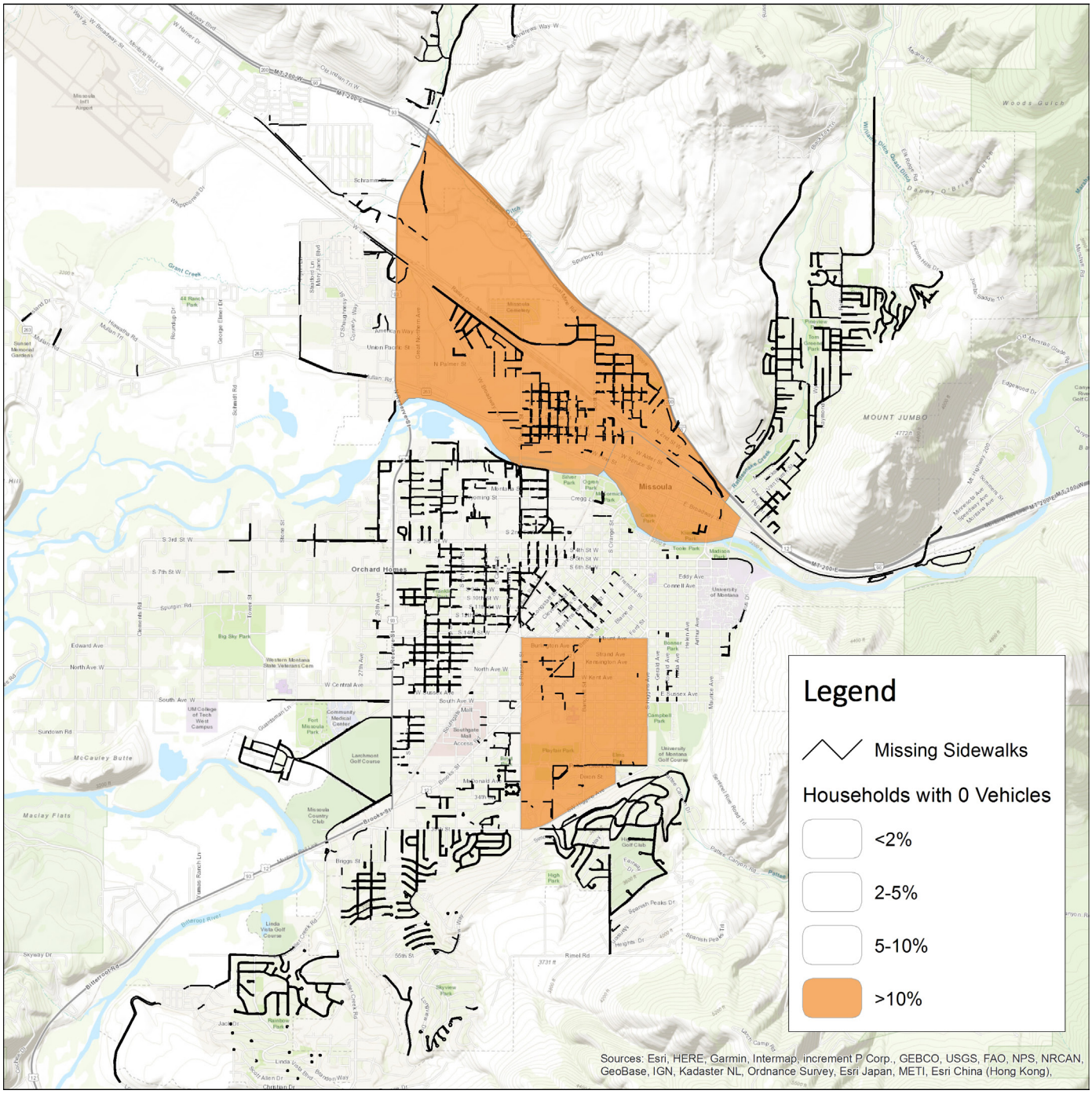


Figure 15. Households with Zero Vehicles Map

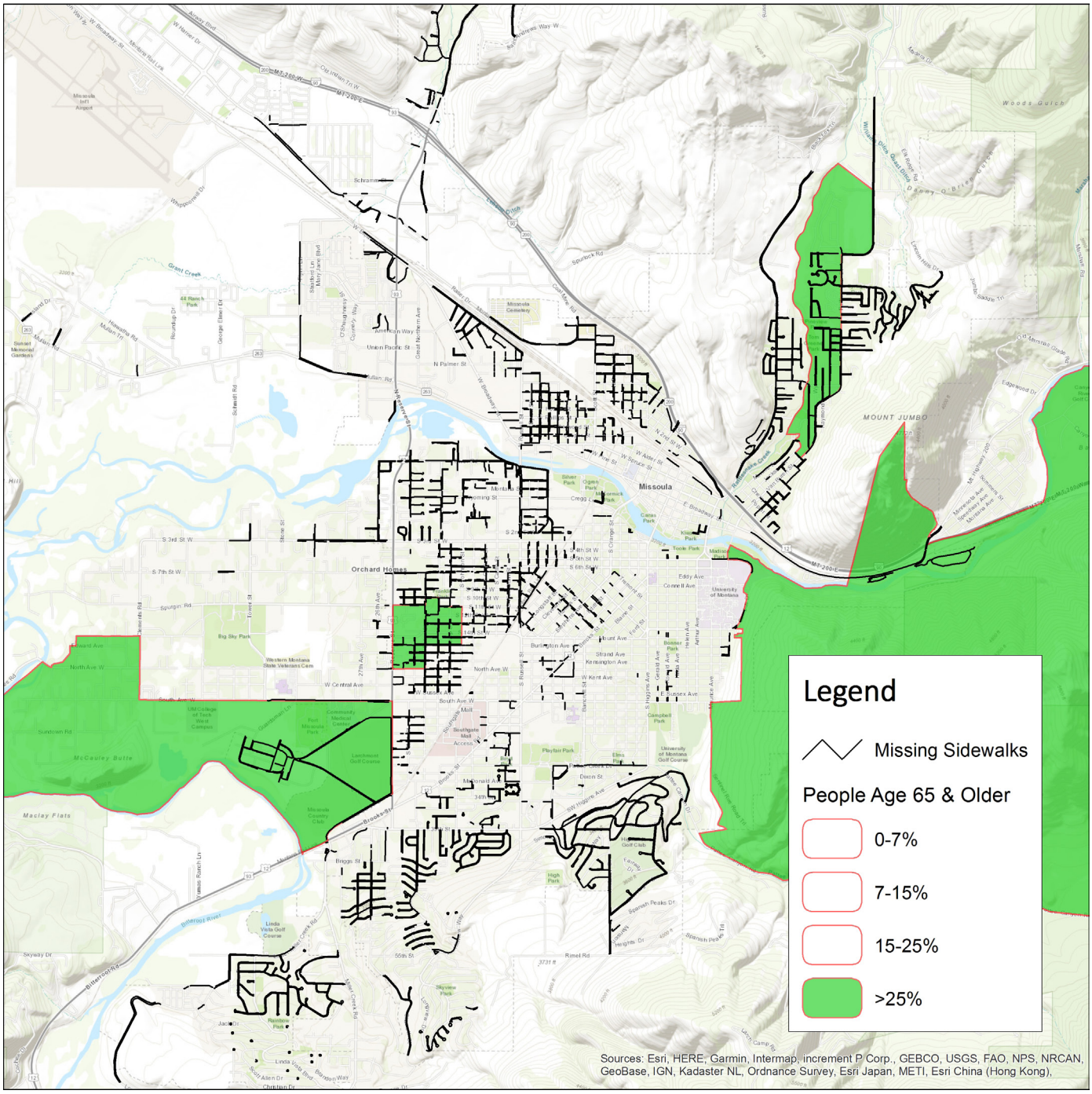


Figure 16. People Aged 65 or Older Map

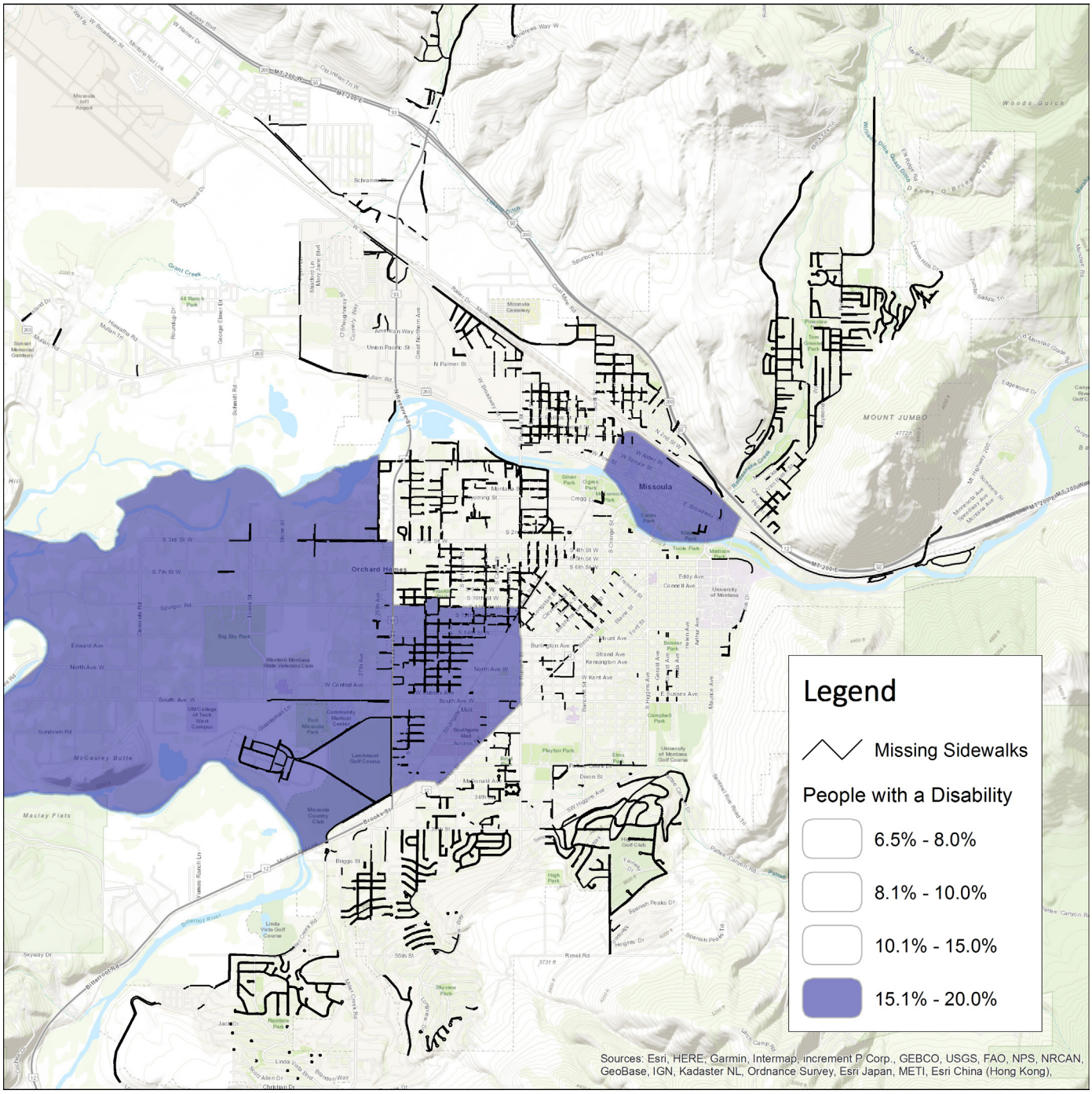


Figure 17. Disability Map

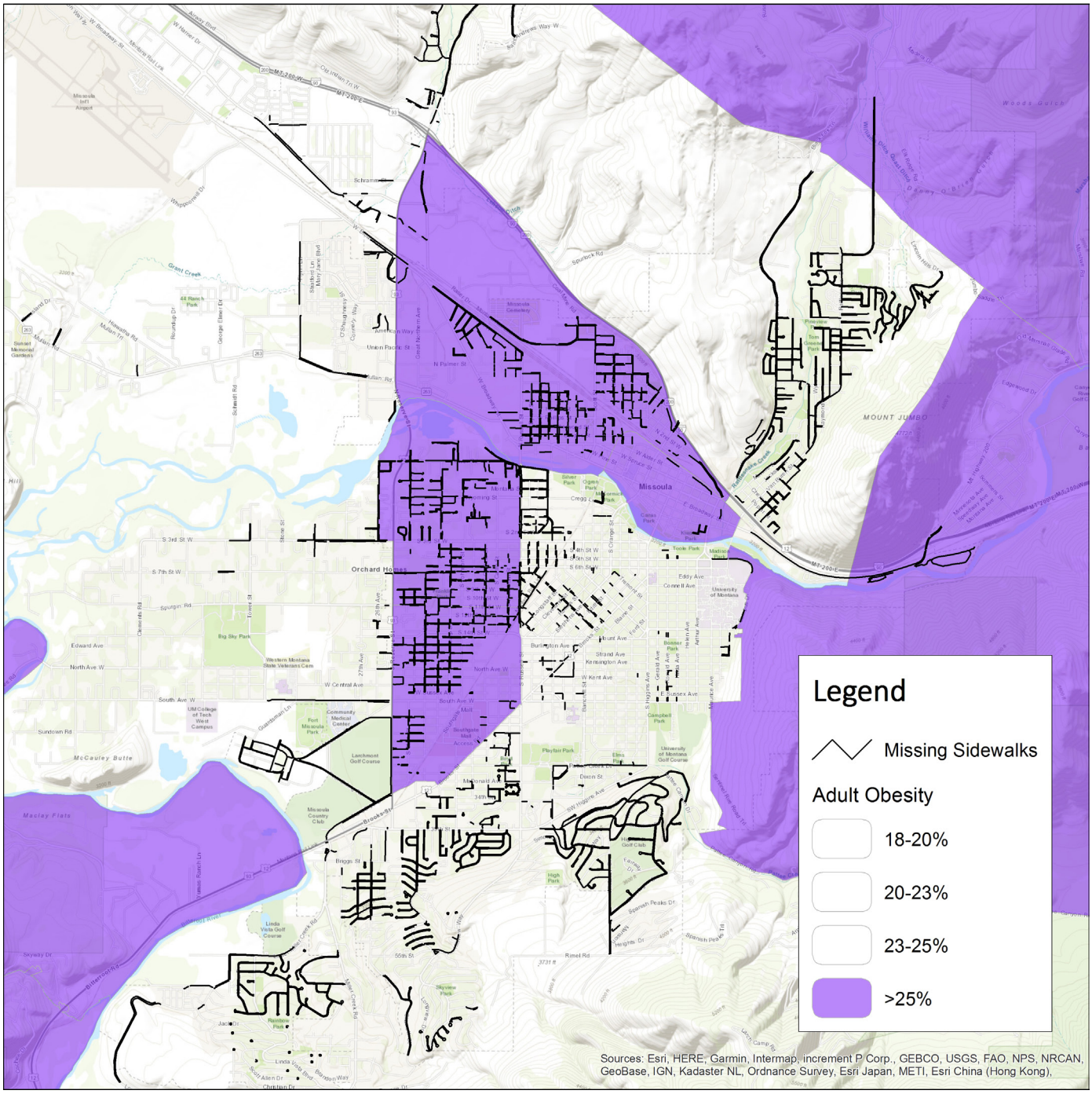


Figure 18. Adult Obesity Map

Appendix C: Attractor Data Maps

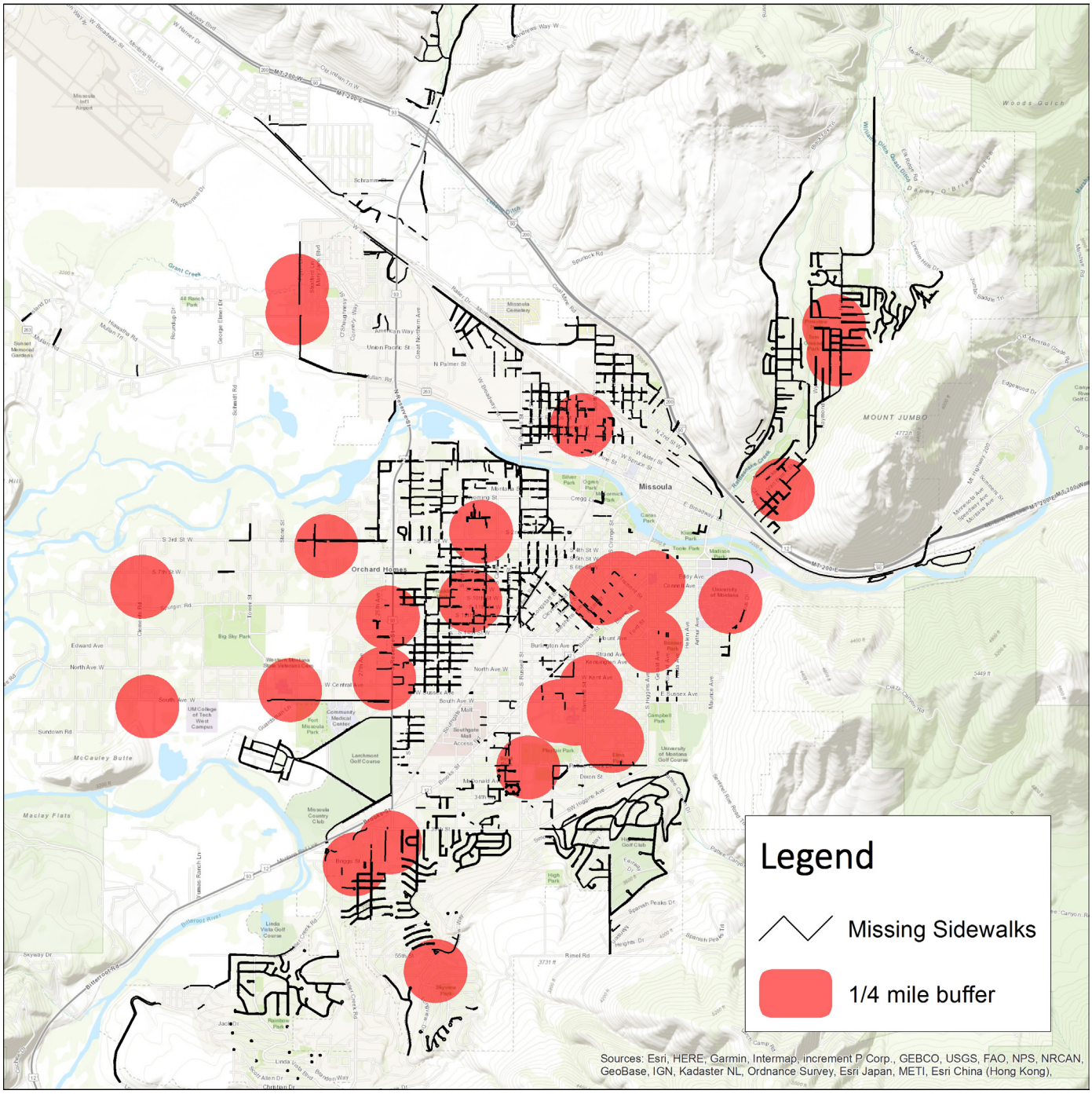


Figure 19. School Buffer Map

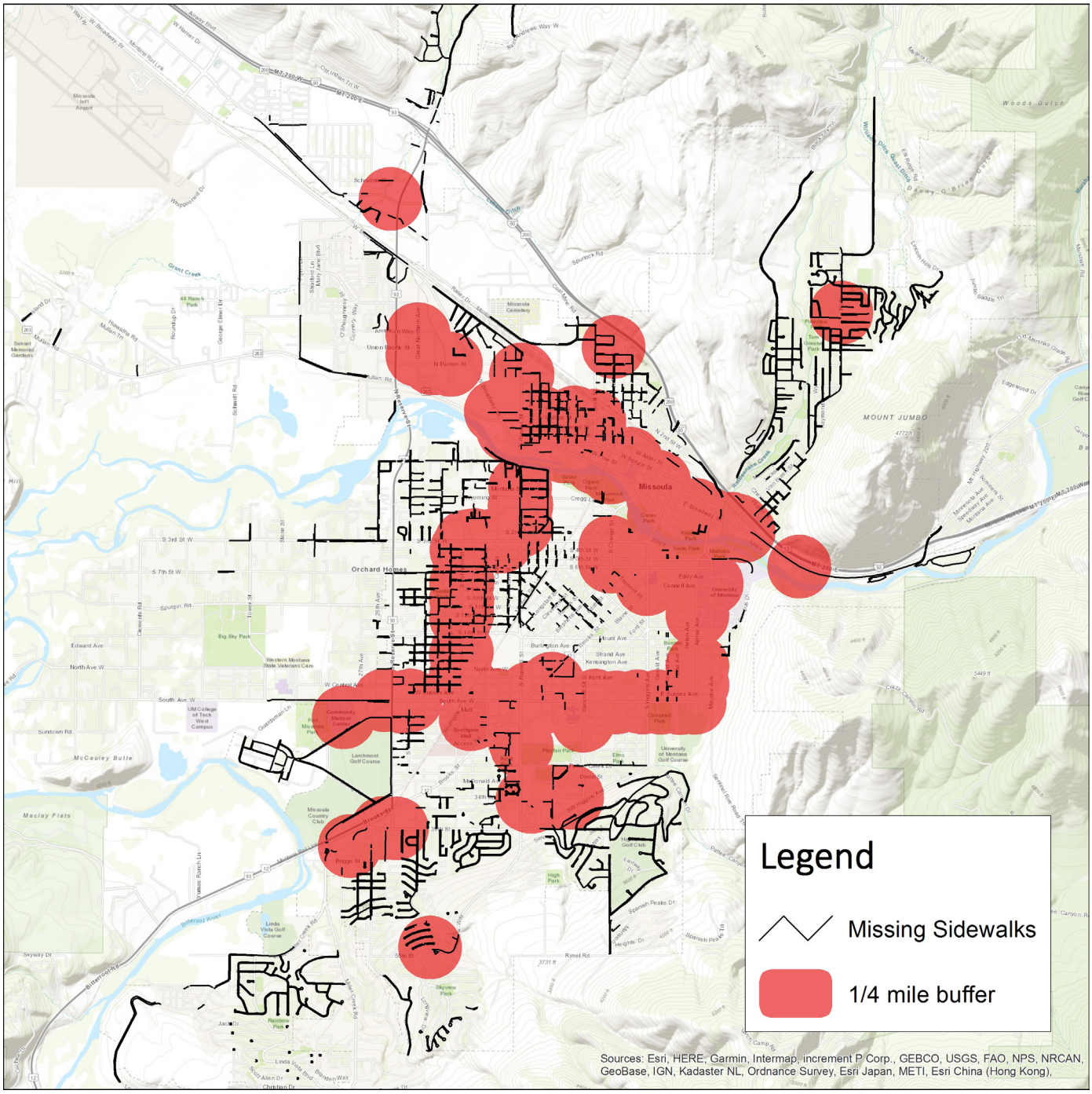


Figure 20. Transit Stops Buffer Map

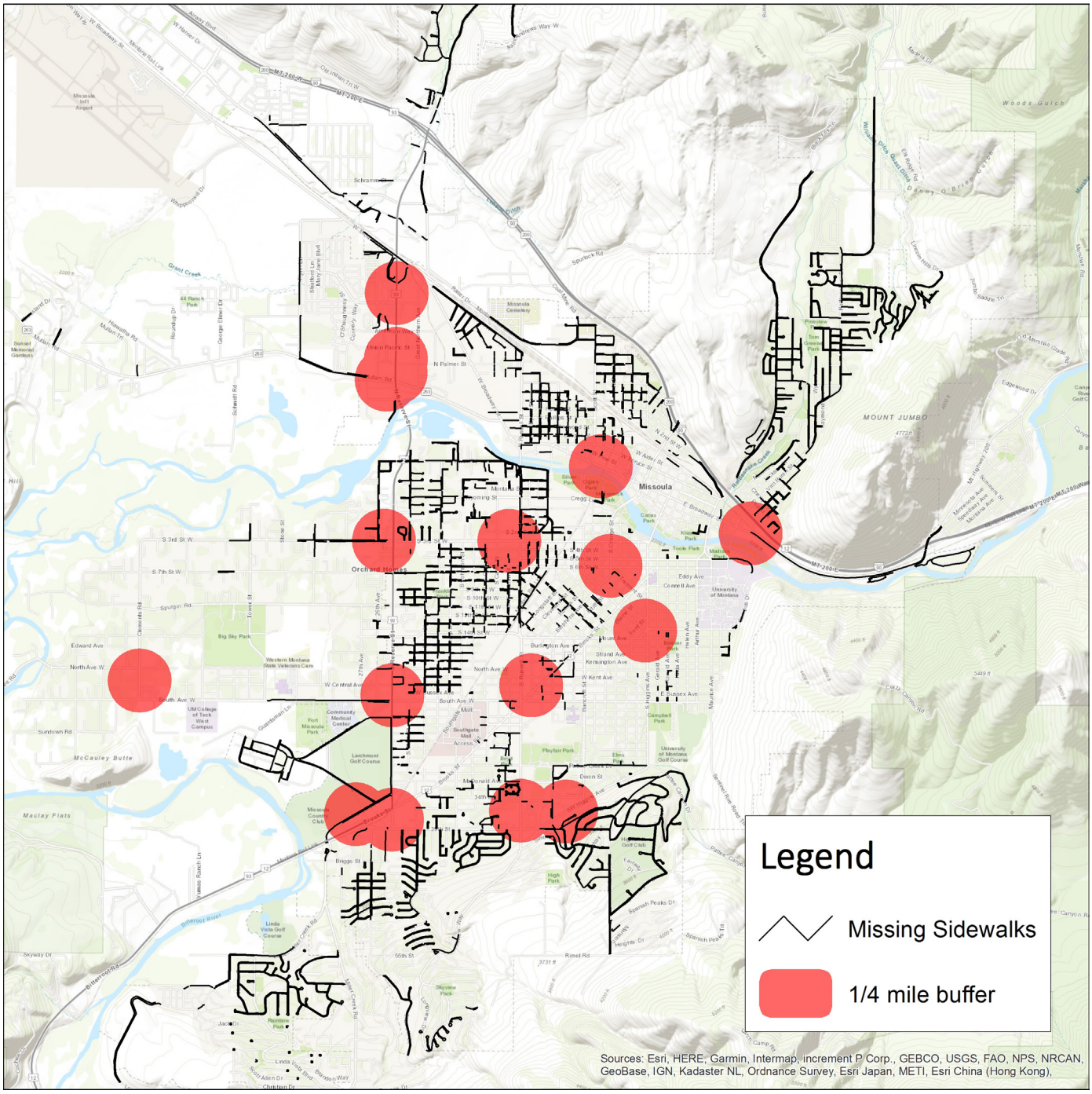


Figure 21. Grocery Stores Buffer Map

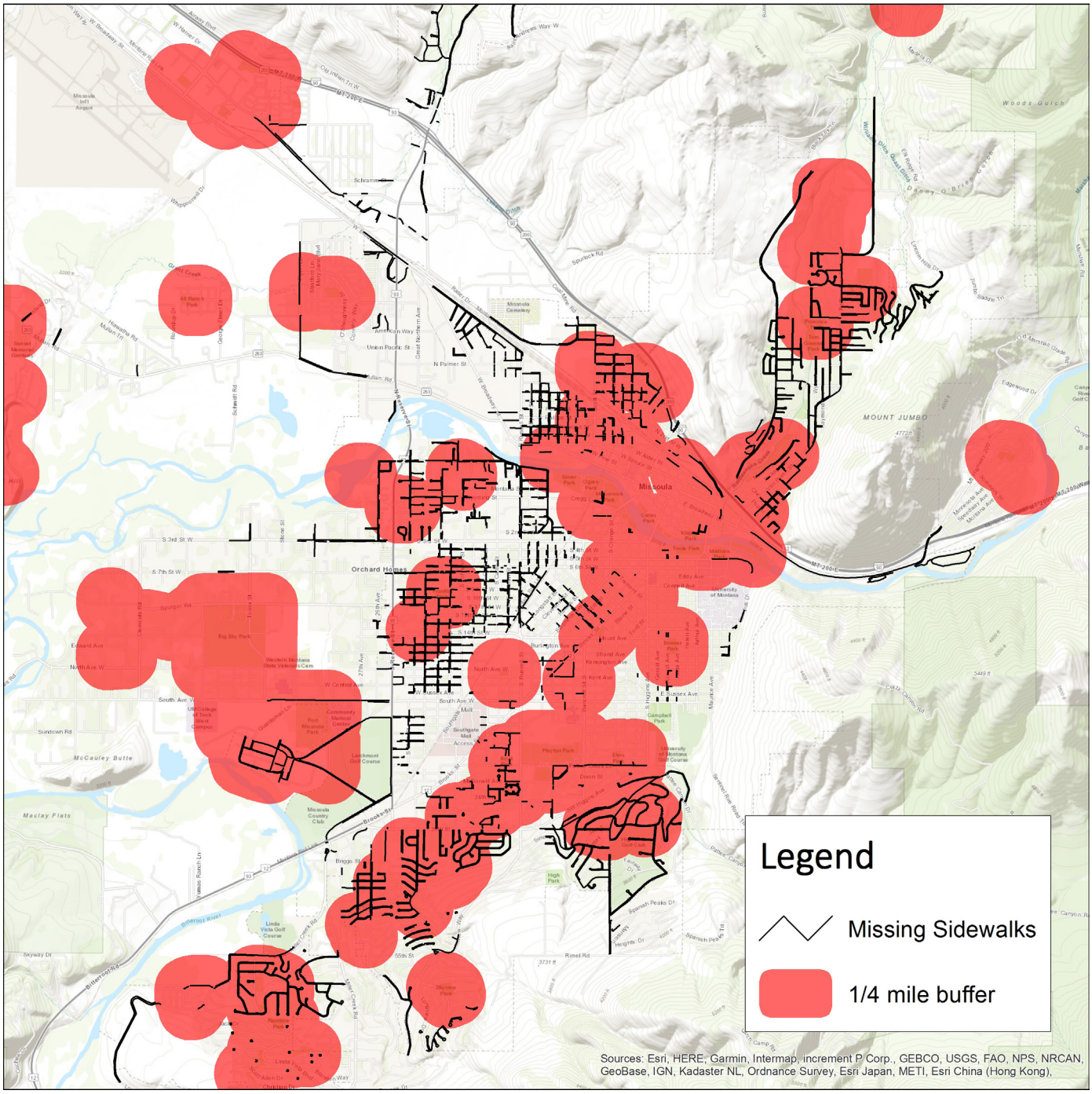


Figure 22. Parks Buffer Map

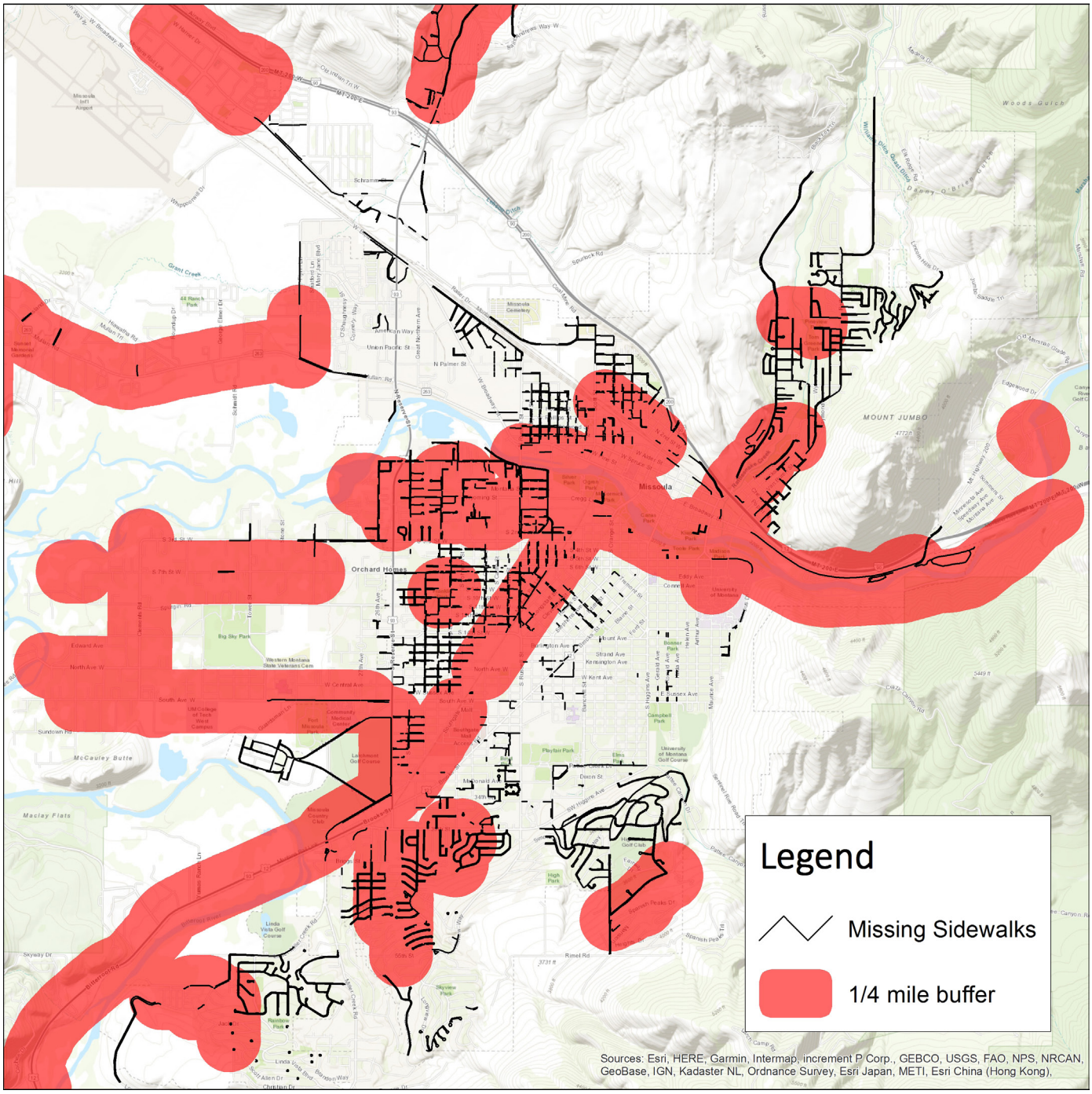


Figure 23. Commuter Paths Buffer Map

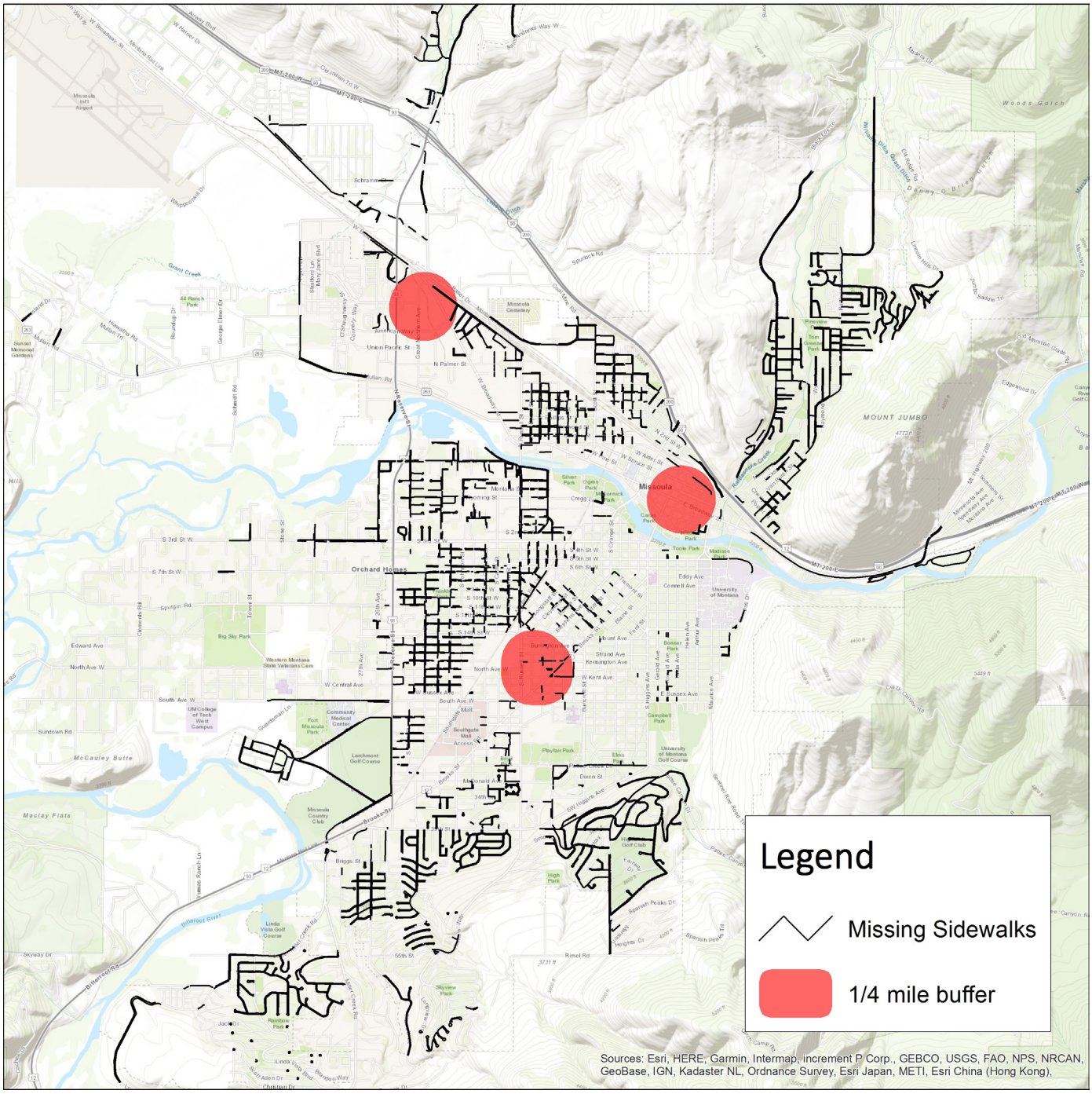


Figure 24. Post Offices Buffer Map

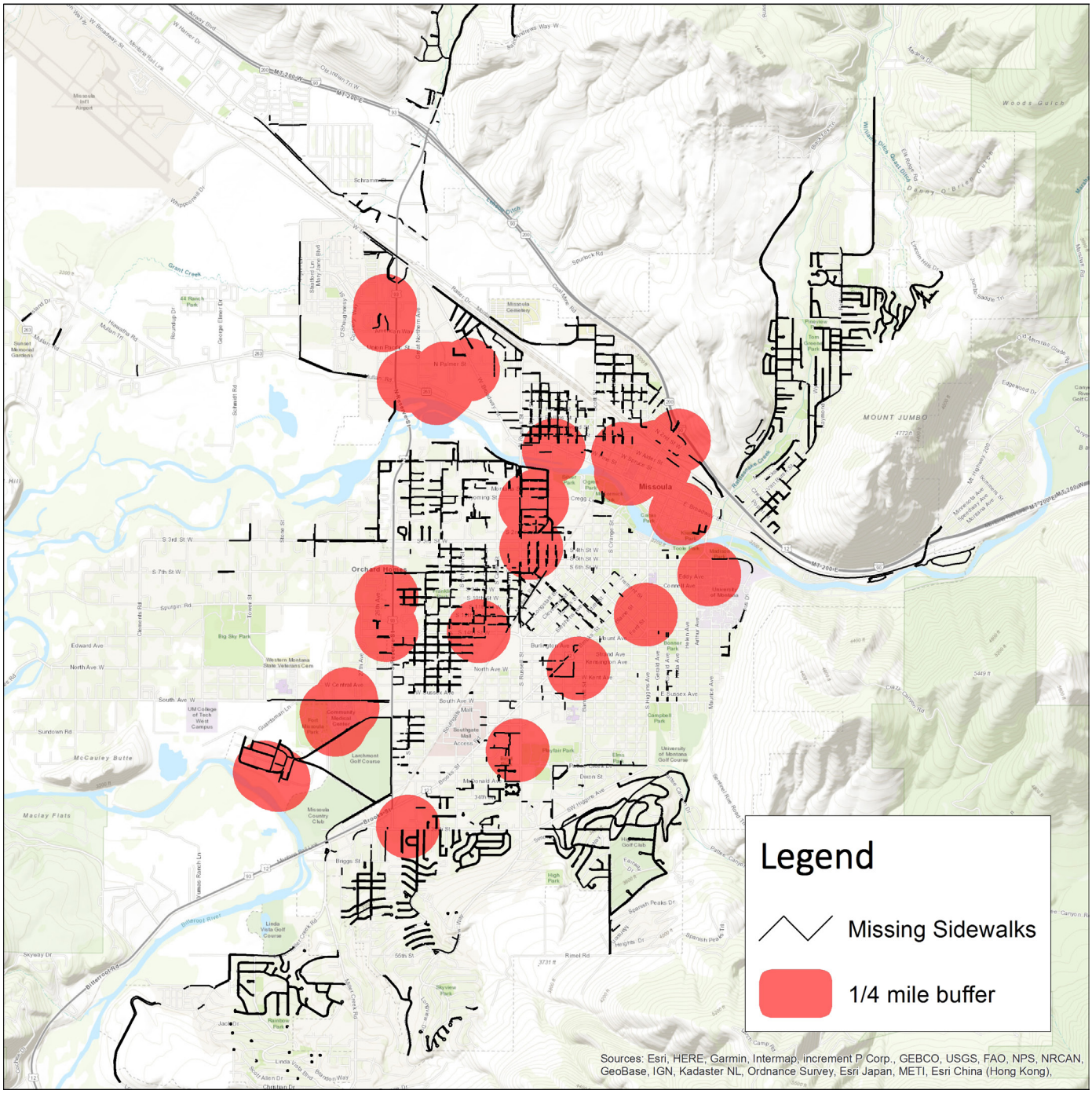


Figure 25. Medical Clinics Buffer Map

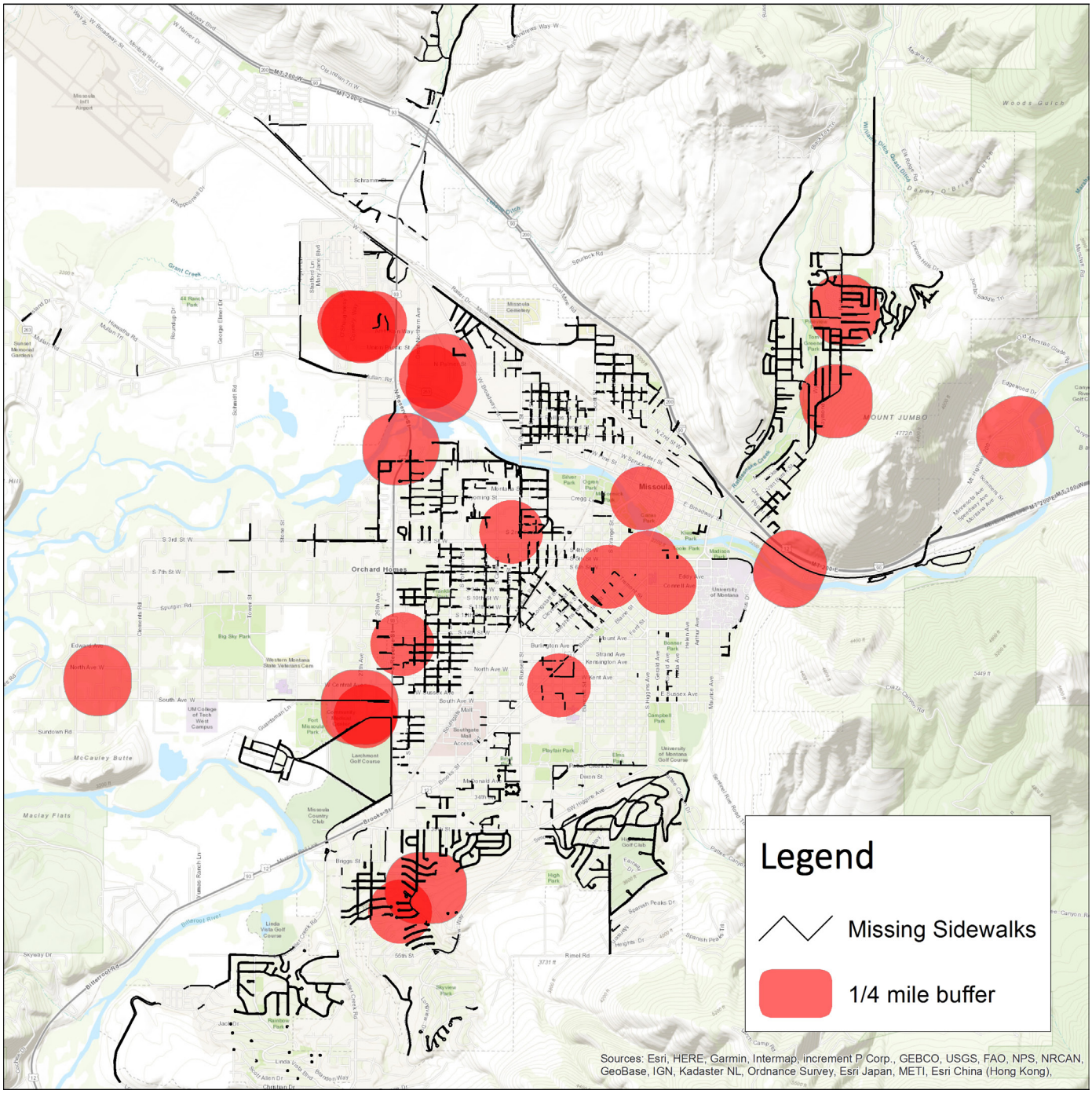


Figure 26. Independent Living Centers Buffer Map

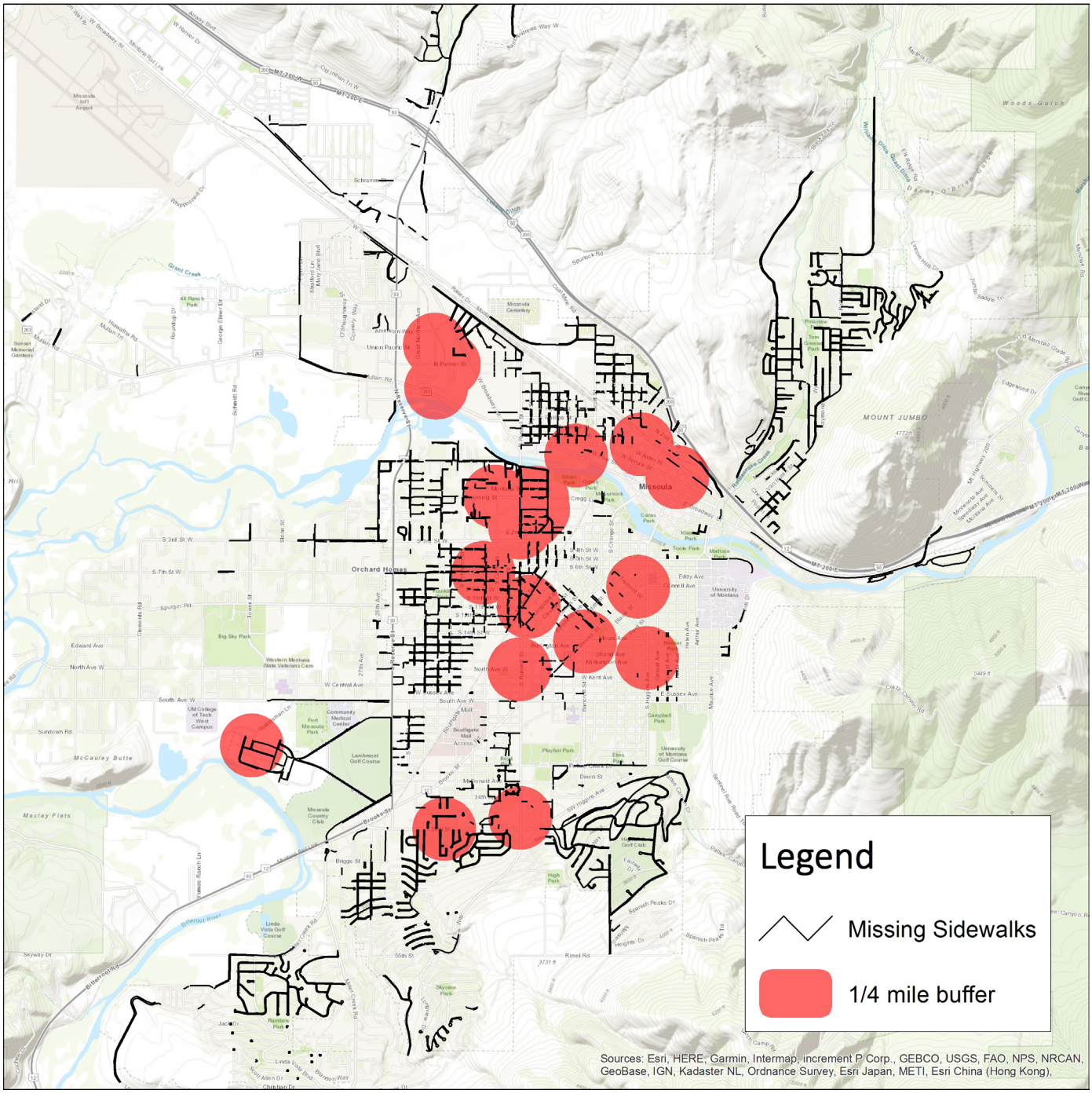


Figure 27. Emergency Services Buffer Map

