



Reedie Drive Pedestrian Road Safety Audit Montgomery County, Maryland

Prepared For:
Department of Transportation
Montgomery County, Maryland



In partnership with the Maryland State Highway Administration

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1. Introduction

1.1 Objective

The objective of this study was to complete a pedestrian road safety audit (PRSA) for Reedie Drive between Veirs Mill Road (MD-586) and Georgia Avenue (MD-97) in Wheaton, Maryland (Figure 1). As a result of the audit, the PRSA team has identified a variety of issues related to pedestrian and bicycle safety and developed a number of suggestions to improve pedestrian and bicycle safety in the study area.

1.2 Background

The study area is an approximately 800-foot segment of Reedie Drive, located north of the WMATA Wheaton metro station. Reedie Drive is a minor roadway traversing a commercial land use area. The study area includes two signalized intersections at Veirs Mill Road and Georgia Avenue, a stop-controlled intersection at Grandview Avenue, and an uncontrolled intersection at Triangle Lane. According to area maps, Reedie Drive ends at Grandview Avenue (approximately 50 feet from Veirs Mill Road), but Reedie Drive effectively connects Veirs Mill Road and Georgia Avenue (and signage at both intersections refers to Reedie Drive), two heavily used arterial roadways, and provides access to the Wheaton Westfield Shopping Mall, located to the west of the study area. The study area experiences significant pedestrian activity, generated by the adjacent commercial land uses, WMATA metro station, public parking, and nearby transit bus stops.

The Reedie Drive study area was identified as one of Montgomery County's High Incidence Areas for pedestrian-related collisions, as part of the Montgomery County Executives' pedestrian safety initiative. Based on collision data provided by Montgomery County and the Maryland State Highway Administration, 14 pedestrian collisions occurred in the study area between January 1, 2004 and December 31, 2008. The purpose of this PRSA was to identify safety issues that may be contributing to the observed pedestrian collisions in the study area.

The audit team disciplines included pedestrian safety, traffic engineering, transportation planning, transportation design, and law enforcement. The PRSA was performed on April 27 and April 28, 2010 during daytime and nighttime hours. The PRSA team consisted of nine members, representing:

- Montgomery County Department of Transportation
- Maryland State Highway Administration (MDSHA)
- Montgomery County Police Department
- Maryland National Capital Parks and Planning Commission
- Vanasse Hangen Brustlin, Inc. (VHB), the PRSA consultant.

