

GREENBRIER AREA PEDESTRIAN SAFETY STUDY



T04-05

MAY 2004

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Greenbrier Area Pedestrian Safety Study

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ABSTRACT

The City of Chesapeake has requested that a pedestrian safety study be undertaken for the Greenbrier area to guide future development and to be included in the City's comprehensive plan. This area serves as one of the largest retail sites in Hampton Roads, and numerous citizens have expressed concerns with crossing Greenbrier Parkway, which is a busy six lane arterial roadway. Currently, an auto-dependent development pattern exists surrounding Greenbrier Mall and along Greenbrier and Volvo Parkways which makes it difficult for pedestrian movement. The overall goal is to create a safe, mixed-used, walkable, and urban environment for automobiles, pedestrians, bicyclists and transit. Most of the focus of this study is on improving pedestrian linkages and connections between existing and proposed developments and transit stops to create a safe and seamless network for pedestrians.

This study analyzes pedestrian needs and identifies improvements to address those needs. This study includes general recommendations for sidewalks, signage, curb ramps, crosswalks, refuge islands, stop bars, and pedestrian signals along study area roadways and intersections to achieve these pedestrian safety and connectivity objectives. The recommendations of this study take into account existing and future land uses, traffic, transit, and pedestrian conditions.

ACKNOWLEDGMENTS

This report was prepared by the Hampton Roads Planning District Commission (HRPDC) in cooperation with the U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), the Virginia Department of Transportation (VDOT), and the City of Chesapeake. The contents of this report reflect the views of the staff of the Hampton Roads Area Metropolitan Planning Organization (MPO). The MPO staff is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, VDOT, or HRPDC. This report does not constitute a standard, specification, or regulation. FHWA or VDOT acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

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INTRODUCTION

The City of Chesapeake has requested that a pedestrian safety study be undertaken for the Greenbrier area to guide future development and to be included in the City's comprehensive plan. This area serves as one of the largest retail sites in Hampton Roads, and numerous citizens have expressed concerns with crossing Greenbrier Parkway, which is a busy six lane arterial roadway. Currently, an auto-dependent development pattern exists surrounding Greenbrier Mall and along Greenbrier and Volvo Parkways which makes it difficult for pedestrian movement. The overall goal is to create a safe, mixed-used, walkable, and urban environment for automobiles, pedestrians, bicyclists and transit. Most of the focus of this study is on improving pedestrian linkages and connections between existing and proposed developments and transit stops to create a safe and seamless network for pedestrians.

Purpose of Study

The goal of the Greenbrier Area Pedestrian Safety Study is to analyze pedestrian needs and identify improvements to address those needs. This study takes into account existing and future land uses, traffic, transit, and pedestrian conditions. Specific concepts addressed in this study include:

- Providing pedestrian accommodations for the general public, including the disabled community
- Pedestrian connections among hotels, Greenbrier Mall, Shopping Centers, residential areas, and other land uses
- Safe and convenient pedestrian movement across major streets
- Feasibility of grade-separated crossing (pedestrian overpass) versus at-grade crossing across Greenbrier Parkway connecting the Greenbrier Mall Site to the Crossways Center Site
- Connecting existing sidewalks via proposed sidewalks to create a pedestrian friendly network for the Greenbrier study area
- Safe and convenient pedestrian connections to bus/transit stops

- By improving the pedestrian system and connectivity, auto trips made to/from the mall, residential areas, and other activity generators could be reduced slightly

The Virginia Department of Transportation (VDOT) has recently adopted a policy that all highway construction projects be initiated with the presumption that they will accommodate bicycling and walking, effective on March 18, 2004. This initiative signifies the importance of integrating bicycle and pedestrian facilities into the transportation network.

Study Area

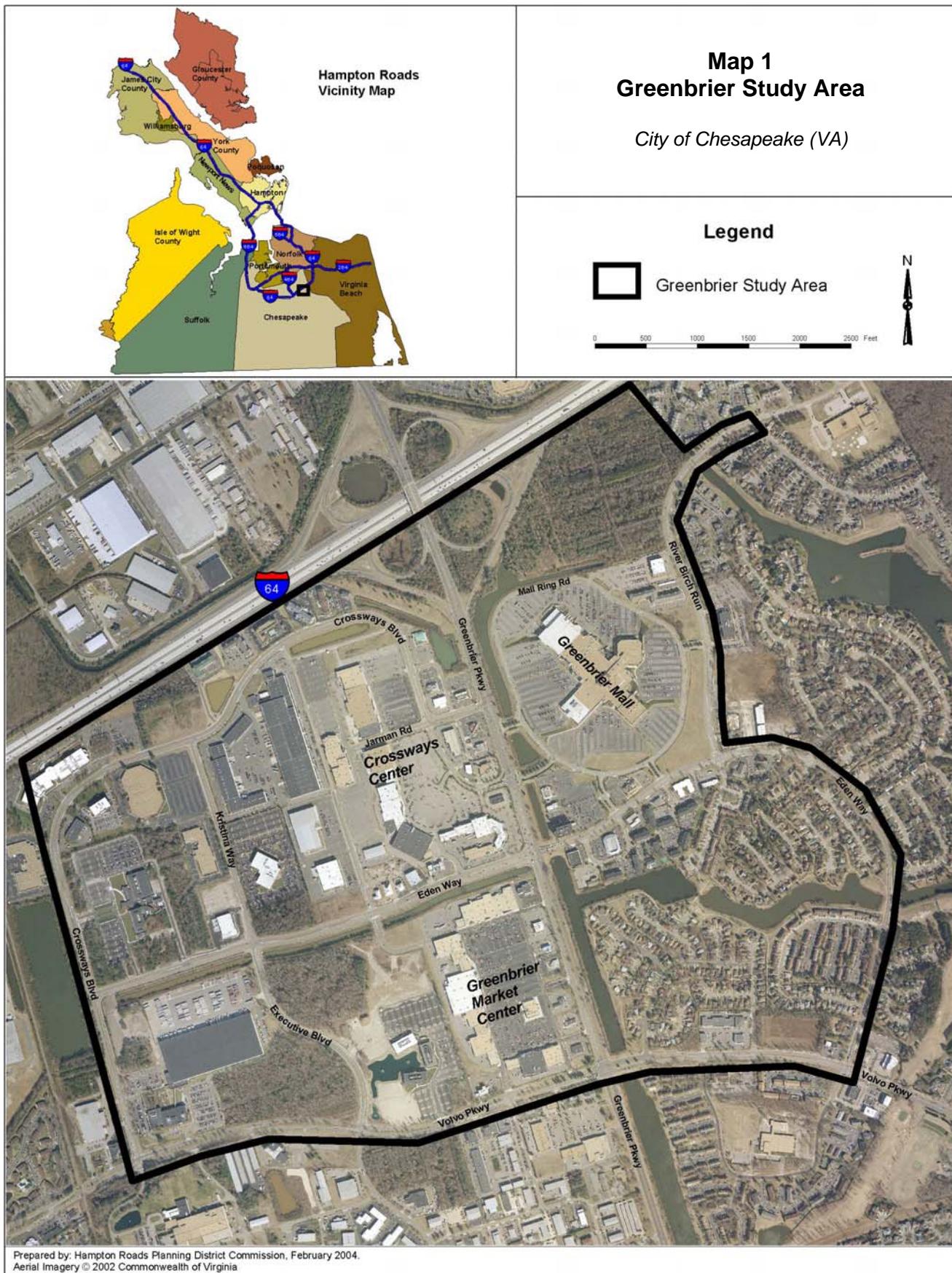
The study area is shown in **Map 1** on page 2. It extends to the north along Interstate 64 and includes the hotels along Crossways Boulevard, to the east along River Birch Run and Eden Way adjacent to medium density residential areas, Volvo Parkway on the south side, and along Crossways Boulevard to the west.



Greenbrier Mall is the primary activity generator in one of the largest retail sites in Hampton Roads.



Citizens have expressed a need for pedestrian facilities along Greenbrier Parkway.



EXISTING CONDITIONS

Roadway Characteristics

The Greenbrier area is one of the highest traveled areas in the City of Chesapeake, particularly during morning and afternoon peak hours. This area contains the mall, large and small retail, office parks, restaurants, hotels, and other businesses that generate large traffic volumes. Roadways included in the study area and their characteristics are provided in the table below.

Roadway Name	Number of Lanes	Divided	Posted Speed Limit (mph)
Greenbrier Parkway	5-6	Yes	45
Volvo Parkway (Crossways Blvd to Greenbrier Pkwy)	4	Yes	45
Volvo Parkway (Greenbrier Pkwy to Eden Way)	4	Yes	35
Eden Way (Crossways Blvd to Greenbrier Pkwy)	4	Yes	45
Eden Way (Greenbrier Pkwy to Bayberry Pl)	4	Yes	35
Eden Way (Bayberry Pl to Volvo Pkwy)	2	No	35
Crossways Boulevard	4	Yes	45
Jarman Road	4	Yes	35
River Birch Run	4	Partial	35
Kristina Way	4	No	35
Executive Boulevard	4	Yes	35

Average Daily Traffic

The following table provides Average Daily Traffic (ADT) counts for primary roadways in the study area.

Roadway Name	Between	ADT 1999	ADT 2002
Greenbrier Parkway	Volvo Pkwy & Eden Way	43,629	42,268
Greenbrier Parkway	Eden Way & I-64	82,280	78,141
Volvo Parkway	Battlefield Blvd & Greenbrier Pkwy	23,835	27,132
Volvo Parkway	Greenbrier Pkwy & Fairway Reach Rd	25,351	21,032
Eden Way	Volvo Pkwy & White Oak Crossing	9,600	N/A
Eden Way	White Oak Crossing & Greenbrier Pkwy	14,970	N/A
Eden Way	Greenbrier Pkwy & Crossways Blvd	8,818	N/A
Crossways Boulevard	Volvo Pkwy & Eden Way	9,823	N/A

N/A – Not Available

Roadway Level of Service

HRPDC staff recently completed a roadway segment level of service analysis¹ of major roadways in the City of Chesapeake. Below are the results for key roadway segments in the study area.

Roadway Name	Between	2002 AM Peak Hour LOS	2002 PM Peak Hour LOS
Greenbrier Parkway	Volvo Pkwy & Eden Way	D	E
Greenbrier Parkway	Eden Way & I-64	F	F
Volvo Parkway	Battlefield Blvd & Greenbrier Pkwy	C	C
Volvo Parkway	Greenbrier Pkwy & Fairway Reach Rd	C	C

¹ Hampton Roads Planning District Commission, "Chesapeake Level of Service Study", June 2003.

Pedestrian Crossing at Intersections

The following list provides the number of lanes pedestrians must cross at major intersections in the study area. The number of lanes varies depending on which side of the roadway is being crossed.

Greenbrier Parkway

@ Crossways Blvd/Mall Entrance	7/9 lanes
@ Eden Way	7/9 lanes
@ Volvo Parkway	6/7 lanes

Volvo Parkway

@ Crossways Boulevard	6/7 lanes
@ Progressive Drive	5/6 lanes
@ Greenbrier Parkway	6/7 lanes
@ Eden Way	5 lanes

Eden Way

@ Greenbrier Parkway	5/7 lanes
@ River Birch Run	5/6 lanes
@ Volvo Parkway	3 lanes

Crossways Boulevard/Main Mall Entrance

@ Greenbrier Parkway	5/6 lanes
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River Birch Run

@ East Mall Entrance	5/6 lanes
@ Eden Way	2/4 lanes

Pedestrian Accident Data

The following table summarizes pedestrian-vehicle accidents from January 1999 through December 2003. Two accidents occurred at the intersection of Greenbrier Parkway and Eden Way, where no crosswalks are available. There were no fatalities.