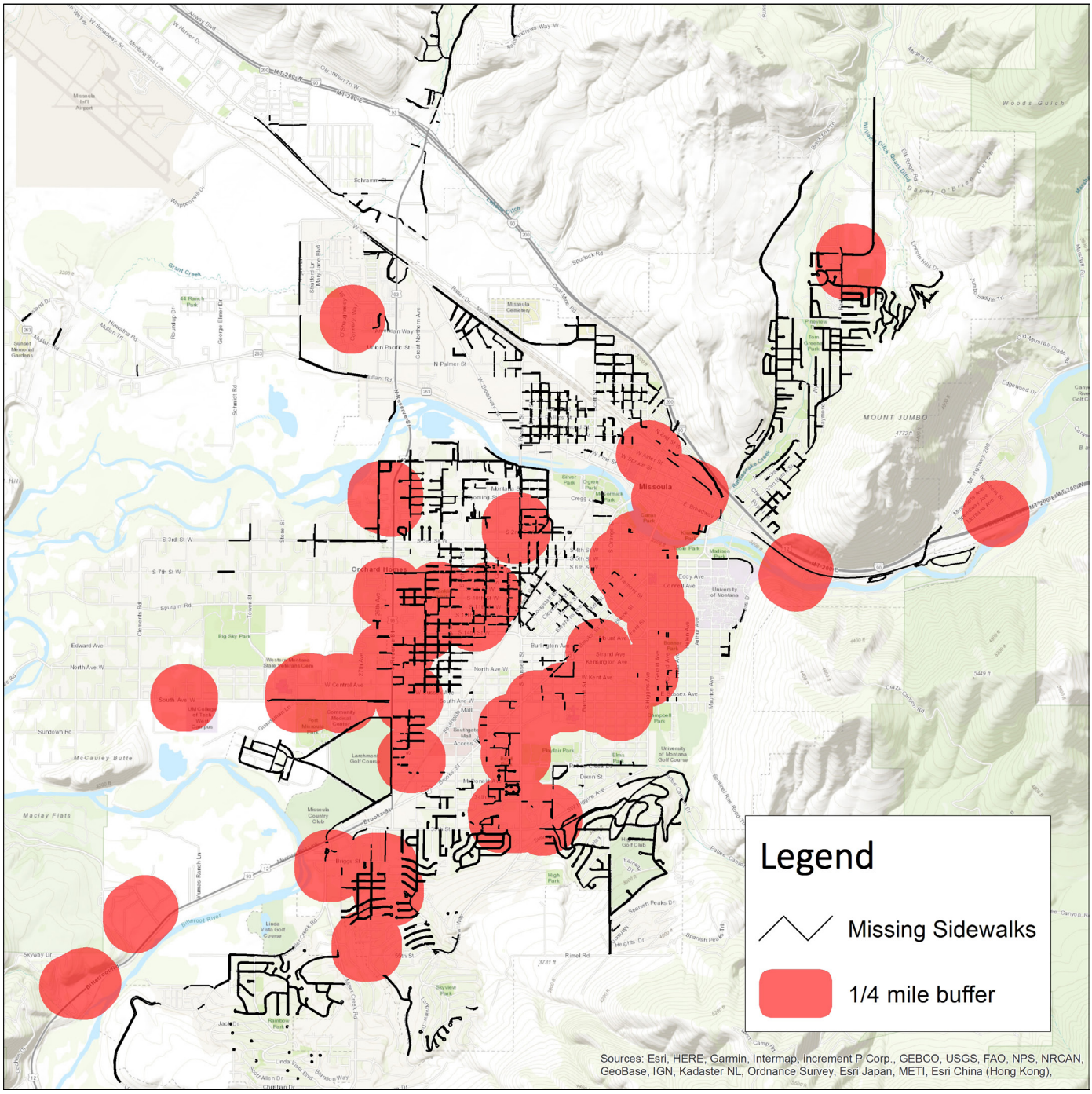


Figure 28. Civic/Religious Centers Buffer Map

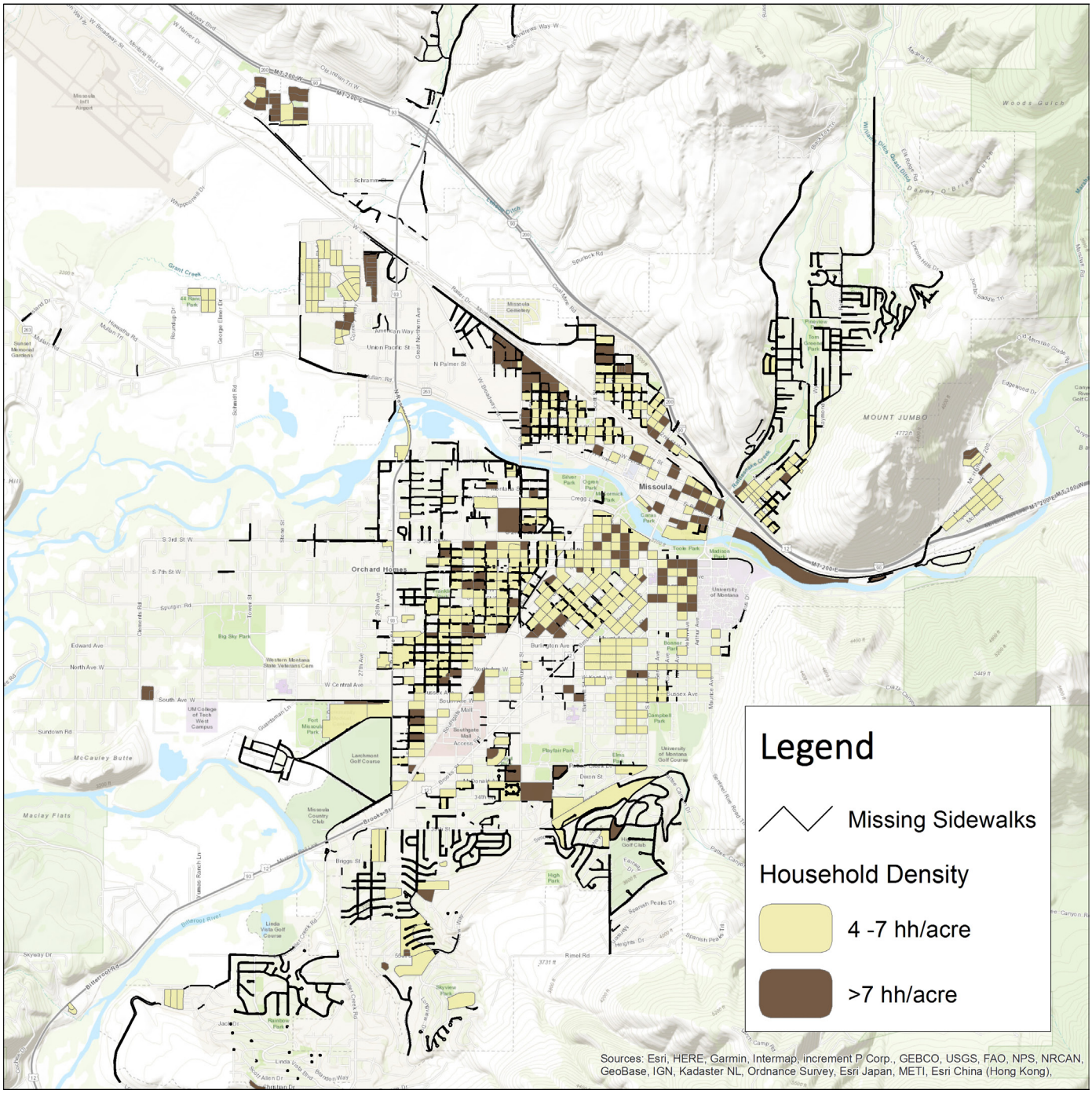


Figure 29. Household Density Map

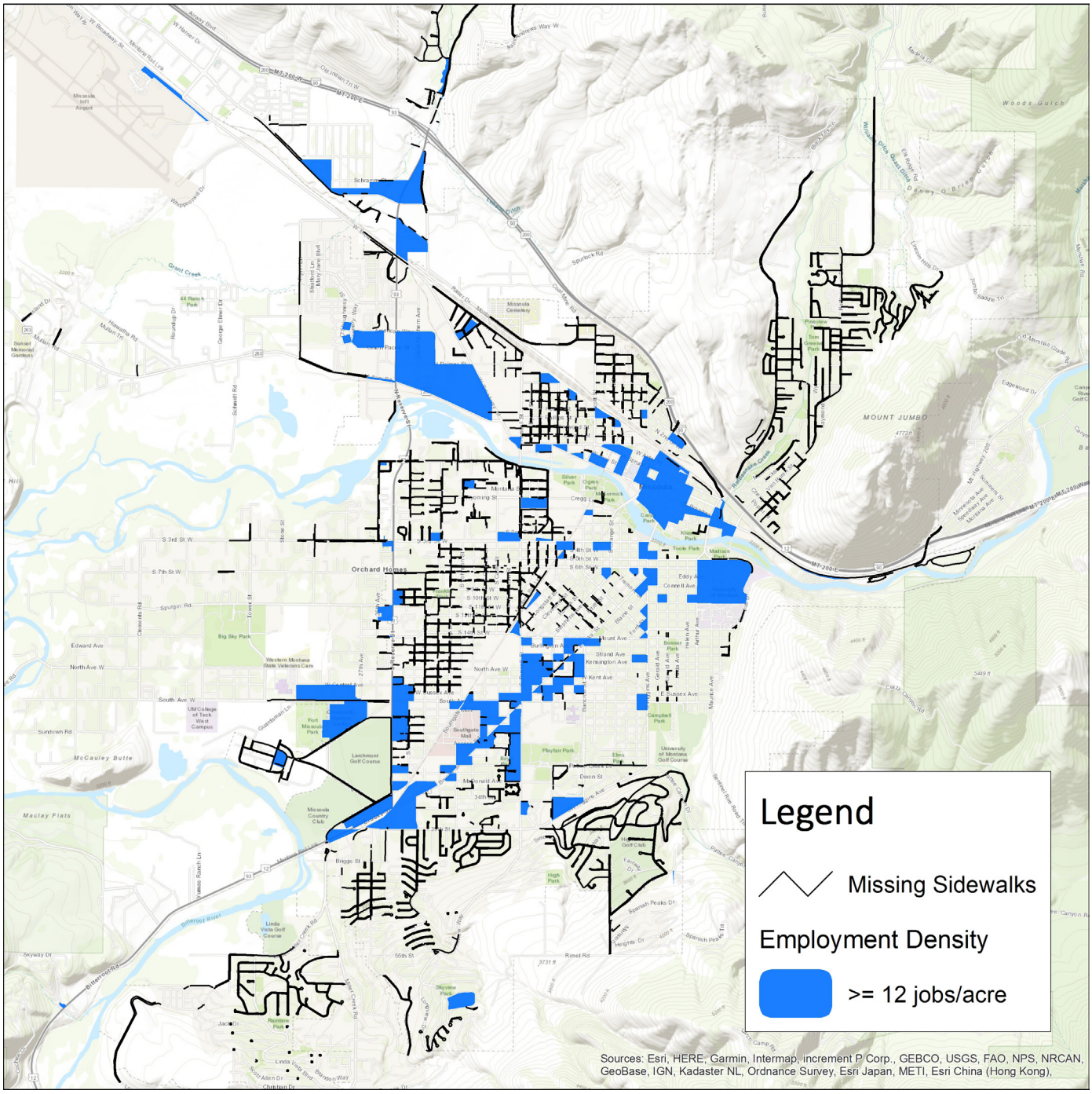


Figure 30. Employment Density Map

Appendix D: Sidewalk Condition Assessment

Missoula County ~ City of Missoula
MPO
METROPOLITAN PLANNING ORGANIZATION

MPO STAFF CONTACT:
Jessica Morriss
(406) 552-6668

Missoula Sidewalk Condition Assessment

Thank you for volunteering for the Missoula Metropolitan Planning Organization's (MPO) sidewalk assessment project. This effort would not be possible without you. We're taking a huge step forward in data collection for our sidewalk inventory.

As a volunteer for the MPO's sidewalk assessment project, you are helping to gather critical data for evaluating Missoula's pedestrian transportation network. As we work on a region-wide Pedestrian Master Plan, the status of our sidewalk network is an important piece of information, for prioritizing sidewalk installation and replacement projects, providing