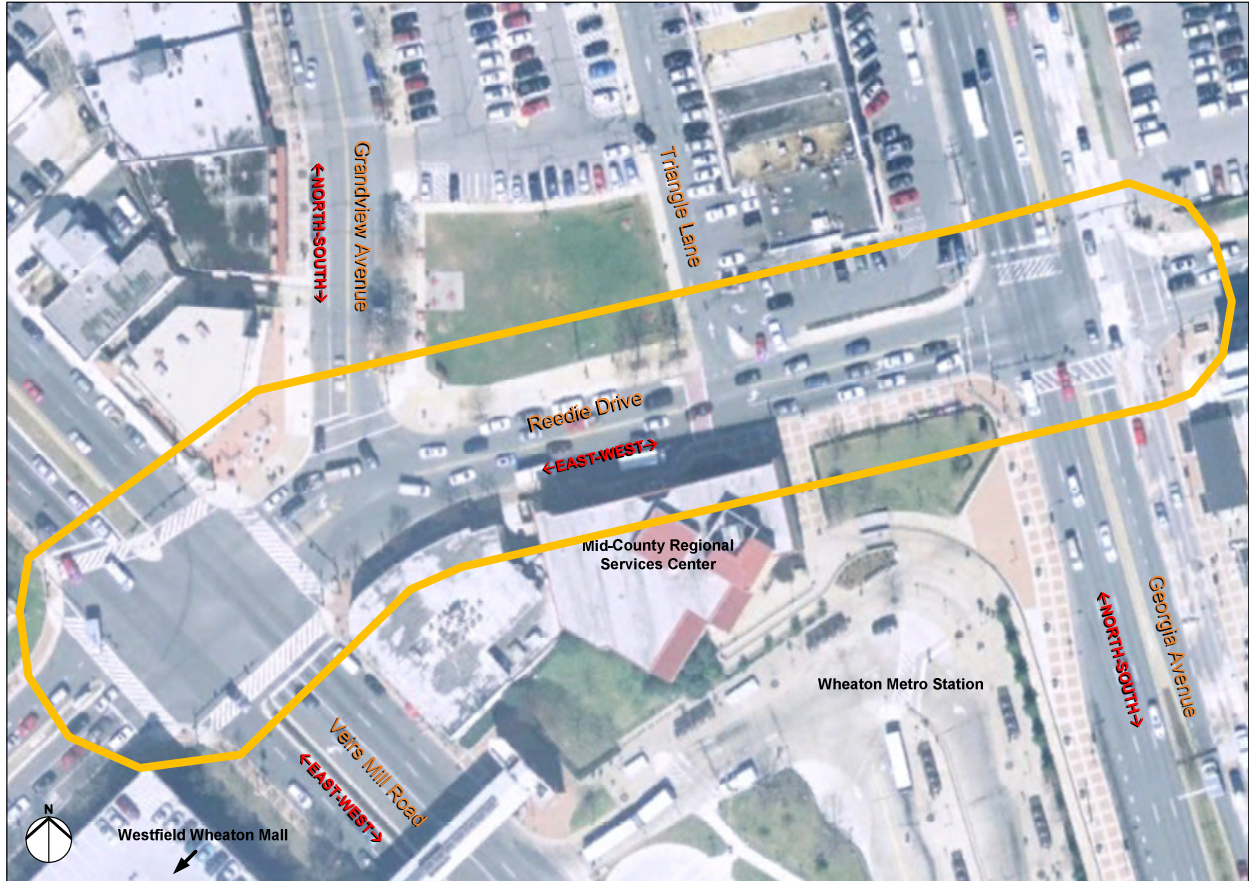


Figure 1: Study Area

1.3 Organization of the Report

This report first presents a description of the existing geometric, operational, and safety conditions for the study area based on field reviews and available data. Next, the report identifies the existing conditions and general issues throughout the corridor by the PRSA team. Finally, the report presents suggestions for pedestrian safety improvements at individual locations in the study area. For each location, the assessment identifies issues, possible contributing factors, and suggestions for improvement.

This report will be a resource to MDSHA and MCDOT, as well as other stakeholders, for implementing pedestrian safety improvements within the audit area. There will be an ongoing vetting of the suggestions and recommendations in this report with collaboration among agencies and stakeholders to implement short and intermediate-term recommendations and assess the feasibility and constructability of long-term projects. Ultimately, this process will assess the merits of these recommendations and establish a process whereby a range of pedestrian safety recommendations are implemented.

1.4 Existing Conditions

1.4.1 Site Characteristics

In the study area, Reedie Drive is an undivided, closed-section, two to three-lane roadway, with on-street parking in some locations. Reedie Drive originates to the east of the study area and terminates at Grandview Avenue (approximately 50 feet from Veirs Mill Road). Two signalized intersections are included in the study area:

- Veirs Mill Road (MD 586) at Grandview Avenue/Westfield Mall Entrance
- Georgia Avenue (MD 97) at Reedie Drive

In proximity to the study area, Veirs Mill Road is a divided six-lane arterial roadway that runs in the east-west direction (see Figure 1). The southbound approach of Grandview Avenue to Veirs Mill Road contains an exclusive left-turn lane and a very wide shared through/right-turn lane (19 feet wide). The Westfield Wheaton Mall driveway comprises the northbound approach of this intersection. The northbound approach contains an exclusive left-turn lane, a through lane, and an exclusive right-turn lane.

Georgia Avenue is a divided six-lane arterial roadway that runs in the north-south direction (see Figure 1) in the study area. An exclusive left turn lane and a shared through/right-turn lane are present on the eastbound approach to the Georgia Avenue intersection. The westbound approach of Reedie Drive to Georgia Avenue, is median divided and contains an exclusive left-turn lane and a shared through/right-turn lane. Vehicular and pedestrian access to the Wheaton Metro station is provided from Reedie Drive, to the east of Georgia Avenue.

