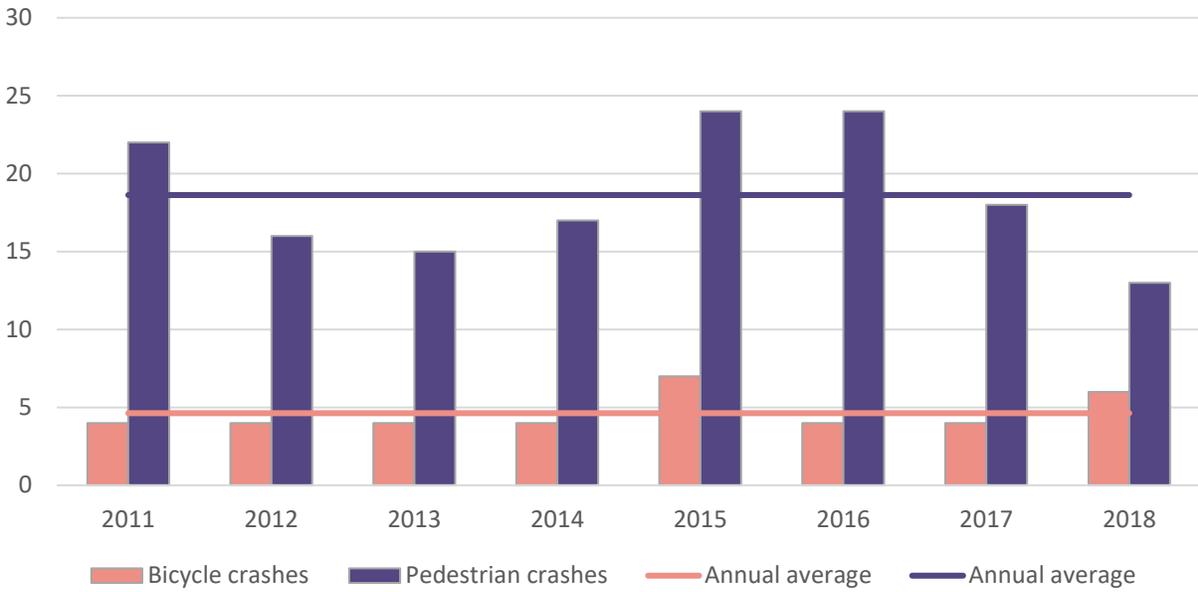


OVERVIEW

- Between January of 2011 and June of 2019, there were 196 crashes involving either pedestrians or bicyclists. This results in a rate of 1.9 crashes per month, 23 crashes per year.
- 159 crashes (81 percent) involved pedestrians, while 37 involved bicyclists.
- Almost all of the crashes (184, or 94 percent) involved the injury or death of a person walking or bicycling.
 - 166 crashes involved injuries only, and another 18 involved a fatality. All 18 fatalities were people walking.
 - 33 percent of injury-only crashes involved serious injuries.¹
- **Chart 1** shows the number of crashes by year. **Chart 2** shows the number of fatal and serious injury crashes by year.

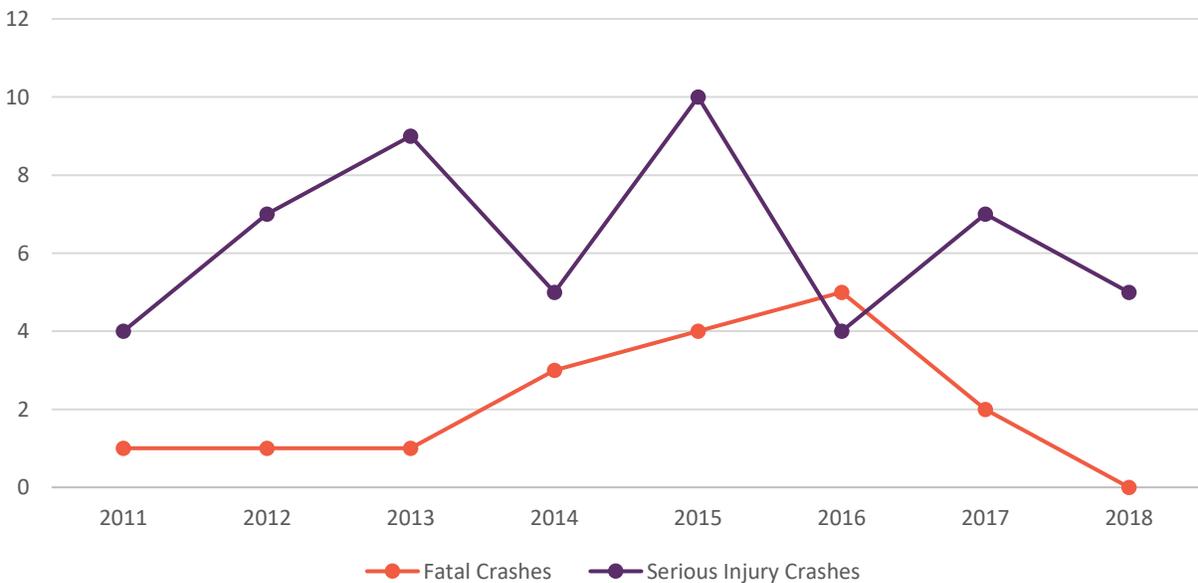
¹ Crash reports rank the severity of crashes as either fatal, suspected serious injury, suspected minor injury, possible injury, or no injury. Suspected serious injury crashes used to be reported as “incapacitating,” and suspected minor injury crashes were reported as “non-incapacitating.” For this report, suspected serious and incapacitating crashes are combined as “serious injury” crashes.

Chart 1: Pedestrian/Bicycle Crashes in Unincorporated Knox County by Year



Bike	4	4	4	4	7	4	4	6
Ped	22	16	15	17	24	24	18	13
Total	26	20	19	21	31	28	22	19

Chart 2: Pedestrian/Bicycle Crashes in Unincorporated Knox County Resulting in Fatality or Serious Injury



CRASH SEVERITY

Crashes in suburban and rural locations are less common, but tend to be more severe. This is likely due to higher travel speed of motor vehicles, compared with speeds in urban areas. For example, Cumberland Avenue in Knoxville has the most pedestrian/bicycle crashes per mile of any corridor in the Region, yet it hasn't seen any pedestrian/bicycle fatalities since 2007. By contrast, Oak Ridge Highway in Knox County saw only five pedestrian/bicycle crashes over eight years, but three of those crashes resulted in fatalities.

The graphic below illustrates the likelihood of a pedestrian being killed in a crash based on the speed of the motor vehicle.