ADA connectivity, and establishing the foundation for funding pedestrian improvement projects. Once this initial large-scale data collection initiative is complete, city and county staff can continue to update the data yearly to maintain a complete inventory for future studies, funding opportunities, and project prioritization.

This packet contains some basic information to assist you in the field while collecting data. If you have questions or issues, don't hesitate to contact your area coordinator (listed below).

In This Packet:

1. **Collector App installation and use instructions. You can either use a tablet provided by the MPO or your own personal device. Operating systems (iOS vs Android) differ somewhat in the layout and methods of the app, so be sure you have the correct instructions.**
2. **Sidewalk condition assessment rating system and ADA ramp types. These instructions detail how to rate the sidewalks, determine the type of ADA ramp (if present), and show illustrations of each.**
3. **Map of assigned blocks to assess. Be sure you are at the correct location prior to recording sidewalk assessment ratings.**

When assessing sidewalks:

1. Please familiarize yourself with the assigned blocks. Each volunteer will be assigned a set group of blocks, and you will need to assess all sidewalks *around* and within that block.
2. Be sure to orient yourself with the digital map and physical surroundings so that you are recording data for the correct sidewalk segment. Be sure you are selecting the appropriate block face before recording assessment ratings.
3. After you are done collecting the sidewalk information, be sure to SYNC the data when you have wi-fi (or sufficient data) available.

In the event of an emergency:

Please call 911.

If something comes up that doesn't require emergency services, but you cannot complete the sidewalk assessments assigned, please contact the MPO staff person coordinating your neighborhood counts.

MPO staff contact:
Jessica Morriss
Office: 406.552.6668
Email: JMorriss@ci.missoula.mt.us

Sidewalk Condition Rating Scale

