GLOUCESTER COUNTY URBAN DEVELOPMENT AREAS MULTIMODAL TRANSPORTATION STUDY

Prepared for Gloucester County

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ACKNOWLEDGEMENTS

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ABOUT GAP-TA

The Growth and Accessibility Planning Technical Assistance Program (GAP-TA) is run by the Virginia Office of Intermodal Planning and Investment (OIPI). The program seeks to align infrastructure development with designated Urban Development Areas (UDAs) or growth areas to improve efficiency and effectiveness. Visit vtrans.org/about/GAP-TA for information about the Growth and Accessibility Planning Technical Assistance program.

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ACRONYMS/ABBREVIATIONS

CTB	Commonwealth Transportation Board
DRPT	Virginia Department of Rail and Public Transportation
EEA	Equity Emphasis Area
GAP-TA	Growth and Accessibility Planning Technical Assistance Program
GIS	Geographic Information Systems
FHWA	Federal Highway Administration
OIPI	Office of Intermodal Planning and Investment
ROW	Right-of-way
UDA	Urban Development Area
VDOT	Virginia Department of Transportation
VTrans	Virginia's statewide transportation plan

INTRODUCTION

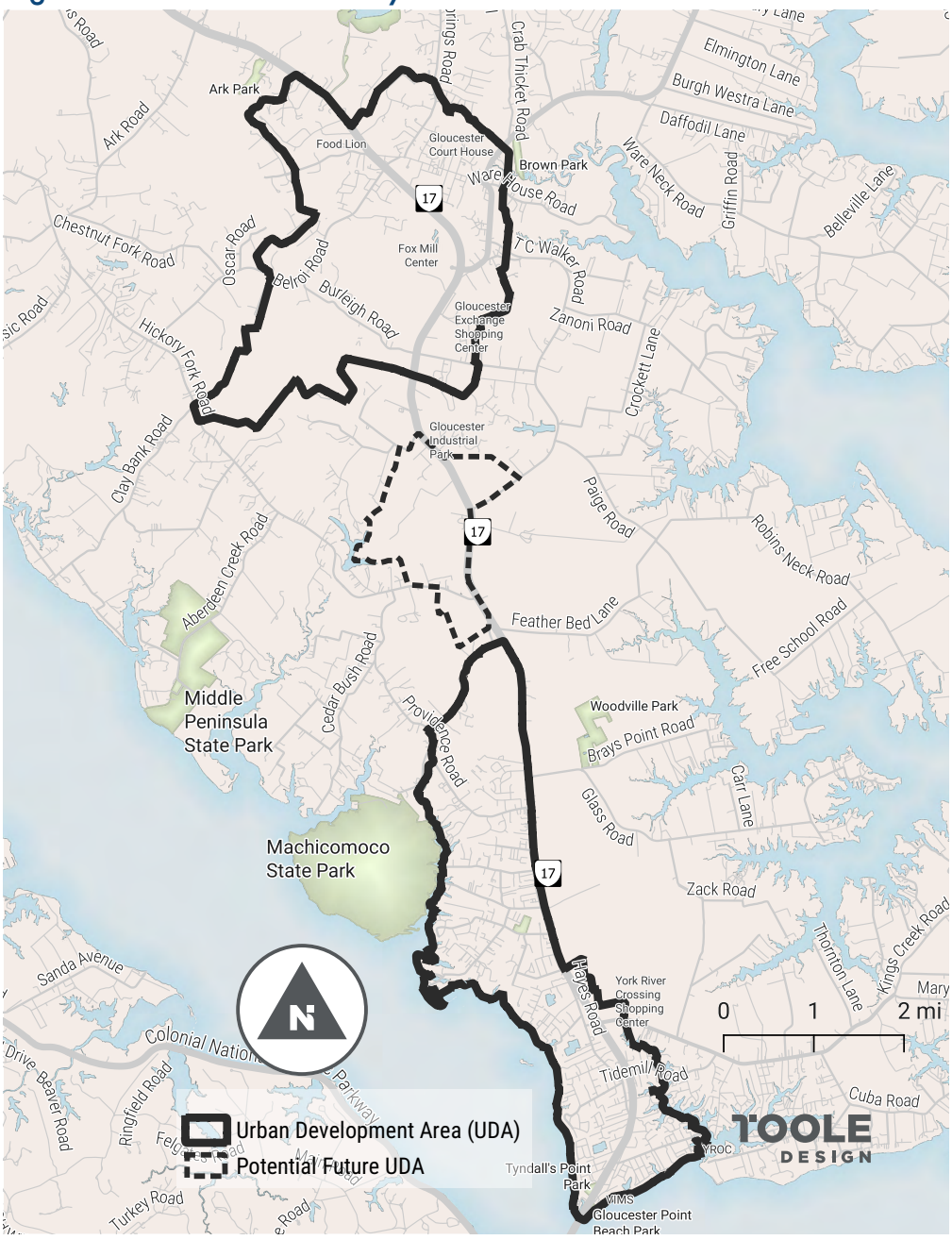
The Virginia Office of Intermodal Planning and Investment (OIPI) funds technical assistance for localities to support planning in Urban Development Areas (UDAs). Under Virginia's state code, UDAs are designated growth areas in a locality's comprehensive plan that provide for walkable places, a mixture of uses, and travel choices. Gloucester County has two existing UDAs at Gloucester Courthouse and Gloucester Point/Hayes and a potential future UDA along Route 17 (Figure 1). The goal of OIPI's technical assistance program is to support better coordination between future land use planning and transportation planning for targeted growth areas in Virginia.

The purpose of this project was to help explore and prioritize opportunities to improve walkability, bicycle access, and transit access within and between the UDAs in Gloucester County. A safe, welcoming, and connected transportation network that serves people using a variety of travel modes has the power to help Gloucester County meet many of its broader community goals: compact development patterns, walkable centers in the designated Urban Development Areas, and healthy, active lifestyles for residents. The effort supports two specific objectives in the County Comprehensive Plan: "Create and adopt a plan for safe active transportation within the County" and "Determine improvements and infrastructure needed to implement the active transportation plan in phases."

This report summarizes the 12-month planning process undertaken by the County and the technical assistance consultants from Toole Design Group. The County is developing a Comprehensive Transportation Plan concurrently, so findings from this effort may inform that process.

The OIPI technical assistance program is built around a performance-based planning process. For this reason, the work presented in this report was developed using data-driven analysis, research, industry best practices, and transparent public engagement methods. Ideas and recommendations presented in this report are not automatically eligible for VTrans Funding (that is a separate process). The purpose of this work is to support County staff, stakeholders, and local leaders in prioritizing projects for further study, grant applications, and engineering evaluation.

Figure 1: Gloucester County UDAs



There are already a lot of people walking and biking in Gloucester County. This includes people making both transportation and recreational trips, such as walking their dog or riding a bike for fitness or fun on roads and trails. As more pockets of compact development are built over time, the demand for safe, comfortable places to walk and bike will continue to increase. Research shows that walkable communities perform better economically over the long term, meaning they are more resilient through economic cycles and they generate and retain more value over time.[1]

To enable more people to feel comfortable walking and biking in Gloucester, it is imperative that roadways and facilities are **designed for people of all ages and abilities**. For example, while a paved shoulder or a striped bike lane on a road with fast or heavy traffic might be an appealing place to ride for a highly confident cyclist, research shows that the majority of people would only feel comfortable biking on slow/quiet streets, trails, or facilities that provide physical separation from traffic (see Figure 2). The same idea holds true for people walking: the higher the speed and volume of traffic, the more important it is to have a buffer between the sidewalk and the travel lanes. Sidewalks and bicycle facilities that do not adhere to these design principles do not tend to be widely used and are unlikely to lead to a meaningful increase in the number of people walking and biking.