Grandview Avenue is a two-lane roadway that runs in the north-south direction (see Figure 1) and intersects Reedie Drive at a skewed T-intersection, approximately 50 feet east of Veirs Mill Road. Two southbound lanes are present on the approach to the intersection, but no lane designations are provided. On-street parking is allowed on both sides of Grandview Avenue.

Triangle Lane is a one-way northbound road that meets Reedie Drive at a T-intersection approximately 150 feet west of the Georgia Avenue intersection. Traffic on Triangle Lane is limited to a single lane, which travels away from Reedie Drive, providing access to businesses and public parking north of Reedie Drive.

Sidewalks are present along both sides of Reedie Drive within the study area and in some areas the sidewalk width exceeds 20 feet. A decorative crosswalk has been installed across Reedie Drive, just west of the Triangle Lane, using a brick paver marking material, high-visibility signage, and a curb extension on the north side of Reedie Drive. Post-mounted delineators have also recently been installed along the south side of Reedie Drive at this crosswalk to restrict eastbound traffic to one lane.

High-visibility crosswalks (diagonal striping) are provided on all four legs of the Veirs Mill Road/Grandview Avenue intersection, but none are present at the Georgia Avenue/Reedie Drive intersection. A standard crosswalk is present across Grandview Avenue, at Reedie Drive.

Average annual daily traffic (AADT) volumes for Veirs Mill Road and Georgia Avenue were obtained from MDSHA traffic count records. AADT for Reedie Drive was estimated based on the MDSHA turning movement and daily count data for both Veirs Mill Road and Georgia Avenue. All traffic volume data and estimates are provided in Table 1.

Table 1: 2009 AADT

Road	Location	AADT
Veirs Mil Road	0.1 miles west of Grandview Avenue	27,112 vpd
Veirs Mil Road	0.1 miles west of Georgia Avenue	23,722 vpd
Georgia Avenue	0.3 miles north of Reedie Drive*	38,230 vpd
Georgia Avenue	0.1 miles north of Veirs Mil Road	40,430 vpd
Reedie Drive	Between Veirs Mill Rd.and Georgia Ave.	9,810 vpd

Note: * Count location is north of University Boulevard, which is approximately 1,000 feet north of Reedie Drive.

Public transportation is heavily utilized in the study area. The WMATA Wheaton Metro station is located on the south side of Reedie Drive in the study area. WMATA bus routes C2, C34, Q2, Y5, Y7, Y8, and Y9 and Montgomery County Ride On routes 7, 8, 9, 31, 34, 37, 38, and 48 stop at the Wheaton metro station.

Peak hour vehicular and pedestrian volumes from the most recent MDSHA traffic volume counts are shown in Table 2. Detailed traffic count reports are included in the Appendix.

Table 2: Traffic Count Data

Year	Location	AM Peak Hour	AM Peak Volume	PM Peak Hour	PM Peak Volume	Daily Ped Volume
2004	Veirs Mill Road at Grandview Ave.	8 – 9 AM	2,087 vph	5 – 6 PM	2,679 vph	805 ppd
2000	Georgia Ave at Reedie Drive	7 – 8 AM	3,107 vph	5 – 6 PM	3,644 vph	639 ppd

1.4.2 Crash Data

A review of all collision records collected by Montgomery County Police in the study area during the five-year period from 2004 through 2008 allowed the PRSA team to identify the location of all reported pedestrian crashes within the corridor (Figure 2). Between 2004 and 2008, a total of 114 vehicular crashes and 14 pedestrian crashes were reported in the study area (Figure 3). No bicyclist crashes were reported during the study period.

