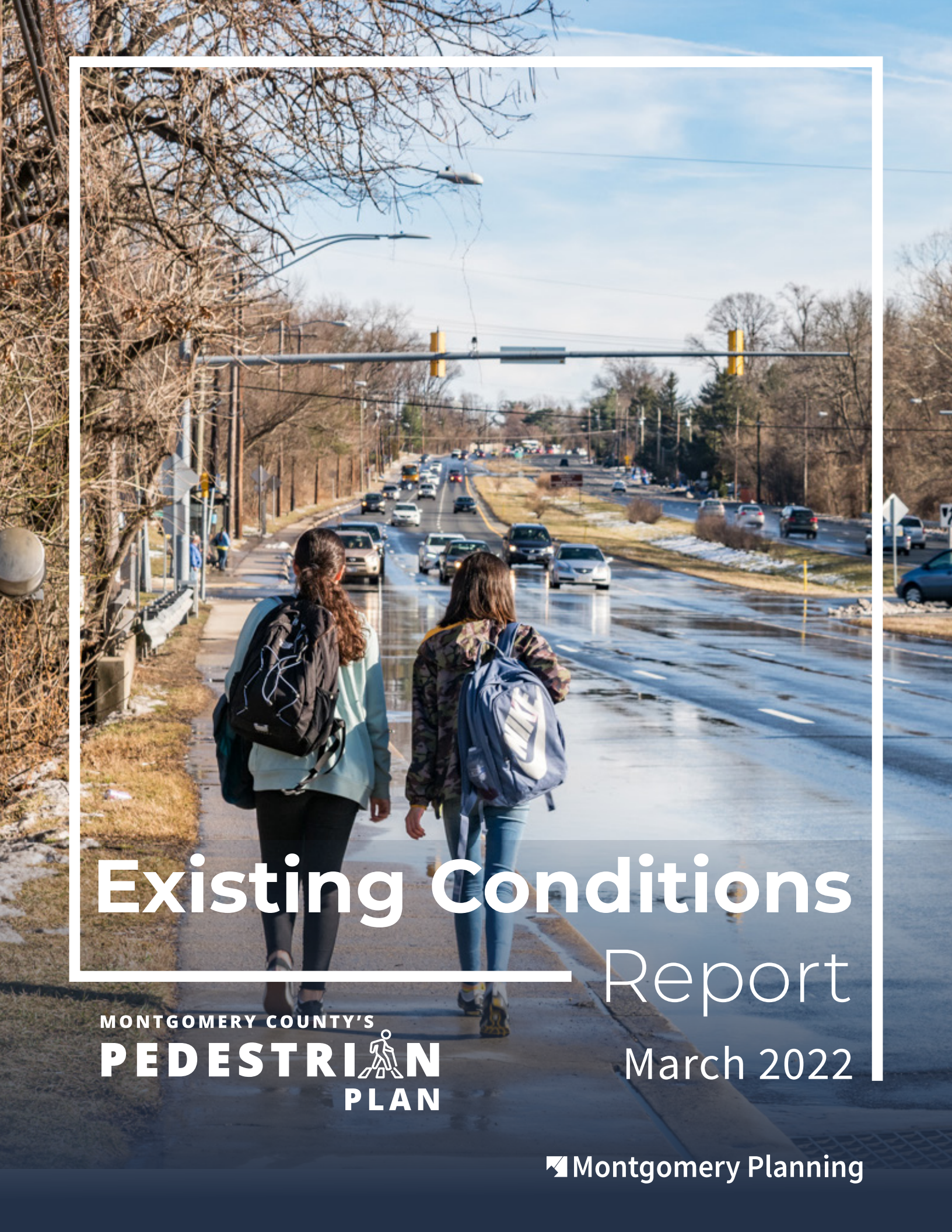

Existing Conditions Report

March 2022

MONTGOMERY COUNTY'S PEDESTRIAN PLAN

Montgomery Planning

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INTRODUCTION

The Pedestrian Master Plan is the first time Montgomery County has centered the pedestrian experience in a countywide planning process. While prior countywide plans have discussed pedestrians within a larger transportation ecosystem, the Pedestrian Master Plan team set out to deeply understand the state of walking and rolling (using a wheelchair, mobility scooter or other similar device) in Montgomery County.

In addition to various national and regional data sources, the project team developed several unique data sources, including:

- A statistically-valid pedestrian survey to document pedestrian activity and perceptions for the county as a whole and different land use types, sent to 60,000 households;
- A student travel tally to understand how public school students arrive to and depart from school, completed by over 70,000 students; and
- A Pedestrian Level of Comfort analysis cataloguing pedestrian conditions along the entirety of the pedestrian transportation network in Montgomery County.

This Existing Conditions report sets the stage for developing data-driven recommendations in the Pedestrian Master Plan by providing an in-depth understanding of the pedestrian experience today. It is organized around the plan goals. Individual sections dedicated to the first three goals include:

GOAL 1: Increase Walking Rates and Pedestrian Satisfaction.

High rates of walking are associated with improved health, lower carbon emissions, and a vibrant economy. As a result, an important measure of success for the Pedestrian Master Plan is the extent to which walking rates and pedestrian satisfaction increases in Montgomery County.

GOAL 2: Create a Comfortable, Connected, Convenient Pedestrian Network.

County residents, employees, and visitors should have a comfortable pedestrian experience, whether walking for recreation, to work, or for other purposes. Improving the pedestrian network can be achieved by building new pathways or reconstructing old ones, reducing vehicular travel speeds along and across pedestrian routes, increasing separation between pedestrians and motor vehicles, among other things.

GOAL 3: Enhance Pedestrian Safety.

Montgomery County has a goal of eliminating transportation-related fatalities and severe injuries by 2030. This “Vision Zero” policy starts with the ethical belief that everyone has the right to move safely in their communities.

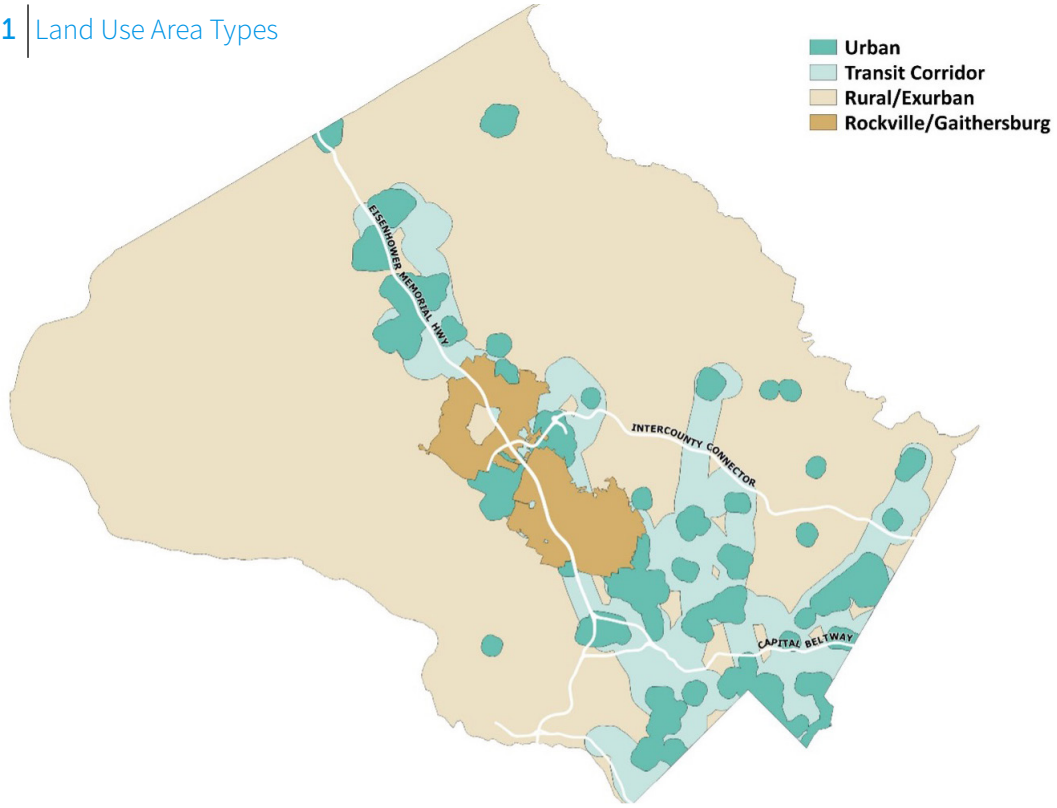
GOAL 4: Build an Equitable and Just Pedestrian Network.

Providing community members with a pedestrian network that meets everyone’s needs is a critical aspect of achieving the county’s racial and social justice goals.

Additionally, while the analysis in this report is provided at a countywide level, there are also important distinctions based on land use type and equity that are woven throughout. Land use is categorized as urban, transit corridor or exurban/rural, using the same area types identified for the Countywide Pedestrian Survey. The different areas are illustrated in Figure 1. Urban areas include the county's downtowns and town centers and their immediate surroundings. Downtowns are envisioned as Montgomery County's highest-intensity areas with dense, transit-oriented development, and a walkable street grid. Town centers are similar to downtowns but generally feature less intense development and cover a smaller geographic area. While the town center area type includes a mixture of uses, it is commonly envisioned as moderate- to high-intensity residential development, including multifamily buildings and townhouses, and retail. Transit corridors are more suburban and include areas within a half-mile of WMATA and RideOn transit services that have at least 20-minute peak headways.
The remainder of the county, with the exceptions of Rockville and Gaithersburg, is defined as exurban/rural. The cities of Rockville and Gaithersburg (shown in dark brown in Figure 1) have been excluded from the analysis except where noted, as Montgomery Planning does not have planning authority over these jurisdictions.

Equity is addressed through a few lenses. First, several data points are evaluated by comparing Equity Focus Areas (EFAs) to the rest of the county[1] (see Figure 2) to highlight any disparities that may exist. Second, school data is disaggregated in two ways. At the elementary level, Title I/Focus Schools are compared to non-Title I/Focus Schools. Schools with these designations are ones with students most heavily affected by poverty and limited English proficiency. For middle and high schools, those schools with higher Free and Reduced Meal

FIGURE 1 | Land Use Area Types



Services (FARMS) rates than the county average are those where student households are more impoverished (Figure 3). These schools are compared to those middle and high schools with below-average FARMS rates. Lastly, some of the results from the countywide pedestrian survey are disaggregated based on reported disability status. As equity is a foundational goal of the Pedestrian Master Plan, equity analyses are highlighted in call-out boxes throughout this report.

FIGURE 2 | Equity Focus Areas

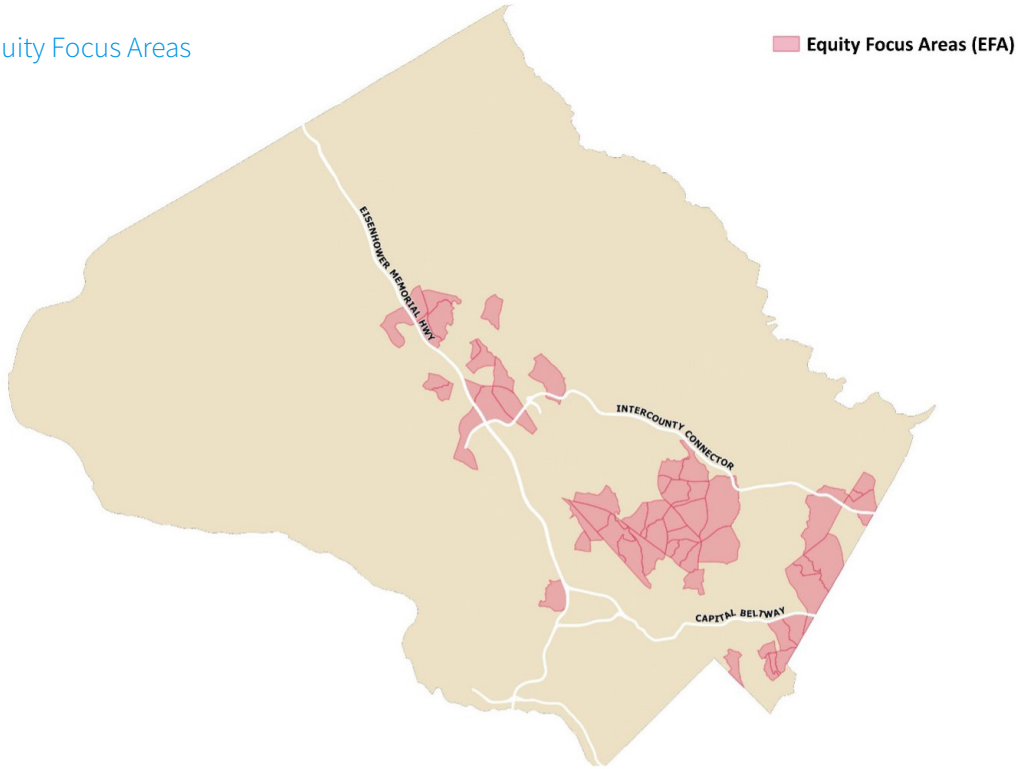
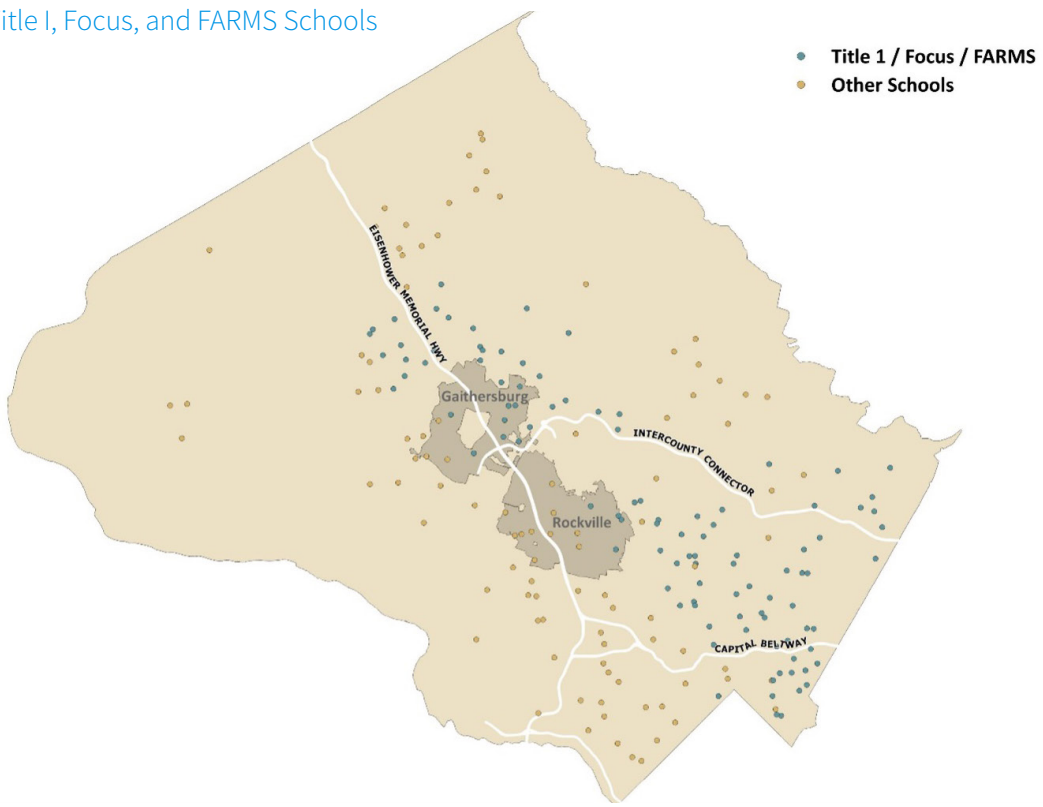


FIGURE 3 | Title I, Focus, and FARMS Schools



HISTORY

The pedestrian experience in Montgomery County largely reflects transportation practices that were in place as the county developed. Older areas of the county that developed around streetcar lines and/or railroads, like Silver Spring, Bethesda and Rockville, have a street grid that is conducive to walking short blocks, many nearby destinations, dedicated pedestrian pathways, and multiple ways to get around.