Surface Rating	Visible Distress	Ratings Examples	Functionality & Aesthetics
10 New	✓ None		✓ Brand new
9 Excellent	✓ Some weathering in the color.		✓ 1 to 2 years old.
8 Very Good	✓ Less than 25% of the sidewalk panels cracking or spalling. ✓ No tripping hazards.		✓ Minor defects caused by weathering. ✓ Still looks acceptable.
7 Good (+)	✓ Over 25% of the sidewalk has minimal spalling. ✓ 25% to 50% shows minimal cracking along the parcel. ✓ Less than 25% of the sidewalk has minimal sloping.		✓ Weathering and minor defects are becoming visible. ✓ Still functional.
6 Good (-)	✓ Moderate spalling beginning to be visible. ✓ Minimal cracking is visible in over 50% of the parcel. ✓ Minimal vertical displacement in under than 25% of the parcel.		✓ Minor defects. ✓ Functionality and aesthetics are slightly lowered. ✓ Still acceptable.

Rating System (continued)

Rating	Visible Distress	Ratings Examples	Functionality & Aesthetics
5 Fair (+)	✓ Minimal displacement is visible in over 50% of the parcel. ✓ Slight overgrowth between the cracks. ✓ Less than 25% of the panel has moderate cracking. ✓ Over 50% of the parcel has moderate spalling.		✓ Might be a hindrance to some pedestrians, but functionality acceptable to most.
4 Fair (-)	✓ Less than 50% of the parcel has severe spalling. ✓ Less than 50% of the sidewalk has moderate cracking. ✓ Minimal vertical displacement in under 25% of the parcel.		✓ Still usable by most. ✓ Not easily navigated by runners, stroller users and wheelchair users. ✓ Lacking aesthetic appeal.
3 Poor	✓ Severe spalling and moderate cracking is evident in 50% of the sidewalk. ✓ Over 25% of the sidewalk has moderate sloping. ✓ Between 25% and 50% of the sidewalk has moderate displacement.		✓ Functionality is almost gone. ✓ Negative aesthetics.
2 Very Poor	✓ Over 50% of the sidewalk displays moderate vertical displacement. ✓ Up to 50% of the sidewalk has severe cracking, sloping, and vertical displacement.		✓ Not functional. ✓ Panels need replacing.
1 Failed	✓ Complete loss of concrete. ✓ Over 50% of the sidewalk has severe cracking, sloping, or displacement.		✓ Sidewalk is impassable. ✓ Needs to be replaced.