Reedie Drive Pedestrian Road Safety Audit



Figure 2: Reedie Drive between Veirs Mill Road and Georgia Avenue Pedestrian Crashes 2004 – 2008

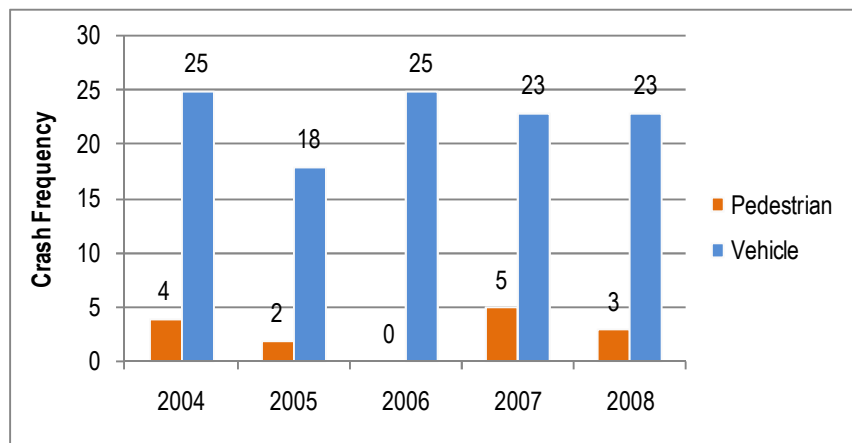


Figure 3: Study Area Crash Frequency 2004 - 2008

Crash data indicate that all but one of the 14 pedestrian crashes resulted in injuries (Figure 4). One crash included a pedestrian fatality, four crashes resulted in disabling injuries, six crashes resulted in non-incapacitating injuries, and two crashes resulted in possible injuries. In addition to the total number of pedestrian collisions, the occurrence of a fatal crash and large proportion of moderate to severe injury crashes supports the need for additional pedestrian safety measures in the corridor.

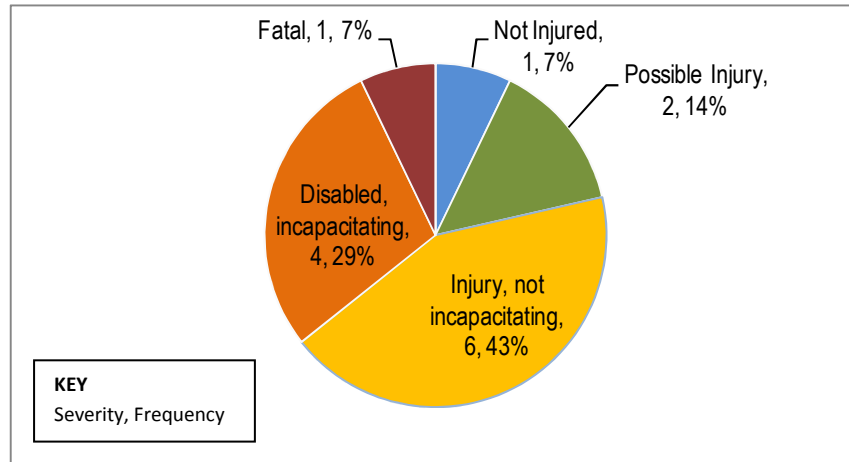


Figure 4: Pedestrian Crashes by Crash Severity 2004 - 2008

Figure 5 shows vehicle movements prior to the pedestrian crashes at the study location. Eight of 14 crashes involved vehicles moving at constant speed. Other vehicle movements prior to the crashes involved making left turns, making a right turn, skidding, slowing or stopping, and accelerating.