Since the 1950s however, much of the county has developed with an auto-oriented suburban character. Because the private automobile made it easier to travel longer distances faster, land uses were separated, streets were arranged in a hierarchy that channeled users onto larger roads rather than a redundant network and dedicated pedestrian space may or may not have been provided. While some of these areas may have been very walkable when they were initially built, as roads have been widened and intended travel speeds increased, their walkability has diminished. Other suburban areas were not walkable from the outset as walking was a less important transportation consideration at the time.

Over the last thirty years, both the public and policymakers have rediscovered the benefits of the pre-automobile urban form, and as a result, development projects are increasingly taking cues from the past. These developments, like the Kentlands in Gaithersburg in the late 1980s and more recently with Pike & Rose in White Flint, create comfortable pedestrian islands but struggle to effectively integrate them into the surrounding streets that are dominated by vehicular traffic. The result is hubs of pedestrian activity that many people drive to access. Development also continues in parts of the county where driving is the only viable transportation option for most people, though these developments are now required to provide pedestrian amenities such as sidewalks.

Making Montgomery County a more pedestrian-friendly place will require building on the traditional urban areas that already exist, knitting together the newer, walkable communities, and retrofitting the suburban fabric to provide comfortable, direct access to destinations. A new emphasis on corridor-focused growth in Thrive Montgomery 2050 offers the opportunity to begin to pull together communities divided by high-speed and high-volume roads.

GOAL 1:
Increase Walking Rates and Walking Satisfaction

The Pedestrian Master Plan aims to increase the number of trips made by walking and rolling. The following is a summary of current pedestrian behavior, including what portion of trips residents – and students, specifically – make by walking, for what purposes residents walk, and resident satisfaction with the pedestrian environment.

MODE SHARE

Overall Travel

The Countywide Pedestrian Survey found that 98 percent of respondents had taken at least one pedestrian trip in the past month.

Overall, 7.5 percent of weekday trips are made by walking in Montgomery County (Table 1) and 2.2 percent of commute trips are made by walking. Walking rates vary greatly by land use type, with a greater share of trips made by walking in urban areas (11.3 percent) compared to transit corridors (7.3 percent) and exurban/rural areas (4.6 percent). In addition, residents in urban areas make up a greater share of commute trips by walking (3.7 percent) than those in transit corridors (1.8 percent) or exurban/rural areas (1.1 percent).

Walking rates also vary depending on whether an area is an EFA, though the variation is less than by land use type. Residents in EFAs make 9.6 percent of trips by walking compared to 7.0 percent of trips by walking in non-EFAs. The share of commute trips by walking is only slightly greater in EFAs (2.4 percent) than in non-EFAs (2.1 percent).

TABLE 1 | Pedestrian Mode Share by Area Types

	Total	Land Use Type			Equity Focus Areas	
		Urban	Transit Corridor	Exurban / Rural	EFAs	Non-EFAs
Overall Weekday Trips*	**7.5%**	11.3%	7.3%	4.6%	9.6%	7.0%
Commute Trips**	**2.2%**	3.7%	1.8%	1.1%	2.4%	2.1%

* Regional Travel Survey, 2017-2018

** American Community Survey, 2019 Five-Year Estimates

Note: County mode share includes Rockville and Gaithersburg.

While the county's pedestrian commuter mode share is low, it is higher than all other counties in the region, except Arlington County. In urban areas such as the City of Rockville and Silver Spring Census Designated Place, commuter mode share is higher. For instance, the 2019 American Community Survey reports that the rate of walking is 3.2 percent in these areas.[2]

TABLE 2 | Commute Mode Share of Jurisdictions in the Metropolitan Washington Region

Jurisdiction	Pedestrian Mode Share
Washington, D.C.	13.4%
Arlington County, VA	5.0%
Montgomery County, MD	**2.2%**
Prince George's County, MD	2.0%
Fairfax County, VA	1.9%
Frederick County, MD	1.8%
Howard County, MD	1.0%

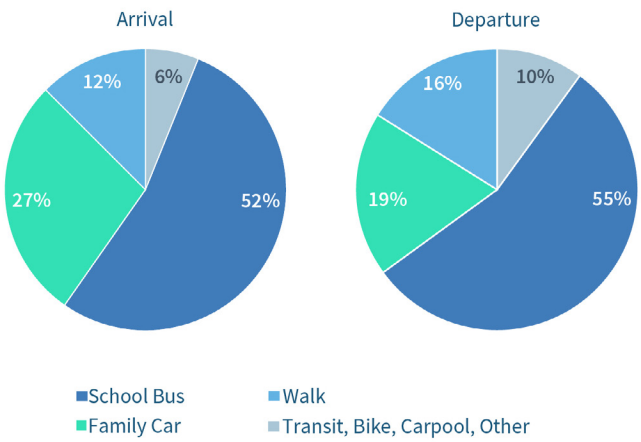
Source: American Community Survey, 2019 Five-Year Estimates

Note: County mode share includes Rockville and Gaithersburg.

School Travel

In addition to evaluating travel to work, school travel is examined as well. Figure 4 shows that walking is the third-most common mode of transportation to and from school, with 12 percent of students arriving and nearly 16 percent of students departing on foot, compared to 52 percent arriving and 55 percent departing by school bus and 27 percent arriving and 19 percent departing by family car. Students are more likely to walk in the afternoon. This holds true for students in every grade level from kindergarten to 12th grade.

FIGURE 4 | Student Mode Share by Arrivals and Departures



Source: Montgomery County Student Travel Tally
Note: Analysis includes schools in Rockville and Gaithersburg.

Walking is most prevalent with elementary school students, with 16 percent of arrivals by walking and 18 percent of departures by walking (Table 3). Walking is least prevalent with high school students, with 8 percent of arrivals by walking and 12 percent of departures by walking. By comparison, surveys of other jurisdictions in the region found the following rates of walking to school: 23 percent of DC public school students in 2017[3], 21 percent of Alexandria public school students in 2019[4], and 20 percent of students in Arlington in 2019[5]. These communities are more compact than Montgomery County, but their walk mode share provides context for the county's own results.

TABLE 3 | Walking Arrivals and Departures by School Level

School Level	Arrival	Departure
Elementary School	16%	18%
Middle School	11%	16%
High School	8%	12%
Total	**12%**	**16%**

Source: Montgomery County Student Travel Tally
Note: Data include schools in Rockville and Gaithersburg.

While walking departure rates from school are generally below 20 percent, there is wide variation in walking rates among individual schools. In some cases, walking rates exceed 30 or 40 percent of school access mode share. Table 5 shows those elementary, middle, and high schools with the highest walking rates. Many of the schools with the highest walking rates are schools designated as Title I/Focus or high FARMS rate schools. High walking rates may be related to shorter walking distances,

Walking rates to school vary slightly based on whether schools are designated as Title I/Focus or have a high FARMS rate. For elementary school students, those at designated schools have higher walk rates both to school (18 percent vs. 13 percent) and from school (21 percent vs. 15 percent). For middle school and high school students, non-designated schools have slightly higher rates of walking. Overall, walk rates are higher at designated schools than non-designated schools.

TABLE 4 | Walking Arrivals and Departures for Title I/Focus and High FARMS Rate Schools

School Level	Title I/Focus and High FARMS Schools		Non-Title I/Focus and Low FARMS Schools	
	Arrival	Departure	Arrival	Departure
Elementary School	18%	21%	13%	15%
Middle School	10%	14%	13%	18%
High School	7%	11%	8%	12%
Total	**13%**	**17%**	**11%**	**15%**

Note: Data include schools in Rockville and Gaithersburg.

neighborhood conditions conducive to comfortably and safely walking to/from school, and whether walking is the only option because busing is not provided (within a certain distance of the school) and parents or guardians are not available to drive the student.

TABLE 5 | Schools with the Highest Walking Departure Rates by School Type

Schools	Walk Mode Share
Elementary Schools	
Glen Haven Elementary School	50%
Snowden Farm Elementary School	49%
Gaithersburg Elementary School	48%
New Hampshire Estates Elementary School	43%
Middle Schools	
Montgomery Village Middle School	46%
Hallie Wells Middle School	43%
Takoma Park Middle School	36%
Gaithersburg Middle School	34%
High Schools	
Bethesda-Chevy Chase High School	24%
Wheaton High School	20%
Albert Einstein High School	19%
Rockville High School	17%

Source: Montgomery County Student Travel Tally

Note: Data include schools in Rockville and Gaithersburg.

Italics indicates that a school is designated as a Title I/Focus and high FARMS rate school.

Table 6 lists those elementary, middle, and high schools with established walk zones that have the lowest walking rates. There are other schools with similarly poor walk rates, but they are located along roadways where walking to school is not currently feasible. Indeed, for many Montgomery County schools, walking will never be a viable access or departure mode because the distances students would have to travel between home and school are too great.

Additional findings from the student travel tally can be found in the appropriate appendix.

TABLE 6 | Schools with the Lowest Walking Departure Rates by School Type

Schools	Walk Mode Share
Elementary Schools	
Luxmanor Elementary School	<1%
Bel Pre Elementary School	1%
Cedar Grove Elementary School	1%
Maryvale Elementary School	1%
Middle Schools	
William H. Farquhar Middle School	1%
Redland Middle School	2%
Briggs Chaney Middle School	3%
Benjamin Banneker Middle School	4%
High Schools	
Col. Zadok Magruder High School	2%
James Hubert Blake High School	2%
Sherwood High School	4%
Paint Branch High School	5%

Source: Montgomery County Student Travel Tally

Note: Data include schools in Rockville and Gaithersburg.

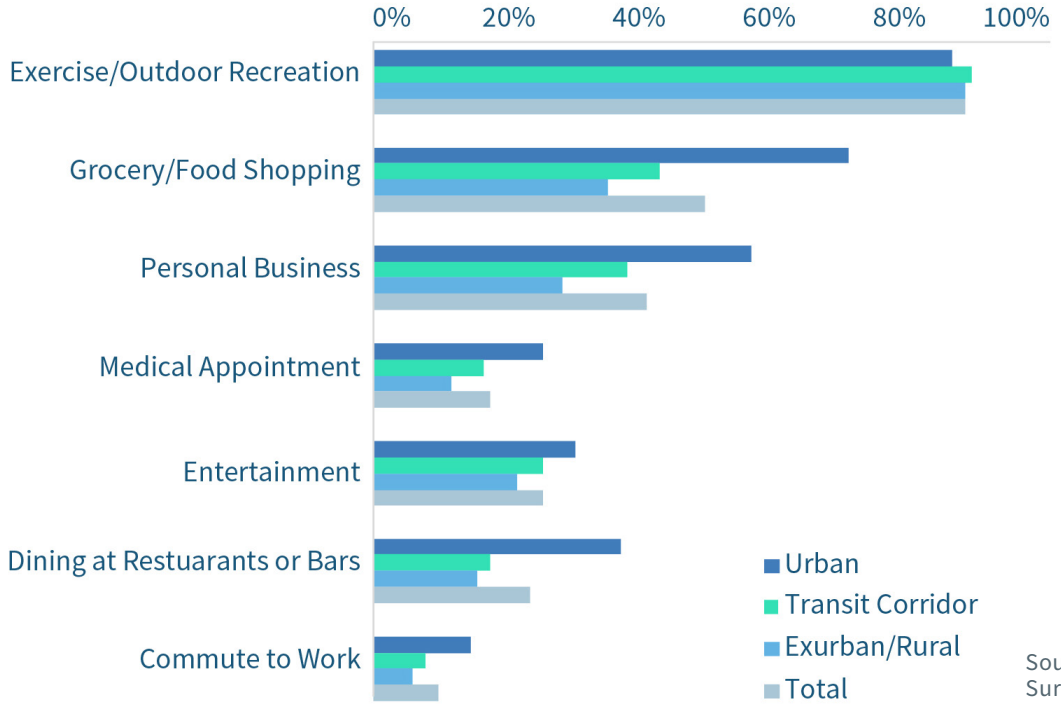
Italics indicates that a school is designated as a Title I/Focus or high FARMS rate school.

WALK PURPOSE

Pedestrian trips are made for many reasons, from recreational walking and exercise to walking to work or to complete errands. Figure 5 summarizes why respondents have taken trips in the past month. No matter the land use type, exercise and outdoor recreation are the most common reasons for walking. More than 90 percent of respondents walked for recreation in the past month.

Utilitarian pedestrian trips – where the purpose of walking is accomplishing errands or getting to a destination – are more common for residents in urban areas (shown in dark blue in Figure 5) than residents of transit corridors or exurban and rural areas (shown in green and light blue, respectively).