This report focuses on a target audience of "All Ages and Abilities," including older adults, families with children, kids walking and biking to school, people with disabilities, lower-income people who depend on affordable transportation options, and people using all types of wheeled devices (e.g., scooters, e-bikes, wheelchairs, skateboards, etc.).

1 George Washington University School of Business and Smart Growth America, Foot Traffic Ahead (2019), https://cpb-us-e1.wpmucdn.com/blogs.gwu.edu/dist/a/326/files/2019/06/FTA19.pdf

Figure 2: Design User Profiles

PEOPLE BIKING[2]

Interested but Concerned

51%–56% of the total population

Often not comfortable with bike lanes, may bike on sidewalks even if bike lanes are provided; prefer off-street or separated bicycle facilities or quiet or traffic-calmed residential roads. May not bike at all if bicycle facilities do not meet needs for perceived comfort.

This group is central to the County's focus on potential bike riders of all ages and abilities.

Somewhat Confident

5–9% of the total population

Generally prefer more separated facilities, but are comfortable riding in bicycle lanes or on paved shoulders if need be.

Highly Confident

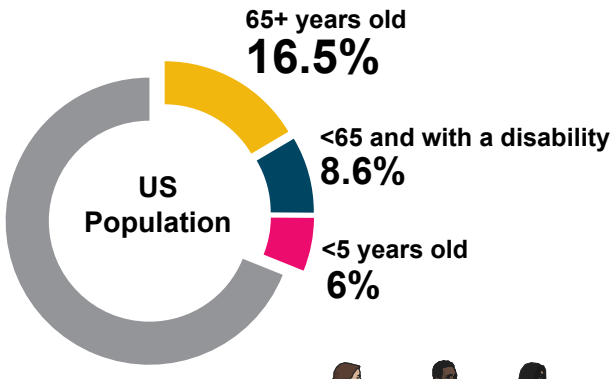
4–7% of the total population

Comfortable riding with traffic; will use roads without bike lanes.

LOW STRESS TOLERANCE — HIGH STRESS TOLERANCE

PEOPLE WALKING[3]

Speed, perception, judgement, and mobility are factors that affect everyone's willingness and ability to navigate streets comfortably and safely as a pedestrian. For at least 30% of the population who are young, old, or disabled at any given time, these factors may be diminished, leading to increased vulnerability when interacting with motorists. We were all young once, will all grow old, and have all had temporary or permanent impairments at some point in our lives.



2 National research by Dill, J., McNeil, N.. Four Types of Cyclists? Examining a Typology to Better Understand Bicycling Behavior and Potential (2012)

3 US Census Bureau, American Communities Survey, 5-Year Estimates (2015-2020)

PROJECT APPROACH AND TIMELINE

May 2021

Project launch

Background research included past plans and studies from the past ten years, both to lay a foundation for this effort and to extract relevant design recommendations made through prior studies.

Existing conditions shows existing sidewalks and trails, as well as projects already planned/programmed for implementation (see Figure 4).

Public engagement gathered via an online interactive map in October and November 2021. Public input collected is visible at https://tooledesign.github.io/50735_Gloucester/ (no more data can be added at this time – see Figure 3). The online survey was not a representative/scientific survey.

Data analysis used GPS/Bluetooth data (via the data provider Streetlight) and crash data from 2014- 2021 (provided by VDOT). Includes a look at trip lengths, travel speeds, traffic volumes, and traffic crashes.

Design guidance / facility selection drawn from national guidance on design for pedestrian and bicycle safety.

Vision network based on public input and the data analysis. (see Figure 16) Shows the long-term, unconstrained vision for a bicycle and pedestrian network connecting the UDAs to key destinations in Gloucester County.

Selection of priority projects amongst the routes that make up the long-term vision network. Priorities were identified by Gloucester County staff using inputs from a public survey and other data sources.

Further development of priority concepts includes facility selection, design considerations, and planning-level cost estimates.

May 2022

Final report summarizes key findings and presents recommended concept designs for priority corridors.

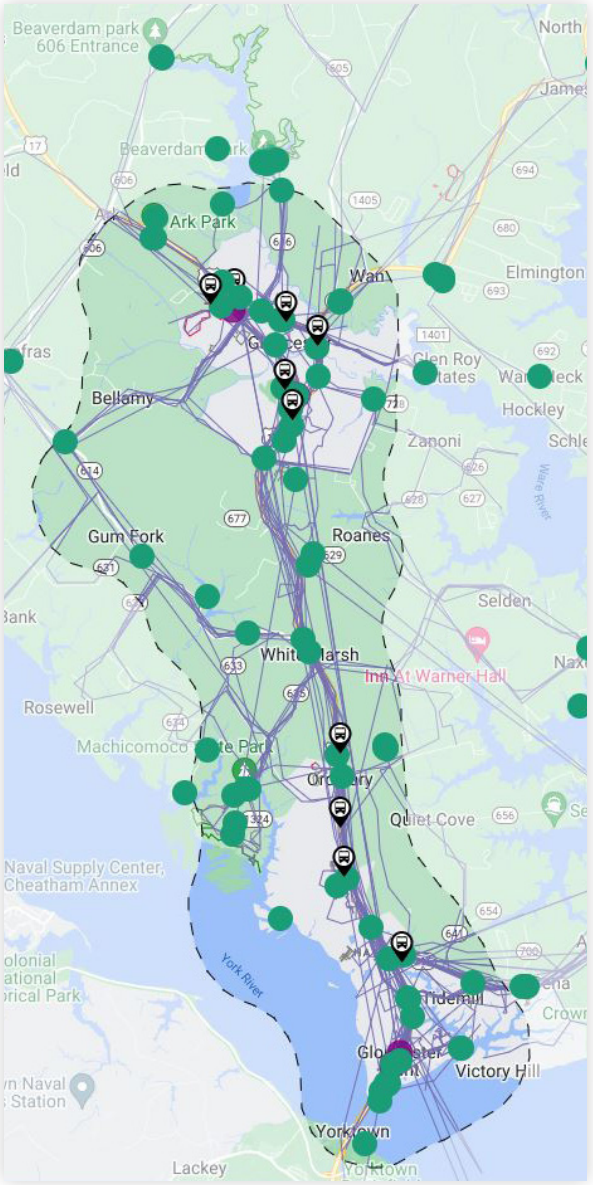


Figure 3: Image from Online Input Map

Image from the online map of public input. Green dots are destinations people want to walk/bike to and from. Lines show routes they currently walk/bike or want to walk/bike more.

EXISTING CONDITIONS

Figure 4 shows existing sidewalks and trails, while Figure 5 and Figure 6 shows projects planned/programmed from previous studies (all of which are also recommended as part of this study).