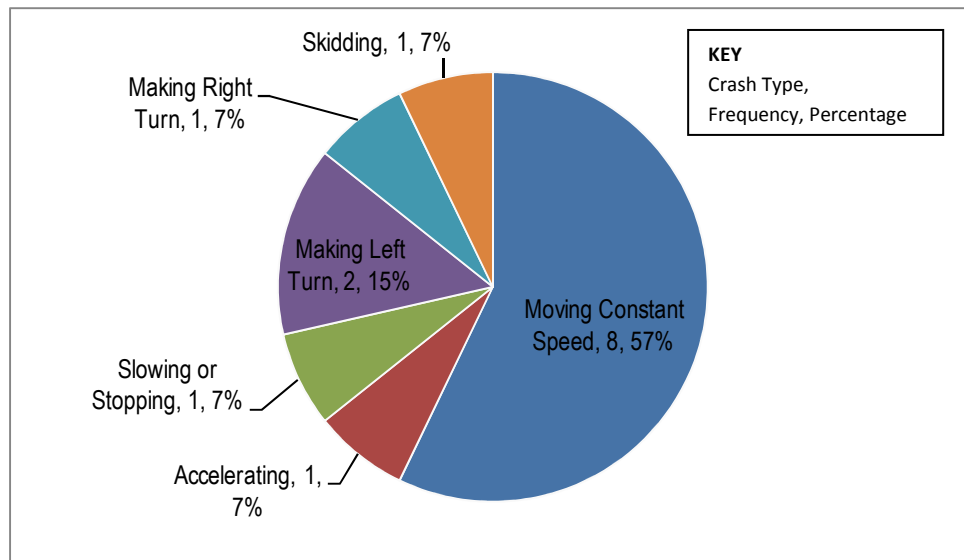


Figure 5: Vehicle Movement Prior to Pedestrian Crash 2004 - 2008

Figure 6 shows the age distribution of pedestrians by age group. Pedestrians involved in crashes represented a range of ages. The distribution does not suggest that age was a primary factor in the pedestrian crashes on Reedie Drive.

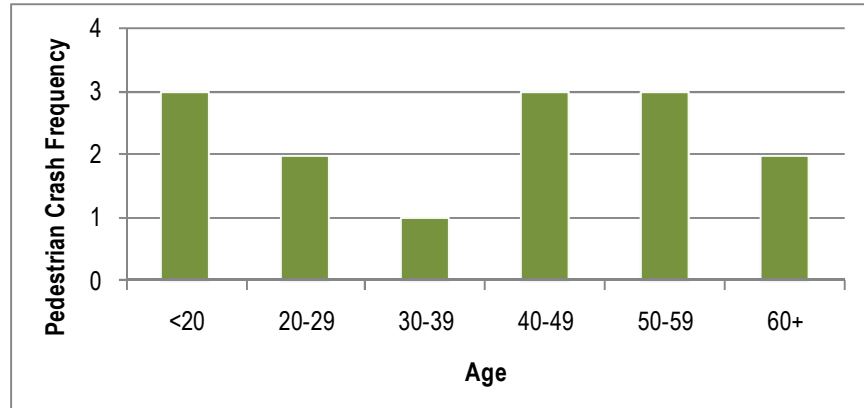


Figure 6: Pedestrian Crashes by Age 2004 - 2008

The majority of the pedestrian crashes occurred during the day and under adequate lighting and dry road surface conditions (Figure 7). Of the 14 crashes, 12 crashes occurred under daylight, and two crashes occurred under dark lighting conditions. The majority of the pedestrian crashes also occurred under dry road surface conditions. Twelve of 14 crashes occurred under dry road surface conditions, while one crash occurred under wet road surface conditions. The road surface condition was unknown for one crash.