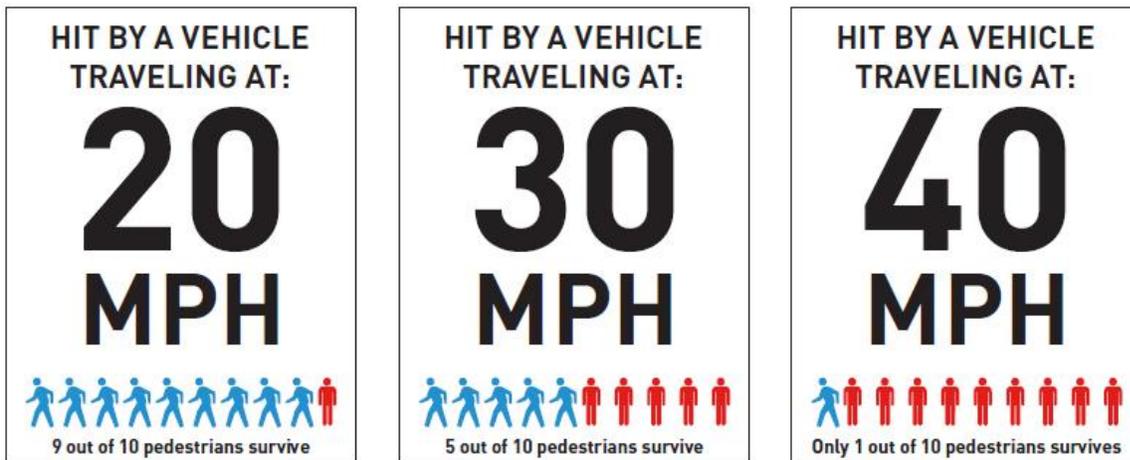
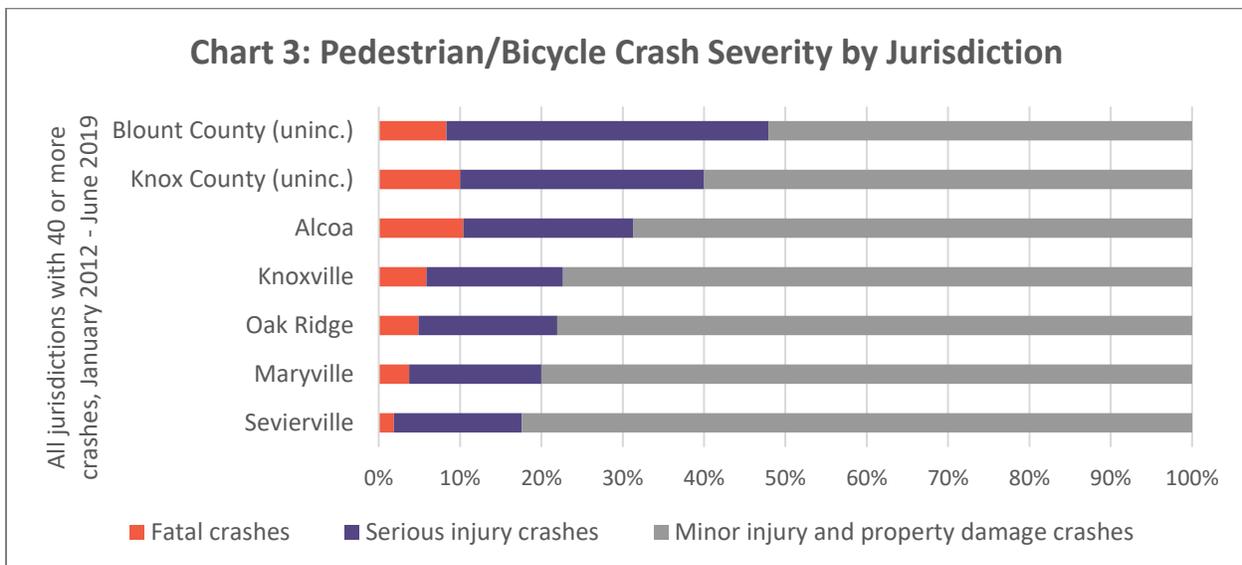


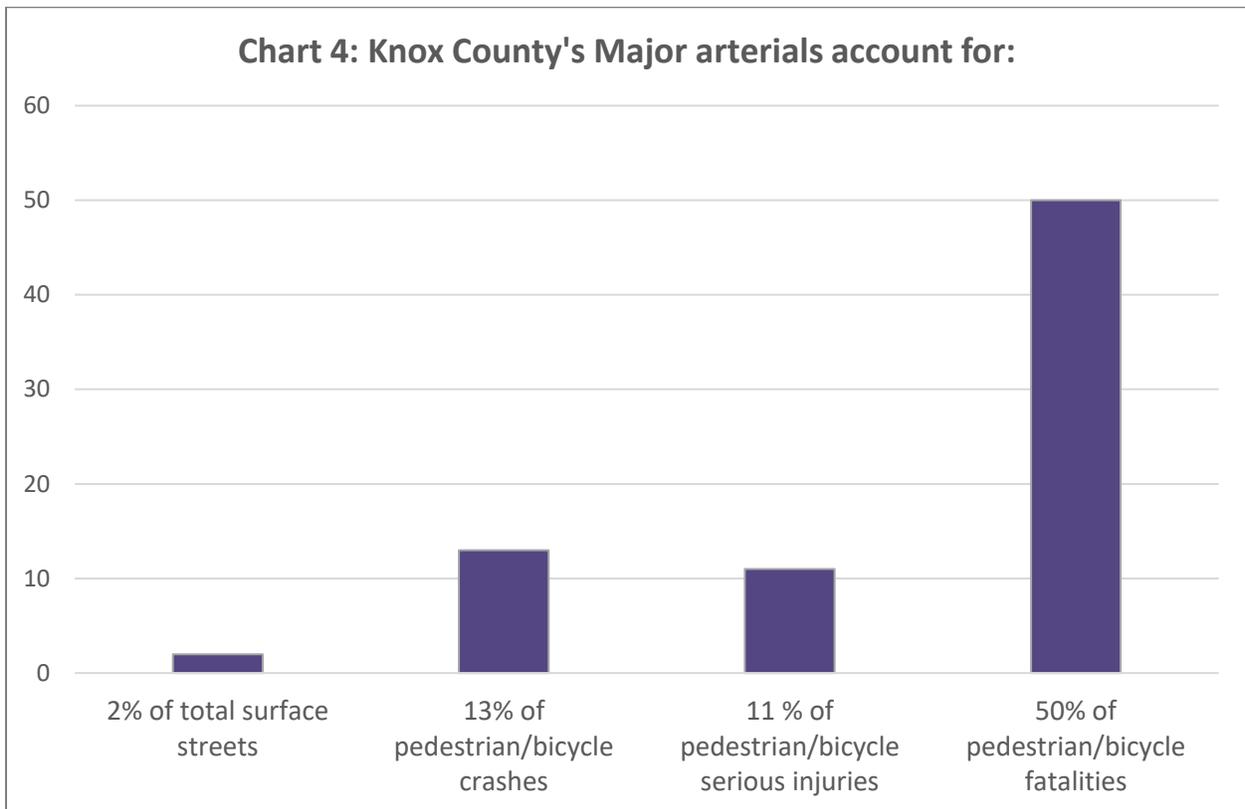
Chart 3 compares the prevalence of fatal and serious injuries in pedestrian/bicycle crashes among all jurisdictions with more than 40 pedestrian/bicycle crashes between January 2012 and June 2019.