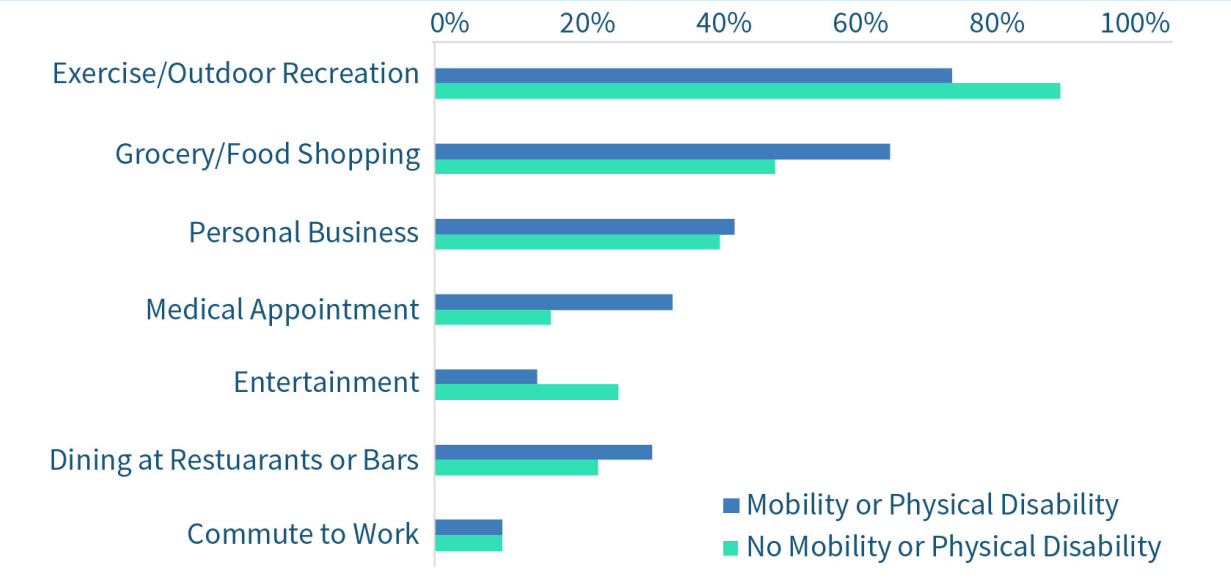
FIGURE 5 | Trip Purpose by Land Use Type



Source: Countywide Pedestrian Survey, 2020.

Respondents with reported disabilities were more likely to walk for non-recreational trips than people without reported disabilities, as seen in Figure 6. In fact, respondents with disabilities were twice as likely as others to walk to a medical appointment (35 percent to 17 percent), about 33 percent more likely to walk to the grocery store/food shopping (67 percent to 50 percent) and to dine at restaurants (32 percent to 24 percent). However, respondents with disabilities take 17 percent fewer trips for exercise or outdoor recreation than respondents without reported disabilities (76 percent to 92 percent).

FIGURE 6 | Trip Purpose by Reported Disability



Source: Countywide Pedestrian Survey, 2020

TRIP FREQUENCY AND LENGTH

Exercise/recreation trips are also the most frequently made pedestrian trip. Overall, 58 percent of pedestrian travel was for exercise or recreation.

There is a marked difference between urban areas and the rest of the county when it comes to the number of pedestrian trips taken and their purpose. Urban area respondents take about 32 percent more pedestrian trips than those in transit corridors and 27 percent more than those in rural/exurban areas. Also, the majority of trips taken in urban areas were for a utilitarian purpose – 53 percent compared to 37 percent in transit corridors and 32 percent in rural/exurban areas.

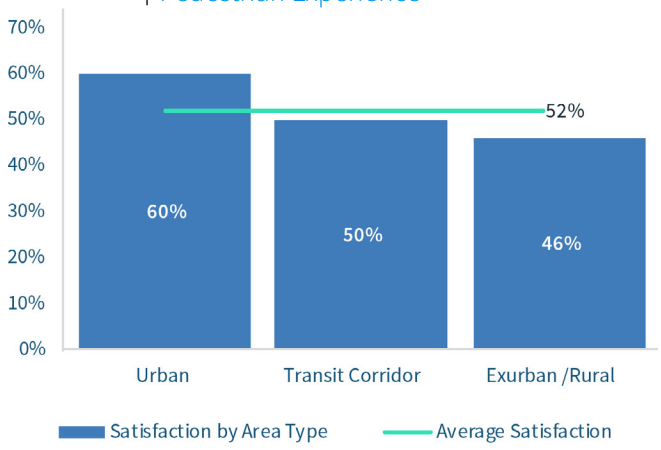
Countywide, exercise/recreational walking trips are longer than utilitarian trips. While 86 percent of recreational trips are longer than 20 minutes, the majority of grocery/food shopping trips, personal business trips, medical appointments, entertainment, dining and commuting are 20 minutes or less. This makes intuitive sense because the purpose of a recreational walk is the walk itself, while for other trip types, the purpose is to reach a destination. If a utilitarian pedestrian trip takes too long, it's likely the trip will not be taken, or would instead become a car or transit trip.

Travel-time differences are also apparent between urban areas and the rest of the county. Looking at food shopping as an example, 62 percent of trips for this purpose in urban areas are 20 minutes or less, while in transit corridors and rural/exurban areas, 39 percent and 42 percent of trips respectively are 20 minutes or less. So, not only are there more pedestrian trips taken to grocery stores in urban areas, but these trips are also shorter. With more destinations within that 20-minute walking distance in the more urban areas of the county, it makes sense that more of these trips are being taken.

SATISFACTION

The Countywide Pedestrian Survey also included questions about how satisfied respondents were with different elements of the pedestrian experience. As shown in Figure 7, 52 percent of respondents are satisfied with the overall pedestrian experience in Montgomery County, with respondents in urban areas reporting the highest rates of satisfaction (60 percent) and those in exurban/rural areas reporting the lowest (46 percent). Higher satisfaction rates in urban areas are not surprising, considering that these areas are the best endowed with both pedestrian accommodations and destinations.

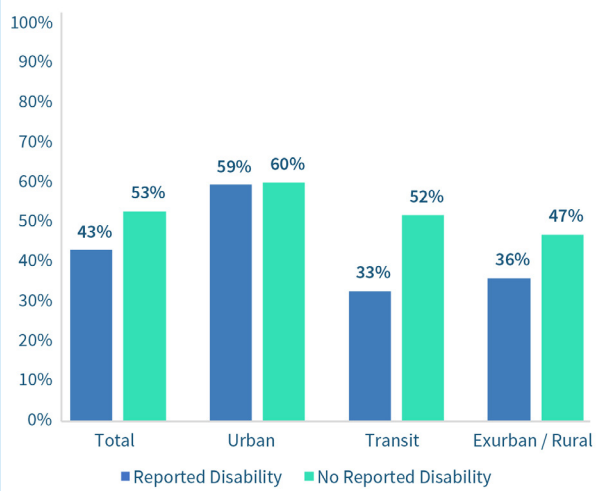
FIGURE 7 | Satisfaction with the Overall Pedestrian Experience



Source: Countywide Pedestrian Survey, 2020.

As shown in Figure 8, only 43 percent of pedestrians with reported disabilities are satisfied with their overall pedestrian experience in Montgomery County, compared to 53 percent of respondents without reported disabilities. However, there are notable differences based on land use type with respondents in urban areas reporting the same level of satisfaction whether they have a reported disability (59 percent) or not (60 percent). In contrast, respondents with reported disabilities in transit corridors are substantially less satisfied (33 percent) than respondents without reported disabilities (52 percent). Respondents with reported disabilities in exurban/rural areas are also less satisfied (36 percent) than respondents without reported disabilities (47 percent), but the differences are less pronounced.

FIGURE 8 | Overall Satisfaction by Reported Disability Status and Land Use Type

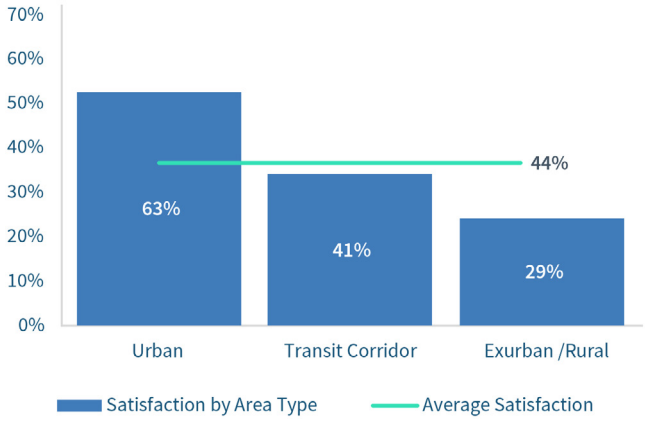


Source: Countywide Pedestrian Survey, 2020.

In addition to overall satisfaction, the Countywide Pedestrian Survey broke down the pedestrian experience into different elements: access to destinations, the experience walking and rolling along streets, the pedestrian experience at intersections and crossings, and the presence of lighting. As shown in Figure 9, 44 percent of respondents are satisfied with walking to retail, restaurants, parks, etc., with respondents in urban areas reporting the highest rates of satisfaction (63 percent) and respondents in exurban or rural areas reporting the least satisfaction (29 percent).

Several elements define the experience of walking along a street: the amount and width of pathways along a route, the distance between sidewalks and cars and the speed of those vehicles. Table 7 compares pedestrian satisfaction while walking along the street in different areas of the county.

FIGURE 9 | Pedestrian Satisfaction with Access to Retail, Restaurants, Parks, Etc.



Source: Countywide Pedestrian Survey, 2020.

While satisfaction rates for this experience are less than 50 percent, county residents are most satisfied with the “amount of sidewalks on their route” (44 percent) and the “width of sidewalks” (44 percent) but least satisfied with the “speed of cars along sidewalks and paths” (21 percent)

and “snow removal” (28 percent). Satisfaction levels across land use types are generally similar, except that urban residents express greater satisfaction with the “amount of sidewalk on their route” (55 percent) than transit corridor (45 percent) and exurban/rural (31 percent) residents.

TABLE 7 | Pedestrian Satisfaction Walking Along the Street

Experience Walking Along the Street	Urban	Transit Corridor	Exurban / Rural	Total
Amount of sidewalks on pedestrian route	55%	45%	31%	**44%**
Width of sidewalks	45%	45%	43%	**44%**
Shading by trees or buildings	39%	42%	38%	**39%**
How often driveways cross sidewalks	36%	34%	34%	**35%**
Distance between sidewalks and cars	33%	31%	28%	**31%**
Snow removal	28%	30%	26%	**28%**
Speed of cars along sidewalks and paths	23%	19%	22%	**21%**

Source: Countywide Pedestrian Survey, 2020.

Similar to the experience walking along the street, the crossing/intersection experience is made up of several elements. Table 8 compares pedestrian satisfaction at intersections and crossings in different areas of the county. As with walking along the street, the crossing/intersection satisfaction rate is less than 50 percent with a majority of residents expressing dissatisfaction with all elements of intersections and crossings that they were asked about. Survey respondents indicated that they are most satisfied with the “distance to cross the street” (49 percent) and the “time to cross the street at pedestrian signals” (47 percent) and are least satisfied with the “number of vehicles cutting across the crosswalk” (22 percent), “places to stop partway while crossing” (33 percent) and “drivers stopping for me when I cross the street” (34 percent).

While urban respondents tend to have greater levels of satisfaction than exurban/rural respondents for “number of places to safely cross the street”, “number of marked crosswalks”, “distance to cross the street” and “place to stop partway while crossing”, respondents in transit corridors have slightly higher levels of satisfaction with the “time to cross the street at pedestrian signals” and the “wait time for a pedestrian walk signal” than urban or exurban/rural respondents.

TABLE 8 | Pedestrian Satisfaction at Intersections and Crossings

Experience at Intersections and Crossings	Urban	Transit Corridor	Exurban / Rural	Total
Distance to cross the street	53%	50%	45%	**49%**
Time to cross the street at pedestrian signals	47%	52%	43%	**47%**
Number of marked crosswalks	50%	48%	39%	**46%**
Wait time for a pedestrian walk signal	43%	47%	43%	**44%**
Number of places to safely cross the street	46%	43%	35%	**42%**
Drivers stopping for me when I cross the street	32%	34%	35%	**34%**
Places to stop partway while crossing	39%	32%	27%	**33%**
Number of vehicles cutting across the crosswalk	20%	22%	23%	**22%**

Source: Countywide Pedestrian Survey, 2020.

While survey respondents expressed low satisfaction with lighting levels overall (31-32 percent), urban respondents (39-40 percent) were more satisfied with lighting than transit corridor (28-30 percent) or exurban/rural (26-28 percent) respondents.

TABLE 9 | Pedestrian Satisfaction with Lighting

Lighting Experience	Urban	Transit Corridor	Exurban / Rural	Total
Overhead lighting along sidewalks and pathways	40%	30%	28%	**32%**
Overhead lighting at crossings	39%	28%	26%	**31%**

Source: Countywide Pedestrian Survey, 2020.

Reviewing the pedestrian satisfaction responses from the Countywide Pedestrian Survey, it is clear that there is room for improvement. While a slim majority of respondents were satisfied overall with their experience as pedestrians, when asked to consider the elements that define that overall experience, satisfaction is much lower.

GOAL 2:
Create a Comfortable, Connected, Convenient Pedestrian Network

Montgomery County's current walking rates and degree of satisfaction with the pedestrian environment may be, in part, explained by the low level of comfort that pedestrians experience when walking or rolling using a mobility device in the county. This section details the specific pedestrian accommodations and resulting pedestrian comfort levels that exist along streets, trails, and at roadway crossings.

Comfort is described using the Pedestrian Level of Comfort (PLOC) methodology. A variety of pathway and crossing factors are considered to determine a comfort score for each crossing and street segment. The four main scores are: undesirable, uncomfortable, somewhat comfortable, and very comfortable. The existing pedestrian network can be viewed on the Pedestrian Level of Comfort Map[6]. A detailed methodology can be found in the appropriate appendix.

"Comfort" is not the same as "safety". While safety will always be the bedrock principle of the transportation system (and is the focus of Goal 3), increasing pedestrian comfort can also help create a pedestrian experience in Montgomery County that residents and visitors enjoy and look forward to, not just tolerate or overcome.

PEDESTRIAN ACCOMMODATIONS

Pedestrian accommodations are the parts of the environment that pedestrians use to travel. They include elements along roads, like sidewalks or sidepaths, elements that cross roads, such as marked crosswalks and pedestrian refuge islands, as well as elements away from roads, like trails and connections between culs-de-sac.

Pedestrian Accommodations Along the Street

Table 10 summarizes sidewalk mileage by street classification[7], as well as where there are sidewalk gaps. Countywide, there are nearly 2,200 miles of sidewalks (primarily on local—or residential—streets) and 218 miles of sidewalk gaps on non-local streets. Many of these gaps are located on roads that connect people to destinations, including major highways, arterials, and primary residential streets.