Figure 4: Existing Facilities for Biking and Walking in Gloucester County

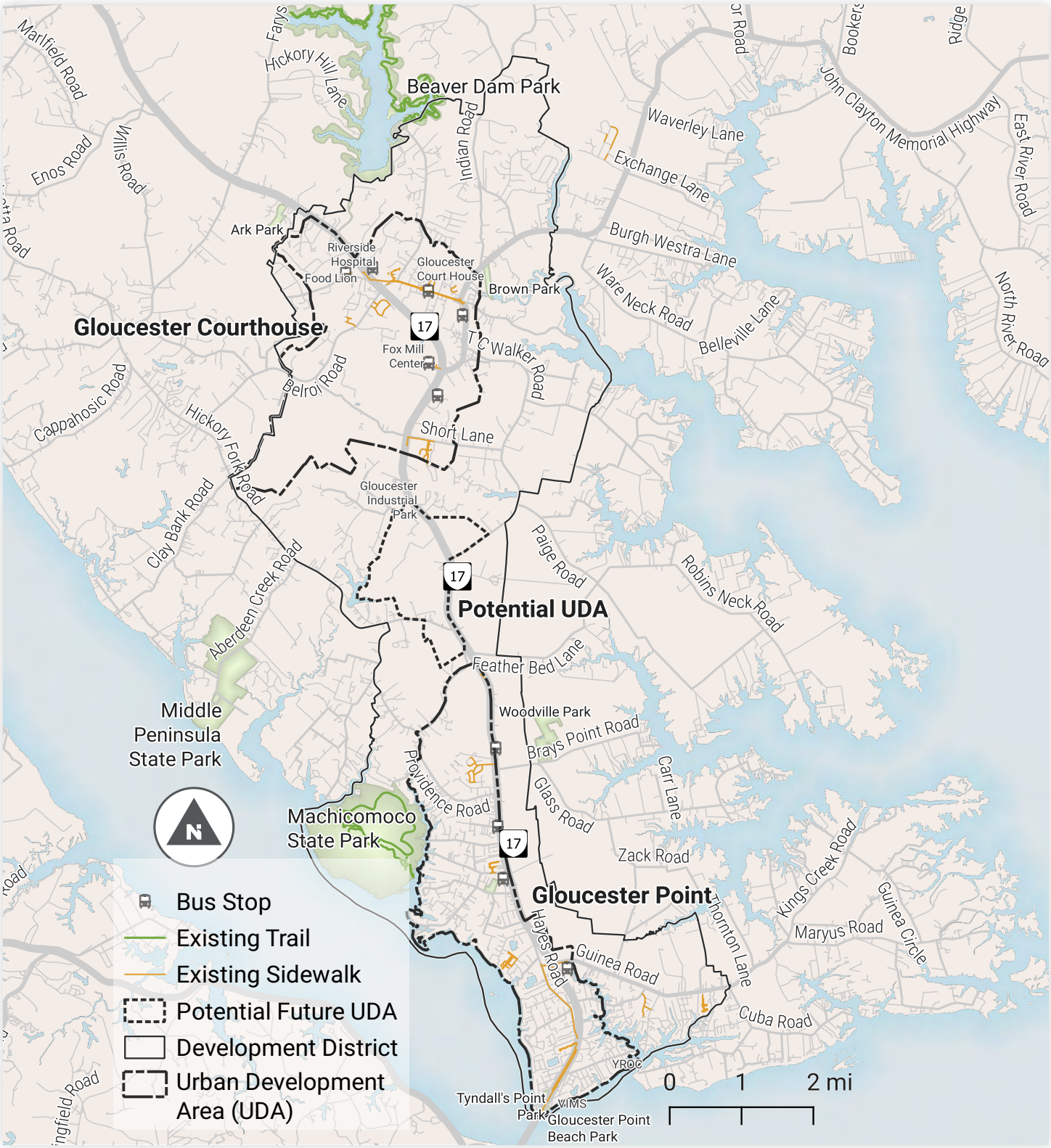
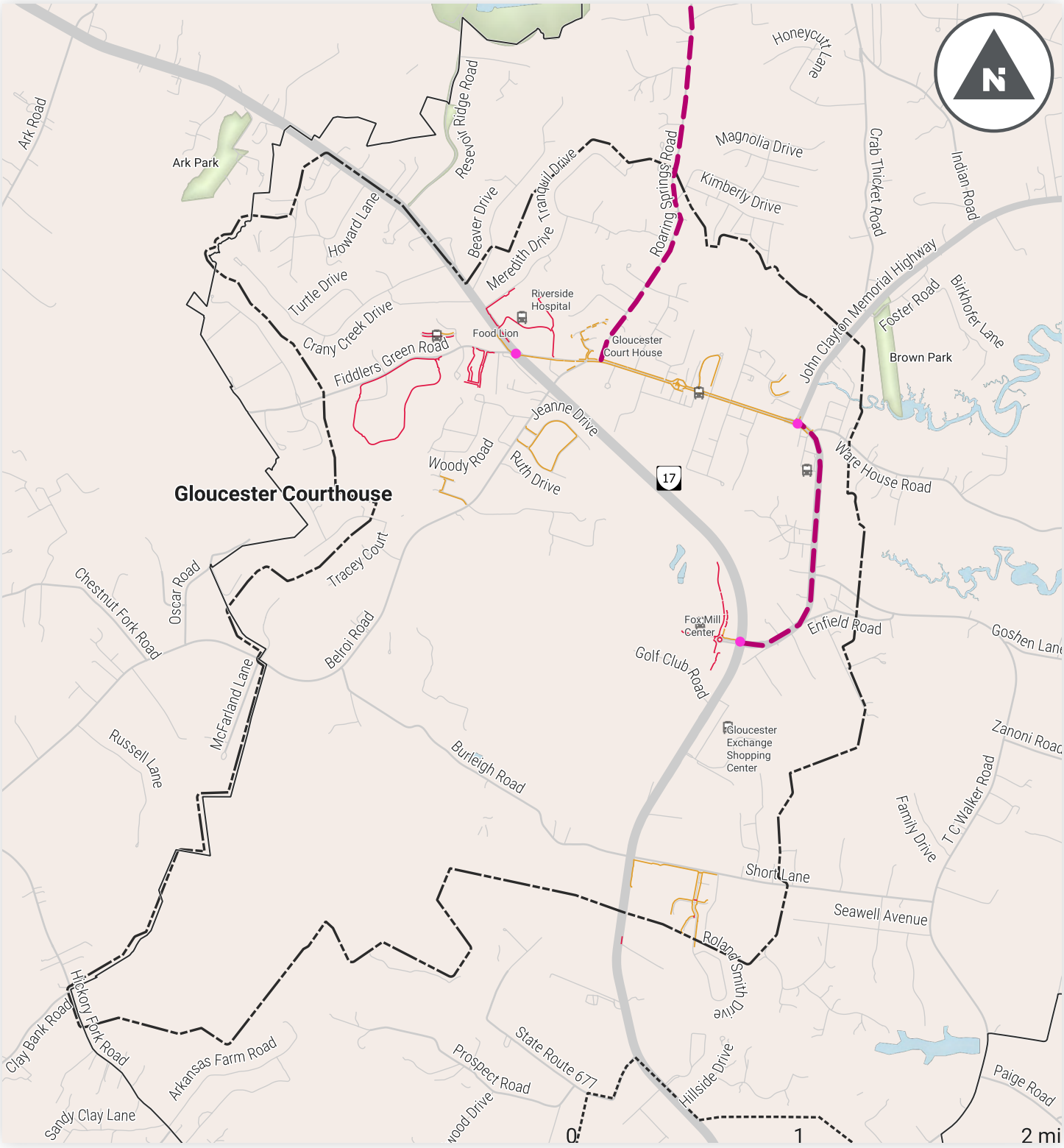