The location of 6 crashes (3 percent) in Knox County is uncertain because of incomplete information in the crash reports. The remainder of this report focuses on the 190 crashes that occurred on surface streets (non-Interstates) where the location is certain.

MAJOR ARTERIALS

- Major arterials make up 2 percent of the surface street mileage within unincorporated Knox County. A disproportionate share of pedestrian/bicycle crashes, especially serious crashes, occur on major arterials (streets such as Clinton Highway and Maynardville Pike). **Chart 4** depicts this data.
 - 13 percent of crashes (24 crashes) occurred on major arterials. 22 of the 24 crashes on major arterials occurred on four streets: Chapman Highway, Clinton Highway, Maynardville Pike and Oak Ridge Highway.
 - Crashes on major arterials resulted in 2 serious injuries, which is 11 percent of all serious injuries resulting from pedestrian/bicycle crashes.
 - Crashes on major arterials resulted in 9 fatalities, which is 50 percent of all fatalities resulting from pedestrian/bicycle crashes.
 - For more information on crashes along major arterials, see the Appendix.



TYPES OF CRASHES ANALYZED IN THIS REPORT

This report analyzes certain crash factors. It focuses on identifying locations and behaviors where interventions – in the form of design changes, education, or enforcement – may help to prevent future crashes. 90 (48 percent) of the 190 total crashes fit into one of these categories. Categories of crashes analyzed in this report are:

- **Drivers failing to yield while turning.** These are crashes where the report indicates that the pedestrian or bicyclist was behaving properly while traveling along or across a street, and the driver failed to yield while making a turn. These crashes suggest the need for changes to the geometry of the intersections and/or to the function of the traffic signals to prevent future crashes. Education and traffic enforcement can also help prevent these types of crashes.
- **People struck by cars while walking in locations without sidewalks.** These are crashes where the report indicates the pedestrian was walking along a street without sidewalks and was struck by a car. These crashes indicate the need for sidewalks to be installed.
- **Drivers failing to yield while going straight.** These are crashes where the report indicates that the pedestrian or cyclist was crossing the street in a legal crosswalk², either marked or unmarked, and was struck by a driver. These crashes indicate the need for better design of crossing locations, which may include reducing crossing distances and the addition of signs, beacons, or signals. Education and traffic enforcement can also help prevent this type of crash.
- **Bicyclists riding in locations without safe facilities.** This category encompasses two crash factors: crashes where a bicyclist was struck from behind, or was struck while riding on the sidewalk.³ These crashes indicate the need for a safe bicycle facility along a corridor.
- **People struck by cars while crossing a street outside of an intersection or marked midblock crossing.** These are crashes where the report indicates a pedestrian was struck while crossing a street at a location other than an intersection or a marked midblock crossing. These crashes suggest the need for additional crossings, as the existing crossings may be dangerous or inconvenient. Education of pedestrians can also help prevent this type of crash.
- **Bicyclists riding in an unsafe manner or location.** This category encompasses two crash factors: crashes where the bicyclist was either riding on the street against traffic, or riding at night with no lights. These crashes suggest the need for education for bicyclists.

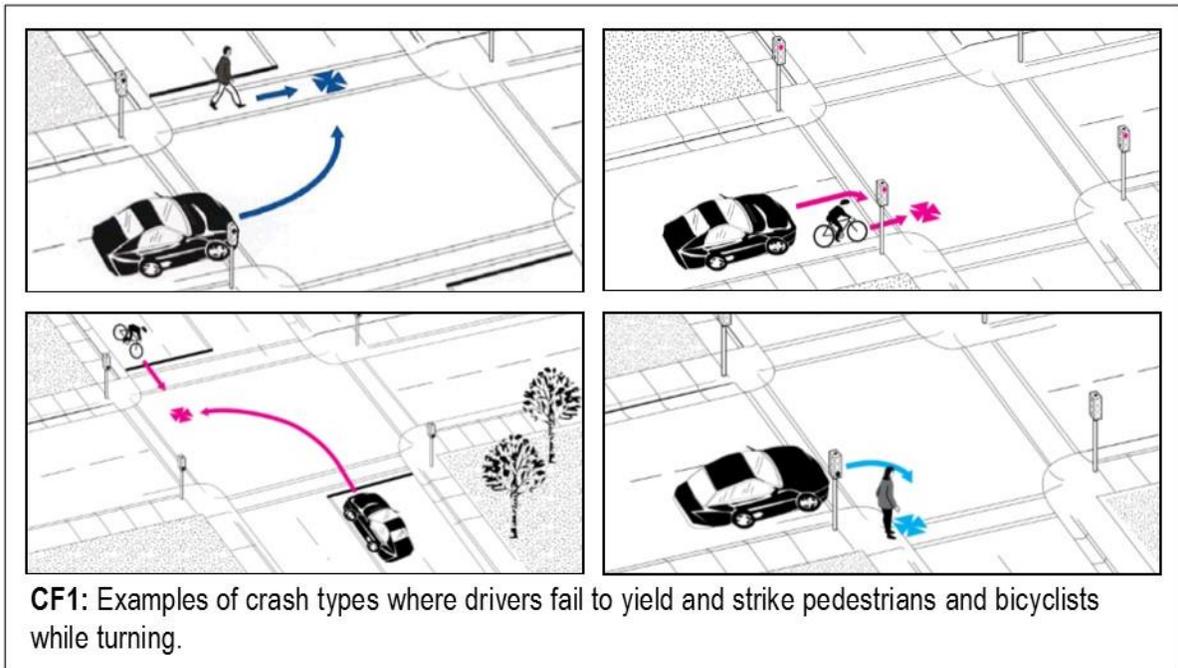
² Tennessee Code Annotated 55-8-101 (11) defines “crosswalk” as “(A) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or, in the absence of curbs, from the edges of the traversable roadway; or (B) Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.”

³ Riding a bicycle on the sidewalk is legal. Bicycle safety educators generally warn against it, because of the danger from turning motor vehicles.