TABLE 10 | Sidewalk Mileage by Street Classification

Street Classification	Street Mileage	Existing Sidewalks (miles)	Sidewalk Gaps (miles)
Controlled Major Highway	19	20	1
Major Highway	159	214	50
Parkway	9	3	0
Arterial	243	205	98
Minor Arterial	48	62	8
Business	50	79	2
Primary Residential	215	227	56
Industrial	7	12	1
Country Road	35	2	3
Rustic Road	149	2	0
Exceptional Rustic Road	40	0	1
Local Streets	2,121	1,367	N/A
Total	**3,149**	**2,193**	**220**

Source: Pedestrian Level of Comfort Analysis

Note: Missing sidewalks on local streets are not classified as sidewalk gaps because traffic volumes and speed limits often allow for a comfortable experience for those pedestrians traveling in the roadway.

These sidewalk gaps are not evenly distributed across the county; 79 percent of the sidewalk gap mileage is in the exurban/rural part of the county. The highlighted cells in Table 11 call out those sidewalk gaps in urban and transit corridor communities along busier, faster streets and locations with more pedestrian activity.

TABLE 11 | Sidewalk Gap Mileage by Street Classification and Land Use

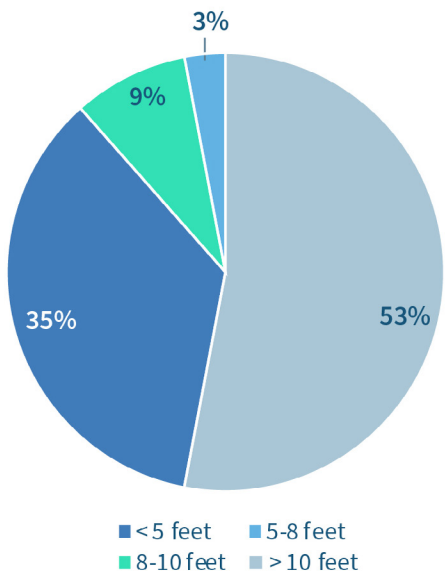
Street Classification	Existing Sidewalks (miles)	Gap Mileage			
		Urban	Transit Corridor	Exurban/ Rural	Total
Controlled Major Highway	20	1	0	0	**1**
Major Highway	214	5	7	38	**50**
Parkway	3	0	0	0	**0**
Arterial	205	7	11	80	**98**
Minor Arterial	62	1	2	5	**8**
Business	79	2	0	0	**2**
Primary Residential	227	4	7	45	**56**
Industrial	12	0	0	1	**1**
Country Road	2	0	0	3	**3**
Rustic Road	2	0	0	0	**0**
Exceptional Rustic Road	0	0	0	1	**1**
Local Streets	1,367	N/A	N/A	N/A	**N/A**
Total	**2,193**	**20**	**27**	**173**	**220**

Source: Pedestrian Level of Comfort Analysis

Note: Missing sidewalks on local streets are not classified as sidewalk gaps because traffic volumes and speed limits often allow for a comfortable experience for those pedestrians traveling in the roadway.

Not all sidewalks are equal. Factors such as how wide a sidewalk is and how far away it is from a parallel street impact the pedestrian experience. Wider sidewalks and wider buffers are associated with greater comfort. As depicted in Figure 10, over half the sidewalks in the county are less than five feet wide (53 percent). Of the remaining sidewalks, most are five-to eight-feet wide (35 percent)[8].

FIGURE 10 | Sidewalk Width



As Table 12 highlights, local streets tend to have narrower sidewalks: 61 percent of sidewalks along local streets are less than five feet wide. While higher classification streets tend to have wider sidewalks, there are still many sidewalks along major highways (23 percent), arterials (26 percent), Business streets (18 percent) and those similar that are narrower than five feet.

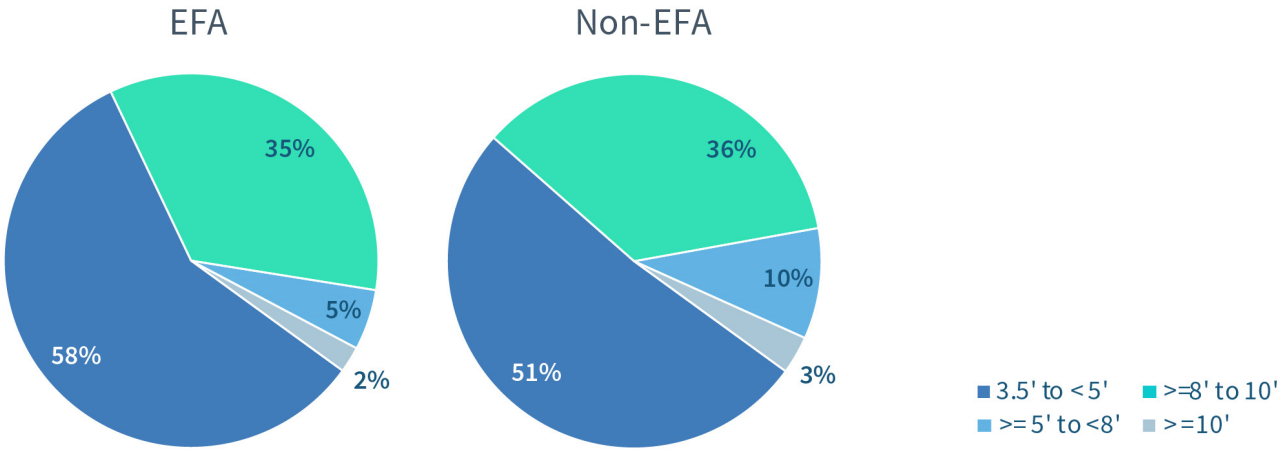
TABLE 12 | Sidewalk Width by Street Classification

Street Classification	Mileage	Sidewalk Width			
		3.5' to < 5'	>= 5' to <8'	>=8' to 10'	> =10'
Controlled Major Highway	20	17%	40%	38%	5%
Major Highway	214	23%	54%	19%	5%
Parkway	3	3%	46%	10%	41%
Arterial	205	26%	47%	25%	3%
Minor Arterial	62	57%	39%	3%	1%
Business	79	18%	57%	14%	11%
Primary Residential	227	74%	21%	5%	0%
Industrial	12	14%	68%	12%	6%
Country Road	2	0%	18%	82%	0%
Rustic Road	2	0%	96%	0%	4%
Exceptional Rustic Road	0	48%	52%	0%	0%
Local Street	1,367	61%	32%	5%	3%
Total Mileage	**2,193**	**1,175**	**784**	**189**	**67**

Source: Pedestrian Level of Comfort Analysis

As Figure 11 indicates, sidewalks in EFAs tend to be somewhat narrower than sidewalks in other areas of the county. In EFAs, 58 percent of sidewalks are between three and a half and five feet wide, while 51 percent of sidewalks outside EFAs are in this category. At the other end of the width spectrum, non-EFA sidewalks are Fmore likely to be between eight and 10 feet (10 percent vs. 5 percent) and greater than 10 feet (3 percent vs. 2 percent).

FIGURE 11 | Sidewalk Width by EFA Status



Buffer width is the distance between the pathway width and the curb. Buffers separate moving vehicles from pedestrians, and they may allow the planting of larger street trees to provide robust physical separation from traffic, shade canopy, and a sense of enclosure for pedestrians. Without a buffer, pedestrians may "shy away" from adjacent travel lanes, effectively using part of the pathway as a buffer, reducing the pathway's effective width.

Of the 2,193 miles of county sidewalks, most (58 percent) have at least a six-foot buffer between the sidewalk and the street. However, nearly half (47 percent) of sidewalks along major highways like Georgia Avenue are missing buffers. By contrast, 20 percent of arterial sidewalks are missing buffers, 11 percent of primary residential sidewalks are missing buffers, and 20 percent of local street sidewalks are missing buffers (Table 13).

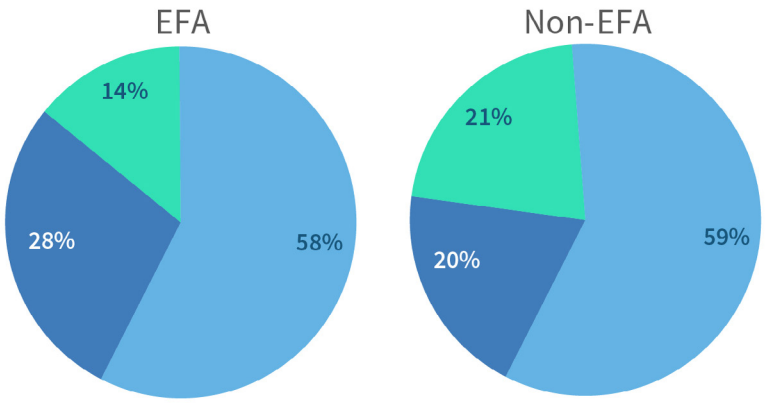
TABLE 13 | Sidewalk Buffer Width by Street Classification

Street Classification	Buffer Width		
	No Buffer	Less than Six Feet	Six Feet or Greater
Controlled Major Highway	3%	66%	31%
Major Highway	47%	30%	23%
Parkway	4%	26%	70%
Arterial	20%	29%	70%
Minor Arterial	21%	27%	52%
Business	29%	32%	39%
Primary Residential	11%	17%	72%
Industrial	15%	25%	61%
Country Road	0%	4%	96%
Rustic Road	8%	18%	74%
Exceptional Rustic Road	53%	27%	21%
Local Street	20%	16%	64%

Source: Pedestrian Level of Comfort Analysis

Sidewalks in EFAs are less likely to have buffers than those outside of EFAs. While 28 percent of sidewalks in EFAs are missing buffers, only 20 percent outside are.

FIGURE 12 | Sidewalk Buffer Width by EFA Status



Wider buffers are more important along roads with higher speeds, but the higher the roadway speed limit the less likely there is to be a wide buffer between the sidewalk and the street (Table 14). The widest buffers are found on the slowest streets. Along streets with speed limits less than 30 mph, 64 percent of buffers are six feet or greater, while along streets with speed limits above 40 mph, this number drops to 30 percent. Sidewalks along the fastest streets are the ones least likely to have a buffer from traffic.

TABLE 14 | Sidewalk Buffer by Posted Speed Limit

Posted Speed Limit	No Buffer	Less than Six Feet	Six Feet or Greater
Less than 30 mph	20%	17%	64%
30-40 mph	28%	28%	45%
Greater than 40 mph	31%	39%	30%
Total	**22%**	**20%**	**58%**

Source: Pedestrian Level of Comfort Analysis

PEDESTRIAN ACCOMMODATIONS CROSSING THE STREET

Pedestrian comfort at crossings is largely a function of five factors: traffic control, the posted speed limit, the number of lanes of the street being crossed, median type, and crosswalk type.

There are three different approaches to crosswalks on county roads. Unmarked crossings have no pavement markings to denote the crosswalk.[9] Standard crosswalk markings include stamped concrete, parallel lines and dashed marking patterns. High-visibility crosswalks have proven pedestrian safety benefits over standard crosswalk markings and include continental, ladder, zebra, and solid designs. Table 15 summarizes the crosswalk types by street classification. Countywide, 67 percent of legal crossings are unmarked, while 16 percent have a standard marked crosswalk and 17 percent have a high-visibility crosswalk. The highest portion of marked crosswalks (standard or high-visibility) are on high-volume, higher-order roadways, such as controlled major highways, major highways, and parkways.

TABLE 15 | Crossing Type by Street Classification

Street Classification	Unmarked	Standard	High-Visibility
Controlled Major Highway	27%	35%	38%
Major Highway	33%	28%	39%
Parkway	29%	16%	55%
Arterial	47%	17%	36%
Minor Arterial	56%	16%	28%
Business	28%	24%	48%
Primary Residential	70%	14%	16%
Industrial	51%	19%	29%
Country Arterial	100%	0%	0%
Country Road	100%	0%	0%
Rustic Road	86%	5%	10%
Exceptional Rustic Road	89%	11%	0%
Local	75%	14%	11%
Total	**67%**	**16%**	**17%**

Source: Pedestrian Level of Comfort Analysis

The Pedestrian Level of Comfort evaluates crossings based on the highest posted speed limit where the crossing is located (typically at an intersection, but also at mid-block crossings). Marked crosswalks, and specifically high-visibility crosswalks, are more prevalent on higher speed streets (Table 16). Marked crossings of all types are more common in urban areas, than along transit corridors or in exurban/rural areas.

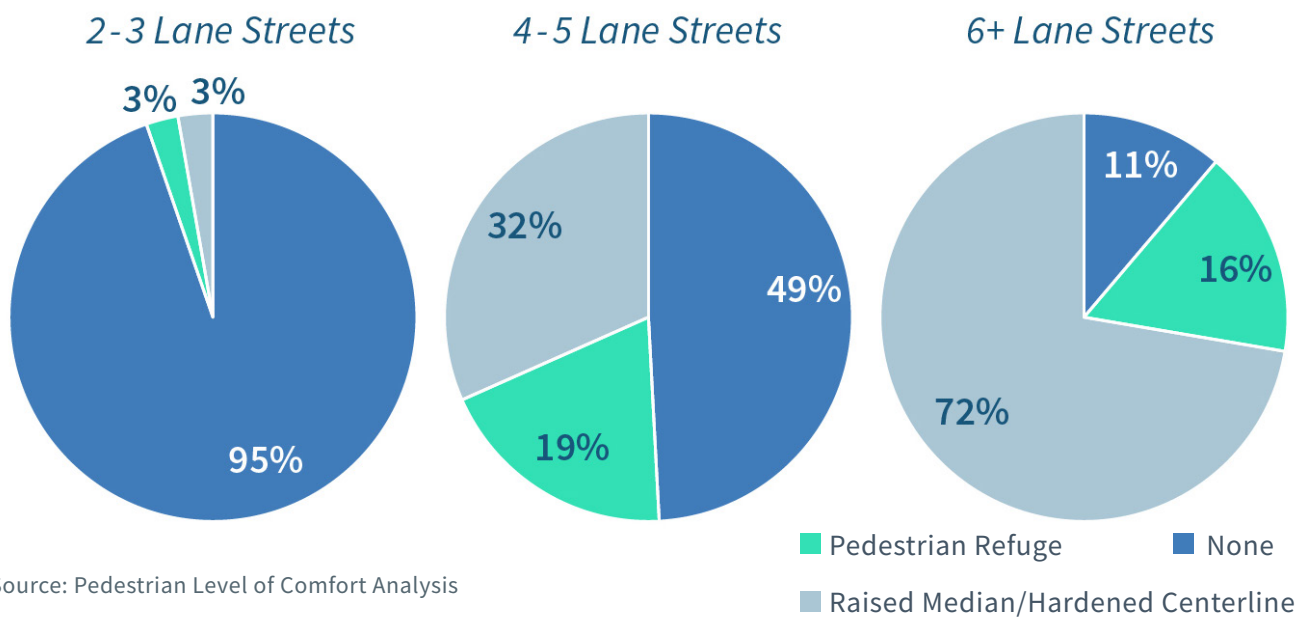
TABLE 16 | Crossing Type by Roadway Speed by Land Use

Posted Speed Limit	Urban			Transit Corridor			Exurban/Rural		
	Unmarked	Standard	High Visibility	Unmarked	Standard	High Visibility	Unmarked	Standard	High Visibility
Less than 30 mph	67%	15%	18%	74%	16%	11%	76%	13%	10%
30-40 mph	33%	25%	43%	48%	16%	36%	63%	14%	22%
Greater than 40 mph	20%	25%	55%	30%	23%	47%	43%	26%	31%

Source: Pedestrian Level of Comfort Analysis

Having a place to stop between directions of motor vehicle traffic improves pedestrian comfort. Medians are categorized as either a pedestrian refuge island (greater than six feet wide) or as a raised median less than six feet wide/hardened centerline. While raised pedestrian refuge islands have the greatest crossing safety and comfort benefits, medians that do not meet the criteria for a refuge may also be beneficial. Figure 13 highlights how prevalent different median treatments are based on the number of lanes pedestrians have to cross. On streets with two or three travel lanes, the crossing distance is short and there are few medians. As roadways widen beyond three lanes, medians become more prevalent; medians are present at 51 percent of four- to five-lane street crossings and 88 percent of crossings on streets with six or more lanes.