Roadway Name	Cross Street	Distance from Cross Street (ft)	Date
Eden Way	River Birch Run	0	12/26/99
Eden Way	River Birch Run	0	3/2/00
Eden Way	Greenbrier Parkway	0	8/29/00
Greenbrier Parkway	Eden Way	0	10/29/00
River Birch Run	River Birch Trail	0	5/2/01

Pedestrian Facilities

The existing pedestrian facilities (sidewalks and crosswalks) for the entire study area are provided in **Map 2** on page 6. This map clearly shows where gaps in the pedestrian facility network are present; (1) surrounding Greenbrier Mall, (2) along Greenbrier Parkway, (3) east end of Crossways Boulevard, (4) along portions of Eden Way, (5) along River Birch Run, and (6) along Volvo Parkway.

Transit

There are currently two Hampton Roads Transit (HRT) bus routes serving the Greenbrier Mall area (shown on Map 2):

- Route 15 (Naval Station Norfolk/Robert Hall Blvd.)
Runs from Chesapeake Square Shopping Center and Greenbrier Mall to Military Circle to Naval Station Norfolk.
Offers Weekday and Weekend Service.
- Route 22 (Naval Station/Greenbrier-Indian River Park & Ride Lot)
From Greenbrier Mall Park & Ride Lot and Indian River Park & Ride Lot to Naval Station Norfolk to Hampton Blvd. and Lexan Ave.
Offers Weekday Service Only.

Bus stops are shown on Map 2 for both routes. The bus stop area for Route 22 is also a designated HRT/TRAFFIX Park & Ride Lot, which provides Greenbrier ridesharers with free, all-day parking and is a convenient place to meet a carpool or vanpool. Currently, approximately 30 ridesharers utilize the Park and Ride lot on a monthly basis. TRAFFIX is a regional program for transportation alternatives.

Greenbrier Mall is one of the major transit generators on the Southside. HRT bus ridership for Routes 15 and 22 for each month in 2003 is provided on the following page. Routes 15 and 22 average approximately 350 and 30 passengers per day respectively. For Route 15, which offers weekday and weekend service, ridership is about 40% lower on weekends compared to weekdays.

It is important to note from Map 2 that there are currently no sidewalks/crosswalks around the

Mall that provide a direct connection from the residential and surrounding areas to the bus stops.

2003 HRT Bus Ridership (Chesapeake Only)

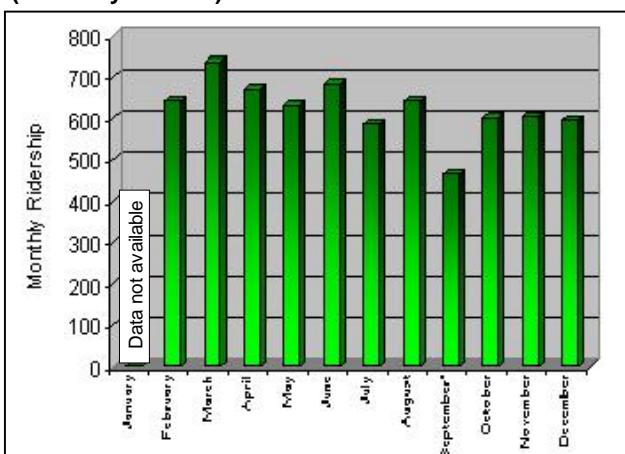
Month	Route 15 Monthly Ridership (7 day service)	Daily Avg.	Route 22 Monthly Ridership (Weekday service)	Daily Avg.
January	6,488	209	N/A	N/A
February	11,013	393	643	32
March	11,982	387	737	35
April	11,781	393	672	31
May	10,124	327	630	30
June	9,906	330	682	32
July	10,364	334	587	27
August	10,971	354	642	31
September*	9,106	304	466	22
October	11,673	377	602	27
November	9,970	332	606	36
December	10,346	334	594	27

*Ridership was lower due to Hurricane Isabel

N/A – Not Available

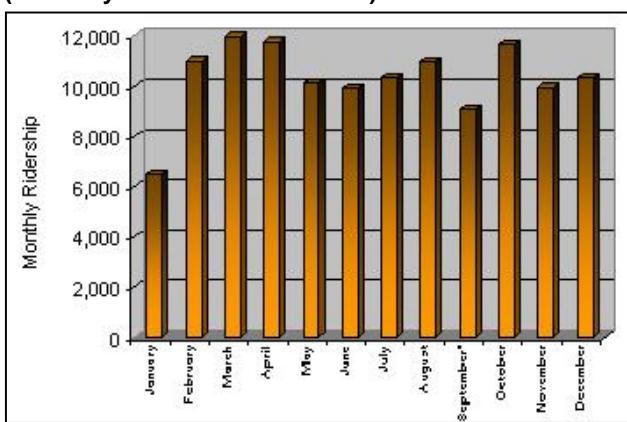
Data Source: Hampton Roads Transit

Route 22 – 2003 Monthly Ridership for Chesapeake (Weekday Service)



Data Source: Hampton Roads Transit

Route 15 – 2003 Monthly Ridership for Chesapeake (Weekday and Weekend Service)



Data Source: Hampton Roads Transit



Pedestrian Activity and Land Use

The primary generator of pedestrian activity in the study area is Greenbrier Mall. Other significant activity centers include the residential areas east of the Mall and Greenbrier Parkway, the concentration of hotels to the north along Crossways Boulevard, and the restaurant and retail areas along Greenbrier Parkway. Children have been seen riding their bicycles along River Birch Run and Greenbrier Parkway due to the absence of sidewalks. The existing land use designations for the Greenbrier study area are shown on **Map 3** on page 6.

Pedestrian counts were taken by the City in late October 2003² for a typical midweek weekday (Tuesday-Thursday) at two key intersections along Greenbrier Parkway for one morning, midday, and afternoon time period: (1) Greenbrier Parkway and Eden Way (2) Greenbrier Parkway and Crossways Boulevard. The results are provided in the following tables.

Greenbrier Parkway and Eden Way

Time	Direction of Travel	Pedestrian Count
7am - 9am	Eastbound across Greenbrier Pkwy from Eden Way (west side)	1
7am - 9am	Westbound across Greenbrier Pkwy from Eden Way (east side)	1
7am - 9am	Southbound across Eden Way from Greenbrier Pkwy (north side)	2
11am - 1pm	Eastbound across Greenbrier Pkwy from Eden Way (west side)	1
11am - 1pm	Westbound across Greenbrier Pkwy from Eden Way (east side)	1
11am - 1pm	Northbound across Eden Way from Greenbrier Pkwy (south side)	1
4pm - 6pm	Eastbound on Eden Way to Southbound along Greenbrier Pkwy	4
4pm - 6pm	Eastbound on Eden Way to Northbound along Greenbrier Pkwy	1
4pm - 6pm	Northbound across Eden Way from Greenbrier Pkwy (south side)	1

2 October 21-23, 2003

Greenbrier Parkway & Crossways Boulevard

Time	Direction of Travel	Pedestrian Count
7am - 9am	Westbound across Greenbrier Pkwy from Mall Entrance	2
11am - 1pm	Eastbound across Greenbrier Pkwy from Crossways Blvd	2
4pm - 6pm	No pedestrian activity	0

It is important to note that pedestrian counts were only taken for one day at these two locations. Currently, these intersections, as well as others in the study area, do not have crosswalks and pedestrian signals, which discourage pedestrian activity. Crosswalks and pedestrian signals increase pedestrian safety by providing higher visibility to motorists and designated crossing times. More pedestrian activity typically occurs when the weather is more seasonable.



Looking across Greenbrier Pkwy from Greenbrier Mall Entrance at Crossways Boulevard, where no crosswalks currently exist.



Looking across Greenbrier Pkwy from east side of Eden Way, where no crosswalks currently exist.



EXISTING PEDESTRIAN FACILITY DEFICIENCIES

Pedestrian facilities, such as sidewalks and crosswalks, are virtually non-existent on the surrounding roadways and driveways at Greenbrier Mall, along River Birch Run, along Greenbrier Parkway, along Volvo Parkway, along some sections of Eden Way, and the eastern portion of Crossways Boulevard (refer to Map 2). A comprehensive pedestrian network does currently exist in the adjacent neighborhood streets and the other study area roadways. The key objective is to provide safe and convenient connections between these existing pedestrian facilities to provide a pedestrian friendly network for the entire Greenbrier area.

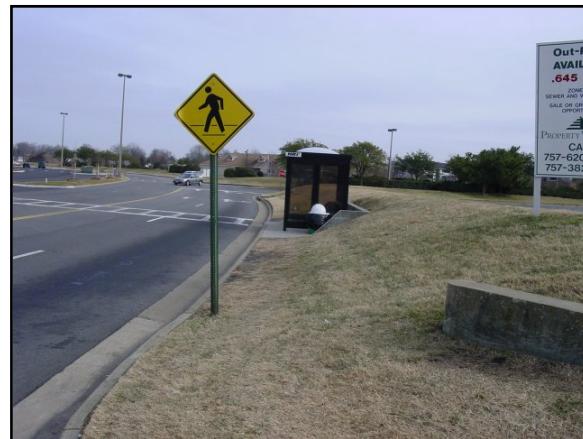
Greenbrier Mall Area

Deficiencies observed at the Greenbrier Mall area include:

- Lack of sidewalks around Mall Ring Road (Circulation roadway)
- No sidewalks leading up to HRT bus stops
- Lack of sidewalks and crosswalks connecting Mall Ring Road and other driveway mall entrances to sidewalks surrounding the mall building
- No curb ramp at the existing crosswalk location across Mall Ring Road (connecting Senior residential area to northeast parking lot at the mall)
- Lack of sidewalks, crosswalks, and median refuges for mall entrances



There is currently available space for sidewalks along Mall Ring Road.



Sidewalks are needed surrounding HRT bus stops.



Greenbrier Mall Main Entrance (looking east). No sidewalks currently exist and shrubbery extends to curb.



Pedestrians currently walk along the edge of the roadway at some Mall entrances, which is extremely unsafe.



Greenbrier Mall Main Entrance (looking west at the same location as the photo above). A path behind the shrubbery has been worn down by pedestrian traffic.



Mall Ring Road location connecting senior residential area to the northeast parking lot at the mall. Needs curb ramp for persons in wheelchairs and sidewalks leading up to the existing crosswalk.



Greenbrier Mall driveway entrances do not have crosswalks or median refuges for pedestrians to safely cross.



Sidewalks do not provide seamless connections around the mall or to driveway mall entrances.



Pedestrian push buttons and crosswalks currently exist for two approaches of the intersection of Eden Way and River Birch Run; however, no pedestrian signals are present to alert pedestrians when it's safe to cross.

Greenbrier Parkway

Deficiencies observed along Greenbrier Parkway include:

- No sidewalks on either side of Greenbrier Parkway from Volvo Parkway to Interstate 64 except for one small section on the western side just south of Eden Way
- Lacks at-grade or grade-separated pedestrian crossing across Greenbrier Parkway from Greenbrier Mall to the Crossways Shopping Center site.
- Lack of crosswalks and pedestrian signal across Greenbrier Parkway at Eden Way and at the Greenbrier Market Shopping Center main entrance
- Lacks crosswalk and pedestrian signal across Greenbrier Parkway for the northern part of the intersection with Volvo Parkway



A worn path along Greenbrier Parkway demonstrates pedestrian activity.



Looking west across Greenbrier Parkway at Eden Way. Sidewalks lead to the intersection on both sides of Eden Way, but no crosswalk or pedestrian signal is provided.



No sidewalks currently exist for a majority of Greenbrier Parkway in the study area.



An observed pedestrian walking along Greenbrier Parkway between Eden Way and Volvo Parkway, where no sidewalks currently exist.



Pedestrians and bicyclists travel along Greenbrier Parkway over Interstate 64 despite the absence of sidewalks and crosswalks, which raises safety concerns.



There are no sidewalks along Volvo Parkway from Greenbrier Parkway to Crossways Boulevard.