Figure 5: Recommendations and Facilities from past plans and studies – Gloucester Courthouse



- Potential Future UDA
- Urban Development Area (UDA)
- Development District
- Bus Stop
- Intersection Improvement
- Planned Shared-use Paths
- Existing Trail
- Existing Sidewalk
- Proposed Sidewalk

Figure 6: Recommendations and Facilities from past plans and studies –Gloucester Point/Hayes

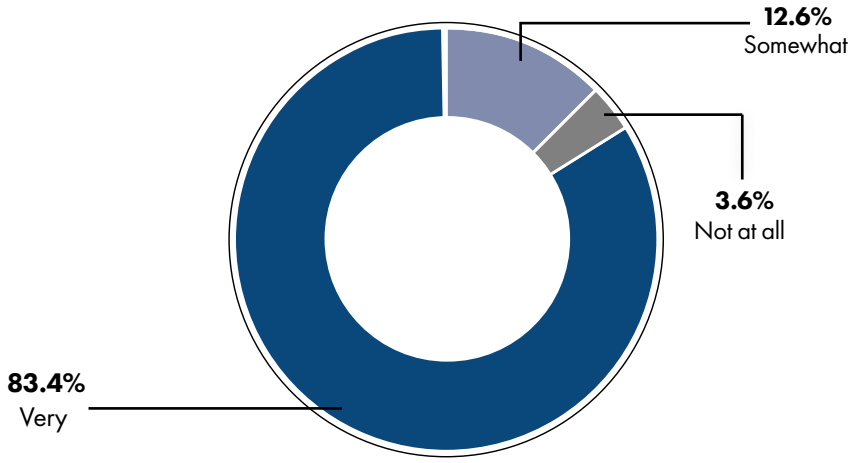
- Potential Future UDA
- Urban Development Area (UDA)
- Development District
- Bus Stop
- Intersection Improvement
- Planned Shared-use Paths
- Existing Trail
- Existing Sidewalk
- Proposed Sidewalk

PUBLIC ENGAGEMENT

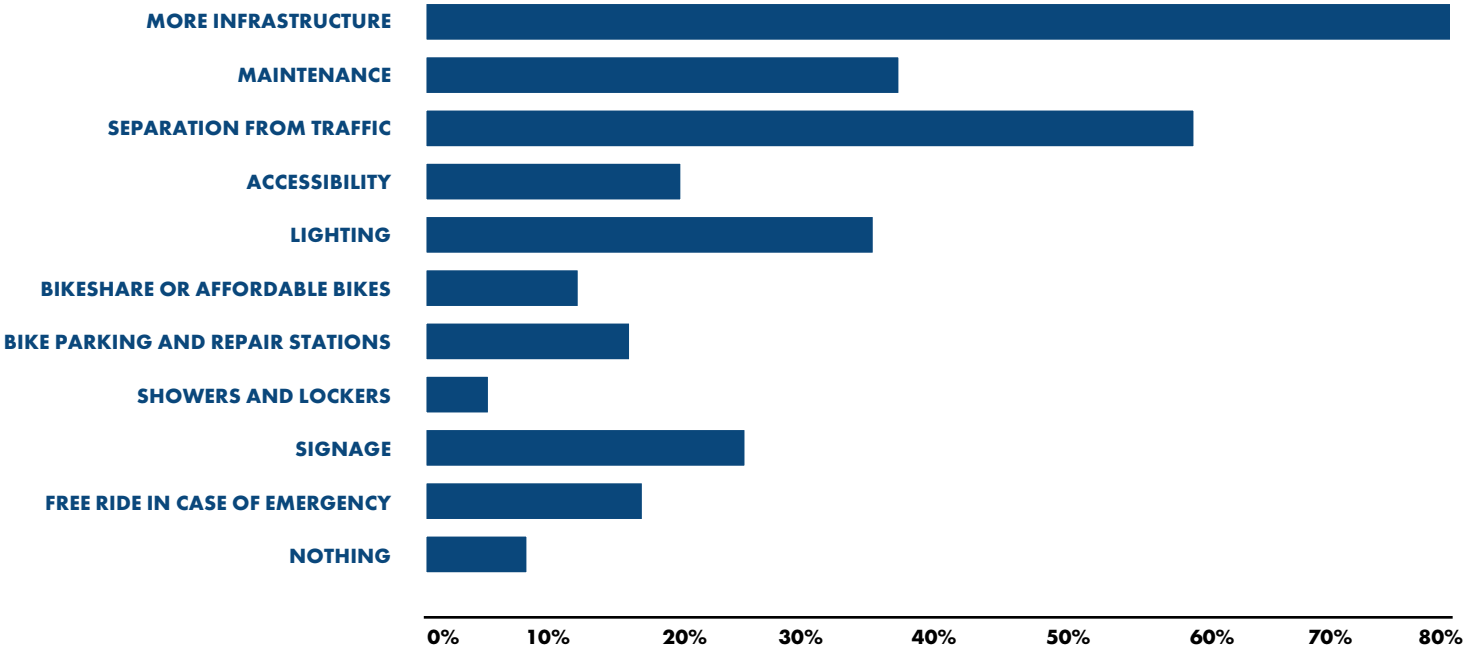
The first round of public engagement for this project was conducted via an online survey and map in October and November of 2021. The survey/map was promoted through the County's social medial networks (Facebook, website, public service announcements), County's Transportation Planning Advisory Committee (TPAC), and an article in the Gazette Journal. People could also submit comments directly via email or phone. During the two-month period that comments were collected, 370 people provided input on the online survey/map and an additional 19 people submitted comments by email or phone. A summary of feedback is presented below.

Figure 7: Key Summary Responses from Online Survey/Map

How important is it to invest in safe and comfortable walking and biking facilities in Gloucester County?



What would encourage you to walk or bike more?



In addition to answering survey questions, participants could drop points, draw lines, and write comments in specific locations on a map to show where they currently walk or bike and/or where they would like to walk or bike more. Although the map is no longer accepting new entries, the data submitted by respondents can be viewed here: https://tooledesign.github.io/50735_Gloucester/.

Overall, map inputs were distributed throughout the study area. Areas that received the most comments indicating a need or desire for improved conditions for walking and biking included:

Route 17: By far, the location that received the most comments was Route 17. Respondents noted that many people currently walk and bike along Route 17, which poses a safety concern, and that many more people would want to walk and bike along Route 17 if there was a continuous facility that was buffered from vehicle traffic.

Major destinations: Respondents tagged a number of key destinations that they would like better access to on foot and bike, including Gloucester Courthouse, the Virginia Institute of Marine Science (VIMS) campus, Beaverdam Park, Machicomoco State Park, schools, York River Crossing, Shoppes at Gloucester, and Gloucester Point Beach Park.