TABLE 1: Crash Factors		Number of Crashes			Percent of Crashes*
		Ped	Bike	Total	
1. Drivers failing to yield while turning (21 total crashes)	Turning left	2	8	10	11
	Turning right (not right on red)	5	5	10	11
	Turning right on red light	1	0	1	1
	Direction of turn unclear	0	0	0	0
2. Pedestrian struck while walking along corridor without sidewalks		30	0	30	33
3. Driver failing to yield while going straight		13	0	13	14
4. Bicyclist riding on sidewalk		0	0	0	0
5. Pedestrian crossing street outside of an intersection or marked crosswalk		16	0	16	18
6. Bicyclist riding against traffic		0	1	1	1
7. Driver striking bicyclist from behind		0	8	8	9
8. Bicyclist riding at night with no lights		0	1	1	1

*Percentages may not total to 100 due to rounding

Crash Factor 1: Drivers failing to yield while turning



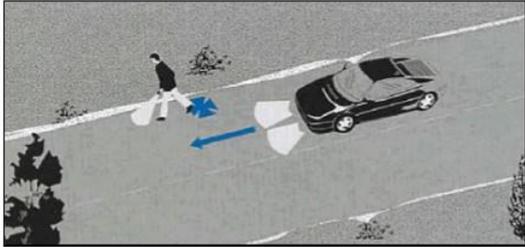
Of the crashes where a crash factor has been identified, 21 (23 percent) involved a pedestrian or bicyclist hit by a car whose driver failed to yield properly when turning.⁴

- Of these, 10 crashes involved drivers turning left; 10 involved a right turn (not on a red light); and 1 involved a right turn on red.
- 16 of these crashes involved injuries, with no fatalities.
- 10 of these crashes involved pedestrians, and the remaining 11 involved bicyclists.
- 2 corridors saw multiple crashes of this type:
 - 4 crashes along Hardin Valley Road/Middlebrook Pike, 3 involving bicyclists
 - 3 crashes along Maynardville Pike, 2 involving pedestrians
- **Table 2** has more details about the locations of these crashes.

⁴ This crash factor is identified only where the bicyclist or pedestrian involved was traveling safely and within the law and the driver failed to yield

TABLE 2: Locations of failure-to-yield crashes (number in red indicates bicyclist involved)				
Corridor	Cross street	Left turns	Right turn (not on red)	Right turn on red
Bittersweet Rd	east of Periwinkle Rd		1	
Cedar Bluff Rd	Bob Gray Rd		1	
Dutchtown Rd	west of Simmons Rd	1		
Elkmont Rd	Abrams Dr	1		
E Emory Rd	east of Andersonville Pk	1		
Hardin Valley Rd/ Middlebrook Pk	Charlevoix Rd	1		
	east of Steele Rd	1		
	west of Steele Rd		1	
	Walden Legacy Way		1	
Joyce LN	W Beaver Creek Dr		1	
Ledgerwood Rd	access road to Halls High School		1	
Lovell Rd	west of Schaffer Rd		1	
Maynardville Pk	Cunningham Rd		1	
	north of Cunningham Rd		1	
	Fountain Valley Dr			1
Old Clinton Pk	south of W Emory Rd	1		
Periwinkle Rd	Umbur Dr	1		
Sevierville Pk	E Norton Rd	1		
Shoreham Blvd	Newfane Cir	1		
W Emory Rd	west of Brickyard Rd		1	
Yarnell Rd	west of Lovell Rd	1		

Crash Factor 2: People struck by cars while walking in locations without sidewalks

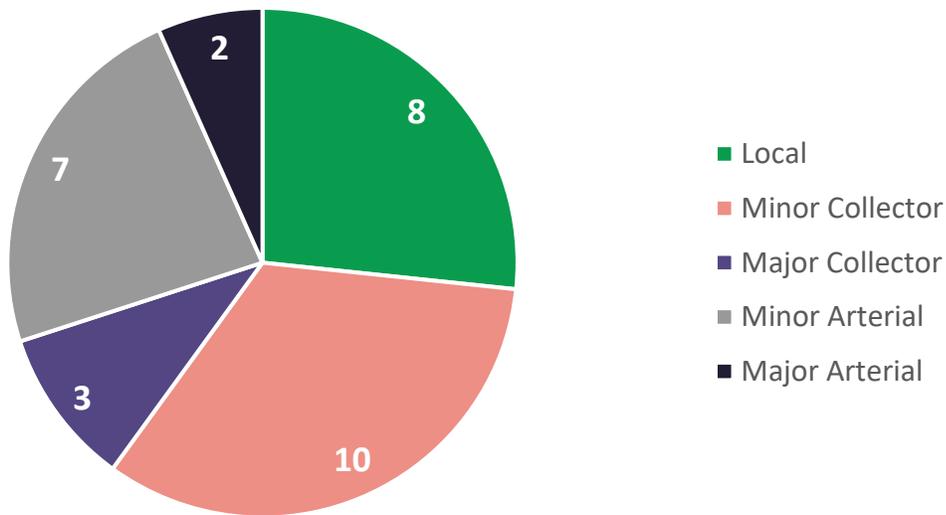


CF2: A frequent crash type in rural & suburban areas is pedestrians being struck while walking in locations lacking sidewalks.

In 30 crashes (33 percent), a person walking along a street without a sidewalk was hit by a driver.⁵ 26 of these crashes involved injuries, and an additional 4 were fatalities.

These crashes are more common on streets with lower functional classifications – local and minor collector streets – compared with higher classification streets. See **Chart 5** for a complete breakdown.

Chart 5: Crashes Involving Pedestrians Walking Along a Street with No Sidewalks, by Street Type



Two corridors saw multiple crashes of this type: Bob Kirby Road (2) and Tazewell Pike (2). **Table 3** shows the locations of all crashes of this type.

⁵ This crash factor is identified only where the crash report finds that the pedestrian was walking along the side of the road when the crash happened, not cases where pedestrians entered the road to cross.

TABLE 3: Locations of people being struck while walking along streets without sidewalks	
Crash occurred on this street	Near the intersection with this street
Asbury Rd	South National Dr
Asheville Hwy	Cash Rd
Bob Kirby Rd	<ul style="list-style-type: none"> • Secretariat Blvd • Thunderbolt Way
Cavetton Rd	Walbrook Dr
Clinton Hwy (fatality)	Stonebridge Dr
Crosslane Rd (fatality)	Byington Solway Rd
Dante Rd	Mundal Rd
Delray Rd	Bob Gray Rd
E Emory Rd	Hallbrook Rd
Glencroft Dr	Dunraven Dr
Governorwood Dr (fatality)	Montmorency Dr
Greenwell Rd	Crystal Point Dr
Hill Rd	York Rd
Maynardville Pk	Old Maynardville Pk
Millertown Pk	Huday Rd
Mynatt Rd	Keithway Ln
Norris Frwy (fatality)	Archibald Way
Nubbin Ridge Rd	Hampson Ln
Old Maynardville Pk	Valley Creek Way
Pelleaux Rd	Western Rd
E Raccoon Valley Dr	I-275
Robinson Rd	Dana Ln
S Carter School Rd	Mill Chase Dr
Shipetown Rd	Daffodil Ln
Snyder Rd	Amber Meadows Cir
Strawberry Plains Pk	McCubbin Rd
Tazewell Pk	<ul style="list-style-type: none"> • Graceland Rd • Beverly Park Cir
W Emory Rd	Boyd Walters Ln

Crash Factor 3: Driver failing to yield while going straight

In 13 crashes (14 percent), drivers were going straight and failed to yield for a person walking or bicycling across the street in a legal crosswalk, either marked or unmarked, or who otherwise had the right of way.⁶

12 of the crashes involved injuries, and the remaining 1 was a fatality. 5 of these crashes occurred around schools, 2 of them at the crosswalk near the western access road to Powell High School. **Table 4** shows the locations of all crashes of this type.