Volvo Parkway

Deficiencies observed along Volvo Parkway include:

- No sidewalks on either side of Volvo Parkway from Greenbrier Parkway to Crossways Boulevard (There are also no sidewalks along the north side of Volvo Parkway from Crossways Boulevard to Sams Drive. Sidewalks on the south side of Volvo Parkway begin just west of train tracks about 600 feet west of Crossways Boulevard and continue to Battlefield Boulevard)
- Lack of sidewalk along the north side of Volvo Parkway from Greenbrier Parkway to the mixed use restaurant/business development (about 900 feet to the east)
- Lacks crosswalks at the intersection of Volvo Parkway and Crossways Boulevard
- Lacks crosswalks at the intersection of Volvo Parkway and Executive Boulevard
- Incomplete crosswalks at the intersection of Volvo Parkway and Progressive Drive
- Lacks crosswalks and pedestrian signal across Volvo Parkway at the Greenbrier Parkway intersection



Incomplete sidewalks at the intersection of Volvo Parkway and Progressive Drive

Eden Way

Deficiencies observed along Eden Way include:

- Incomplete sidewalk along east side of Eden Way from Volvo Parkway to approximately 1500 feet north of that location
- Incomplete sidewalk along west side of Eden Way from about 600 feet north of Mill Lake Quarter to about 350 feet past Cypress Place
- Lack of sidewalk along the north side of Eden Way from about 200 feet east of River Birch Run to Greenbrier Parkway
- Lacks crosswalks and pedestrian signal across Eden Way at Greenbrier Parkway

- Lacks crosswalks across Eden Way at the southeast mall entrance driveway
- Lacks crosswalk and pedestrian signal across Eden Way for the eastern part of the intersection with River Birch Run
- No mid-block crosswalks across Eden Way just north of Mill Lake Quarter



Pedestrians must walk on grass when traveling along some sections of Eden Way.



No crosswalk to allow pedestrians to safely change sides to access other portion of sidewalk along Eden Way.

Crossways Boulevard

Deficiencies observed along Crossways Boulevard include:

- No sidewalks on either side of Crossways Boulevard from Greenbrier Parkway to Jarman Road
- Lacks crosswalk across Crossways Boulevard for the western side of the intersection with Greenbrier Parkway
- No mid-block crosswalk across Crossways Boulevard in between Greenbrier Parkway and Jarman Road
- Lack of crosswalks at the intersection of Crossways Boulevard and Jarman Road



A pedestrian's view while attempting to cross Eden Way at the intersection with Greenbrier Parkway

FUTURE CONDITIONS

Traffic Conditions

The findings from the Chesapeake Level of Service Study (June 2003) include 2021 traffic conditions for major roadways in the City. Below are the results for key roadway segments in the study area. Greenbrier Parkway from Volvo Parkway to Eden Way is expected to see increased traffic of about 20,000 vehicles per day by 2021. The other roadway segments are projected to experience minimal increases by 2021.

Roadway Name	Between	2021 Lanes	2021 ADT	2021 AM Peak Hour LOS	2021 PM Peak Hour LOS
Greenbrier Parkway	Volvo Pkwy & Eden Way	6*	60,000	D	E
Greenbrier Parkway	Eden Way & I-64	6	80,000	F	F
Volvo Parkway	Battlefield Blvd & Greenbrier Pkwy	4	28,000	C	C
Volvo Parkway	Greenbrier Pkwy & Fairway Reach Rd	4	25,000	C	C

*This roadway segment is to be widened from 5 to 6 lanes as a part of the Hampton Roads 2021 Plan.

Bus Transit

There are currently two Hampton Roads Transit (HRT) bus routes (Route 15 and 22) serving the Greenbrier Mall area. The 2026 Transit Plan (**Map 4** on page 15) for Chesapeake includes two new circulators (Routes 59A/59B) in the Greenbrier area. These proposed circulators would serve the study area particularly along Greenbrier Parkway to the south and to the Sam's Club area along Battlefield Boulevard. The Future Plan also includes a new bus route (Route 60) connecting the Mall /study area to the Pembroke area in Virginia Beach. As new bus routes are added, pedestrian traffic will increase as well as the need for safe and accessible pedestrian facilities.

Light Rail Transit

HRT has recently completed several corridor analyses as a part of the overall vision for Regional Light Rail in Hampton Roads (**Map 5**). In May 2000, the Chesapeake City Council decided to provide its citizens the opportunity by way of a referendum to determine if their city

should be included in the regional Light Rail Transit system, which passed by a vote of 55% yes and 45% no. HRT's initial objective is to complete the Norfolk corridor and then expand to provide a seamless connection to other areas.

Map 5 – Hampton Roads Regional Light Rail Transit System



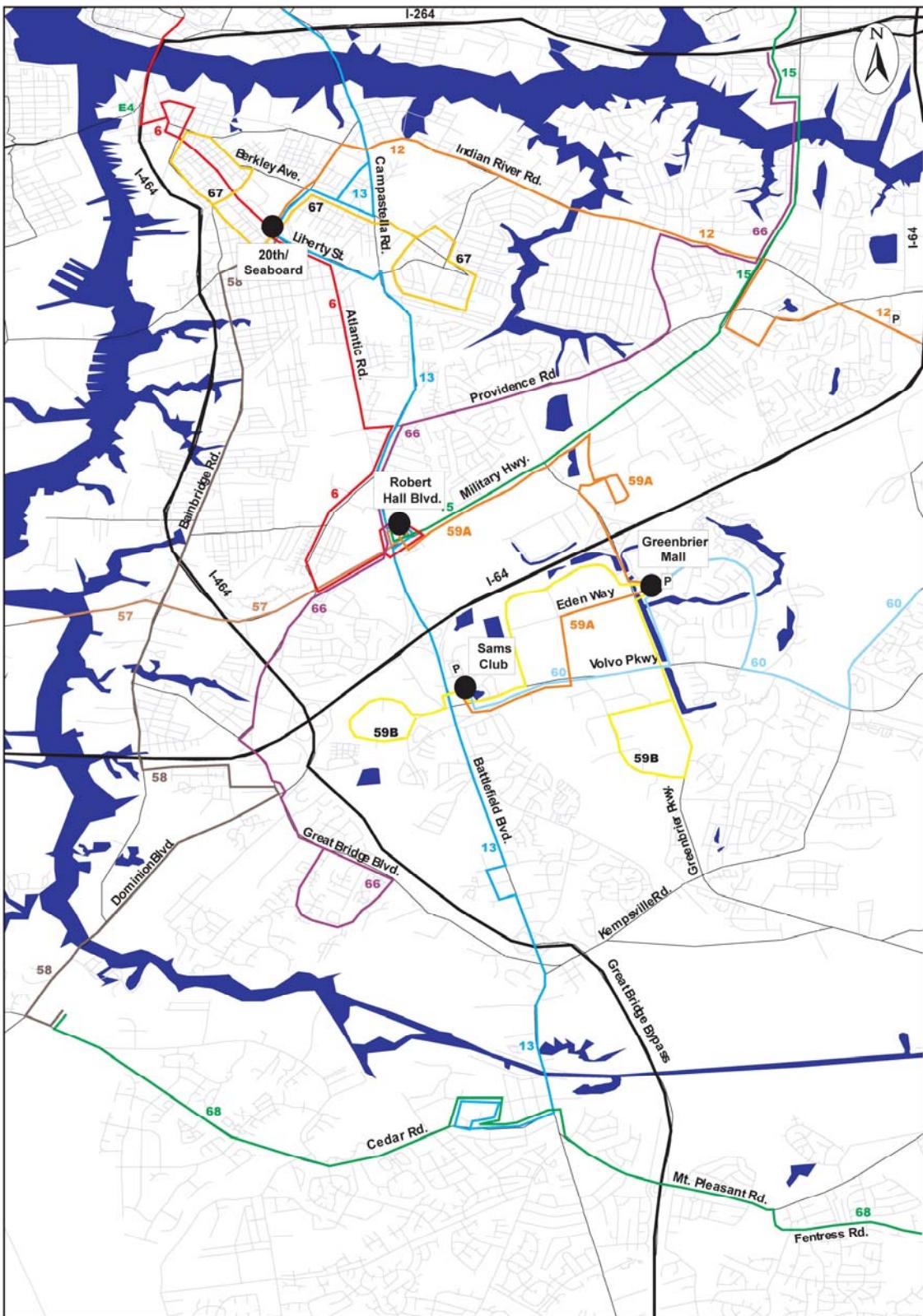
Source: Hampton Roads Transit

The *HRT Chesapeake Corridor Planning Study* has recently been completed and it includes alternative analyses to bring light rail service to the Greenbrier Mall area (**Map 6** on page 16). Based on the analysis presented in the Report, none of the rail alternatives in the study corridor found to pass the fatal flaw analysis. However, future growth in the area may make fixed guideway transit a viable solution in the future. Improving the existing bus system in order to encourage the use of transit was a key recommendation of the Report.

Two key objectives of the Chesapeake alternative is to reduce auto dependency and to contain sprawl by providing a means to focus and support future growth in Chesapeake. In order for the Greenbrier area to be a successful site for light rail service, safe and convenient pedestrian links to and from the surrounding developments will play a critical role.



Map 4 – 2026 Regional Bus Transit Plan (Chesapeake)



A more detailed map of the potential Greenbrier LRT option is provided on page 17 as **Map 7**. A critical issue determined from the *HRT Chesapeake Corridor Planning Study* for the potential LRT transit station at Eden Way and Kristina Way was the need for pedestrian links from the surrounding developments. It was also noted that there was no existing convenient and safe pedestrian link to Greenbrier Mall for the potential LRT transit station at Eden Way and River Birch Run.

Attributes of the potential Greenbrier LRT option are provided below:

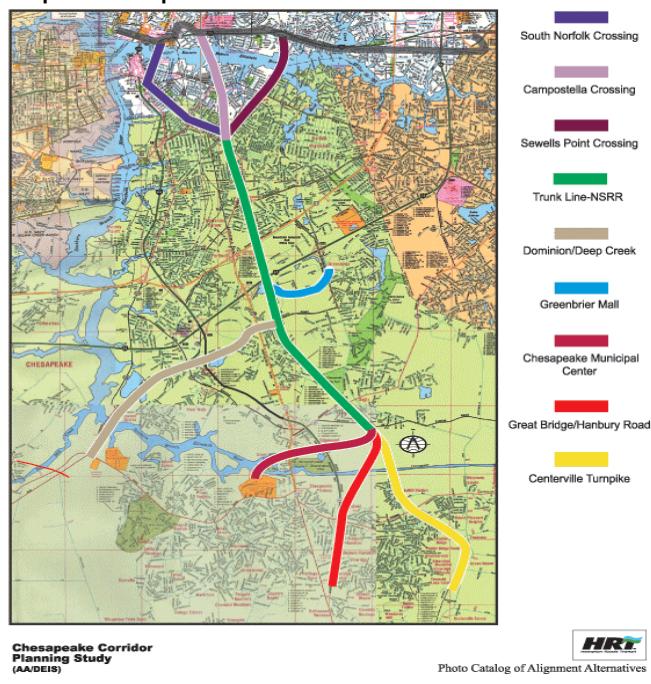
Major features include:

- Provides access to Greenbrier Mall
- Provides access to commercial/office developments along Eden Way

Physical Description:

- This corridor would branch off of the main NSRR trunk line along Eden Way, cross the Greenbrier Parkway, and end in the Greenbrier Mall parking complex
- Shared right-of-way along Eden Way with vehicular traffic
- Will serve commercial area on both sides of Greenbrier Parkway
- Requires new structure over Greenbrier Parkway

Map 6 – Chesapeake LRT Corridor Alternatives



Source: Hampton Roads Transit

Pedestrian Activity and Land Use

The demand for pedestrian activity will rise in the future, particularly if light rail transit is implemented in the area. Greenbrier Mall, Crossways Center, and Greenbrier Market Center will all most likely continue to be the major retail centers for the area in the future. If the Greenbrier Mall LRT option were built, development would certainly increase along the Eden Way corridor from Crossways Boulevard to River Birch Run.