FIGURE 13 | Median Treatment by Number of Lanes



Source: Pedestrian Level of Comfort Analysis

OVERALL PEDESTRIAN COMFORT

Montgomery Planning's Pedestrian Level of Comfort, or PLOC, analysis finds that 58 percent of pathway miles and 44 percent of crossings in the county are comfortable. This means they meet either the "Very Comfortable" or "Somewhat Comfortable" metrics outlined in the PLOC methodology found in the appropriate appendix.

TABLE 17 | Overall Pedestrian Comfort on Streets and at Crossings

PLOC Score	Pathway Mileage	Crossing Locations
Very Comfortable	24%	11%
Somewhat Comfortable	34%	33%
Uncomfortable	21%	38%
Undesirable	20%	17%

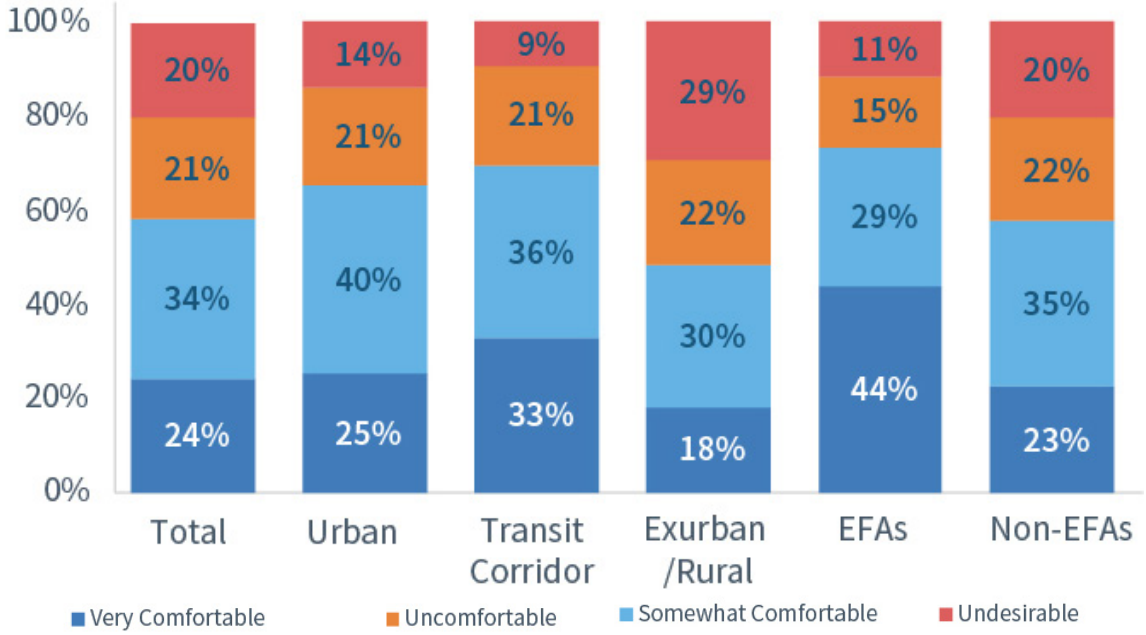
Source: Pedestrian Level of Comfort Analysis

An analysis of pedestrian conditions along all streets and crossings in the county shows that there are large areas of the county where it is uncomfortable to walk and many locations where it is undesirable to do so. Figure 14 summarizes pedestrian comfort along pathways. Comfort levels in urban areas (65 percent) and transit corridors (69 percent) are greater than exurban/rural (49 percent) areas of the county.

Figure 15 summarizes pedestrian conditions at crossings. Overall, only 44 percent of crossing locations are a comfortable walking experience for pedestrians. Crossings in transit corridors tend to be slightly more comfortable (47 percent) while crossings in exurban/rural areas tend to be somewhat less comfortable (40 percent). The comfort of crossings is similar between EFAs and non-EFAs.

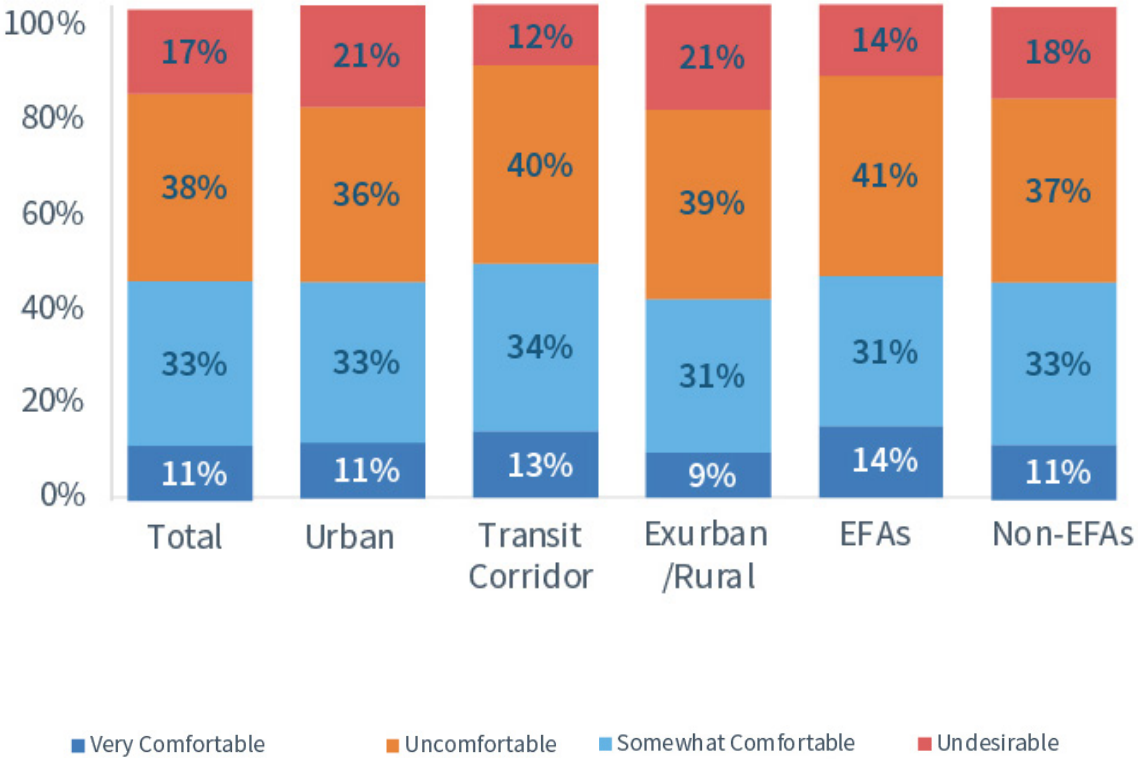
Pathway comfort levels are substantially higher in EFAs (73 percent) than non-EFAs (58 percent), likely due to where these areas are located and when they were developed.

FIGURE 14 | Overall Pedestrian Comfort Along Pathways



Source: Pedestrian Level of Comfort Analysis

FIGURE 15 | Overall Pedestrian Comfort Along Crossings



Source: Pedestrian Level of Comfort Analysis

ACCESS TO DESTINATIONS

An important aspect of understanding pedestrian comfort is evaluating access to common destinations. While many people walk for recreation, as summarized under Goal 1, many people also walk for practical reasons like getting to community destinations, transit stations, or schools. The PLOC data the project team collected allow analyses of the county's entire pedestrian network to better understand how comfortable it is to get to these destinations.

To conduct these analyses, the project team created a one-mile walkshed around each public facility (community destination or transit station). Trips between each residence and destination were modeled using the most direct route along the PLOC network. The comfortable access percentage is the sum of all the comfortable portions of the trips divided by the total trip distance (see Figure 16).

FIGURE 16 | Pedestrian Comfort Scoring for Community Destinations and Transit Stations

$$\text{Comfortable Access} = \frac{\text{Total Comfortable Distance of All Residential Trips}}{\text{Total Distance of All Residential Trips}}$$

Table 18 provides the comfortable access scores for walking to community destinations (libraries, recreation centers, and parks) and transit stations broken out by pathway and crossing mileage. While all libraries and recreation centers were scored, only two types of parks (regional and recreational) were included in the analysis. Overall, the pathways are the most comfortable part of the walk to these destinations. Crossing streets is generally less comfortable. While most destination types show disparities between pathway comfort and crossing comfort, the difference for parks is the greatest at 37 percent. Only 34 percent of the crossing distance between residences and parks was comfortable, lower than every other destination in Table 18.

TABLE 18 | Comfortable Pedestrian Access to Community Destinations and Transit Stations

	Pathways	Crossings
Community Destinations		
Libraries	77%	62%
Recreation Centers	79%	62%
Parks	71%	34%
Transit Stations		
Red Line	86%	66%
Purple Line	79%	79%
Brunswick Line	84%	72%

Source: Pedestrian Level of Comfort Analysis

Comfortable access to community destinations and transit stations varies based on area type, but the results are not consistent across each type of destination or transit service. Table 19 breaks down comfortable access for these different destinations.

Across area types, pathway comfort tends to exceed crossing comfort. Libraries are most comfortable to access in urban areas, while parks are most comfortable to access in exurban/rural areas. Transit corridors and urban areas have

similar comfortable connectivities to recreation centers. Comfortable connectivity to Red Line and Purple Line stations is better in urban areas than in transit corridors, while people living in exurban/rural areas within one mile of the stations have the most comfortable Brunswick Line access.

As noted in the table, not all community destinations or transit stations are present in the different area types (e.g., there are no Red Line stations in exurban/rural areas).

TABLE 19 | Comfortable Access to Community Destinations and Transit Stations by Area Types

		Community Destinations			Transit Stations		
		Libraries	Recreation Centers	Parks	Red Line	Purple Line	Brunswick Line
Urban	**Pathways**	79%	82%	N/A	87%	79%	83%
	Crossings	63%	65%	N/A	68%	79%	70%
Transit Corridor	**Pathways**	64%	86%	61%	74%	69%	N/A
	Crossings	65%	58%	27%	48%	82%	N/A
Exurban/Rural	**Pathways**	78%	59%	81%	N/A	N/A	92%
	Crossings	34%	53%	42%	N/A	N/A	89%

Note: The approach for calculating access to destinations for land use type is based on where the community destination or transit station is located (urban area, transit corridor, etc.).

Source: Pedestrian Level of Comfort Analysis

Comfortable access to community destinations and transit stations also varies by whether the walkshed is within an EFA. Table 20 illustrates that, overall, crossing comfort tends to be worse in EFAs, while pathway comfort is better. While Red Line station connectivity is more comfortable in EFAs, Purple Line station connectivity is worse.

TABLE 20 | Comfortable Access to Community Destinations by EFA Status

		Community Destinations			Transit Stations		
		Libraries	Recreation Centers	Parks	Red Line	Purple Line	Brunswick Line
EFAs	Pathways	77%	82%	83%	88%	73%	88%
	Crossings	55%	49%	34%	59%	73%	79%
Non-EFAs	Pathways	77%	77%	66%	85%	81%	83%
	Crossings	66%	68%	34%	68%	80%	69%

Note: The approach for calculating access to destinations for EFAs is based on where residences within the walksheds for each community destination or transit station are located (either within or outside of an EFA).

Source: Pedestrian Level of Comfort Analysis

Like other community destinations, schools were evaluated for comfortable access, but with two main differences. First, rather than a uniform one-mile distance, the walkshed for each school was defined by the school's attendance boundary and the walking distance established by Montgomery County Public Schools for the school type— one mile for elementary schools, one and a half miles for middle schools, and two miles for high schools. Second, it is not reasonable to expect or encourage school-aged children to walk along undesirable pathways or crossings. Therefore, trips requiring travel along such a segment were counted as part of the total distance traveled to that particular school but comfortable portions of a trip that included an undesirable segment were not included in the total comfortable distance traveled to that school. Figure 17 shows an equation describing the approach.

FIGURE 20 | Pedestrian Comfort Scoring for Schools

$$\text{Comfortable School Access} = \frac{\text{Total Comfortable Distance of All Residential Trips (without travel along undesirable segments)}}{\text{Total Distance of All Residential Trips (including those traveling along undesirable segments)}}$$

The implication of this scoring change is that schools will tend to score worse than other community destinations.

Table 21 shows that walking to elementary schools tends to be more comfortable than walking to other schools, with 40 percent comfortable access walking along streets, and 32 percent comfortable access at crossings. In contrast, walking tends to be the least comfortable to high schools, with only seven percent comfortable access along pathways and five percent comfortable access at crossings.

While the percentage of students walking to school also decreases as school type changes (Table 3), the relationship between comfort and mode share is likely correlated but not causative. The decline in both metrics is more likely a function of the distance between a residence and the school. As that distance gets farther (as it tends to when moving from an elementary

to a middle or from a middle to a high school), the amount of walking declines, and pedestrian comfort also declines because it is more likely at least one (and likely more) of the pathways and crossings used to get to school score "Uncomfortable" or "Undesirable."

TABLE 21 | Comfortable Pedestrian Access to School

School Types	Streets	Crossings
Elementary Schools	40%	32%
Middle Schools	21%	13%
High Schools	7%	5%

Source: Pedestrian Level of Comfort Analysis

Comfortable pedestrian access to schools varies by land use type. While elementary and high schools located in transit corridors have the most comfortable pedestrian access, middle schools have the most comfortable access in exurban/rural areas.