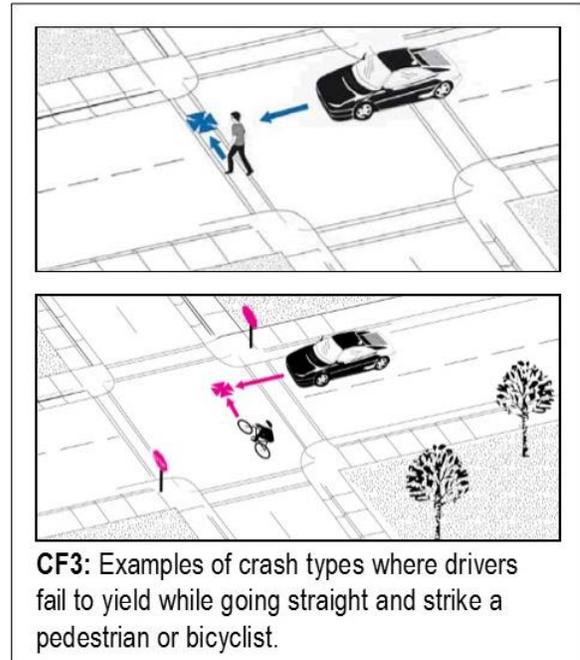
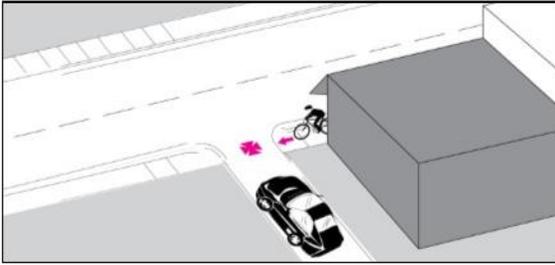


TABLE 4: Areas with pedestrians struck by drivers going straight and failing to yield	
Crash occurred on this street	In this area
Ball Camp Pk	at eastern access road to Ball Camp Elementary
Ball Rd	at Hackberry Rd
E Emory Rd (fatality)	at Ridge Creek Ln
Karns Middle School Access Rd	at main entrance to school
Millertown Pk	at Lakin Rd
Pedigo Rd	at Ideal Dr
S Northshore Dr	at Nantasket Rd
Sedgewick Dr	at Penwood Dr
Success Way	at Welcome Way
Tipton Station Rd	at western access road to South-Doyle High School
W Copeland Dr	at Collier Rd
W Emory Rd	2 crashes at western access road to Powell High School

⁶ This crash factor is not identified where the crash report finds that the person walking or bicycling entered the street in a way that failed to give the driver sufficient time to yield the right of way.

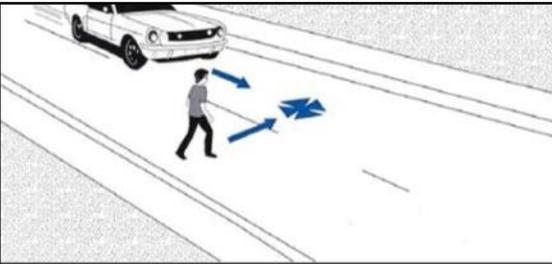
Crash Factor 4: Bicyclist riding on sidewalk



CF4: It's legal for bicyclists to ride on sidewalks. But it can put them in danger of being struck by a driver who does not expect to see them in that location.

No crashes of this type were reported in unincorporated Knox County during the time analyzed in this report.

Crash Factor 5: Pedestrian crossing street outside of an intersection or marked crosswalk



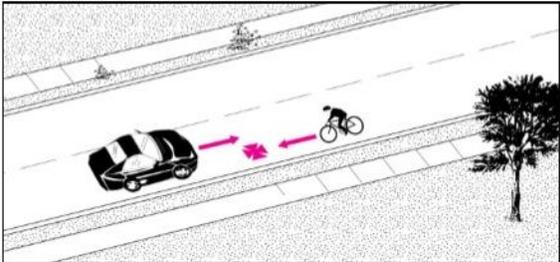
CF5: People crossing streets outside of designated crossing areas can be an indication that more and/or better crossing locations are needed.

In 16 crashes (18 percent), pedestrians were crossing the street outside of an intersection or marked crosswalk. 9 of these crashes involved injuries, and 5 others were fatalities. 2 corridors saw multiple crashes of this type: Chapman Highway (3) and Clinton Highway (2). **Table 5** shows the locations of all crashes of this type.

TABLE 5: Areas with pedestrians struck while crossing outside of an intersection or marked crosswalk

Crash occurred on this street	In this area
Bakertown Rd	east of Romulus Ln
Ball Camp Byington Rd	south of Foggy Ridge Way (fatality)
Chapman Hwy	2 crashes near W Circle Dr (both fatalities); 1 crash south of Simpson Rd
Clinton Hwy	1 crash east of Larkspur Ln; 1 crash east of Pentucket Way (both fatalities)
Cunningham Rd	east of Mash Ln
Lovell Rd	between Outlet Dr and Lexington Dr
Miller Rd	east of Pedigo Rd
Mynatt Rd	west of Keithway Ln
N Cedar Bluff Rd	south of Dutchtown Rd
Oak Ridge Hwy	north of Solway Rd
Pellissippi Pkwy	south of Horse Shoe Bend Ln
Rifle Range Rd	east of Magnum Ln
Thorn Grove Pk	west of Burkbrook Ln

Crash Factor 6: Bicyclist riding against traffic

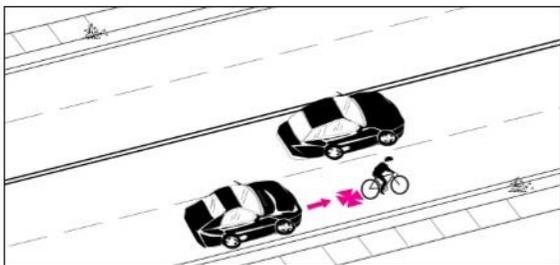


CF6: Some bicyclists ride against traffic in the mistaken belief that it's safer than riding in the same direction as other traffic.

One crash was associated with a bicyclist riding against traffic. It was an injury crash. The location was on Barnard Road near Woods-Smith Road.

Crash Factor 7: Driver striking bicyclist from behind

8 bicyclists were struck from behind by drivers. All 8 crashes involved injuries, with no fatalities. **Table 6** shows the locations of all crashes of this type.