There still remain some parcels of land that could be developed in the future that could generate greater pedestrian activity. These areas include west of River Birch Run next to Interstate 64, along sections of Eden Way and Crossways Boulevard, as well as Executive Boulevard. It should be noted that a new condo development located west of River Birch Run and north of Greenbrier Mall is currently under construction, which will increase pedestrian activity in this area. Plans to incorporate pedestrian facilities into new developments, such as these to and from major activity centers like Greenbrier Mall will help achieve pedestrian connectivity objectives into the future.

Edits are currently being made to the Draft 2026 Land Use Plan – Comprehensive Plan Update by the City of Chesapeake.



Crossing Alternatives for Greenbrier Parkway

The primary purpose of this section is to determine whether current or future conditions require "At-Grade" or "Grade-Separated" pedestrian crossings across Greenbrier Parkway in the Greenbrier Mall area. The standard for the maximum distance a typical pedestrian is willing to walk before choosing to drive is $\frac{1}{4}$ mile or about 5 minutes, and the standard for maximum distance persons using public transportation will travel is approximately $\frac{1}{2}$ mile or a 10-minute walk. Both distances are represented in relation to the Greenbrier Mall on **Map 8**. As shown, Greenbrier Mall is within reasonable walking distance from a number of residential and retail areas. Many citizens have expressed concern crossing Greenbrier Parkway, a busy six lane arterial, from the Mall to businesses in the

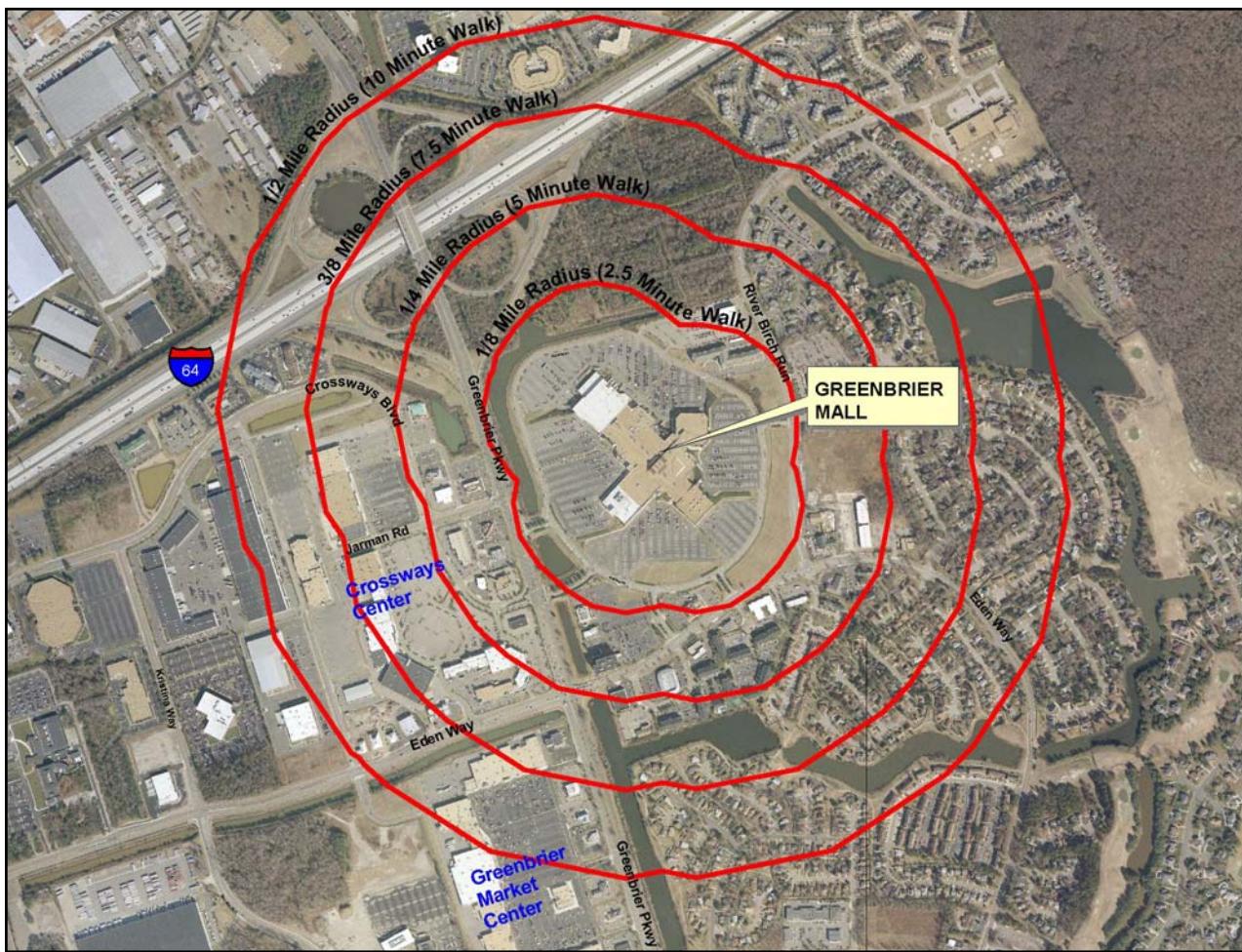
Crossways Center as no safe pedestrian crossing alternative currently exists. This section analyzes different types and styles of crossing alternatives for Greenbrier Parkway in an effort to determine which alternative best suits the needs of the users.

At-Grade Crossings

At-Grade Crossings are most commonly referred to as 'crosswalks' and provide pedestrians and bicyclists a designated location to cross at street level.

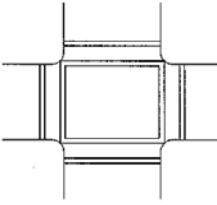
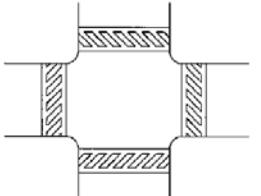
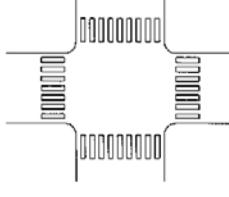
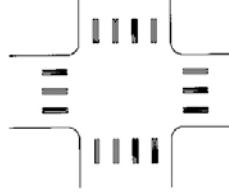
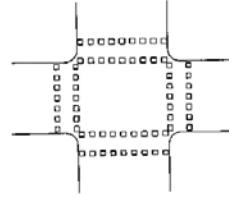
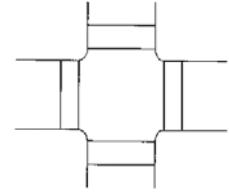
Crosswalks are the most common treatment for pedestrian crossings and are typically marked or painted by lines or varied pavement texture. The marking of crosswalks not only directs the attention of drivers to the crosswalk, but also directs pedestrians to the safest crossing area.

Map 8 – Walking Distances from the Perimeter of Greenbrier Mall



The following table depicts various forms of crossing treatments and the advantages and disadvantages associated with each. The horizontal bars marking pattern is most often observed the Greenbrier area and throughout the City of Chesapeake. Ladder bar marking patterns are more commonly preferred as they are highly visible to drivers. Stamped asphalt

crosswalks (not shown below), which resemble brick pavers, are becoming more popular for localities looking to improve the aesthetics of an area while maintaining a safe and highly visible crossing. The minimum width for a crosswalk is 6 ft., however 10 ft. is recommended according to the Manual of Uniform Traffic Control Devices (MUTCD).

Advantages and Disadvantages of Crosswalk Marking Patterns			
	Marking Pattern	Advantages	Disadvantages
	Horizontal Bars	Common practice at stop controlled intersections, less expensive, easy to install and maintain	Not as visible as some other marking types; bars tend to wear faster than other types; not appropriate for mid-block locations
	Zebra	Highly visible	More maintenance required since wheel friction rubs off diagonal stripes; surface can be slippery
	Ladder Bar	Highly visible	Wider stripes rub off with wheel friction, but can be placed to minimize this effect; surface can be slippery
	Piano	Highly visible and becoming more commonly used; easy to maintain since stripes can be placed outside the wheel friction areas	—
	Dashed (European)	Captures attention because it is not a commonly used pattern	May not define space as well as some of the other choices
	Solid	Visible (but may not be as eye catching as other patterns); not commonly used	Expensive; more difficult to install and maintain; surface can be slippery

Source: Pedestrian Facilities Guidebook, Washington State Department of Transportation

In addition to pavement markings, many other devices are commonly used to mark pedestrian crossings, including lighted signals, signs, and audio signals for the visually impaired. In general, the busier the facility, the more highly visible the crosswalks should be.



An example of ladder bar crosswalks used in Virginia Beach.

Grade-Separated Crossings

Grade-separated Crossings are dedicated overpasses or underpasses that allow pedestrian or bicycle riders to cross a transportation facility without having to interact with vehicular traffic. These types of facilities greatly improve pedestrian safety by removing that interaction.

As listed in Design and Safety of Pedestrian Facilities, A Recommended Practice of the Institute of Transportation Engineers, there are several types of grade-separated facilities. They are as follows:

Overpasses:

1. *Pedestrian Overpasses/Bridges* – These are passage ways for pedestrians constructed over a roadway in which stairs or ramps generally lead up to the overpass. The Americans with Disabilities Act (ADA) requires that stairs should not be the only means to access an overpass or underpass, although they can be used with a ramp. In some cases, however the road is depressed and the bridge is at ground level.
2. *Elevated Walkways* – These refer to sidewalks or walkways above ground level that often run parallel to the flow of

motor vehicles. Such facilities may be freestanding or connected to adjacent buildings.

3. *Skywalks/Skyways* – These typically refer to enclosed walkways built one or more levels above ground level that connect buildings at mid-block. These crossings allow for walking between buildings without being exposed to inclement weather and especially beneficial to elderly and physically disadvantaged pedestrians with lesser mobility.



The pedestrian skywalk on Waterside Drive in Downtown Norfolk has been successful because it connects two concentrated activity centers – Waterside Market Place and a multi-level parking garage.

Underpasses:

1. *Pedestrian Tunnels/Underpasses* – These generally involve stairs or ramps that lead down to a belowground passageway. In some cases, however, the underpass is at ground level and the road is elevated.

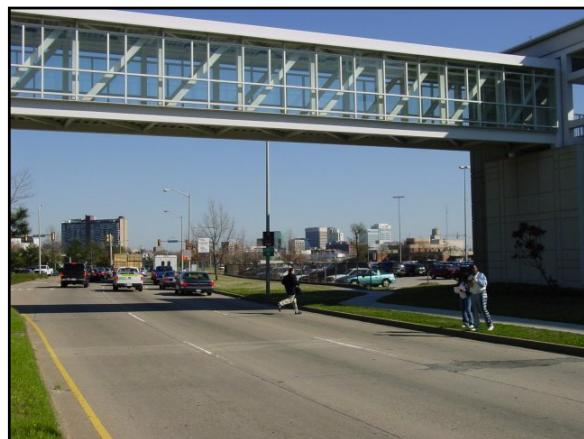
While at-grade crossings tend to be simple in terms of implementation, grade-separated crossings by their very nature are major construction projects with high associated costs. Because of this, localities must assess very carefully whether the use of a grade-separated facility is called for. Locally the Brambleton Avenue pedestrian overpass in Norfolk, VA had a cost of \$920,000 in 1999, not including elevators that would be required by the ADA. Inflated to 2004, the cost for this project would be over \$1.1 million plus the cost of elevators.

According to the Institute of Transportation Engineers, the perceived ease of use or accessibility of a grade-separated facility can greatly influence its success. For example, a study by Moore and Older found that if the travel time for an overpass is the same as at-grade, then 95% of pedestrians are likely to use the overpass. However, once the trip takes 50% longer usage of the overpass drops to nearly 0.