Main Street, the Courthouse area, and Roaring Springs Road: Although many respondents noted that they already enjoy walking in the Courthouse area and along Main Street, they noted the need for improved yielding for people crossing Main Street, improved crossing conditions at the intersection of Main Street and Route 14, and the potential for formalized walking/jogging loops. Multiple people also commented on the desire to connect to Beaverdam Park via Roaring Springs Road.

Guinea Road and Tidemill Road: A number of respondents focused their comments on the need for improved access and safety along Guinea Road. Respondents noted the prevalence of people already walking and biking there, and that the high driving speeds and lack of separation from cars presents safety concerns. They talked about the desire to walk to and between shops at York River Crossing Shopping Center and throughout the Hayes commercial district. Respondents noted the need for better access to Achilles Elementary School, and improved safety along the popular biking route referred to as the Guinea Loop that uses Guinea Road, Maryus Road, and Guinea Circle.

Other critical road connections: Other roads that received multiple comments included Ware House Road, Hickory Fork Road, T.C. Walker Road, Route 14, Hayes Road, Burleigh Road, Short Lane, Piney Swamp Road, Providence Road, and Belroi Road. Although not the central focus on this study, there were also comments noted for areas further from the UDAs such as Ark Road, Cappahosic Road, and Farys Mill Road.

Off-road trails: Numerous respondents expressed interest in an off-road trail following the utility easement that runs north/south near Route 17. The alignment discussed starts at Ware House Road, connects behind the Gloucester-Matthews Humane Society, crosses Short Lane near Gloucester High School, crosses to the west side of Route 17 near the Stagecoach Market, parallels Route 17 through the White Marsh area, crosses back to the east of Route 17 just south of Calvary Baptist Church, and continues in parallel to Route 17 to Guinea Road. There is also a utility easement that runs east/west along the north side of Guinea Road, which respondents also noted as a potential trail opportunity.

The public is very interested in off-road routes, as demonstrated by their interest in the utility corridor. However, after further discussions and public comments, it is clear that this concept has notable challenges and may not be feasible. However, the significant public interest in these utility corridors highlights the need to search for feasible opportunities for off-road trails. Other ideas included a boardwalk or path that connects from Main Street to Route 17 roughly following Fox Mill Run in the Courthouse area, a trail running along the wooded area north/east of Route 17 across from Walmart, and a trail in the County-owned Fox Mill Natural Area north of Home Depot.

DESIRED ROUTES AND KEY DESTINATIONS MAP

The feedback from public engagement was distilled into the following map of key destinations and desired routes. Figure 8–Figure 10 show places where people in Gloucester want improved pedestrian and bicycle access and safety.

Figure 8: Key Destinations and Desired Routes

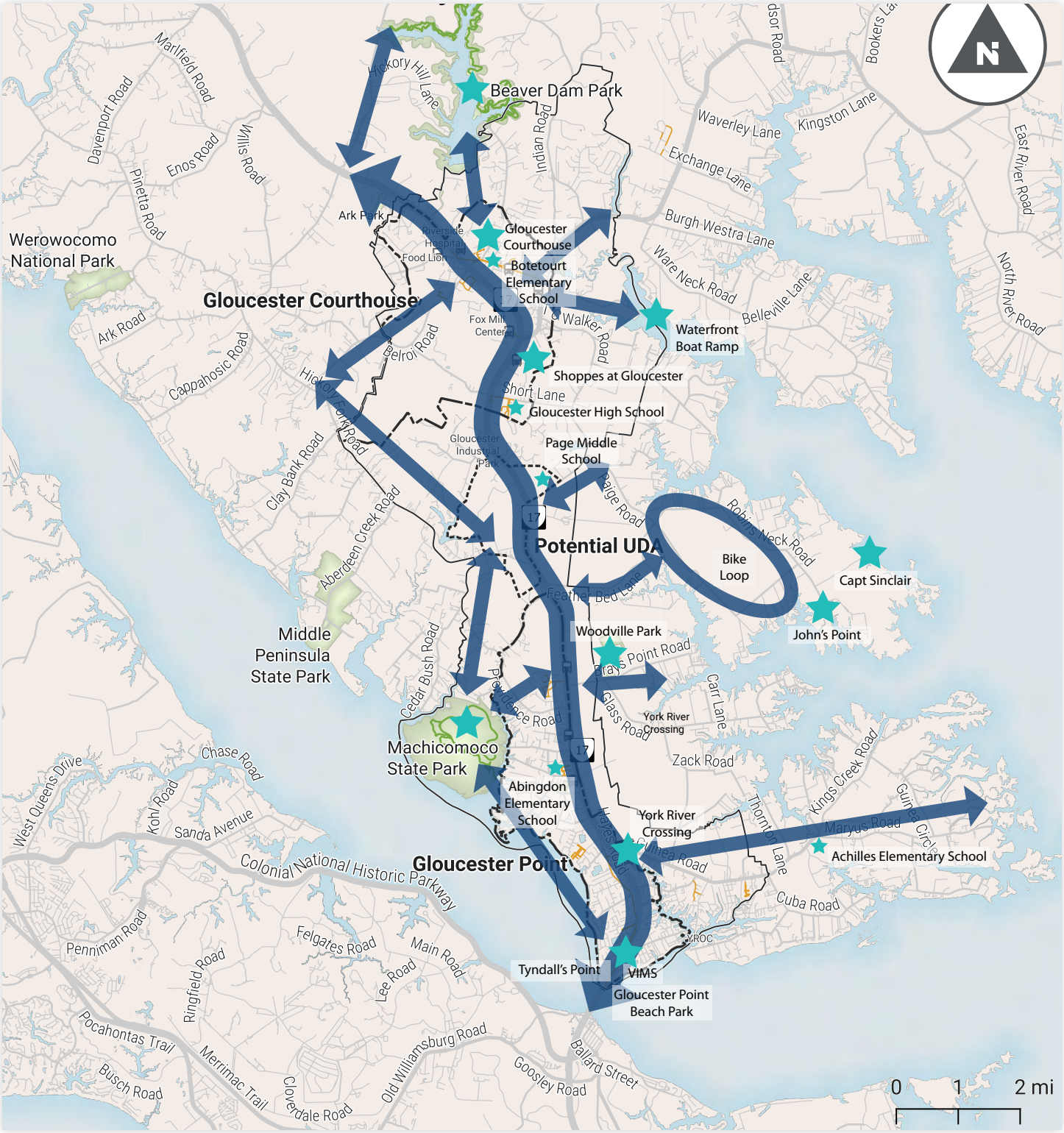


Figure 9: Key Destinations and Desired Routes: Courthouse Area

Urban Development Area (UDA)
Potential Future UDA
Development District
Bus Stop
Existing Trail
Existing Sidewalk
Desired Routes
Key Destinations