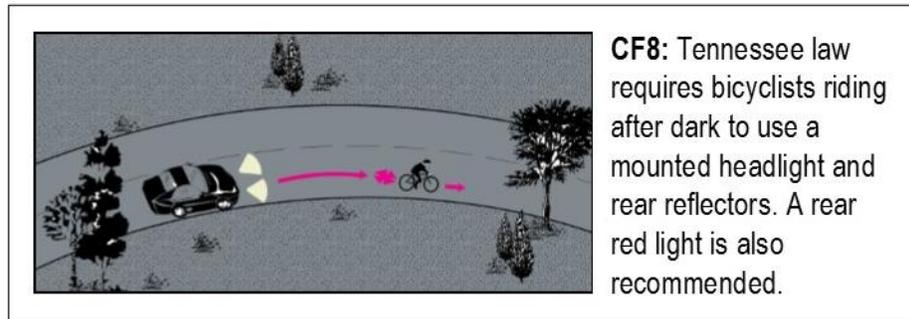
CF7: Drivers striking bicyclists from behind is a relatively uncommon but very dangerous crash type, accounting for 25% of fatal bicycle crashes across the U.S.

TABLE 6: Locations with bicyclists being struck from behind by drivers

Crash occurred on this street	In this area
Andersonville Pk	at Cedar Crossing Rd
Chapman Hwy	south of Kimberlin Heights Rd
Murphy Rd	south of Horsecross Dr
Sevierville Pk	at Helix Ln
Strawberry Plains Pk	east of Moshina Rd
Tedford Ln	west of Kelsey Ln
W Emory Rd	east of Harrell Rd
W Martin Mille Pk	south of Artella Dr

Crash Factor 8: Bicyclist riding at night with no lights

1 bicyclist was struck while riding at night with no lights. It was an injury crash.



CF8: Tennessee law requires bicyclists riding after dark to use a mounted headlight and rear reflectors. A rear red light is also recommended.

Methodology

Crash data were downloaded from the TITAN database maintained by the State of Tennessee. Crashes were mapped in ArcMap GIS software based on latitude/longitude or closest intersection, where lat/long data were not available. TPO staff then reviewed the location of each crash to correct data errors. TPO staff assigned crash factors based on information obtained from individual crash reports, including crash narratives and information about citations issued.

Image credit

All crash type images are from the Pedestrian and Bicycle Crash Analysis Tool (PBCAT), which was developed by the Federal Highway Administration (FHWA), in cooperation with the National Highway Traffic Safety Administration (NHTSA). The purpose of the PBCAT is to assist with analysis of pedestrian/bicycle crashes with the goal of preventing them.

Appendix: Pedestrian/bicycle crashes on major arterials in unincorporated Knox County

As described in the full report on pedestrian/bicycle crashes in Knox County, a disproportionate share of crashes and fatalities occur on major arterials (streets such as Clinton Highway and Maynardville Pike).

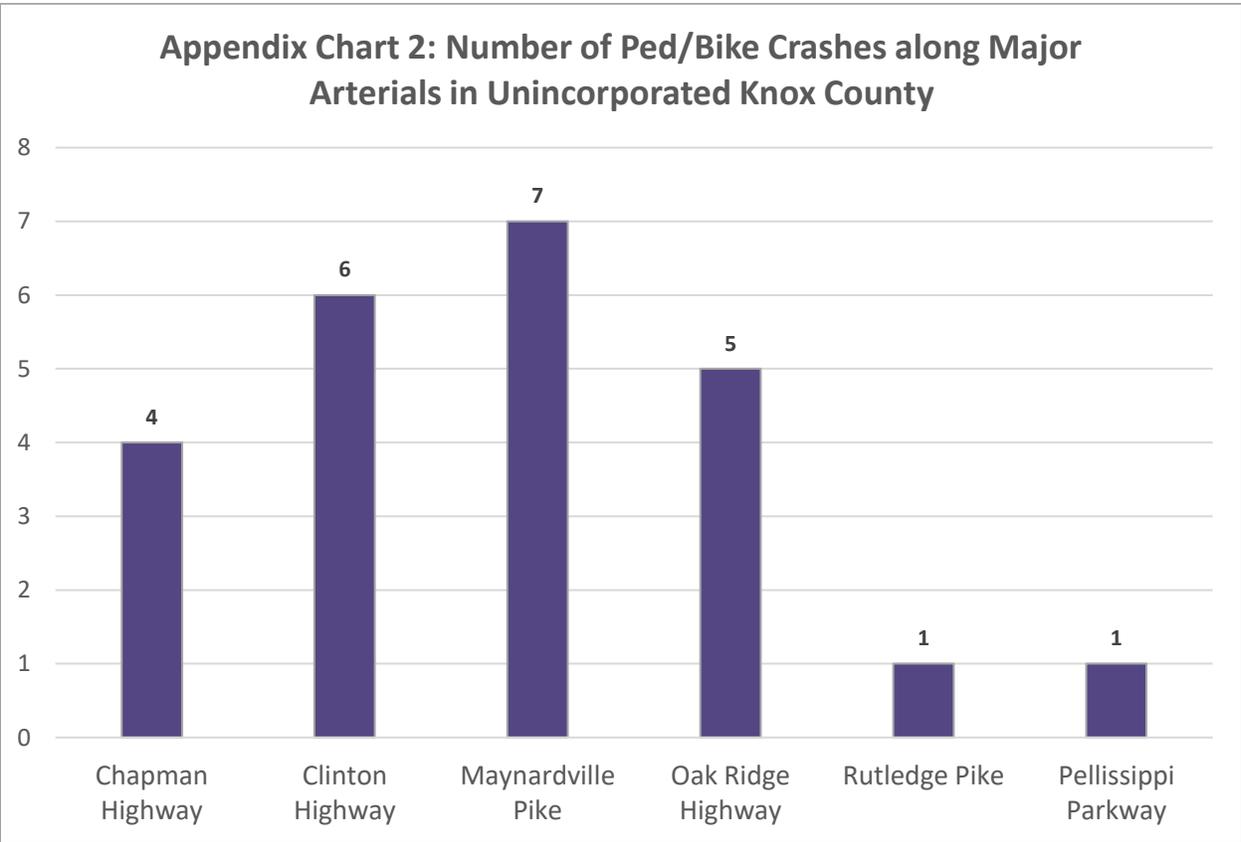
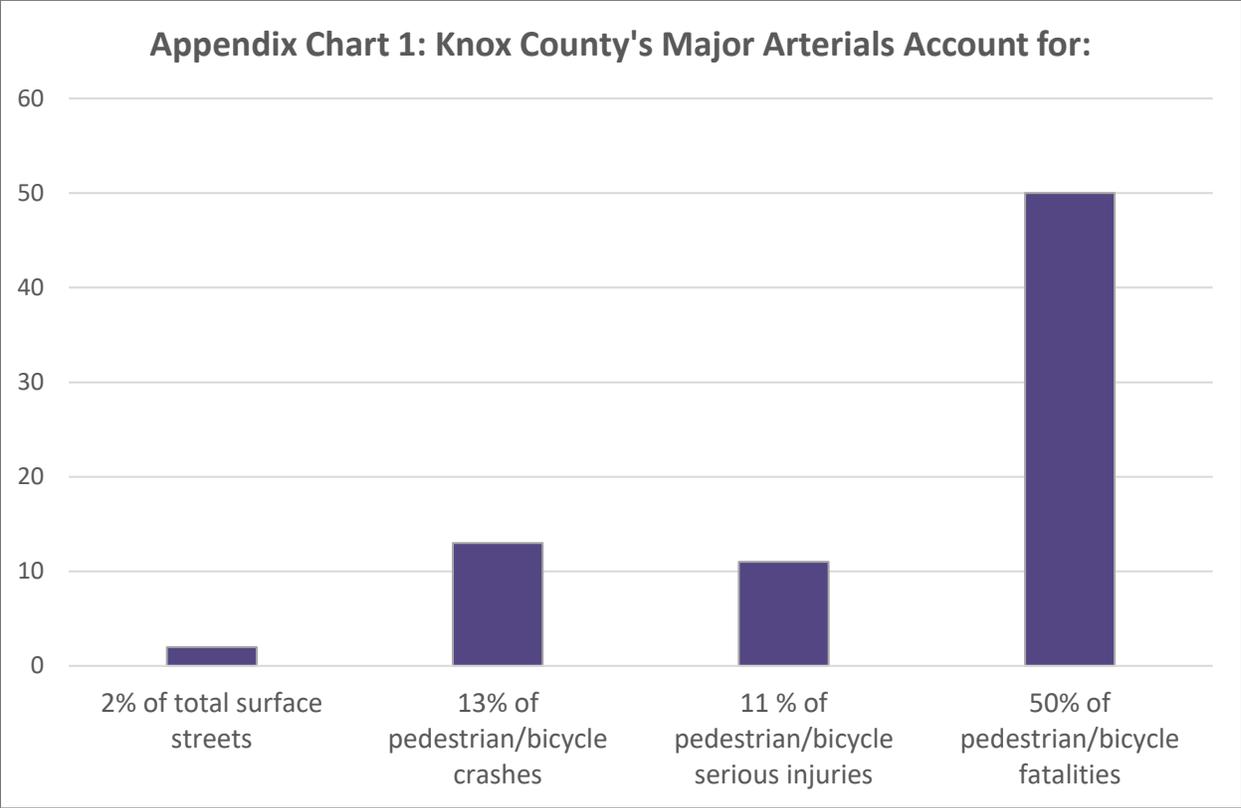
This confluence of pedestrian/bicycle crashes along major arterials happens for several reasons. Major arterials tend to be wide streets with high volumes of fast-moving traffic. High speeds make drivers less able to detect people walking and bicycling, and less able to stop quickly to avoid a collision.