Title I/Focus designated elementary schools have greater comfortable pedestrian access than non-designated schools, while comfortable access is similar across FARMS and non-FARMS schools for middle schools and high schools.

TABLE 22 | Table 22. Comfortable Pedestrian Access to School by Area Types and Designation

School Type	Land Use Type						Title I/Focus and High FARMS Rate Schools			
	Urban		Transit Corridor		Exurban / Rural		Yes		No	
	Pathways	Crossings	Pathways	Crossings	Pathways	Crossings	Pathways	Crossings	Pathways	Crossings
Elementary Schools	30%	24%	46%	38%	36%	39%	43%	34%	36%	30%
Middle Schools	15%	3%	16%	11%	26%	19%	18%	11%	20%	14%
High Schools	5%	5%	14%	6%	6%	5%	6%	3%	7%	7%

Source: Pedestrian Level of Comfort Analysis

A school-by-school breakdown illustrating walksheds and comfortable connectivity scores can be found in Appendix B.

TREE CANOPY

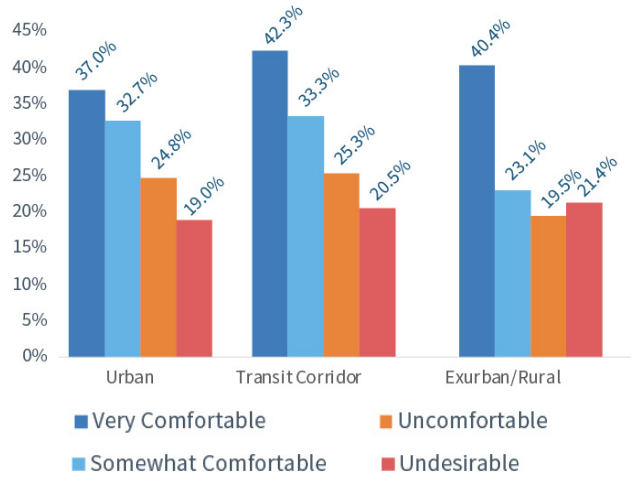
Unshaded sidewalks and pathways can reach high and, at times, dangerous temperatures in the summer. Analysis for the Silver Spring Central Business District (CBD) revealed a significant difference between shaded and unshaded sidewalks. While the amount of tree-canopy cover needed to counteract higher temperatures associated with impervious surface cover is not known, one study found that in urban areas, daytime air temperatures were substantially reduced when tree-canopy cover and shade were greater than 40 percent[10]. Satisfaction with the quality of shade along pathways in Montgomery County is low. The Countywide Pedestrian Survey found only 39 percent satisfaction countywide with existing shading by trees or buildings.

Analysis by the Pedestrian Master Plan team[11] showed that 28 percent of all sidewalk miles in the county are shaded. Transit corridors have a canopy coverage of 33 percent, followed by urban areas at 30 percent, and exurban/rural areas at 24 percent[12].

Breaking down these area statistics further by the pathway PLOC score, no matter the area, pathways that are more comfortable are also likely to have better tree canopy. For instance, in transit corridors, there is twice as much canopy coverage along a very comfortable pathway as along an undesirable one. Thus, pedestrians walking on narrow sidewalks along higher-speed roads without buffers (see Table 14) are also more likely to be doing so in unshaded conditions.

While shade from buildings is also important, data were not readily available at the countywide level.

FIGURE 18 | Tree Canopy Coverage by Land Use by PLOC Score



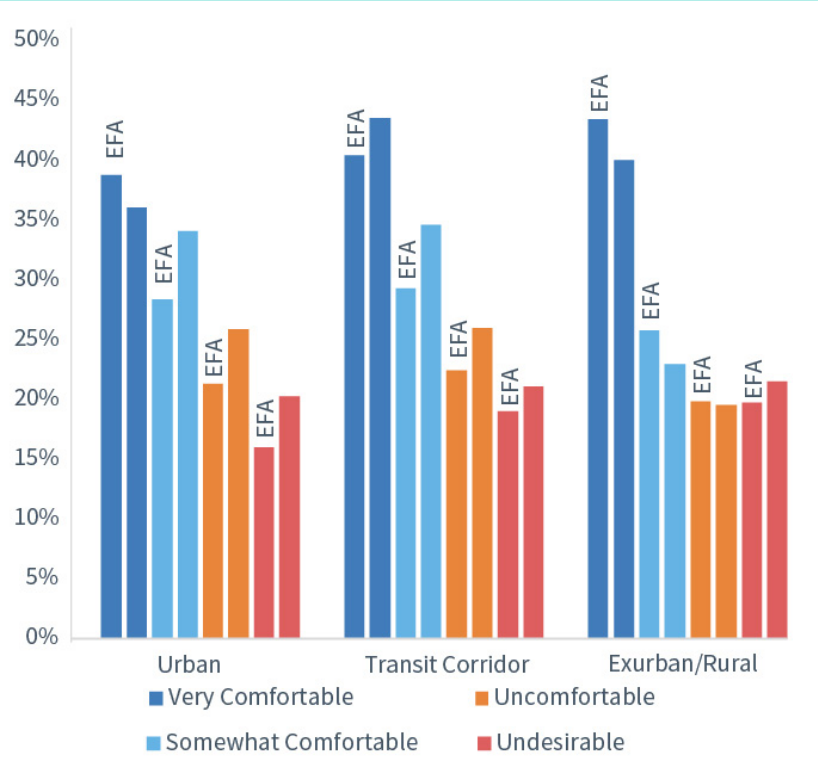
Undesirable pathways are more likely to be along wider, faster roadways like Georgia Avenue or University Boulevard where landscape panels that buffer the sidewalk (if they exist at all) may not be sufficiently wide or have enough soil volume to support the growth of canopy trees. Table 23 shows that canopy coverage tends to be greater along pedestrian pathways with wider buffers. Pathways without buffers have nearly half the canopy coverage as those with at least a six-foot buffer.

TABLE 23 | Canopy Coverage by Buffer Width

Buffer Width	Canopy Coverage
None	**22.2%**
Less than Six Feet	**30.1%**
Six Feet or More	**39.5%**

Communities within EFAs have less canopy coverage than their non-EFA counterparts along the less-comfortable roads ("Somewhat Comfortable" through "Undesirable") in urban and transit corridor areas, (Figure 19). For example, somewhat comfortable pathways in EFAs in urban areas have 5.7 percent less canopy coverage than non-EFAs. In transit corridor areas, these same pathways have 5.4 percent less coverage. The canopy coverage percentages overall are relatively small, so these are non-negligible differences despite the small percentages.

FIGURE 19 | Canopy Coverage by Land Use by EFA



GOAL 3:
Enhance Pedestrian Safety

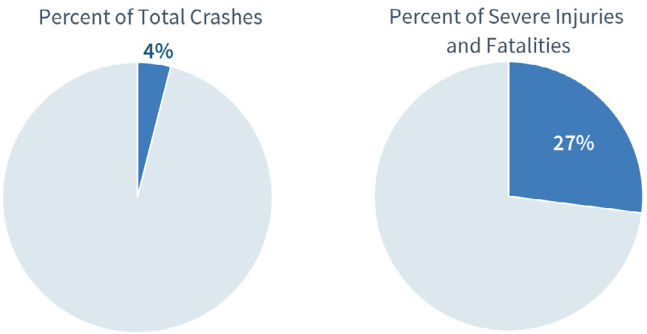
Through its 2016 Vision Zero resolution, Montgomery County committed to eliminating traffic fatalities and severe injuries. This commitment represented the beginning of a fundamental change in how the county plans and designs roads, shifting from a focus on maximizing motor vehicle efficiency to ensuring that our roads are safe regardless of how we get around the county. Vision Zero recognizes that people will sometimes make mistakes and that roads should be designed to ensure those inevitable mistakes do not result in severe injuries or fatalities.

This section describes pedestrian crash trends between 2015 and 2020 by examining different factors, including where and when crashes occurred.

PEDESTRIAN CRASHES BY SEVERITY

While users of all transportation modes suffer fatalities and severe injuries, pedestrians are particularly vulnerable. Figure 20 shows pedestrians were only involved in four percent of total crashes between 2015 and 2020, but they accounted for 27 percent of severe injuries and fatalities. Pedestrian crashes disproportionally result in severe injuries and fatalities because while motor vehicles provide drivers and passengers protection from crashes, pedestrians do not have similar protection.

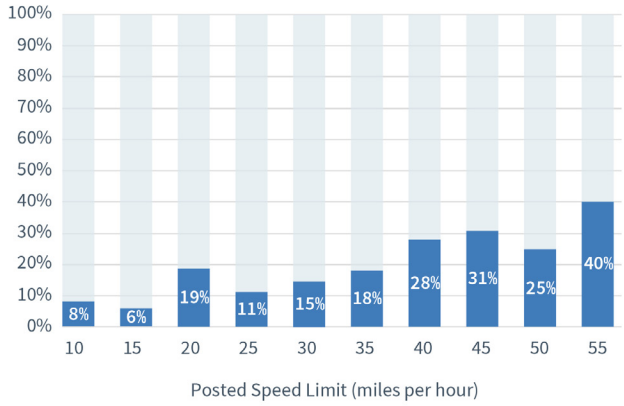
FIGURE 20 | Pedestrian Crashes as a Percent of Total Crashes and Severe Injuries and Fatalities



Note: Data includes crashes in Rockville and Gaithersburg.

Speed is a factor in pedestrian crash severity. While 40 percent of crashes involving pedestrians on streets with a 55-mph posted speed limit result in a severe injury or fatality, only 11 percent of crashes on streets with a 25-mph posted speed limit result in a severe injury or fatality.

FIGURE 21 | Percent of Pedestrian Crashes Resulting in a Severe Injury or a Fatality by Speed Limit



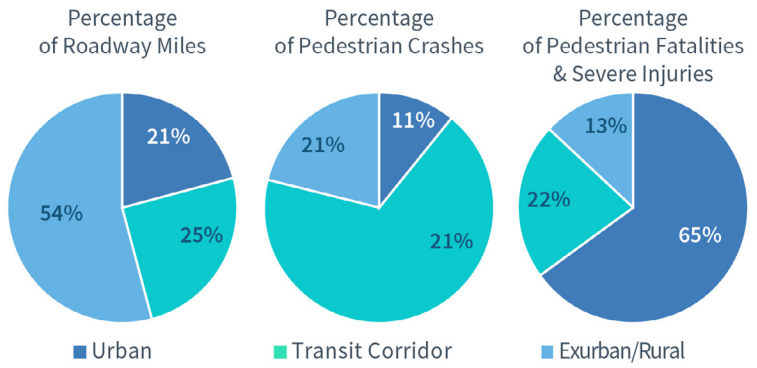
Note: Data include crashes in Rockville and Gaithersburg.

CRASH LOCATION

Crashes occur at different rates on different types of streets and in different land use contexts throughout the county. This section explores crash trends to identify where pedestrian crashes occur and where they result in severe injuries and fatalities.

Figure 22 depicts roadway mileage, pedestrian crashes, and pedestrian fatalities and severe injuries by land use type. While over half (54 percent) of the roadway miles in the county are in exurban or rural areas, these areas only comprise 11 percent of pedestrian crashes and 13 percent of pedestrian severe injuries or fatalities. In contrast, urban areas only comprise 21 percent of roadway miles, while making up about two thirds of pedestrian crashes (68 percent) and pedestrian severe injuries and fatalities (65 percent).

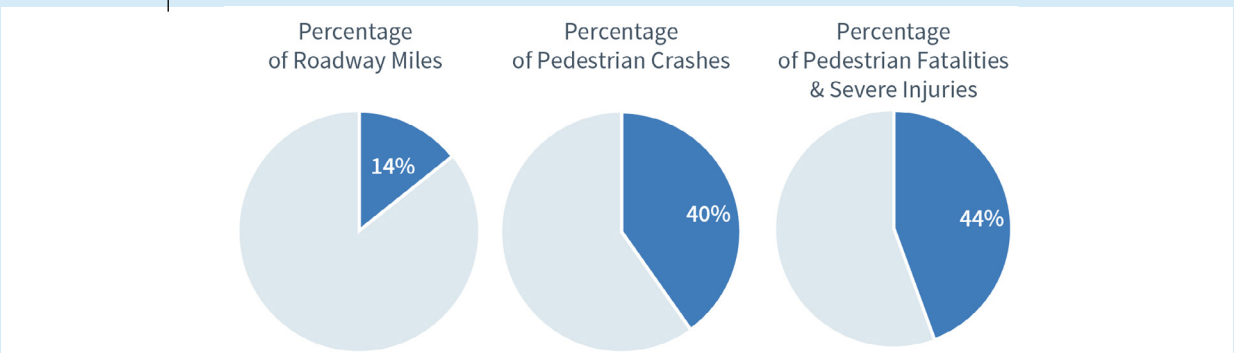
FIGURE 22 | Pedestrian Crashes by Area Type



Note: Data include crashes in Rockville and Gaithersburg.

While data are not available to indicate whether low-income residents of color are disproportionately impacted by pedestrian crashes, Figure 23 shows that streets in EFAs have higher crash rates. While EFAs contain only 14 percent of roadway miles in the county, they account for 40 percent of all pedestrian crashes and 44 percent of pedestrian crashes that result in a fatality or severe injury. Additionally, Black Montgomery County residents had an emergency room admission rate for motor vehicle crashes 136 percent higher than Asian/Pacific Islander residents and 104 percent higher than white, non-Hispanic residents.

FIGURE 23 | **Pedestrian Crashes in Equity Focus Areas**



Note: Data include crashes in Rockville and Gaithersburg.

Beyond land use types, the safety analysis zooms into the specific locations and street types where crashes occur. Table 24 shows that pedestrian crashes along a street (rather than at an intersection) are disproportionately likely to result in a severe injury or fatality. At the same time, while fully 21 percent of pedestrian crashes happen in parking lots, they are less likely to be severe or fatal. The difference between these two crash types may be due to motor-vehicle speed, as motor vehicles are likely traveling faster when they collide with pedestrians along street segments than in parking lots.

TABLE 24 | Pedestrian Crashes by Location

Location	Percent of Pedestrian Crashes	Percent of Pedestrian Severe Injuries and Fatalities
Signalized Intersection	26%	26%
Stop-Controlled Intersection	6%	5%
Uncontrolled Intersection	13%	16%
Along a Street	27%	37%
Off-road	4%	2%
Parking Lot	21%	10%
Driveway	4%	4%
Total	**100%**	**100%**

Note: Data include crashes in Rockville and Gaithersburg.

There is no meaningful difference between the crash locations in Table 24 based on whether they are in an EFA.