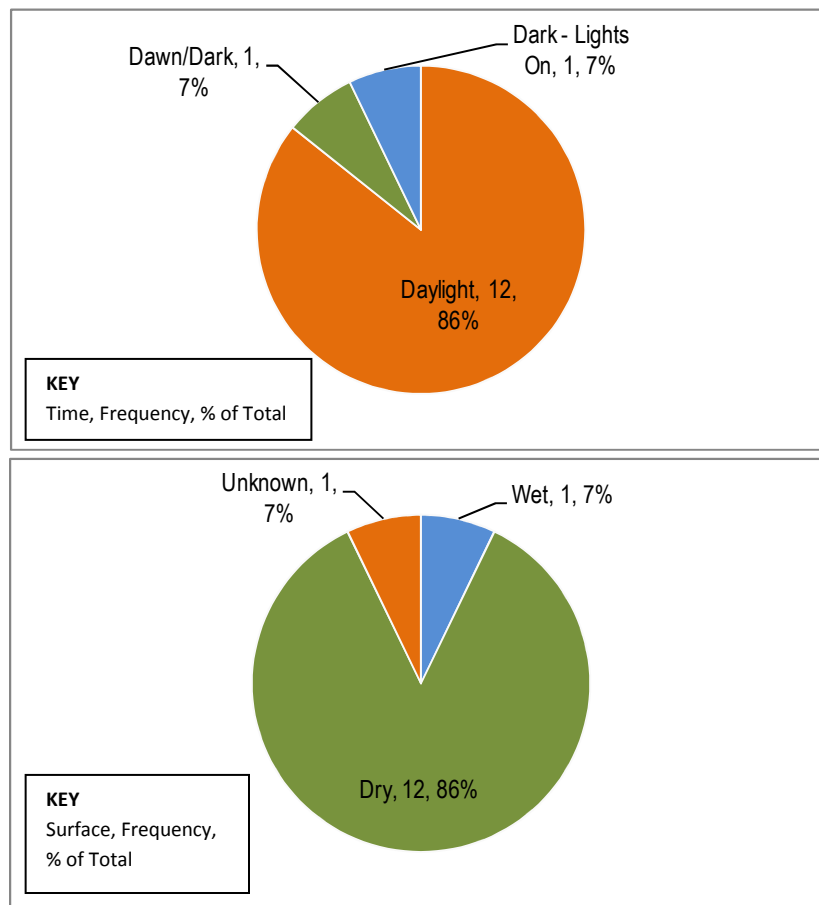


Figure 7: Pedestrian Crashes by Time of Day and Road Surface Conditions 2004 - 2008

2. Road Safety Audit Findings

2.1 Safety Benefits of Existing Roadway Features

Notable existing roadway features that enhance pedestrian safety in the study area include but are not limited to:

- *Continuous sidewalks:* Sidewalks within the corridor are continuous and provide a designated space for pedestrians in the corridor. Some sidewalks in this area are 20 feet wide, or greater, which allows a high volume of pedestrians to walk comfortably and eases mobility for pedestrians with impairments.
- *Decorative and high-visibility crosswalks:* MCDOT has installed a decorative crosswalk, using brick paver materials, on Reedie Drive at Triangle Lane in front of the Mid-County Regional Services Center. MCDOT has also installed post-mounted delineators on the south end of the crosswalk to function as a temporary “curb extension” that reduces the lane width on eastbound Reedie Drive; minimizes vehicle-pedestrian conflicts; reduces pedestrian crossing distance; and improves visibility of the crossing.



Decorative Crosswalk on Reedie Drive at Triangle Lane

Additionally, crosswalks with transverse or diagonal striping patterns (which increase visibility) are provided on all legs of the Veirs Mill Road/Grandview Avenue intersection and are accompanied by pedestrian signals at all locations.

- *Pedestrian signage:* The Reedie Drive crosswalk, located just west of Triangle Lane, is accompanied by post-mounted and knock-down regulatory signage indicating that vehicles must stop when a pedestrian is crossing the road.
- *Countdown pedestrian signals:* Pedestrian countdown signals are used at the intersections of Reedie Drive at both Georgia Avenue and Veirs Mill Road. Countdown pedestrian signals have been found to reduce pedestrian injury crashes and improve pedestrian compliance to traffic controls in several national studies.



Photo of a countdown signal

- *Audible pedestrian signals:* The intersection of Georgia Avenue at Reedie Drive has been equipped with audible pedestrian signals (referred to in some states as Accessible Pedestrian Signals). These signals emit a telltale sound to alert pedestrians with sight impairments that a signalized crossing is present and allow pedestrians to find the push button. When the pedestrian push button is depressed, the signals also deliver an audible message to pedestrians when it is proper to cross the street (i.e. “You may now cross Georgia Avenue.”). This message is repeated during the full extent of the walk phase for each crosswalk.
- *Pedestrian Barriers and Bridges:* An 8-foot fence has been installed along the median on Veirs Mill Road, south of Reedie Drive, to deter pedestrians from attempting to cross Veirs Mill Road at a mid-block location. This barrier encourages pedestrians to cross Veirs Mill Road at one of the signalized crosswalks on either side of the fence, or use the pedestrian bridge between the Wheaton Metro station and the parking garage on the west side of the road. MCDOT is also considering a project to construct a median fence on Georgia Avenue, north of Reedie Drive to deter uncontrolled midblock crossing activity, primarily related to existing Metro bus stops.