“10”

New Sidewalk: No sign of distress

“9”

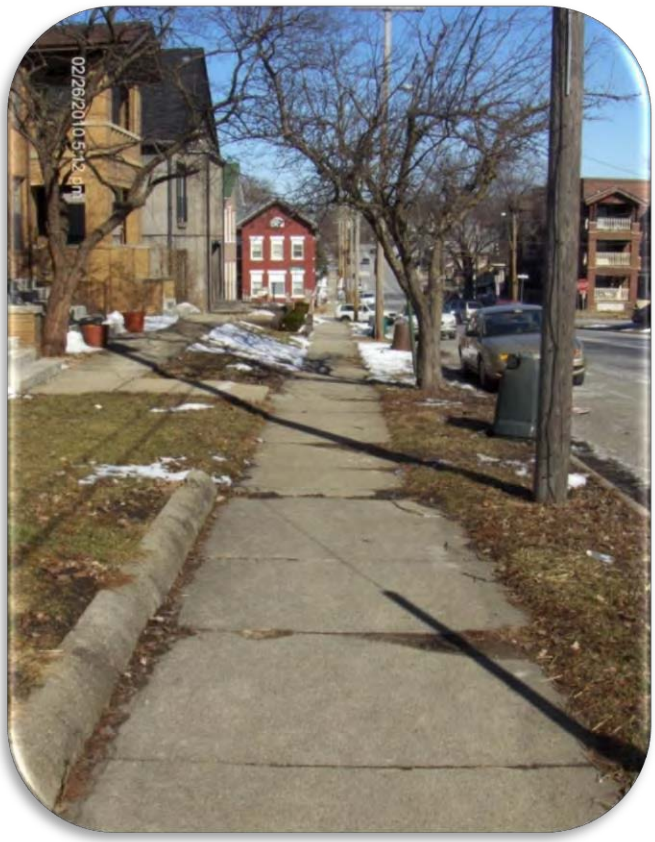
Excellent: some weathering in color

“8”

Very Good: Less than 25% of the sidewalk panels cracking or spalling. No tripping hazards.

“7”

Good (+): Over 25% of the sidewalk has minimal spalling. 25% to 50% shows minimal cracking along the block. Less than 25% of the sidewalk has minimal sloping.



“6”

Good (-): Moderate spalling beginning to be visible. Minimal cracking is visible in over 50% of the block. Minimal vertical displacement in under than 25% of the block.

“5”

Fair (+): Minimal displacement is visible in over 50% of the block. Slight overgrowth between the cracks. Less than 25% of the block has moderate cracking. Over 50% of the block has moderate spalling.

"4"

Fair (-): Less than 50% of the block has severe spalling. Less than 50% of the sidewalk has moderate cracking. Minimal vertical displacement in under 25% of the block.

"3"

Poor: Severe spalling and moderate cracking is evident in 50% of the sidewalk. Over 25% of the sidewalk has moderate sloping. Between 25% and 50% of the sidewalk has moderate displacement.

“2”

Very Poor: Over 50% of the sidewalk displays moderate vertical displacement. Up to 50% of the sidewalk has severe cracking, sloping, and vertical displacement.

“1”

Failed: Complete loss of concrete. Over 50% of the sidewalk has severe cracking, sloping, or displacement.

ADA Curb Ramp Types

Ramp - Engraved: Indicates the ramp is a diamond pattern or other etched pattern with no raised surface. The diamond shapes are engraved into the concrete.

Ramp - Domes: Indicates a plastic, concrete or metal domed ramp. The color serves to warn pedestrians. These types of ramps are preferred in federal standards.

Ramp: Means a ramp has no detectable warning.

Alley Ramp: Means an ADA ramp is present connecting sidewalk to the alley paving.

Types of Sidewalks

A-type combined sidewalk & curb (no gutter):

Curbside sidewalk (w/ curb & gutter):

Boulevard Sidewalk (w/ curb & gutter):

Boulevard Sidewalk (no curb/gutter):

Sidewalk Defect Types:

Type of Problem	Definition	Sidewalks Examples	Common Causes
Vertical displacement	The shifting in the land causing an unevenness of pavement between sidewalk panels.		➢ Roots growing underneath the sidewalks. ➢ Tree trunk flare encroaching on the sidewalk. ➢ Ground is not compacted correctly. ➢ Movement in the ground. ➢ Concrete expands when liquid freezes, causing a shift in panel positioning.
Sloping	The abrupt change in the slope of the whole sidewalk panel.		➢ Roots growing underneath the sidewalks. ➢ Ground is not compacted correctly.
Cracking	A separation of the sidewalk pavement caused by cracks forming in the concrete.		➢ Extreme temperatures causing the concrete to buckle. ➢ Soil underneath is not sufficiently compacted during installment. ➢ Heavy- vehicle traffic on insufficiently supported concrete. ➢ Erosion of the concrete. ➢ Growth of tree root underneath or close to sidewalk structure.
Spalling/ scaling	The flaking away of the hardening concrete.		➢ Cheap/weak concrete mix. ➢ Poor techniques in pouring and finishing. ➢ Foreign substances are accidentally in the mix. ➢ Gradual destruction of material by a chemical reaction. ➢ Exposure to high temperatures.