The pedestrian overpass on Brambleton Avenue in Norfolk connects the Hospital with employee parking lots, however, requires pedestrians to use the stairway or elevator.

In 1984, Axler developed specific guidelines for justifying whether a grade-separated facility should be constructed. The table on the following page uses those guidelines in a generalized pass/fail test for the Greenbrier Parkway corridor. Some of these criteria require a specific proposed design or plan. In addition, these guidelines were developed for an urban setting. Research for this study did not reveal guidelines for a more suburban setting like that of the Greenbrier Parkway.



Many pedestrians sprint across Brambleton Avenue rather than climbing the stairs or taking the elevator at the Norfolk hospital pedestrian overpass.

Recommended Crossing Alternative

Based on these guidelines it is not currently feasible to construct a pedestrian overpass on Greenbrier Parkway. It is recommended that high-visibility crosswalks (ladder bar marking pattern), pedestrian signals and signs, and median refuge islands, where feasible, be implemented for Greenbrier Parkway given current conditions. In conjunction with these improvements, sidewalks and curb ramps leading up to Greenbrier Parkway crossing locations must be improved to ensure safe pedestrian movements in the area. Details of these recommendations are provided in the next section of this report entitled "Proposed Improvements."



The proposed site for a pedestrian bridge should be at least 600 feet from the nearest alternative "safe" crossing (see third guideline on following page). Here, a crosswalk near the Norfolk hospital pedestrian bridge is about 320 feet away.

Guidelines Test for a Grade-Separated Crossing Across Greenbrier Parkway

Guidelines	Greenbrier Parkway Pass or Fail
The pedestrian hourly volume should be more than 300 in the four highest continuous hour periods if the vehicle speed is more than 40 mph and the proposed sites are in urban areas and not over or under a freeway. Otherwise, the pedestrian volume should be more than 100 pedestrians in the four highest continuous hour periods.	Fail
Vehicle volume should be more than 10,000 in the same four hour period used for the pedestrian volume warrant or have an ADT greater than 35,000 if vehicle speed is over 40 mph and the proposed sites are in urban areas. If these two conditions are not met, the vehicle volume should be more than 7,500 in the four hours or have an ADT greater than 25,000.	Pass
The proposed site should be at least 600 feet from the nearest alternative "safe" crossing. A "safe" crossing is defined as a location where a traffic control device stops vehicles to create adequate gaps for pedestrians to cross. Another "safe" crossing is an existing overpass or underpass near the proposed facility.	Currently, no "safe" crossing exists at intersections (with crosswalks and pedestrian signals) along Greenbrier Parkway in the Greenbrier Mall area.
A physical barrier is desirable to prohibit at-grade crossing of the roadway as part of the overpass or underpass design plan.	(no proposed design)
Artificial lighting should be provided to reduce the potential crime against users of the underpasses or overpasses. It may be appropriate to light underpasses 24 hours a day and overpasses at nighttime.	(no proposed design)
Topography of the proposed site should be such as to minimize changes in elevation for users of overpasses and underpasses and to help ensure that construction costs are not excessive. Elevation change is a factor that affects the convenience of users.	Fail
A specific need may exist for a grade-separated crossing based on the existing or proposed land uses adjoining the proposed development site that generates pedestrian trips. This land use should have a direct access to the grade-separated facility.	Fail (See explanation below in Future Considerations)
Funding for construction of the pedestrian overpass or underpass must be available prior to a commitment to construct it.	(no plan in place)

Source: Design and Safety of Pedestrian Facilities, A Recommended Practice of the Institute of Transportation Engineers

Future Considerations

Pedestrian overpasses typically are successful where there are two concentrated activity centers that generate significant pedestrian volumes and are located on opposite sides of a roadway. For this study area, Greenbrier Mall serves as one concentrated activity center; however, on the western side of Greenbrier Parkway, land uses are less centralized. As traffic conditions, pedestrian volumes, and land uses change in the future, a pedestrian overpass may become a

feasible solution for crossing Greenbrier Parkway. Meanwhile, at-grade crossings or crosswalks are the recommended alternative in the near future. Prior to any consideration of a pedestrian overpass, gaps in the existing pedestrian facility network need to be filled to create a safe and seamless network for pedestrians.

PROPOSED IMPROVEMENTS

The focus of this study is on improving pedestrian linkages and connections between existing and future developments and transit stops to create a safe and seamless network for pedestrians, particularly around Greenbrier Mall and along Greenbrier Parkway. The overall goal is to create a safe, mixed-used, walkable, and urban environment for automobiles, pedestrians, bicyclists and transit. This section includes general recommendations for sidewalks, signage, curb ramps, crosswalks, refuge islands, stop bars, and pedestrian signals along study area roadways and intersections to achieve these pedestrian safety and connectivity objectives. Sidewalk and crosswalk proposed improvements for the Greenbrier area are provided on **Map 9** on page 31.

Sidewalk Recommendations

A summary of the specific recommendations for sidewalks in the study area is provided below. Refer to Map 9 for specific locations for some improvements. For some recommended sidewalk locations, sidewalks could initially be constructed along one side of the roadway or along certain sections first. Improvement priorities (See page 30) will need to be established until the entire network is complete.

Greenbrier Mall Area

- Construct sidewalks around Mall Ring Road (Circulation roadway). Mall Ring Road as well as other areas surrounding Greenbrier Mall are privately owned. It is important that the City work with private property owners to build partnerships for implementing some pedestrian facilities throughout the area.
- Provide sidewalks leading up to HRT bus stops along Mall Ring Road.
- Construct sidewalks to connect Mall Ring Road and other driveway mall entrances to the existing sidewalks surrounding the mall building.
- Construct sidewalks along mall entrances from River Birch Run, Eden Way, and Greenbrier Parkway.

River Birch Run

- Construct sidewalks on both sides of River Birch Run from Eden Way to the existing sidewalks located in the northeastern residential areas along River Birch Run.

Greenbrier Parkway

- Construct sidewalks on both sides of Greenbrier Parkway from Volvo Parkway to Jarman Road.
- Construct sidewalks along entrances to the Greenbrier Market Shopping Center to provide safe pedestrian access from Greenbrier Parkway. These improvements may also be on private property, which may require a partnership with the City for implementation.
- Construct sidewalks along both sides of Greenbrier Parkway (as well as crosswalks at Interstate 64 entry and exit ramps) from Jarman Road and across Interstate 64 to connect pedestrian facilities north of the interstate highway. Field observations indicate that local citizens currently walk along this section of Greenbrier Parkway and do not always walk in the safest location. Sidewalks and crosswalks will provide pedestrians the safest locations to travel this section of roadway. This improvement is only recommended if pedestrian facilities are improved north of Interstate 64 so that a safe connection can be made. At a minimum, pedestrian facilities should be provided on one side, preferably the east.



Pedestrians currently walk along Greenbrier Parkway over Interstate 64 where no pedestrian facilities are present.



Sidewalks and crosswalks currently exist along both sides of Indian River Road over Interstate 64.



Sidewalks currently exist along Battlefield Boulevard from Wal-Mart Way to the Chesapeake Expressway. Constructing sidewalks along Volvo Parkway will connect the Greenbrier and Battlefield Boulevard areas.

Volvo Parkway

- Construct sidewalks on both sides of Volvo Parkway from Greenbrier Parkway to Crossways Boulevard (Outside of the study area, it is also recommended to construct sidewalks beyond Crossways Boulevard to connect with existing sidewalks starting at Sams Drive on the north side of Volvo Parkway and to the train tracks, about 600 feet west of Crossways Boulevard, on the south side of Volvo Parkway. This will connect pedestrian facilities in the Greenbrier area with those that are already present in the Battlefield Boulevard area).
- Construct a sidewalk along the north side of Volvo Parkway from Greenbrier Parkway to the mixed use restaurant/business development (about 900 feet east of Greenbrier Parkway).

Eden Way

- Complete sidewalk along east side of Eden Way from Volvo Parkway to approximately 1500 feet north of that location.
- Complete sidewalk along west side of Eden Way from about 600 feet north of Mill Lake Quarter to about 350 feet past Cypress Place.
- Complete sidewalk along the north side of Eden Way from about 200 feet east of River Birch Run to Greenbrier Parkway.

Crossways Boulevard

- Construct sidewalks on both sides of Crossways Boulevard from Greenbrier Parkway to Jarman Road.

Intersection Recommendations

A summary of the specific recommendations for intersections in the study area is provided below. Much of the focus of this study is centered on pedestrian travel across and along Greenbrier Parkway; as a result, detailed intersection drawings of the proposed improvements at the intersections along Greenbrier Parkway are provided in **Maps 10 – 14** on pages 32 – 36. It is important to note that some intersections will need to be retimed in order to give pedestrians adequate time to cross the roadway, which may alter green time for vehicular traffic.

Greenbrier Parkway @ Jarman Road (See Map 10 on page 32)

- Install high-visibility (ladder bar marking) crosswalks across Greenbrier Parkway and Jarman Road. Relocate stop bars as needed.
- Provide refuge islands across medians.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.



An example of a high-visibility (ladder bar marking) crosswalk used in Virginia Beach.

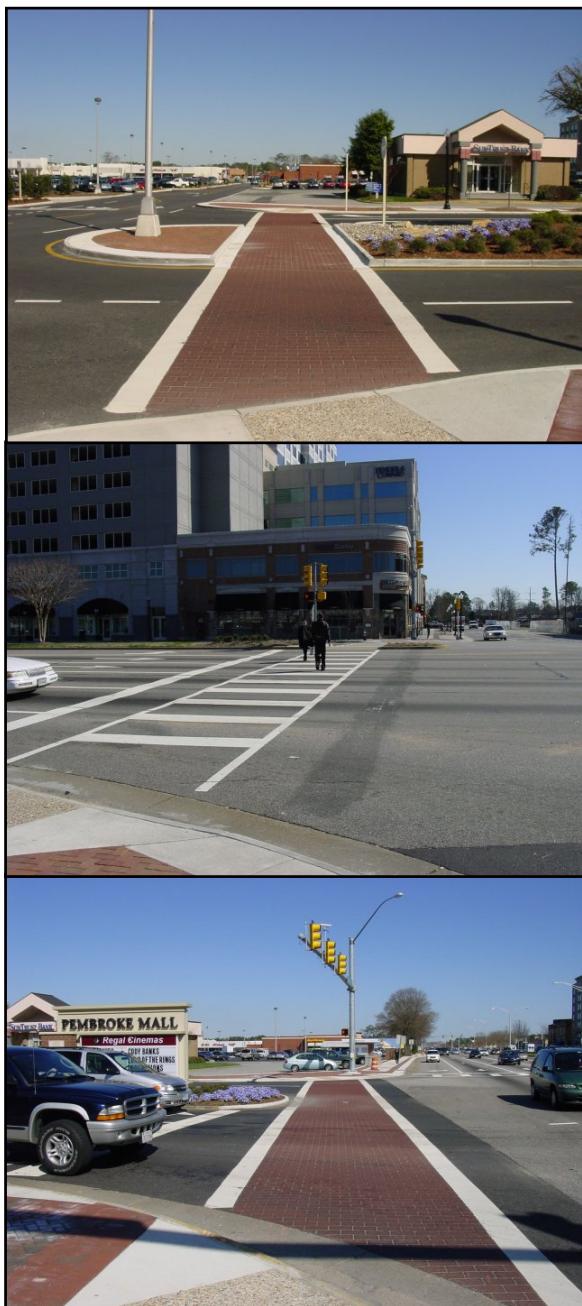
Greenbrier Parkway @ Crossways Boulevard/Greenbrier Mall Main Entrance (See Map 11 on page 33)

- Install high-visibility (stamped asphalt) crosswalks on all four approaches and the exclusive right-turn lane. Stamped asphalt crosswalks will improve aesthetics in the Greenbrier Mall area. Relocate stop bars as needed.