Figure 10: Key Destinations and Desired Routes: Hayes/Point area

DATA ANALYSIS

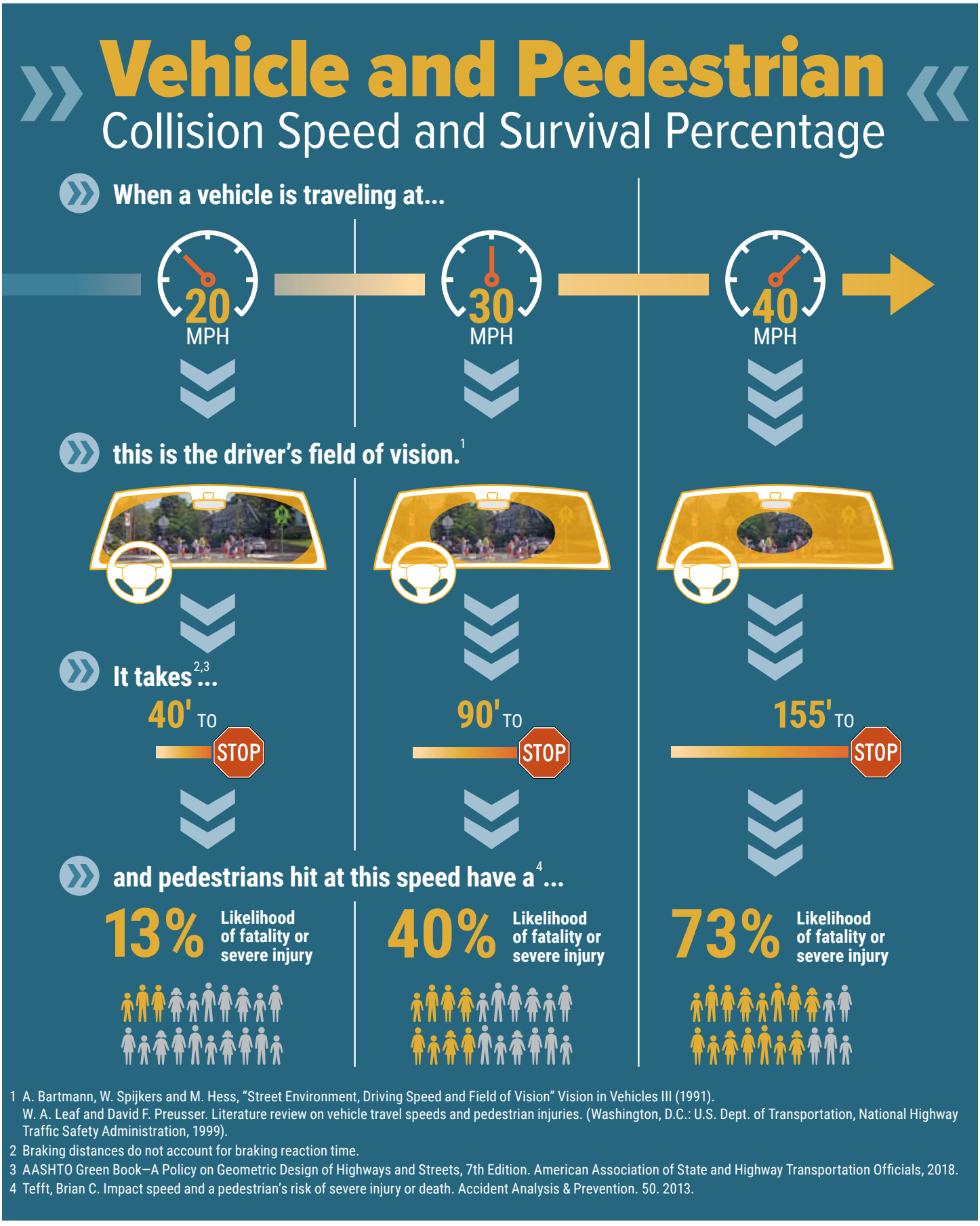
The data analysis for this study used two central data sources: VDOT crash data from 2014-2021 and Streetlight data, which uses information from GPS- and Bluetooth-enabled devices to provide information about where and how people travel. The purpose of the analysis was to complement the public input in order to support decisions about where facilities are needed, what types of facilities may be appropriate, and what locations should be prioritized.

Traffic Volume and Speed

The two leading inputs used to determine what type of pedestrian and bicycle facilities are appropriate on a particular road are traffic volume and speed. The most appropriate or desired facility type may not always be viable based on right-of-way limitations or other factors. However, according to the Federal Highway Administration (FHWA), the decision-making process should begin with a discussion of what type of facility will deliver the highest degree of safety to the user while also making it comfortable and convenient for people to walk or bike.[4] Facilities that do not improve safety and provide an adequate degree of comfort and convenience are less likely to be used and can lead to frustration amongst the public about a perceived waste of limited public resources.

There is a robust field of research that documents the relationship between pedestrian and bicycle safety and comfort and traffic volume and speed. In particular, managing the speed of traffic is paramount to providing a safe environment for all users on the road network, as there is a strong correlation between vehicle speeds and crash outcomes. As vehicle speeds increase, the severity of crashes (i.e., the likelihood of injury and fatality) goes up for all road users, and pedestrians are particularly at risk (see next page). Figure 11 presents information on traffic volumes and speeds collected as part of this study.

4 Federal Highway Administration, Bikeway Selection Guide, 2019, https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf



1 A. Bartmann, W. Spijkers and M. Hess, "Street Environment, Driving Speed and Field of Vision" Vision in Vehicles III (1991).
W. A. Leaf and David F. Preusser. Literature review on vehicle travel speeds and pedestrian injuries. (Washington, D.C.: U.S. Dept. of Transportation, National Highway Traffic Safety Administration, 1999).

2 Braking distances do not account for braking reaction time.

3 AASHTO Green Book—A Policy on Geometric Design of Highways and Streets, 7th Edition. American Association of State and Highway Transportation Officials, 2018.

4 Tefft, Brian C. Impact speed and a pedestrian's risk of severe injury or death. Accident Analysis & Prevention. 50. 2013.

Figure 11 shows the travel speeds and estimated traffic volumes for major roadways evaluated as part of this study. The Streetlight data used for this analysis was from 2019 (March, April, September, October) and 2020 (all months). The 2019 and 2020 data are viewed separately, since 2020 reflects altered travel habits resulting from the COVID-19 pandemic. Consistent with industry practices, the driving speeds shown in Figure 11 are the 85th percentile speeds (i.e., 85 percent of drivers are going this speed or slower). As explained in the next section, this table can be used alongside Figure 18 and Figure 19 to inform bicycle facility selection. Three key takeaways from the analysis include:

- **100%** of the driving speeds exceed the posted speed limits. Driving speeds were **7% – 80%** above the posted speed.
- Most (but not all) 2020 speeds were higher than 2019 speeds, reflecting pandemic conditions where less congestion likely led to higher speeds. This trend has been similarly documented in communities around the United States.
- Using national standards for pedestrian and bicycle facility design, creating conditions for safe, comfortable bicycle and pedestrian travel in Gloucester will require separation (buffers) from vehicle traffic on most roads. (See Facility Selection section for more details.)