These measures help improve driver awareness of pedestrians and compliance of traffic signals. In general, implementation of these features can reduce the potential for collisions.

2.2 Observed Issues, Contributing Factors, and Opportunities for Improvements

The Reedie Drive PRSA team identified a number of pedestrian safety issues in the study area during the audit. These issues were discussed by the team and prioritized to identify the issues presenting the greatest challenges to pedestrian safety in the study area. The following section describes the identified pedestrian safety issues, in order of importance to the audit team:

Uncontrolled Midblock Crossings – Uncontrolled midblock crossings are prevalent throughout the study area and were identified as one of the primary contributing factors to pedestrian collisions in the study area. Possible causes of uncontrolled midblock crossings are the locations of various land uses, including the Metro station, public parking lot, and commercial properties, on both sides of Reedie Drive. Vehicle drop-off activity near the Metro station was also observed as contributing to uncontrolled midblock crossing activity.

Pedestrian-Vehicle Conflicts – Most pedestrian conflicts, other than midblock crossings, are comprised of turning movement vehicle conflicts with pedestrians at intersections in the study area. Left-turn and right-turn conflicts result from high turning movement volumes on the major arterial roadways, long crossing distances (i.e. higher pedestrian exposure), and significant pedestrian activity in the study area.

Pavement Markings and Signage – Many of the existing pavement markings on Reedie Drive, Veirs Mill Road, and Georgia Avenue have been worn down by regular traffic activity. Additionally, the limited guidance provided by pavement markings and signage may contribute to driver confusion and vehicle conflicts in this area. Crosswalk markings at one location were found to be askew, in order to accommodate a wide corner turning radius and wheelchair ramp placement. Some of the

crosswalk markings in the area are standard markings (two parallel bars) instead of high-visibility markings (diagonal or ladder-bar striping).

Sidewalk Design and Pedestrian Continuity – A number of issues with the sidewalk design or continuity of pedestrian facilities were observed during the audit, including sidewalk diversions, which interrupt the visual continuity of the pathway for pedestrians. Tree boxes and lamp posts in the sidewalk also limit the effective width for pedestrians in some locations. Some sidewalks are not adequately separated from private parking lots.

Lighting Conditions – Some pedestrian-scale lighting appeared to be non-functional during the nighttime audit observation period. The study team also identified a few streetlights that appeared damaged or otherwise not functioning (some of these streetlights are privately maintained).

Compliance of Pedestrians to Signals – Pedestrians were observed violating pedestrian signals. Possible contributing factors may include pedestrian wait times, signal cycle lengths, transit activity, and unpredictable human factors.

Maintenance – Drainage grate covers that are constructed with parallel-bars (in relation to the traffic direction), which are not compatible with bicycle tires, were observed in a few locations.

2.3 Summary of Issues and Suggestions

2.3.1 Study Area Issues and Suggestions

The following section provides a summary of the issues identified during the PRSA process and the suggestions for improvements at each location discussed in this report. The anticipated timeframe for completion [Short Term (ST), Intermediate (I), and Long Term (LT)] is referenced after each suggestion.

Safety Issue	Suggestions
Uncontrolled Midblock Crossings	<ul style="list-style-type: none"> <li data-bbox="727 1274 1360 1339">▪ Pursue streetscape improvements to deter uncontrolled midblock crossing activity (I). <li data-bbox="727 1350 1414 1451">▪ Determine constructability and feasibility of modifications to medians to deter uncontrolled midblock crossings or improve pedestrian refuge space (I). <li data-bbox="727 1461 1442 1526">▪ Consider adding additional signage to indicate nearby crosswalk locations (ST). <li data-bbox="727 1537 1450 1602">▪ Pursue streetscape modifications and traffic calming measures to reduce speeds and improve pedestrian safety and mobility (I).