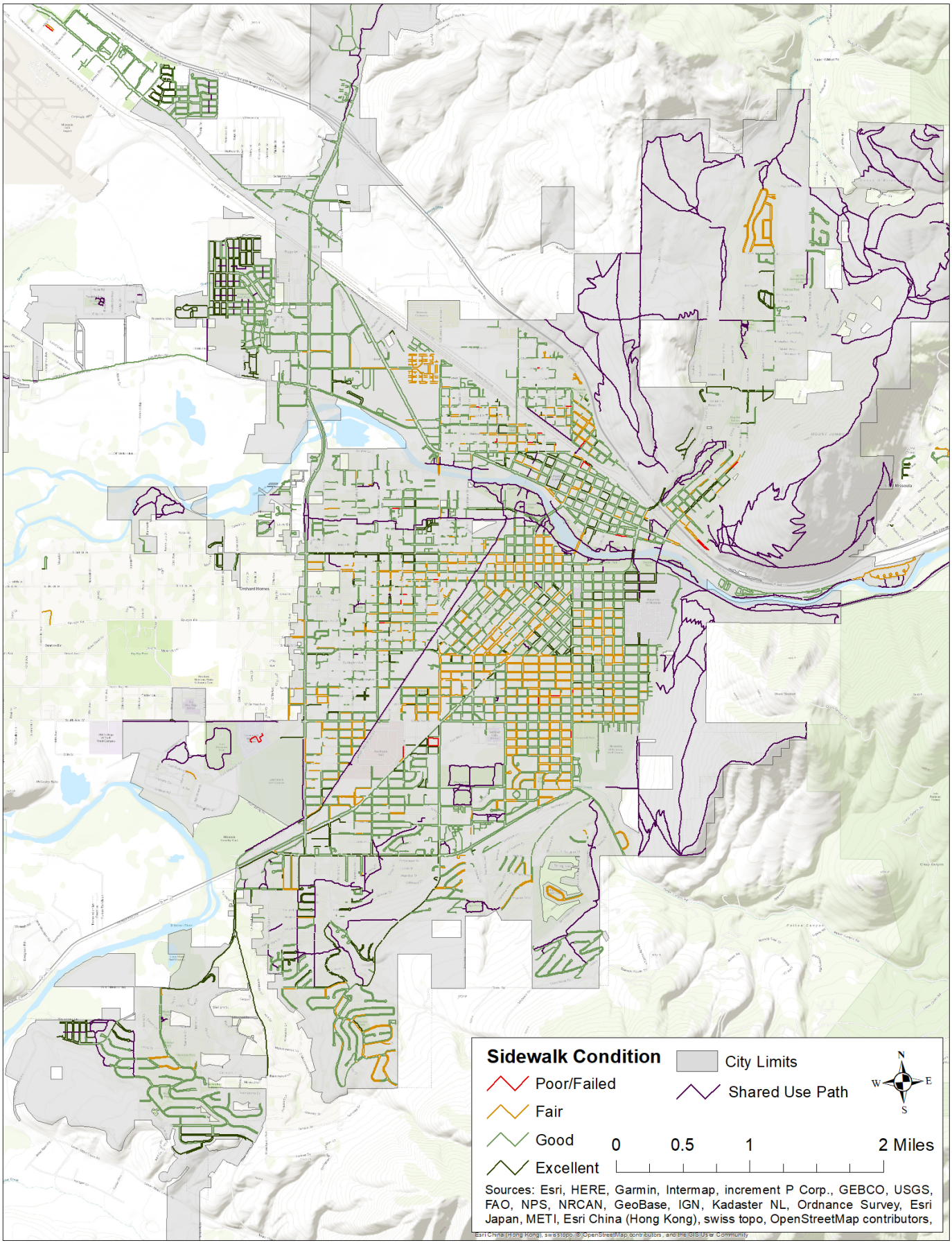


Figure 31. Sidewalk Condition Map

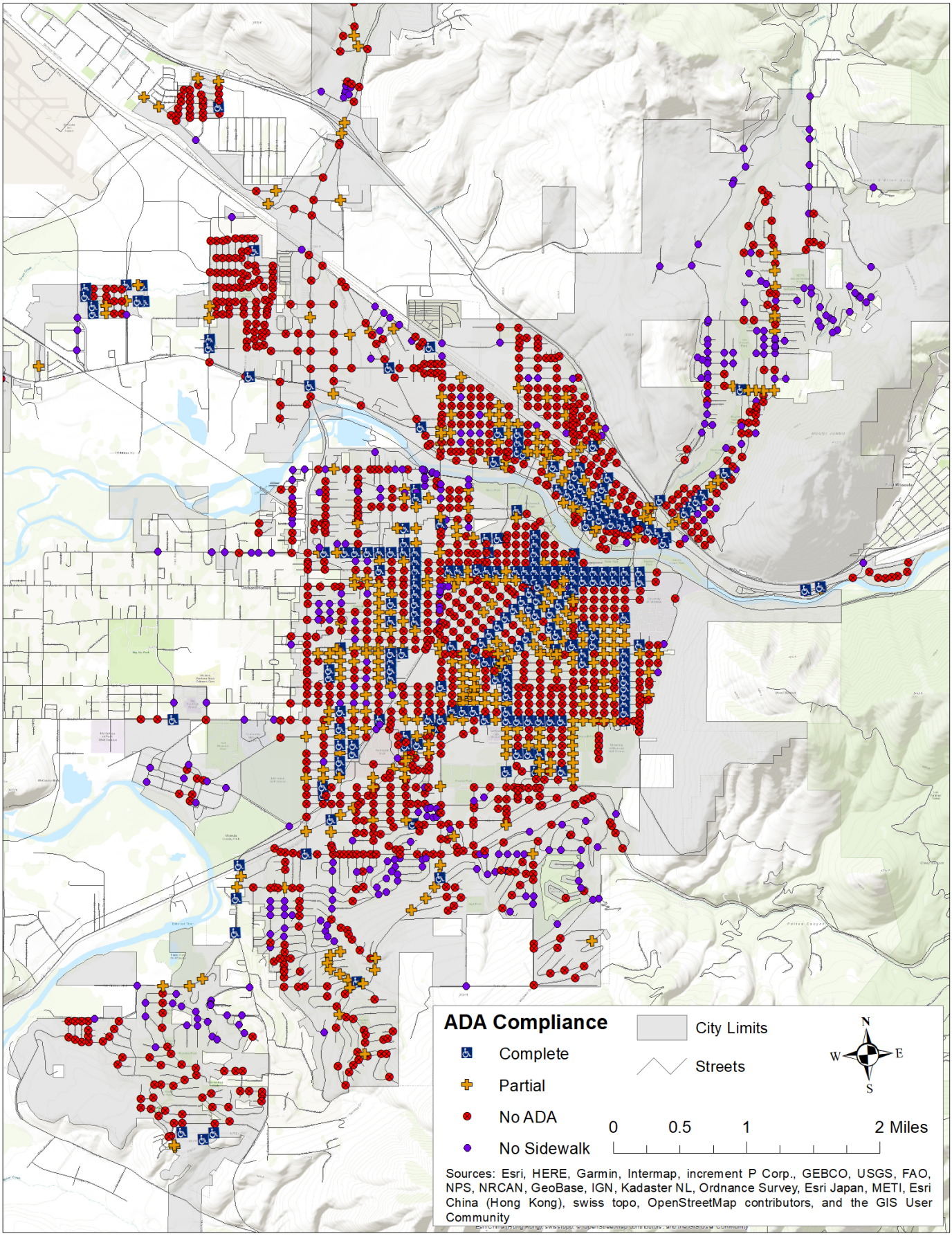


Figure 32. ADA Compliance Map

Appendix E: Sidewalk Alternatives

Table 10. Sidewalk Alternative Materials

Alternative	Description	Pros	Cons
Rubber	Rubber sidewalks offer a more flexible alternative to traditional concrete and can be installed in either a continuous or paneled fashion. Although a relatively new product, their lifespan is yet to be confirmed at approximately 10-15 years, but pilot projects are underway in well over 60 U.S. cities. It has increased void space for permeability and is found in many colors, as well as a traditional gray, but has popularly been used in place-making or in displays of public art.	• Permeability (decreased runoff) • Freeze/thaw resistance • Low susceptibility to cracking • Reduction of conflicts with tree roots, etc. • Use of recycled materials	• Soft surface (different than traditional options) • Lumps and rolls often created by underlying tree roots • New technology, limited testing completed
Porous Pavement	There are three main types of porous pavements: porous asphalt, pervious concrete, and permeable pavers. Porous asphalt is a mixture of non-fine crushed aggregate and asphalt binder, typically experiencing a void ratio of 10-20%. Installation is similar to traditional asphalt and specific maintenance includes vacuuming/street sweeping twice a year to maintain the proper void space. Pervious concrete is made from a combination of aggregate and Portland cement, with a low cement-to-water ratio. Permeable pavers come in a variety of materials, from clay to salvaged materials such as bricks and stones to sawcut concrete sidewalk squares. They are placed in a grid pattern on a level surface with gaps spacing the sidewalk squares a distance of 8-20% the width of the pavers. Space between pavers is filled with a coarse sand infill and leveled.	• Permeability (decreased runoff) • Freeze/thaw resistance • Reduced cracking • Increased air/water flow (tree health, increased evaporation, etc.) • Increased durability	• More expensive than traditional sidewalks/paths of same materials (paver options may be less expensive depending on materials) • Require sweeping and/or blowing/ pressure washing

Alternative	Description	Pros	Cons
Stamped Asphalt	Stamped asphalt provides an attractive alternative for sidewalk purposes, while still benefitting from the inexpensive price of asphalt and quick installation time. It provides the opportunity for decorative patterns, relatively simple maintenance and easy snow removal, as well as a continuous surface without any major tripping points. Additionally, asphalt is a flexible pavement which makes it more resistant to cracking compared to traditional cement. However, it does have a relatively short life span and must be resurfaced regularly.	• Aesthetically appealing • Inexpensive • Easy installation	• Short life span • Impervious (perpetuates runoff problems, evaporation/heat island, etc.)
Psyllium Husk (Binder)	Psyllium binders are plant-based, containing a mucilage that is able to bind aggregate. It may appear more natural than other asphalt or concrete, but may also be less durable, especially for higher trafficked areas. Psyllium is capable of binding many types of aggregate, from different sizes of crushed or degraded rock to recycled glass, and its appearance will be dependent on aggregate choice. Psyllium husk is a plant-based form, so it is able to displace harmful chemicals found in conventional paving techniques. Pilot psyllium projects have already been implemented on a relatively small scale around Missoula beginning in 2012 in locations such as Silver Park (photo), the Missoula Urban Demonstration Project, and Greenough Park.	• Made of natural materials • Possibility of using recycled materials (glass aggregate)	• Less durable than traditional concrete • Installation can be tricky/can make or break project • Impermeable
Pine Resin (Binder)	Pine resin walkways are composed of a combination of pine resin, pitch from pine trees, and an aggregate (crushed rock, decomposed granite, recycled glass, etc.). It looks similar to asphalt, but can vary in color based on the aggregate. Rather than being mixed and poured hot, this alternative is mixed with cold water and laid as needed. Conventional methods are then used for compaction and setting occurs through evaporation rather than by cooling. There are a few small pilot projects in northern Montana near Glacier National Park.	• High compressive strength • Natural ingredients (no volatile/petroleum-based chemicals)	• Impermeable • High cost • Need for certain outdoor temperatures during installation

Alternative	Description	Pros	Cons
(Porous) Gravel Paver	A porous gravel paver is a pervious load bearing surface with generally over 90% void space for increased porosity and the integration of different types of aggregate. They come in large rolls for easy installation and are made up of a geotextile fabric ring and grid structure. Requiring a level base course, the structure is rolled out and rock or glass aggregate fills in the ring space for a pathway that mimics the appearance of the aggregate. The Missoula Urban Demonstration Project is installing a pilot project using a crushed glass aggregate on their property in the summer of 2018.	• Strong heat energy reflection • Decreased runoff • Possibility of excess stormwater pollution filtration and treatment • Opportunity to use recycled materials	• Few pilot projects • Requires level rock base for best results

Appendix F: Public Participation Records

Table 11. Meetings/Interviews/Committee Outreach

Group/Meeting/ Event	Date	Staff attended	Description
TTAC	7/6/2017	All	Review and approve scope of work
TPCC	7/18/2017	All	Review and approve scope of work
City Council Public Works	7/12/2017	Jessica Morriss	Review and approve scope of work
STAC	8/25/2017	Tara Osendorf	Discussion of upcoming kick off/survey
Out to Lunch	8/26/2017	Tara Osendorf	Table with survey
Downtown Tonight	8/27/2017	Tara Osendorf	Table with survey
Public Meeting #1 Kick Off Event	10/25/2017	All	Kick off plan, review existing conditions
Missoula in Motion Commuter Breakfast	11/2/2017	Aaron Wilson	Kick off plan, review existing conditions
TTAC	11/9/2017	All	Kick off plan, review existing conditions
Development Community Meting	11/17/2017	Jessica Morriss	Kick off plan, review existing conditions
TPCC	11/21/2017	Aaron Wilson, Jessica Morriss	Kick off plan, review existing conditions
Steering Committee #1	12/5/2017	All	Kick off, present initial research, discuss goals
STAC	1/26/2018	Tara Osendorf	Discussion regarding pedestrian barriers to people with disabilities
Steering Committee #2	1/30/2018	All	Discussion regarding prioritization options
TTAC	2/1/2018	Aaron Wilson	Discussion regarding prioritization options
TPCC	2/20/2018	Aaron Wilson	Discussion regarding prioritization options
Public Meeting #2	2/21/2018	All	Vote on prioritization options, wiki sticks activity, public comment
TTAC	4/5/2018	Aaron Wilson	Presented new MPO website and participation page
Steering Committee #3	4/10/2018	All	Finalize prioritization, start funding discussion
TPCC	4/17/2018	Aaron Wilson	Presented new MPO website and participation page
Steering Committee #4	5/17/2018	All	Discussion regarding funding and implementation, guiding principles
City Council Public Works	5/23/2018	Aaron Wilson	Present on current progres,, including prioritizatino options/preferred option

Group/Meeting/ Event	Date	Staff attended	Description
STAC	6/22/2018	Aaron Wilson	Discussed ADA Transition Plan and collected comments
Steering Committee #5	6/26/2018	All	Discussion regarding implementation/comments on staff memos
Public Meeting #3	7/10/2018	All	Presented final plan information before assemblage
Planning Board	10/2/2018	Aaron Wilson	Presented overview of plan process and recommendations
Trail 101.3 Interview	10/20/2017	Jessica Morriss	Interview on the morning show
KPAX Interview	10/25/2017	Jessica Morriss	Interview with Augusta McDonnel of KPAX

Table 12. Media Outreach

Media Messaging	Date	Description
Facebook (FB) Post: Pedestrian Facilities Master Plan Meeting + Open House (Event)	2/5/2018	Public Meeting #2 Facebook Event
FB: We need your input to guide improvements to Missoula's pedestrian facilities! Attend the Pedestrian Facilities Master Plan: Meeting + Open House on Wed., Feb 21 at Missoula Food Bank to provide comments and help us establish priorities for the plan.	2/13/2018	Reminder for Public Meeting #2 (refers to facebook event with more details)
FB: What do you think should be the priorities for improving Missoula's pedestrian network? Attend the Pedestrian Facilities Master Plan: Meeting + Open House on Wed. Feb. 21 to provide input and learn about next steps for the plan.	2/16/2018	Reminder for Public Meeting #2 (refers to facebook event with more details)
FB: Tonight! Join us for the Pedestrian Facilities Master Plan: Meeting + open House at Missoula Food Bank (1720 Wyoming St). Listen to a short presentation and help us identify priorities for improving Missoula's pedestrian network. See you there!	2/21/2018	Day of reminder for Public Meeting #2
FB: Thanks to all who came out for Meeting #2 of the Pedestrian Facilities Master Plan! Attendees provided valuable feedback on priorities for improving facilities in Missoula using table-top maps, live polling, and discussion.	2/22/2018	Update and photos of Public Meeting #2

Media Messaging	Date	Description
FB: Miss the Pedestrian Facilities Master Plan open house in February? We're still receiving input on priorities! Check out the Participate page on our new website to review the presentation and select one of the 5 priority options. Give us a call with any questions at 552-6675.	3/28/2018	Link to the website's 'Participate' page to provide online feedback
Press Release: Plan Kick Off Public Meeting #1	10/17/2017	Jessica Morriss issued a press release welcoming the public to the plan's kick off meeting
Press Release: Public Meeting #2	2/21/2018	Jessica Morriss issued a press release inviting the publc to attend Public Meeting #2