Figure 11: Travel Speeds and Estimated Volumes (source: Streetlight data from 2019 and 2020)

Location	Posted Speed Limit	2019 Driving Speed	2020 Driving Speed	Estimated 2020 Daily Traffic Volume
Belroi Road (SR 616, north of Summerville Dr)	40 MPH	49 MPH	51 MPH	3,793
Ark Road (SR 606, south of White Oak)	45 MPH	58 MPH	61 MPH	2,143
Borden Road (SR 635, south of Providence Rd)	35 MPH	41 MPH	43 MPH	554
Burleigh Road (SR 615)	35 MPH	44 MPH	45 MPH	2,096
Main Street (BUS 17, west of Cary Ave)	25 MPH	33 MPH	33 MPH	6,446
Main Street (BUS 17, at Fox Mill Rd)	45 MPH	50 MPH	50 MPH	17,952
Farys Mill Road (SR 606, north of Kings Dr)	45 MPH	57 MPH	60 MPH	2453
Feather Bed Lane (SR 614, west of Outapocket Ln)	55 MPH	53 MPH	53 MPH	769
Greate Road (SR 1208, at Tarleton Rd)	25 MPH	33 MPH	45 MPH	1,736
Guinea Road (SR 216, west of Low Ground Rd)	45 MPH	54 MPH	56 MPH	5,150
Tidemill Road (SR 641)	45 MPH	48 MPH	49 MPH	4,627
Hayes Road S (SR 1216, south of Hoefork Ln)	30 MPH	49 MPH	48 MPH	2,845
Hayes Road N (SR 1216, south of Stokes Dr)	45 MPH	48 MPH	48 MPH	2,879
Hickory Fork Road (SR 614, south of Patricia Pl)	45 MPH	55 MPH	56 MPH	4,051
Piney Swamp Road (SR 635, south of Marsh Ln)	25 MPH	45 MPH	44 MPH	1,030
Rt 14 (west of Indian Rd)	55 MPH	63 MPH	65 MPH	14,365
T C Walker Road (SR 629, south of Walnut Cove Dr)	55 MPH	62 MPH	59 MPH	2,144
Ware House Road (SR 621)	35 MPH	40 MPH	40 MPH	555
Route 17 (Belroi Rd to Main St)	55 MPH	62 MPH	64 MPH	16,057
Route 17 (Fleming Rilee Ln to SR 677)	55 MPH	62 MPH	64 MPH	25,138
Route 17 (Mid Country Dr to Earnest Ln)	55 MPH	64 MPH	65 MPH	28,948
Route 17 (Providence Rd to Linda Cir)	55 MPH	63 MPH	64 MPH	14,690
Route 17 (Longview Dr to Plum Tree Dr)	55 MPH	62 MPH	64 MPH	29,682
Route 17 (Hayes Rd to Guinea Rd)	55 MPH	60 MPH	62 MPH	29,308
Providence Rd (SR 636)	35 MPH	45 MPH	45 MPH	2,406
Roaring Springs Road (SR 616, south of Holly Springs)	25 MPH	38 MPH	39 MPH	1,999

Trip Lengths

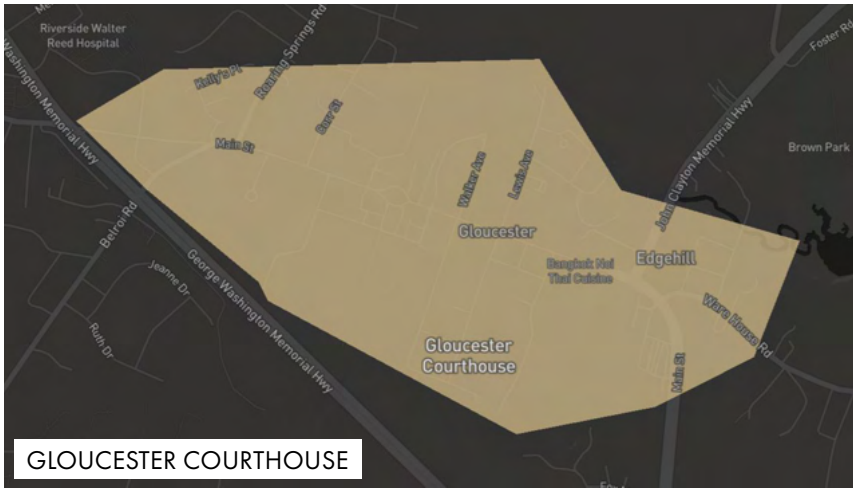
Streetlight data was also used to evaluate trip lengths. The purpose of this analysis is to identify the potential for mode shift. In places where people are taking a lot of short trips in their cars, there may be more potential for people to shift some of those trips from automobile trips to walking or biking trips. This information can help County staff and leaders prioritize locations for future multimodal transportation facilities (i.e., new sidewalks, trails, or bikeways), and can help them compare the relative potential for walking and biking in different areas. For the purposes of this analysis, short trips were defined as three miles or less. The methodology used for this analysis involved defining a small area of focus (see Figure 12 below), gathering the trip length for all trips that either start or end inside that zone, and then determining what percentage of those trips were three miles or less.

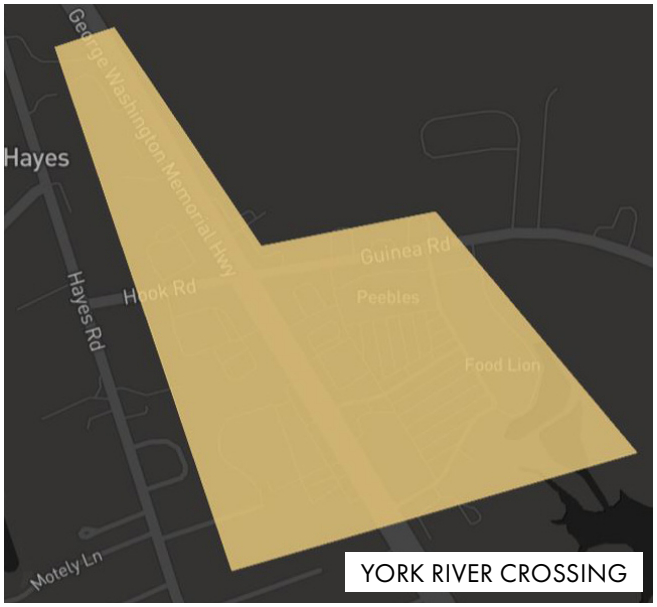
The key takeaways from this analysis include:

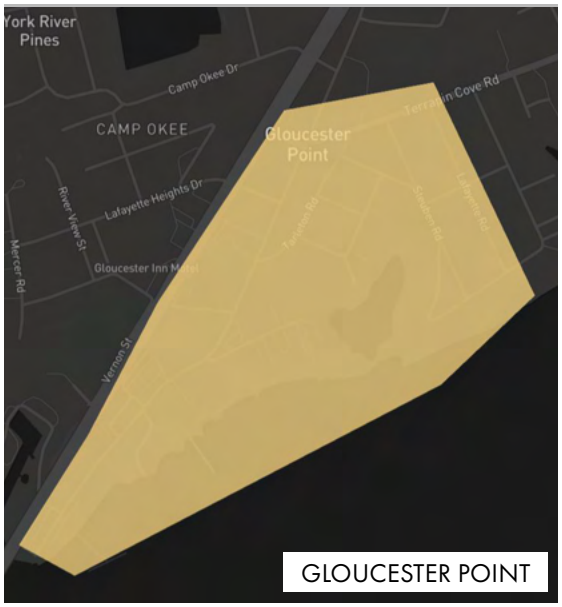
- In Gloucester Courthouse, **37%** of all the trips that started or ended in this area in 2020 were 3 miles or less. This reflects 3,388 average daily trips.
- In the area around York River Crossing Shopping Center, **35%** of all the trips that started or ended in this area in 2020 were 3 miles or less. This reflects 1,832 average daily trips.
- In the Gloucester Point/VIMS Campus area, **25%** of all the trips that started or ended in this area in 2020 were 3 miles or less. This reflects 291 average daily trips.