- Provide refuge islands across medians and remove shrubbery as necessary.
- Retime signal phasing to provide adequate time for pedestrians to cross the roadway.
- Install pedestrian signals and accessible pedestrian signal push buttons for all approaches.
- Install overhead pedestrian warning signs.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.



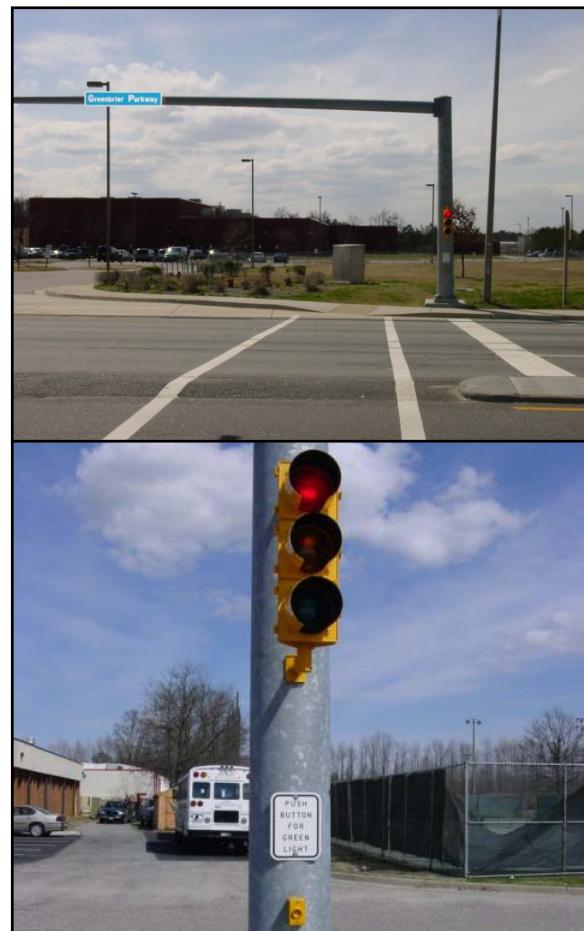
The intersection of Kempsville Road and Providence Road in Virginia Beach contains many characteristics recommended for the Greenbrier Parkway and Crossways Boulevard/Mall Main Entrance intersection, such as stamped asphalt crosswalks, pedestrian signals, and overhead signs.



The revitalization effort in the Pembroke Mall area in Virginia Beach incorporates stamped asphalt and ladder bar crosswalks, pedestrian signals, median refuge islands, and streetscape improvements. These features add character to the area and improve pedestrian safety.

Greenbrier Parkway @ Eden Way (See Map 12 page 34)

- Install high-visibility (ladder bar marking) crosswalks on all four approaches and the exclusive right-turn lane. Relocate stop bars as needed.
- Retime signal phasing to provide adequate time for pedestrians to cross the roadway.
- Install pedestrian signals and accessible pedestrian signal push buttons for all approaches.
- Install overhead pedestrian warning signs.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.
- Provide a refuge island in the right-turn triangle for pedestrians crossing the northern end of Greenbrier Parkway.



An example of pedestrian signals used in Chesapeake (shown here is the intersection of Greenbrier Parkway and Greenbrier Middle School).

Greenbrier Parkway @ Greenbrier Market Square Main Entrance (See Map 13 on page 35)

- Install high-visibility (ladder bar marking) crosswalks on all three approaches. Relocate stop bars as needed.
- Provide refuge islands across medians.
- Retime signal phasing to provide adequate time for pedestrians to cross the roadway.
- Install pedestrian signals and accessible pedestrian signal push buttons for all approaches.
- Install overhead pedestrian warning signs.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.



An example of a median refuge island at the intersection of Greenbrier Parkway and Volvo Parkway. Refuge islands allow pedestrians to cross one direction of traffic at a time. They also allow bicyclists to travel safely across the median.



An example of a pedestrian signal used in Charlottesville, Virginia. The hand signifies "stop" and the walking man figure signifies that it is "ok to cross". This type of pedestrian signal is most commonly used.

Greenbrier Parkway @ Volvo Parkway (See Map 14 on page 36)

- Install high-visibility (ladder bar marking) crosswalks on all four approaches. The crosswalk at the southern end of the intersection across Greenbrier Parkway is currently marked with horizontal bars; to maintain consistency and to increase visibility it is recommended to restripe this crosswalk with the ladder bar marking pattern. Also, relocate stop bars as needed.
- Provide refuge islands across medians.



Horizontal bar crosswalks with pedestrian push buttons are currently used at the intersection of Greenbrier Parkway/Butts Station Road and Kempsville Road in Chesapeake. No pedestrian signals are used, however.



Horizontal bar crosswalks and pedestrian signals with push buttons are currently used at the intersection of Kempsville Road and Battlefield Boulevard in Chesapeake.



An excellent example of a mid-block crosswalk treatment (located across Waterside Drive in Downtown Norfolk). Features include a high-visibility crosswalk, clear instructions on push button locations, and pedestrian signs and signals.

Crossways Boulevard @ Jarman Road

- Install high-visibility (ladder bar marking) crosswalks on all four approaches and for the exclusive right-turn lane. Relocate stop bars as needed.
- Provide refuge islands across medians.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.

Eden Way @ River Birch Run

- Remove existing horizontal bar markings for the eastbound and northbound approaches and install high-visibility (ladder bar marking) crosswalks on all four approaches. Relocate stop bars as needed.
- Retime signal phasing to provide adequate time for pedestrians to cross the roadway.
- Install pedestrian signals and accessible pedestrian signal push buttons for all approaches.
- Install overhead pedestrian warning signs.
- Provide refuge islands across medians as necessary.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.



Crosswalks currently exist on all four approaches of the Battlefield Boulevard @ Volvo Parkway Intersection.

Volvo Parkway @ Crossways Boulevard

- Install high-visibility (ladder bar marking) crosswalks on all four approaches. Relocate stop bars as needed.
- Provide refuge islands across Volvo Parkway median.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.

Volvo Parkway @ Executive Boulevard

- Install high-visibility (ladder bar marking) crosswalks on all four approaches. Relocate stop bars as needed.
- Provide refuge islands across Volvo Parkway median.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.

Volvo Parkway @ Progressive Drive

- Remove existing horizontal bar markings for the westbound and northbound approaches and install high-visibility (ladder bar marking) crosswalks on all four approaches. Relocate stop bars as needed.



Push buttons for pedestrian crossing currently exist for two approaches of the intersection of Volvo Parkway and Progressive Drive.

- Retime signal phasing to provide adequate time for pedestrians to cross the roadway.
- Install pedestrian signals and accessible pedestrian signal push buttons for all approaches.
- Install overhead pedestrian warning signs.
- Provide curb ramps, where they currently do not exist, to align with crosswalks.

Other Recommendations

- Install curb ramp at the existing crosswalk location across Mall Ring Road (connecting Senior residential area to northeast parking lot at the mall).
- Install high-visibility (ladder bar marking) crosswalks and refuge islands across medians, when possible, for all mall entrances. See Map 9 for specific locations.
- Install high-visibility (ladder bar marking) crosswalks across Eden Way at the southeast mall entrance driveway.
- Install high-visibility (ladder bar marking) crosswalks across River Birch Run at the east mall entrance driveway.
- Install two mid-block high-visibility (ladder bar marking) crosswalks across Eden Way just north of Mill Lake Quarter. See Map 9 for specific locations.
- Install mid-block high-visibility (ladder bar marking) crosswalk across Crossways Boulevard in between Greenbrier Parkway and Jarman Road.
- Consider making streetscape improvements, such as trees, flowers, and ornamental shrubs in new sidewalk locations to promote pedestrian friendly conditions.
- Consider adding signs to direct pedestrians to desired crossings.
- Consider improving lighting along pedestrian facilities to improve safety and to maintain the urban character of the area.



As a result of high traffic volumes at the intersection of Battlefield Boulevard and Volvo Parkway, some crosswalks are no longer visible.

- Continue to maintain/replace worn out crosswalk pavement markings to ensure maximum visibility and safety for pedestrians.

Improvement Priorities

The City of Chesapeake is encouraged to prioritize the proposed pedestrian facility improvements for the Greenbrier area if funding is not immediately available for all improvements. Some criteria for determining priority include: current and future pedestrian activity and demand, accident history, safety issues, and cost effectiveness. **Map 15** on page 37 provides a generalized approach for prioritizing the proposed improvements. In this illustration, areas are grouped and identified as "high", "medium", and "low" priority with the focus on improving pedestrian facilities around Greenbrier Mall and along Greenbrier Parkway first, then along River Birch Run, Crossways Boulevard, and Volvo Parkway (Executive Boulevard to Greenbrier Parkway), and then finally along other sections of Mall Ring Road, Eden Way, Greenbrier Parkway, and Volvo Parkway.

Estimated Costs

For the purpose of this study, estimated costs have been developed for proposed sidewalks, crosswalks (ladder bar), pedestrian signals, pedestrian warning signs, and retiming existing signals and grouped according to the "high", "medium", and "low" priority levels previously outlined. These cost estimates are based on planning level estimates provided by the VDOT – Hampton Roads District Office. The cost

estimates provided in the following table do not include costs related to right-of-way acquisition, tree or shrub removal, median refuge islands, stamped asphalt crosswalks, curb ramps, removing existing crosswalks, or relocating existing stop bars. Field inspections at each of the proposed sidewalk sites and intersections will need to be made to determine what additional costs will be required.

High Priority Level

	Distance (ft)	Cost per unit	Total
Sidewalks	15,960	@ \$12.69 per linear ft	\$202,500
Crosswalks	3,960	@ \$5.00 per linear ft	\$19,800
	Units	Cost per unit	Total
Pedestrian Signals	5	@ \$25,000 per signalized intersection	\$125,000
Pedestrian Warning Signs	15	@ \$200 each (includes installation)	\$3,000
Retime Signals	5	@ \$50,000 per signalized intersection	\$250,000
		Total	\$600,300

Medium Priority Level

	Distance (ft)	Cost per unit	Total
Sidewalks	9,180	@ \$12.69 per linear ft	\$116,500
Crosswalks	1,625	@ \$5.00 per linear ft	\$8,125
	Units	Cost per unit	Total
Pedestrian Signals	1	@ \$25,000 per signalized intersection	\$25,000
Pedestrian Warning Signs	2	@ \$200 each (includes installation)	\$400
Retime Signals	1	@ \$50,000 per signalized intersection	\$50,000
		Total	\$200,025

Low Priority Level

	Distance (ft)	Cost per unit	Total
Sidewalks	14,600	@ \$12.69 per linear ft	\$185,300
Crosswalks	675	@ \$5.00 per linear ft	\$3,375
	Units	Cost per unit	Total
		Total	\$188,675