Major arterials also tend to feature transit routes and other frequent destinations for people walking and bicycling, resulting in a concentration of walkers and bicyclists on these streets.

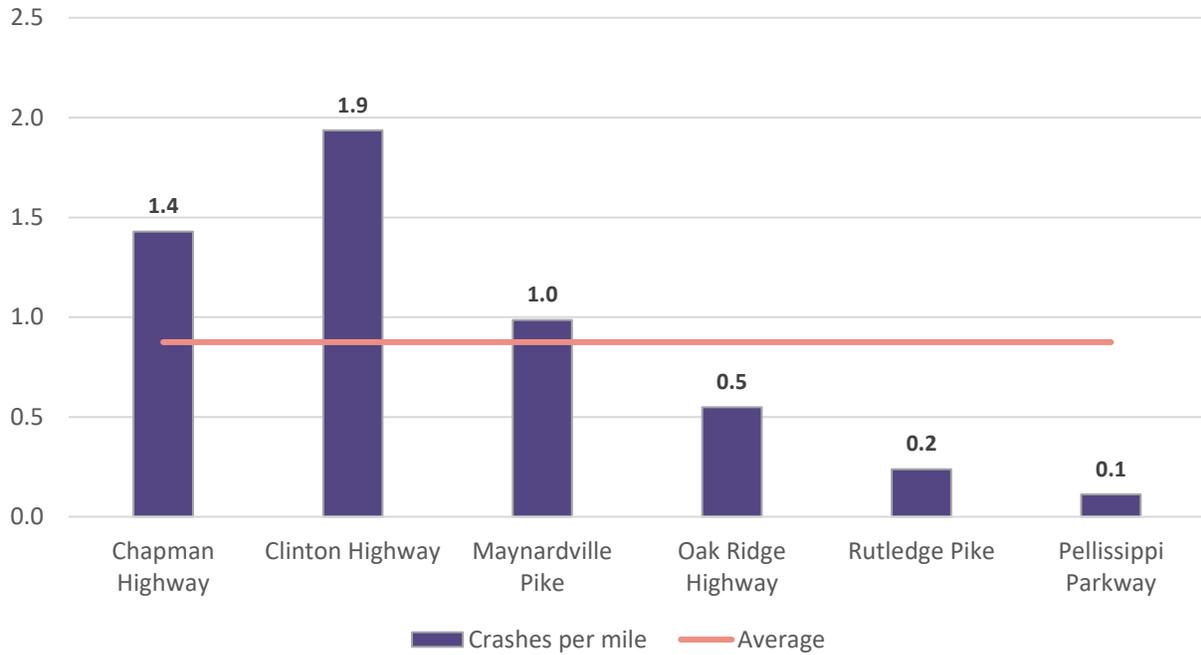
- Major arterials make up 2 percent of the surface street mileage within unincorporated Knox County.
- Of the crashes where locations are certain, 13 percent (24 crashes) occurred on major arterials. 22 of the 24 crashes on major arterials occurred on four streets: Chapman Highway, Clinton Highway, Maynardville Pike and Oak Ridge Highway.
- Crashes on major arterials resulted in 2 serious injuries⁷, which is 11 percent of all serious injuries resulting from pedestrian/bicycle crashes.
- Crashes on major arterials resulted in 9 fatalities, which is 50 percent of all fatalities resulting from pedestrian/bicycle crashes. Four streets accounted for all 9 fatal crashes on major arterials: Clinton Highway (3), Oak Ridge Highway (3), Chapman Highway (2), and Maynardville Pike (1). Clinton Highway had the most fatalities per mile.
- All 9 of the fatalities on major arterials involved people walking rather than people bicycling.
- The most common crash factor in crashes along major arterials is pedestrians crossing the street outside of an intersection or marked crosswalk, which accounted for 7 crashes on major arterials and 4 fatal crashes.

The charts and table that follow provide more data about crashes on major arterials.