Higher classification roads such as controlled major highways and major highways, as well as business streets, disproportionately account for pedestrian crashes resulting in severe injuries or fatalities. While controlled major highways, major highways and business streets make up eight percent of roadway mileage, they account for 58 percent of pedestrian crashes and 64 percent of pedestrian severe injuries and fatalities.

TABLE 25 | Pedestrian Crashes by Roadway Type

Street Classification	Percent of Roadway Miles	Percent of Pedestrian Crashes	Percent of Pedestrian Severe Injuries and Fatalities (KSI)
Controlled Major Highway	1%	3%	5%
Major Highway	5%	33%	39%
Parkway	0%	0%	0%
Arterial	8%	11%	9%
Minor Arterial	2%	5%	3%
Business	2%	22%	20%
Primary Residential	7%	16%	15%
Industrial	0%	1%	0%
Country Arterial	2%	0%	0%
Country Road	1%	0%	0%
Rustic	5%	0%	1%
Exceptionally Rustic	1%	0%	0%
Local	67%	10%	7%
Total	**100%**	**100%**	**100%**

Breaking the same data down by area type (Table 26), it is clear the majority of the pedestrian severe injuries and fatalities (KSI) along those roads occur in urban areas. For instance, even though 0.4 percent of total roadway miles are controlled major highways in urban areas, those roads account for four percent of total pedestrian KSI countywide. Similarly, urban major highways represent two percent of total roadway mileage but account for 25 percent of pedestrian KSI countywide. The relationship is similarly disproportionate for business and primary residential streets.

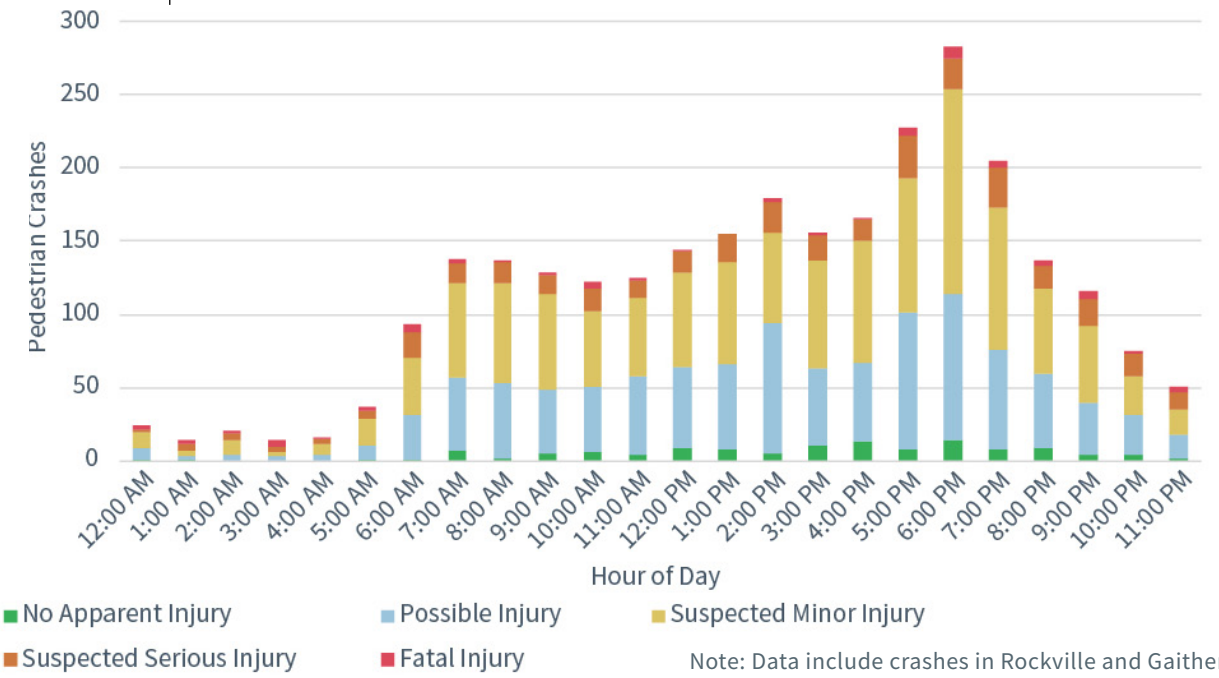
TABLE 26 | Pedestrian KSI by Area Type by Roadway Type

Street Classification	Urban		Transit Corridor		Rural		Total	
	% KSI	% Roadway Mileage	% KSI	% Roadway Mileage	% KSI	% Roadway Mileage	% KSI	% Roadway Mileage
Controlled Major Highway	4%	0.4%	1%	0.2%	0%	0.1%	5%	0.6%
Major Highway	25%	2.0%	10%	1.3%	4%	1.8%	39%	5.0%
Arterial	6%	1.8%	2%	1.2%	1%	4.7%	9%	7.7%
Country Arterial	0%	0.0%	0%	0.0%	0%	1.8%	0%	1.8%
Minor Arterial	1%	0.5%	1%	0.6%	0%	0.5%	3%	1.5%
Business	20%	1.6%	0%	0.0%	0%	0.0%	20%	1.6%
Country Road	0%	0.0%	0%	0.0%	0%	1.1%	0%	1.1%
Industrial	0%	0.0%	0%	0.1%	0%	0.1%	0%	0.2%
Parkway	0%	0.0%	0%	0.1%	0%	0.2%	0%	0.3%
Local	3%	13.6%	2%	19.4%	1%	34.3%	7%	67.4%
Primary Residential	7%	1.3%	5%	1.9%	3%	3.7%	15%	6.8%
Exceptional Rustic Road	0%	0.0%	0%	0.0%	0%	1.3%	0%	1.3%
Rustic Road	0%	0.1%	0%	0.1%	1%	4.6%	1%	4.7%

CRASHES BY TIME OF DAY AND LIGHTING CONDITIONS

Time of day is also an important factor when it comes to pedestrian-involved crashes. As shown in Figure 24, most crashes occur during the day, peaking during the evening rush hour.

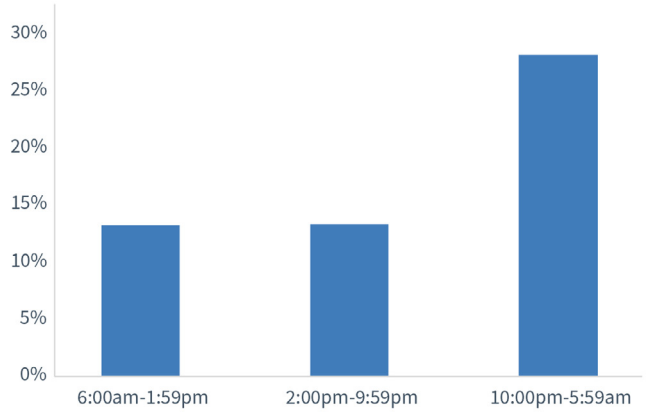
FIGURE 24 | Pedestrian Crashes by Time of Day



Note: Data include crashes in Rockville and Gaithersburg.

While fewer pedestrian crashes occur in the overnight hours, those crashes are more likely to result in severe or fatal injuries (Figure 25). For instance, while 13 percent of pedestrian crashes between 6:00 a.m. and 9:59 p.m. are severe or fatal, that percentage jumps to 28 percent between 10:00 p.m. and 5:59 a.m. In addition to increased vehicle speeds common at night due to reduced congestion and lighting-related visibility issues, impairment may also play a role in the increased likelihood of fatal and severe crashes during these time periods.

FIGURE 25 | Crashes Resulting in KSI as a Percentage of All Pedestrian Crashes by Time of Day

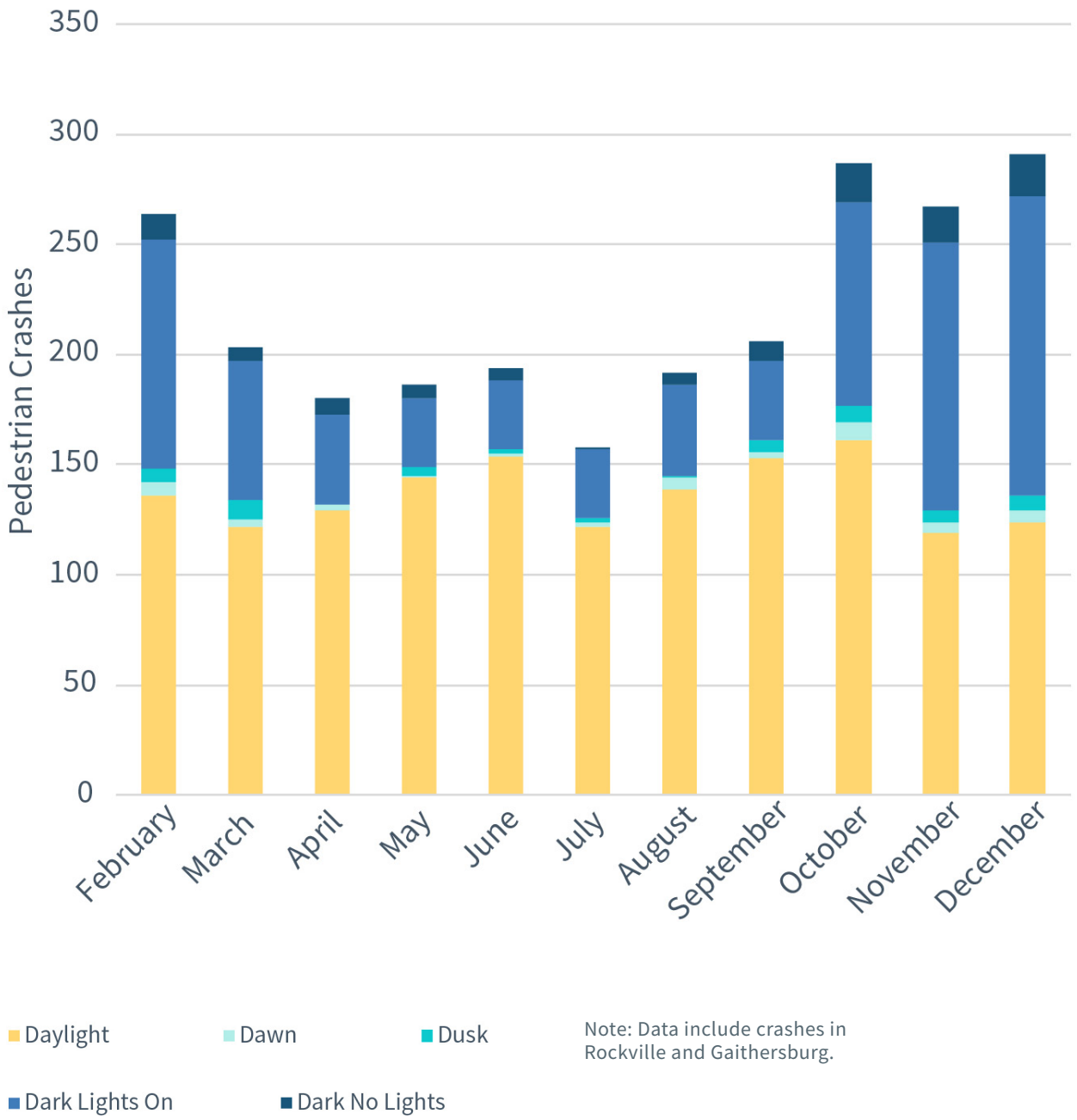


Note: Data include crashes in Rockville and Gaithersburg.

Lighting conditions are related to pedestrian crashes. During the months with longer nights, the number of pedestrian crashes increases. As shown in Figure 26, while the number of daylight pedestrian crashes tends to be higher during months with more daylight hours, there is a noticeable jump in pedestrian crashes occurring in darkness beginning in October and ending in February when there are fewer hours of daylight. In fact, in November, December, and January, the majority of pedestrian crashes take place when it's dark outside. Most of these nighttime crashes

take place in areas with existing streetlights. Perhaps it is because there is more street lighting in places with greater pedestrian volumes or that the existing lighting does not provide sufficient illumination to ensure pedestrians and drivers are visible to each other.

FIGURE 26 | Pedestrian Crashes by Lighting Conditions



Note: Data include crashes in Rockville and Gaithersburg.

KNOWLEDGE OF TRAFFIC LAWS

Knowledge of traffic laws specifically focused on pedestrian behavior is mixed. As part of the Countywide Pedestrian Survey, participants were asked to decide whether statements about traffic laws were true or false.

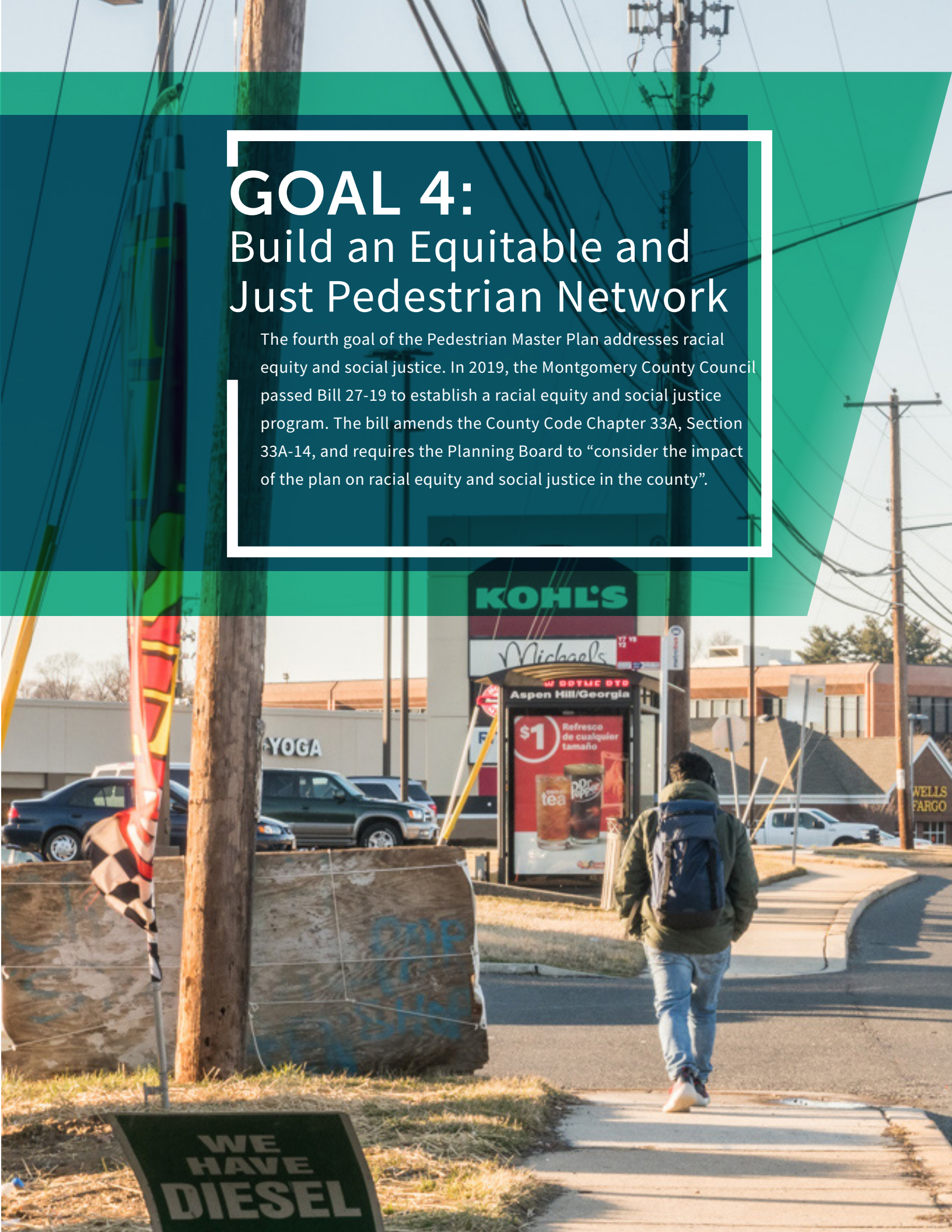
Table 27 includes the survey questions and the portion of respondents who responded correctly to the prompt. While questions about driver responsibilities were correctly answered by over 90 percent of respondents, questions about pedestrian responsibilities were correctly answered between 33 percent and 51 percent of the time. This is concerning, as creating an environment where motorists know where to expect pedestrians to be crossing the street influences their readiness to stop or yield to pedestrians. The lack of understanding about where pedestrians are permitted to cross the street may be a factor in pedestrian crashes and perpetuates the motor vehicle's perceived dominance over the shared transportation system.