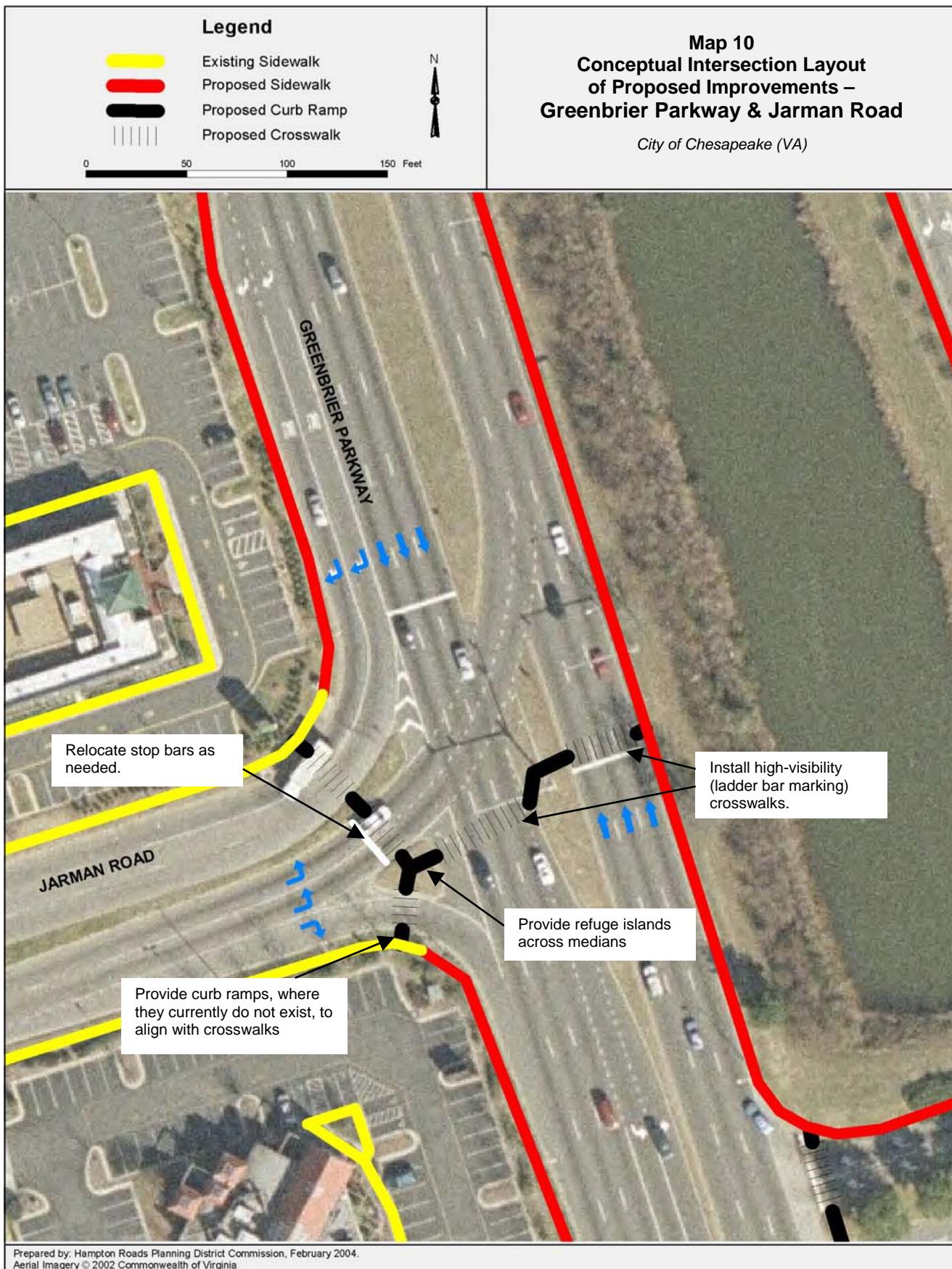
Cost Estimate Source: VDOT
Hampton Roads District

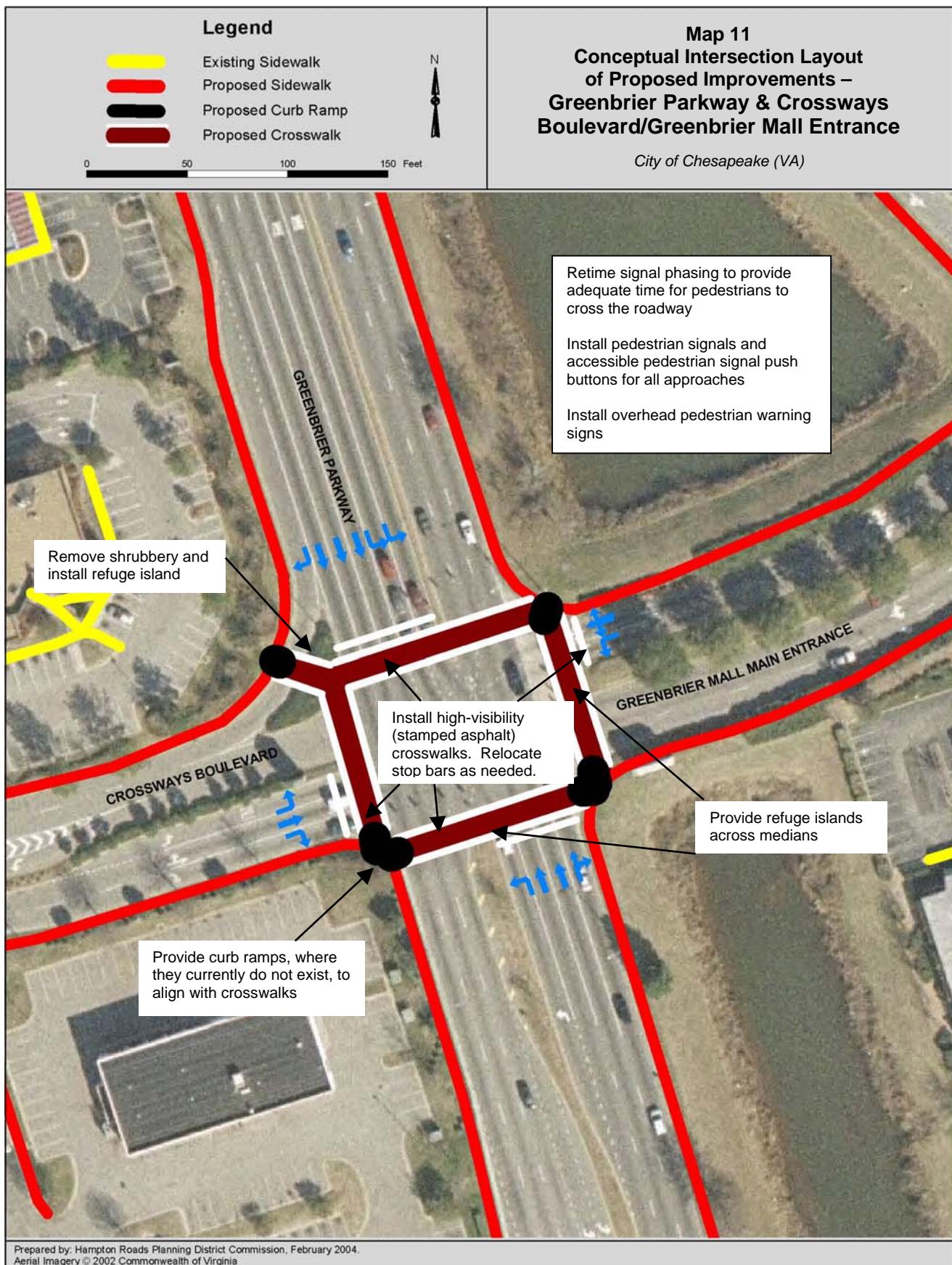
TOTAL ~ \$989,000

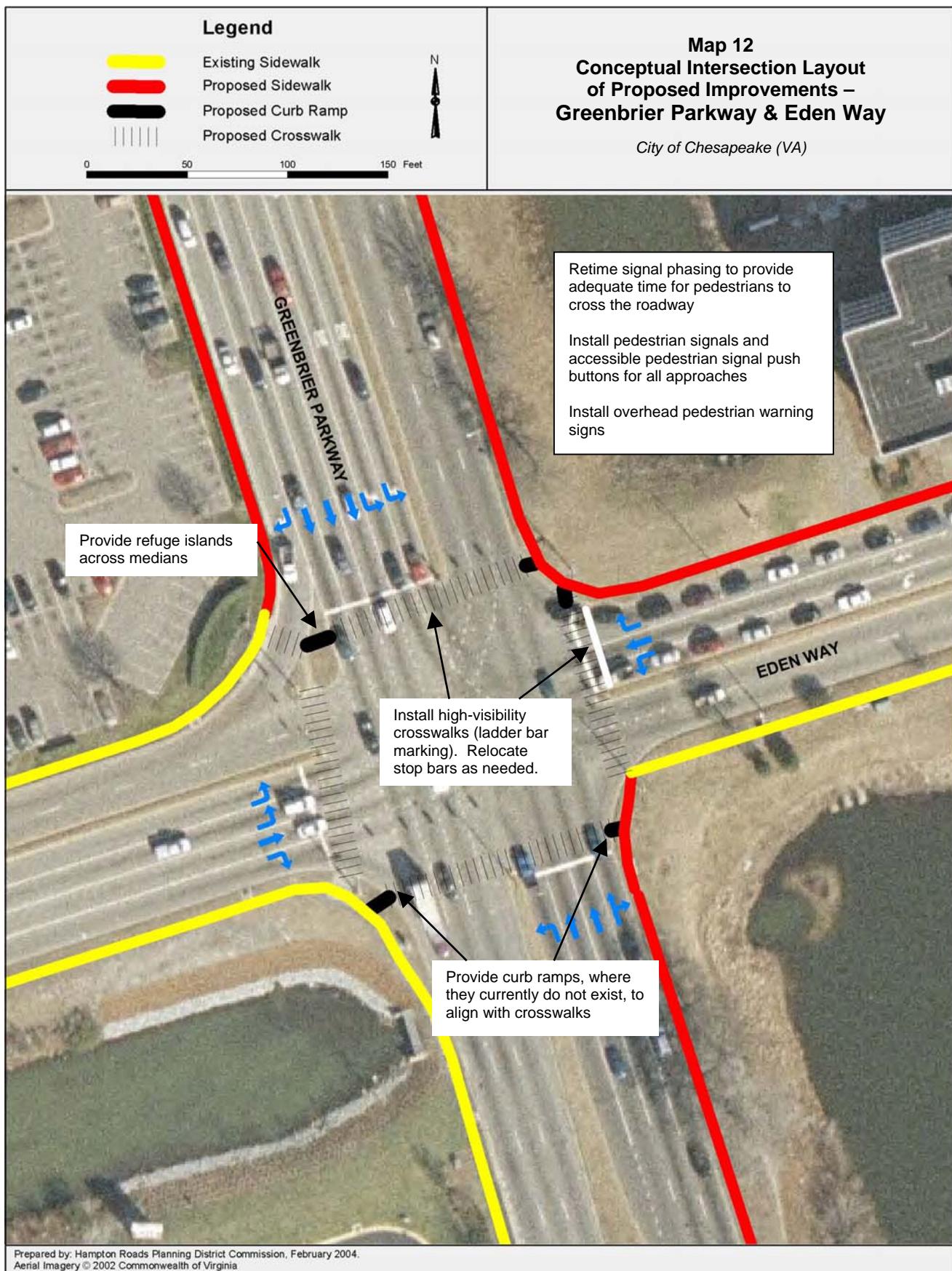
Listed below are additional cost estimates from VDOT for other related improvements that may be necessary. These items need to be evaluated on a case-by-case basis:

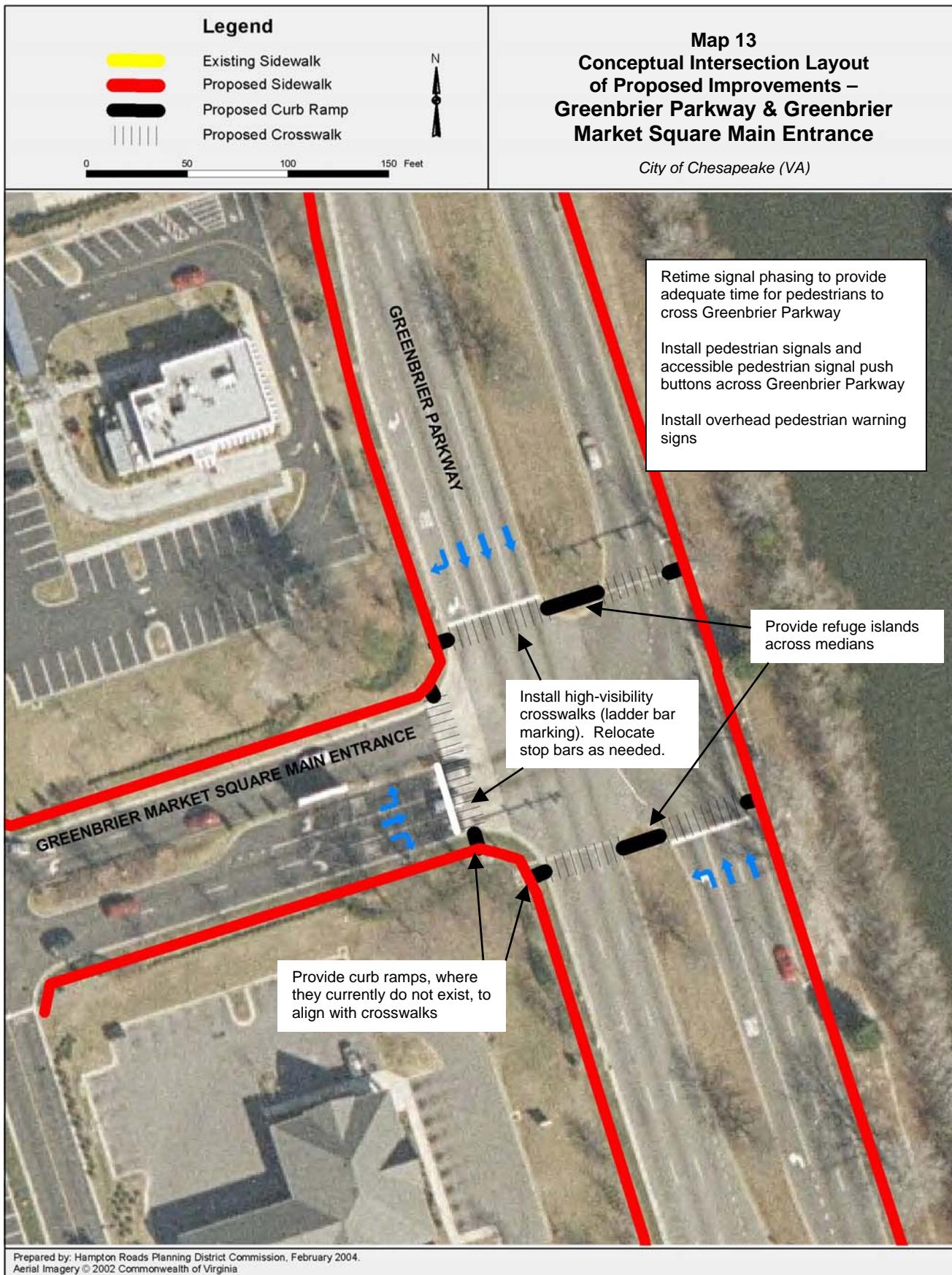
- Stamped asphalt (\$200 per ton)
- Adding a new curb ramp (\$3,000)
- Median refuge islands (\$65 per square yard)
- Removing stop bars (\$2.50 per linear foot)
- Removing existing crosswalks (\$2.50 per linear foot)

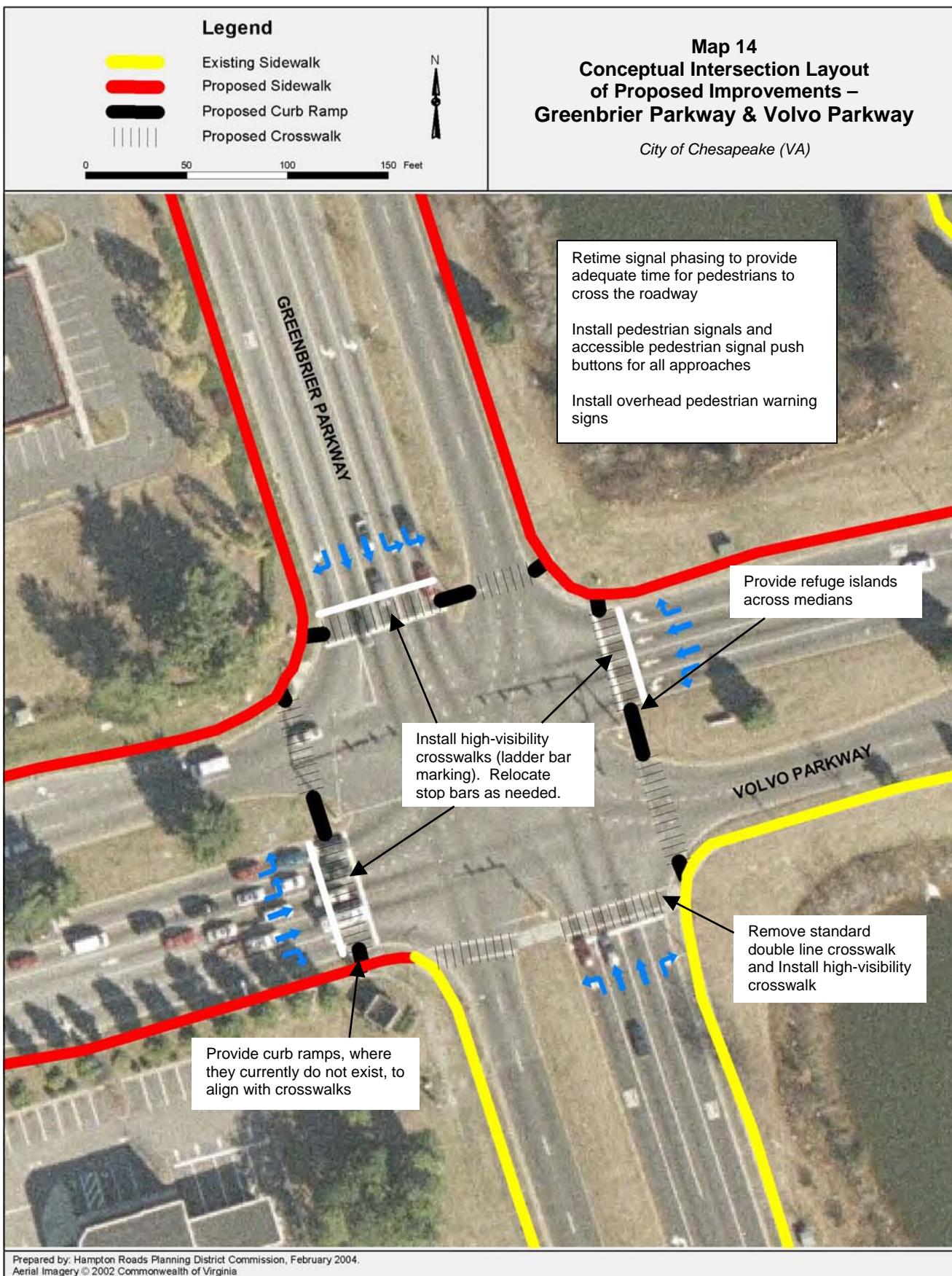


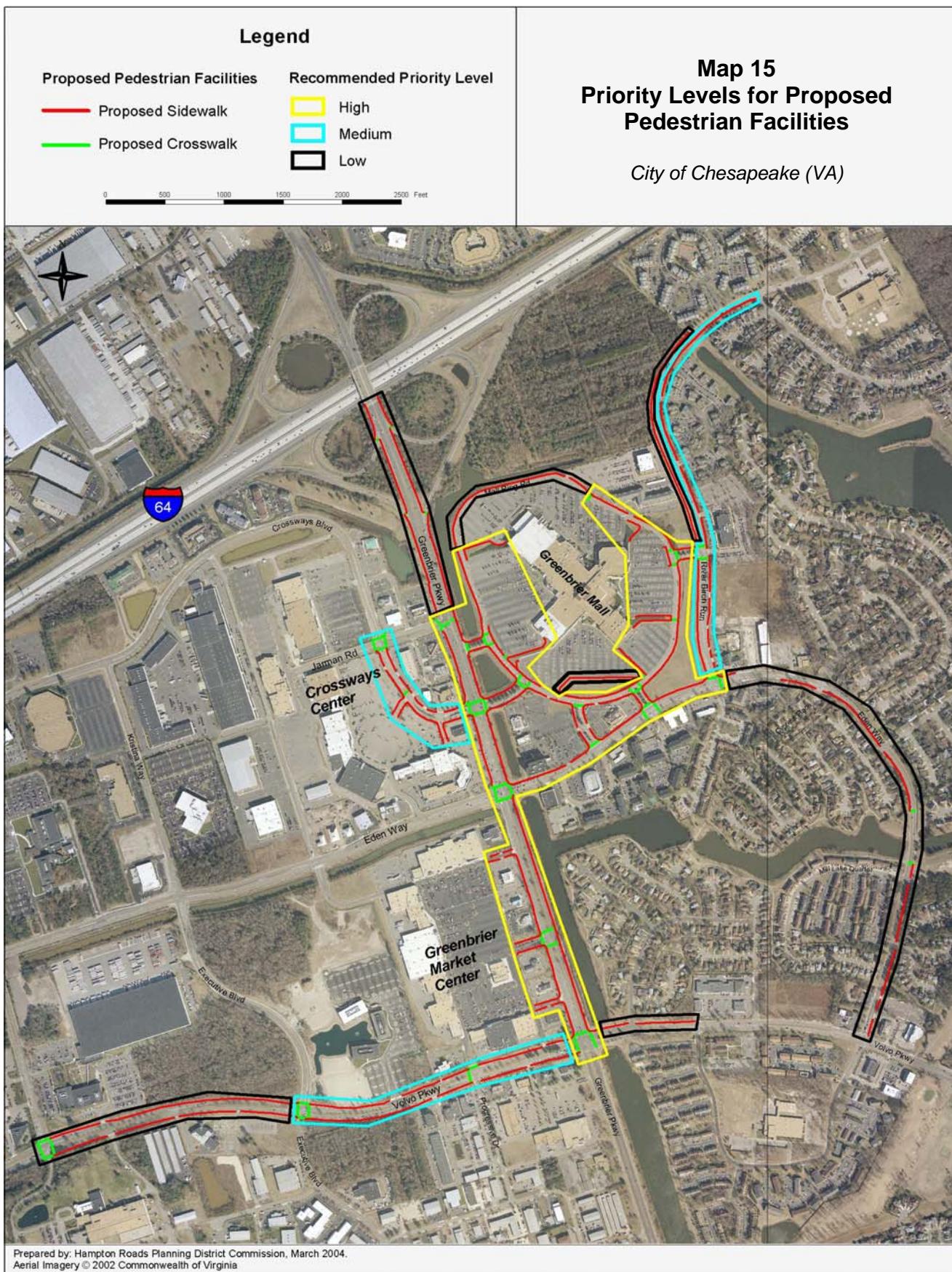












CONCLUSIONS

The overall objective of the Greenbrier Area Pedestrian Safety Study is to improve pedestrian linkages and connections between existing and proposed developments and transit stops to create a safe and seamless network for pedestrians. This study analyzes pedestrian needs and identifies improvements to address those needs. The recommendations of this study take into account existing and future land uses, traffic, transit, and pedestrian conditions.

The Virginia Department of Transportation (VDOT) has recently adopted a policy that all highway construction projects be initiated with the presumption that they will accommodate bicycling and walking, effective on March 18, 2004. This initiative signifies the importance of integrating bicycle and pedestrian facilities into the transportation network. This policy states that appropriate bicycle and pedestrian accommodations provide the public, including the disabled community, with access to the transportation network; connectivity with other modes of transportation; and independent mobility regardless of age, physical constraints, or income. It also emphasizes that effective bicycle and pedestrian accommodations enhance the quality of life and health, strengthen communities, increase safety for all highway users, reduce congestion, and can benefit the environment.

It is important to note that some of the proposed improvements are located on private property. It is absolutely essential that the City of Chesapeake work to build partnerships with existing and future private property owners to provide pedestrian connections between private and public facilities to create a seamless network. Implementation of the proposed improvements will create a safe, mixed-used, walkable, and urban environment for automobiles, pedestrians, bicyclists and transit for the entire Greenbrier area.