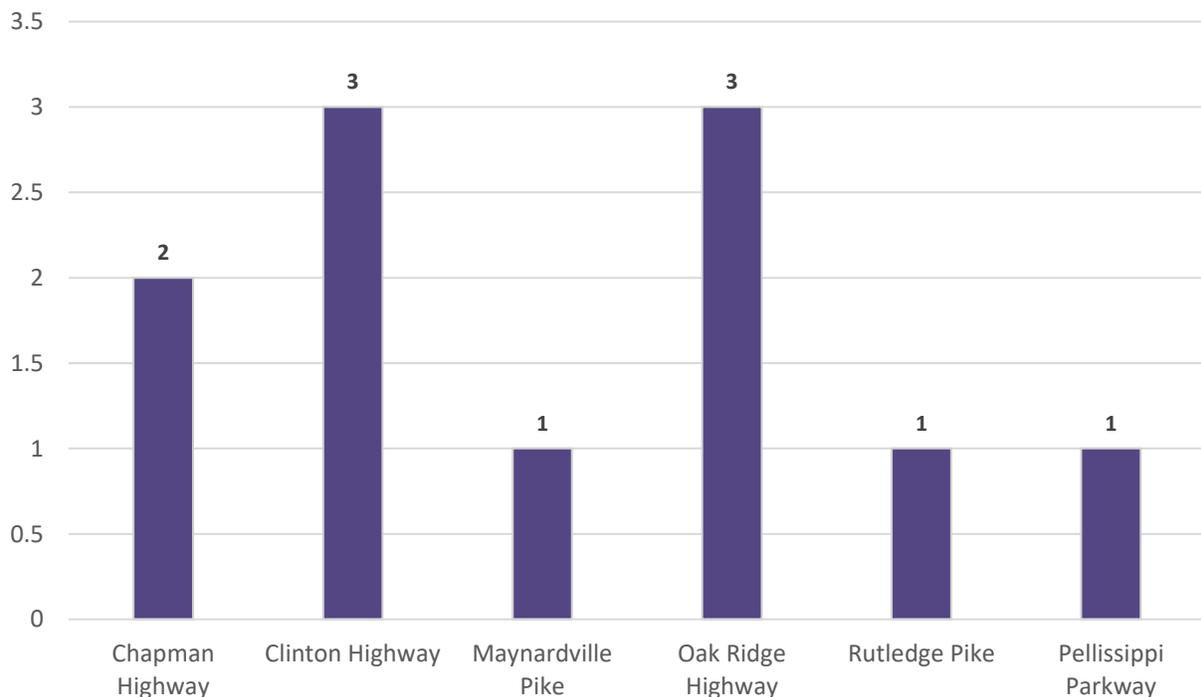
⁷ Crash reports rank the severity of crashes as either fatal, suspected serious injury, suspected minor injury, possible injury, or no injury. Suspected serious injury crashes used to be reported as “incapacitating,” and suspected minor injury crashes were reported as “non-incapacitating.” For this report, suspected serious and incapacitating crashes are combined as “serious injury” crashes.



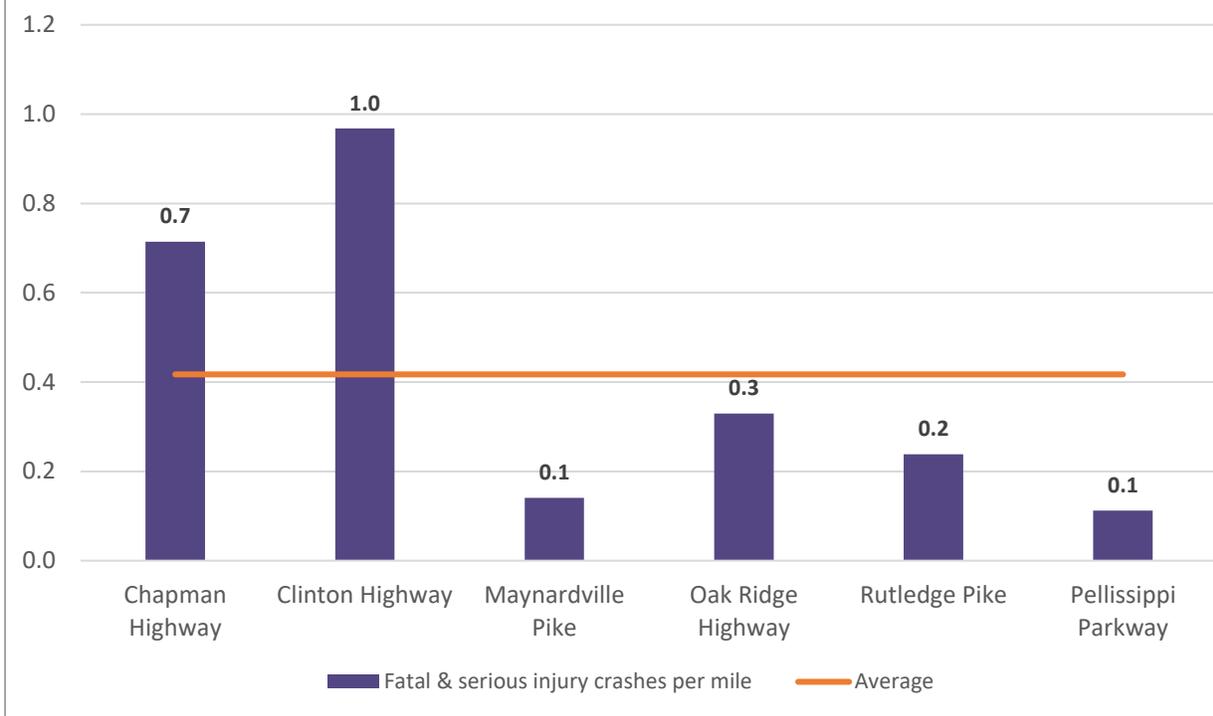
Appendix Chart 3: Ped/Bike crashes Per Mile along Major Arterials in Unincorporated Knox County



Appendix Chart 4: Fatal & Serious Injury Ped/Bike Crashes along Major Arterials in Unincorporated Knox County



Appendix Chart 5: Fatal & Serious Injury Ped/Bike Crashes per mile along Major Arterials in Unincorporated Knox County



Appendix Table 1: Ped/Bike Crashes Along Major Arterials in Unincorporated Knox County - Jan. 2011-June 2019

Major Arterial	Number of Crashes	Length of Arterial (in miles)	Crashes per Mile	Number of Fatalities	Number of Serious Injuries*	Fatal + Serious Injury Total	Fatal + Serious Injury Per Mile
Chapman Highway	4	2.8	1.4	2	0	2	0.71
Clinton Highway	6	3.1	1.9	3	0	3	0.97
Maynardville Pike	7	7.1	1.0	1	0	1	0.14
Oak Ridge Highway	5	9.1	0.5	3	0	3	0.33
Rutledge Pike	1	4.2	0.2	0	1	1	0.24
Pellissippi Parkway	1	8.9	0.1	0	1	1	0.11

* Crash reports rank the severity of crashes as either fatal, suspected serious injury, suspected minor injury, possible injury, or no injury. Suspected serious injury crashes used to be reported as “incapacitating,” and suspected minor injury crashes were reported as “non-incapacitating.” For this report, suspected serious and incapacitating crashes are combined as “serious injury” crashes.