TABLE 27 | Knowledge of Traffic Laws

Survey Questions (True or False)	% Correct
Drivers must stop for pedestrians in crosswalks (TRUE)	98%
It's okay to pass a vehicle that has stopped for a pedestrian at an intersection, as long as there is no marked crosswalk present (FALSE)	90%
It's okay for vehicles to stop in the crosswalk at a traffic light (FALSE)	90%
If a driver is turning right on red, they must yield to pedestrians crossing the perpendicular street (TRUE)	98%
It is a driver's responsibility to ensure they are not looking at their phone or distracted while driving (TRUE)	98%
Unmarked crosswalks exist at every corner where the side street has a sidewalk and where painted lines or other markings do not exist to mark the crossing (TRUE)	51%
Pedestrians must only cross the street in marked crosswalks (FALSE)	33%
If there are two intersections in close proximity, and one has a signal and the other doesn't, pedestrians must cross the street at the intersection with a signal (FALSE)	33%

GOAL 4:
Build an Equitable and Just Pedestrian Network

The fourth goal of the Pedestrian Master Plan addresses racial equity and social justice. In 2019, the Montgomery County Council passed Bill 27-19 to establish a racial equity and social justice program. The bill amends the County Code Chapter 33A, Section 33A-14, and requires the Planning Board to "consider the impact of the plan on racial equity and social justice in the county".



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NEXT SIGNAL

Addressing equity and justice issues first requires understanding the issues. Throughout this Existing Conditions Report, the analysis and results have been supplemented with data about how specific topics pertain to historically disadvantaged people and areas of the county. The equity findings described throughout the previous sections are summarized below:

Goal 1: Increase Walking Rates and Walking Satisfaction

Overall and commute walking rates are higher in EFAs: Residents in EFAs make 9.6 percent of trips by walking compared to 7.0 percent of trips by walking in non-EFAs. The share of commute trips by walking is only slightly greater in EFAs (2.4 percent) than non-EFAs (2.1 percent).

Walk-to-school rates are slightly higher for Title I/Focus and high FARMS rate schools: Students at designated schools have walk mode shares to and from school of 13 percent and 17 percent respectively, compared to 11 percent and 15 percent arrival and departure walk shares for non-designated schools. Many of the schools with the highest walking rates are schools designated as Title I/Focus or high FARMS rate schools.

Travelers with disabilities are more likely to make utilitarian pedestrian trips: In fact, respondents with disabilities were twice as likely as others to walk to a medical appointment (35 percent to 17 percent) and about 33 percent more likely to walk to the grocery store (67 percent to 50 percent) and to dine at restaurants (32 percent to 24 percent).

Pedestrian satisfaction is lower for people with reported disabilities: Only 43 percent of pedestrians with reported disabilities are satisfied with their overall pedestrian experience, compared to 53 percent of respondents without reported disabilities. Respondents in transit corridors and exurban/rural are less satisfied if they report having a disability (33 percent and 36 percent, respectively) than respondents without reported disabilities (52 percent and 47 percent, respectively).

Goal 2: Create a Comfortable, Connected, Convenient Pedestrian Network

Overall, crossing comfort accessing community destinations tends to be worse in EFAs, while pathway comfort is better. While Red Line station connectivity is more comfortable in EFAs, Purple Line station connectivity is worse.

Title I/Focus elementary schools have more comfortable access than their more affluent counterparts. Pathway comfort for Title I/Focus Schools is seven percent greater than it is for other elementary schools (43 percent vs. 36 percent). Crossing comfort is four percent greater (34 percent vs. 30 percent).

Less comfortable pathways in urban and transit corridor EFAs have less tree-canopy coverage than similar pathways outside EFAs. "Somewhat Comfortable" pathways in EFAs in urban areas have 5.7% less canopy coverage than non-EFAs. In transit corridor areas, these same pathways have 5.4% less coverage.

Goal 3: Enhance Pedestrian Safety

Crashes and injuries are overrepresented in EFAs: While EFAs contain only 14 percent of roadway miles in the county, they account for 40 percent of all pedestrian-involved vehicular crashes and 44 percent of such crashes that result in a fatality or severe injury.

NEXT STEPS FOR THE PEDESTRIAN MASTER PLAN

The Existing Conditions Report sets the stage for developing detailed policy, program, and funding recommendations in the Pedestrian Master Plan. While pedestrian comfort and safety need to be improved throughout the county, particular areas of focus emerge from the data:

Goal 1: Increase Walking Rates and Walking Satisfaction in Montgomery County

Address Issues Pedestrians with Disabilities Face: Improve the pedestrian experience for residents with disabilities, particularly in transit corridors and exurban/rural areas.

Improve Pedestrian Satisfaction Along Streets: Address issues with low levels of pedestrian satisfaction throughout the county, with a focus on transit corridors and exurban/rural areas. Elements with countywide satisfaction below 40 percent include speed of cars along sidewalks and paths (21 percent), snow removal (28 percent), distance between sidewalks and cars (31 percent), how often driveways cross sidewalks (35 percent), and shading by trees or buildings (39 percent).

Improve Pedestrian Satisfaction at Crossings: Address issues with low levels of pedestrian satisfaction throughout the county, with a focus on transit corridors and exurban/rural areas. Topics with countywide satisfaction below 40 percent include the number of vehicles cutting across the crosswalk (22 percent), places to stop partway while crossing (33 percent), and drivers stopping when pedestrians cross the street (34 percent).

Goal 2: Create a Comfortable, Connected, Convenient Pedestrian Network in Montgomery County

Fill Sidewalk Gaps: Construct missing sidewalks with a focus on major highways, arterials, and primary residential streets in the areas of the county where they will improve connectivity comfort to schools, parks, transit stations, and other community destinations.

Prioritize Buffers on High-Speed Streets: Provide a buffer between the sidewalk and the street, prioritizing roads with speeds greater than 40 miles per hour; 31% of sidewalks on these streets are missing a traffic buffer.

Provide Pedestrian Refuges: Increase the number of pedestrian refuges to improve crossing comfort, particularly on roads with six or more lanes of traffic. Today, only 16% of crossings with six or more lanes have pedestrian refuges that are ADA-compliant.

Focus on Crossing Improvements: Prioritize improvements to the comfort and safety of crossings, as crossings are less comfortable than street segments and result in a greater number of pedestrian crashes resulting in severe injuries and fatalities.

Improve Comfortable Access to Elementary Schools: While elementary schools already have the highest connectivity comfort, this connectivity should be enhanced further. Improving comfortable access to elementary schools will increase the number of students walking to school, reduce busing costs, and make it more comfortable for all pedestrians to travel in school areas.

Prioritize Safer Crossings to Parks: Improve the comfort of crossings to parks, as parks have lower comfortable pedestrian access than recreation centers and libraries (34 percent relative to 66 percent).

Goal 3: Enhance Pedestrian Safety

Reduce High-Speed Pedestrian Crashes: Identify strategies to reduce pedestrian crashes on high-speed roads, given the correlation between pedestrian crash
severity and vehicle speeds.

Address Safety Disparities: Concentrate safety improvements in EFAs, given the overrepresentation of crashes and severe injuries and fatalities in these communities. EFAs comprise 14 percent of the county's roadway miles, but experience 40 percent of the county's pedestrian crashes and 44 percent of the county's pedestrian severe injuries and fatalities.

Improve Lighting: Identify strategies to improve pedestrian visibility in dark conditions (e.g., lighting at intersections and along streets).

Communicate Permitted Pedestrian Activity: Given the lower understanding of permitted pedestrian behavior, relative to driver behavior, improve education and communication about where and how pedestrians are permitted to travel.

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SUMMARY OF DATA SOURCES

American Community Survey: Published by the U.S. Census Bureau, this is the primary source of travel information in the United States as it publishes estimates about commuting for communities across the country every year. However, there are two main deficiencies with the American Community Survey that lead to undercounting of pedestrian activity. First, since the survey only captures an individual's predominant mode of transportation to work, it excludes walking trips to get to a public transportation station and it excludes occasional walk trips to work. Second, the survey only focuses on commuter trips, which represent about 20 percent of trips in the region.

Countywide Pedestrian Survey: This Planning Department survey sought to understand the differences in pedestrian trip purpose, duration, and perception of the pedestrian environment among community members living in urban, transit corridor, and exurban/rural areas of Montgomery County. Survey results can be found in Appendix D and at: https://montgomeryplanning.org/planning/transportation/pedestrian-planning/pedestrian-master-plan/pedestrian-master-plan-survey-results/

Crash Data: This data source is provided by Montgomery County's Vision Zero program and can be downloaded at: https://montgomerycountymd.gov/visionzero/.

Montgomery County Student Travel Tally: This survey of arrival and departure mode of travel by students at Montgomery County Public Schools was conducted from November 1, 2019 to December 13, 2019 and received 73,602 responses.

Pedestrian Level of Comfort: Pedestrian Level of Comfort (PLOC) is a methodology developed by Montgomery Planning to capture how comfortable it is to walk and roll in different conditions in Montgomery County. A variety of pathway and crossing factors are considered to determine a comfort score for each crossing and street segment. A map showing PLOC scores throughout the county can be found at: https://mcatlas.org/pedplan/.

Regional Travel Survey: This survey is conducted every 10 years by the Transportation Planning Board and was last conducted in 2017/2018. It collects demographic and travel information from a randomly selected representative sample of households in the region and adjacent areas. It is the primary source of observed data used to estimate, calibrate, and validate the regional travel demand model, which is used for the travel forecasting and air quality conformity analysis of the region's long-range transportation plan. The survey data are also used to analyze travel trends and for other key program activities.

APPENDICES

A. Pedestrian Level of Comfort Methodology
B. School and Community Destination Comfortable Connectivity
C. Student Travel Tally
D. Countywide Pedestrian Survey

Endnotes

1 Equity Focus Areas (EFAs) are parts of Montgomery County that are characterized by high concentrations of lower-income people of color who may also speak English less than very well. About 26% of the county's population live in EFAs.

2 Silver Spring Census Designated Place includes Downtown Silver Spring, East Silver Spring, Woodside, Woodside Park, Lyttonsville, North Hills Sligo Park, Long Branch, Indian Spring, Goodacre Knolls, Franklin Knolls, Montgomery Knolls, Clifton Park Village, New Hampshire Estates, and Oakview.

3 "How Many Public School Students in DC Could Walk to Their School?", 10/2019. https://dme.dc.gov/sites/default/files/dc/sites/dme/publication/attachments/DME_Edsight%20Distance%20to%20School%20FINAL.pdf

4 "Student Travel Tally Report: Combining Schools in One Data Collection Season", Fall 2019. https://www.virginiadot.org/programs/resources/safe_routes/2016-2017/Resources/STTW-2019/Fall_2019_STTW_Alexandria.pdf

5 "Arlington County Public Schools Student Travel Tally" 2/21/2020. https://www.virginiadot.org/programs/resources/safe_routes/2016-2017/Resources/STTW-2019/Fall_2019_STTW_Arlington.pdf

6 Montgomery County Pedestrian Level of Comfort Map. http://www.mcatlas.org/pedplan

7 A street's classification is determined by the Master Plan of Highways and Transitways, which was comprehensively updated in 2018. A street's classification reflects its function in the county's transportation network. Some streets, like local streets, exist to provide access to/from residences, while others, like major highways, facilitate higher-speed travel between regional destinations and provide access to businesses. Other streets balance access and mobility in different ways.

8 Sidewalks less than five feet wide are less likely to be compliant with the Americans with Disabilities Act. While these narrower sidewalks (three feet or more) are allowed, five-foot wide passing spaces every 200 feet or less must be constructed. The proposed Public Rights-of-Way Accessibility Guidelines (PROWAG) increases the minimum allowable sidewalk width to four feet from the current three. The county's Complete Streets Design Guide includes a six-foot default sidewalk width for all street types.

9 According to MD. Transportation Code Ann. § 21-101 (2020), a crosswalk without lines or other markings is defined as "... the part of a roadway that is… within the prolongation or connection of the lateral lines of sidewalks at any place where 2 or more roadways of any type meet or join, measured from the curbs or in the absence of curbs, from the edges of the roadway."

10 Ren, Z., Zhao, H., Fu, Y. et al. Effects of urban street trees on human thermal comfort and physiological indices: a case study in Changchun city, China. J. For. Res. (2021). https://doi.org/10.1007/s11676-021-01361-5

11 To estimate the percentage of county sidewalks shaded with trees Montgomery Planning overlayed the Pedestrian Level of Comfort pathway linework and tree canopy cover data.

12 These are general averages and do not represent full shade conditions, tree size or health, density of cover, and street orientation which significantly effect temperature reductions and cooling effect. Additionally, the tree-canopy cover GIS maps used indicate the amount of shade cast on the sidewalk at noon is significantly greater than other times of the day when the sun's angle casts different tree-canopy shadow shade.

MONTGOMERY COUNTY'S

PEDESTRIAN PLAN

Montgomery Planning

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