Safety Issue	Suggestions
Pedestrian - Vehicle Conflicts	<ul style="list-style-type: none"> ▪ Install signage to improve driver awareness of pedestrians and reduce turning movement conflicts at intersections (ST). ▪ Determine constructability and feasibility of geometric roadway improvements to reduce pedestrian crossing distances or improve pedestrian refuge spaces (I). ▪ Determine whether pedestrian signal timing modifications are needed (I). ▪ Consider pavement marking modifications to provide additional guidance to motorists (ST).
Pavement Markings/Signage	<ul style="list-style-type: none"> ▪ Refresh fading pavement markings (ST). ▪ Repair damaged signage. ▪ Consider implementing pavement marking improvements to provide additional guidance to motorists and better delineate the on-street parking (ST). ▪ Consider installing guide signage to reinforce the lane assignments (ST). ▪ Consider installing high-visibility crosswalk markings (I). ▪ Consider additional crosswalks or other crossing treatments in the study area (LT).
Pedestrian Facility Continuity	<ul style="list-style-type: none"> ▪ Work with MDSHA to upgrade pedestrian signals, consistent with MDSHA Accessible/Countdown Pedestrian Signals standards (ST). ▪ Determine the constructability of sidewalk widening or realignments to provide visible and continuous roadside pathways for pedestrians (I).
Lighting Conditions	<ul style="list-style-type: none"> ▪ Assess apparently damaged or non-functioning lights and replace or repair if necessary (ST). ▪ Consider installing additional streetlights at crosswalks (ST).
Pedestrian Compliance with Signals	<ul style="list-style-type: none"> ▪ Consider implementing a pedestrian education program (ST). ▪ Consider installing signage to indicate pedestrians should comply with signals (ST).
Maintenance	<ul style="list-style-type: none"> ▪ Consider replacing outmoded drainage grates with grates that are compatible with bicycle tires (ST). ▪ Consider basic measures to ensure pedestrians on sidewalks are protected from vehicles in parking lots (ST). ▪ Work with Transit Services to pursue minor improvements to bus stops to ensure good accessibility to buses is provided to all pedestrians (ST).

2.3.2 Other Possible Issues

The Reedie Drive PRSA team also observed pedestrian issues in other areas surrounding the Reedie Drive corridor, some of which are outside of the study area for this PRSA. However, the audit team wished to provide its observations and offer some suggestions for MCDOT to consider or discuss with other parties affected by these pedestrian issues. Below is a summary of the other observations and suggestions made by the PRSA team.

Wheaton Metro Station

The Reedie Drive PRSA team noted the following lighting and maintenance issues in the Wheaton Metro station area:

- Lighting in the Metro bridge (over Veirs Mill Road) stairwell on the east side of Veirs Mill Road is not functional.
- Some street-level lights in the Metro bus station are not functional
- An electrical wire near the West Entrance to the Metro station is hung only 1-2 feet above head height.

WMATA may want to consider replacing the non-functional street lighting and address the electrical wire in the Wheaton Metro Station area.

Wayfinding

The PRSA team also noted minimal wayfinding signage in the Metro station area and surrounding vicinity. WMATA may want to consider installing basic wayfinding signage (i.e. directions to Metro entrance, Westfield Mall, and Reedie Drive) at the east entrance to the Metro bridge over Veirs Mill Road, possibly including information in multiple languages. MCDOT may want to consider discussing the potential to install maps along Reedie Drive, noting the locations of designated trails and bicycle routes in the Wheaton area, with any other appropriate County agencies.

Pedestrian Facility Continuity

The Reedie Drive PRSA team noted that the installation of some pedestrian features, including tactile warning surfaces (truncated domes) on wheelchair ramps and accessible pedestrian signals, was inconsistent at various locations in and around the study area. The MCDOT and MDSHA may want to consider conducting an ADA-compliance and accessibility study to identify any locations that may not comply with ADA guidelines and provide uniform pedestrian facilities, including wheelchair ramps and pedestrian push-buttons, throughout the study area.

The PRSA team also noted that some electrical plate covers on the bases of some signal poles along Georgia Avenue and Veirs Mill Road were missing and a number of street trees in the area have died or are entirely missing from tree planters. MCDOT may want to consider replacing these items or discuss their condition and any potential problems with their design with other responsible parties.