Overall, this analysis suggests that there is the most potential for mode shift in the Courthouse area, and that all three areas studied have a significant potential to increase walk and bike trips if adequate pedestrian/bicycle infrastructure was provided.

Figure 12: Areas used for Trip Length Analysis







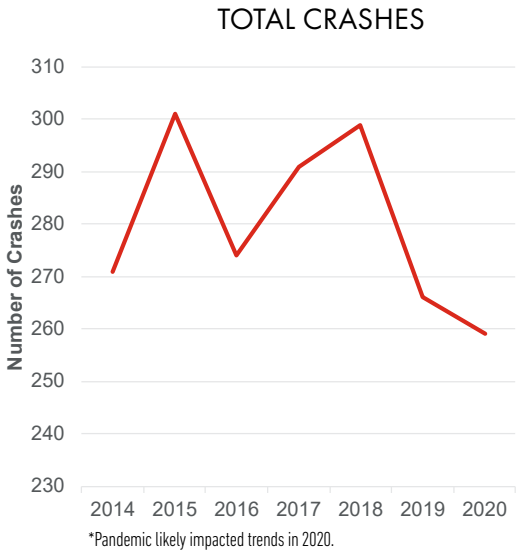
Crash Analysis

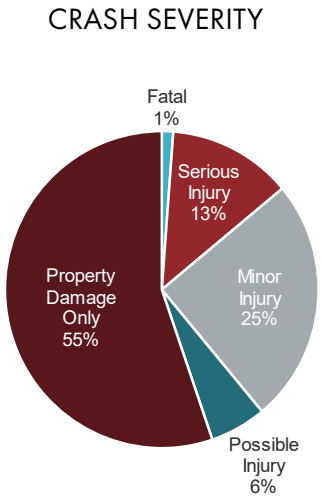
The data used in this analysis was provided by VDOT and covered the period January 2014 to January 2021. The analysis focused on a one-mile buffer around the Urban Development Areas. The analysis also used baseline information from Open Street Map roadway data.

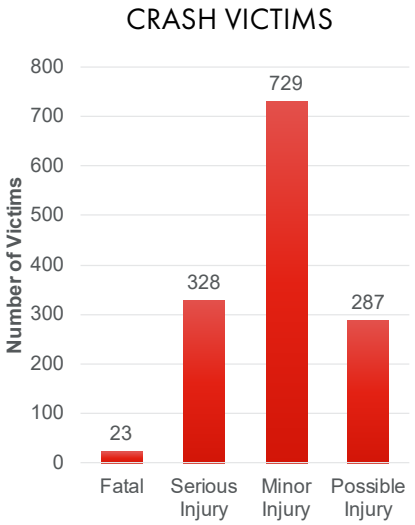
Figure 13 shows the findings when analyzing all crashes (auto, bike, pedestrian, motorcycle). Key takeaways include:

- The total number of reported traffic crashes ranged from 260 to 300 per year, with the lowest numbers of crashes occurring in recent years.
- **45%** of reported crashes involved an injury or fatality, including 351 people (~50/year) who were seriously injured or killed.
- The heatmaps indicate concentrations of crashes primarily along Route 17, Main Street, Route 14, and Guinea Road. Other locations also had crashes but did not show a concentration.
- Speed was documented as a factor in nearly a quarter of all crashes and for half of fatal crashes. However, speed is often underreported as a crash factor and is highly subjective (i.e., speed is likely a factor in more traffic-related injuries and fatalities than the data suggests).
- **43%** of crashes occurred at intersections, while **57%** of crashes occurred along the roadway (non-intersection locations).

Figure 13: Summary Results of All Reported Crashes (All Modes), Jan 2014–Jan 2021 (data source: Virginia Department of Transportation)







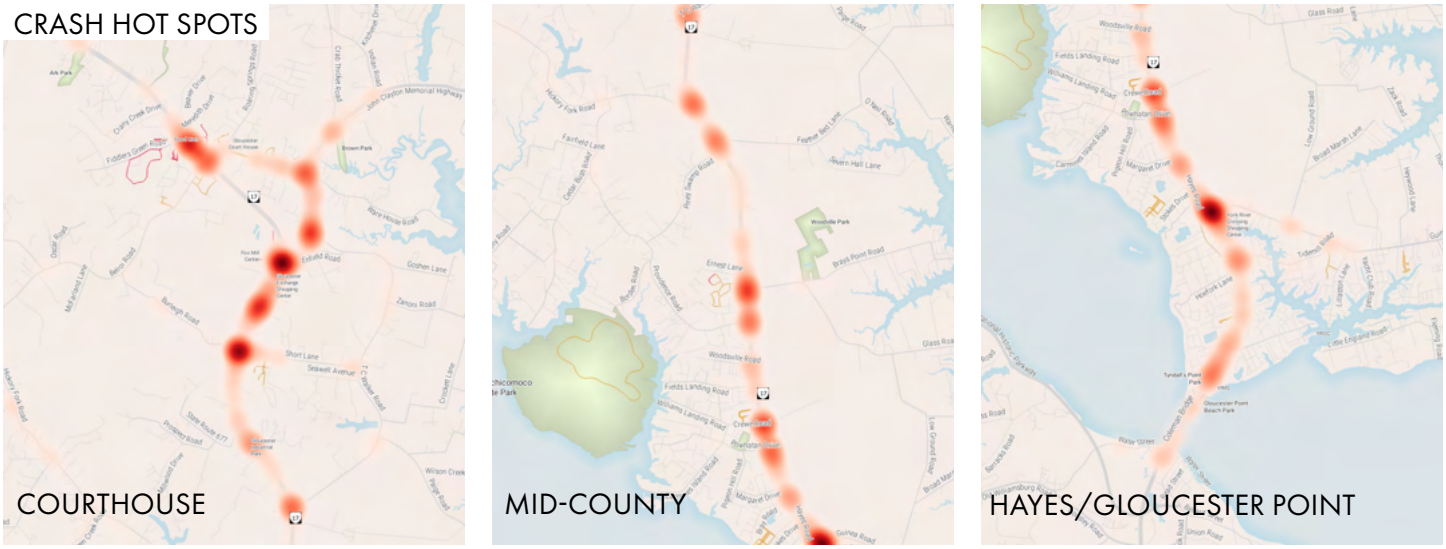


Figure 14 shows the locations of reported pedestrian and bicycle crashes from January 2014 – January 2021. Key takeaways from the review of pedestrian and bicycle crashes include:

- There were 26 reported pedestrian crashes, including 6 fatalities.
- There were 11 reported bicycle crashes. No fatalities were reported in this data.
- All pedestrian and bike crashes involved injuries. Pedestrian and bicycle crashes accounted for **2%** of all crashes but **7%** of fatal and serious injury crashes. In other words, amongst people involved in a crash, the risk of injury is higher for people walking and biking compared to people driving.

Figure 14: Locations of Crashes Involving People Walking (Pedestrian) and People Biking, Jan 2014 – Jan 2021 (data source: Virginia Department of Transportation)

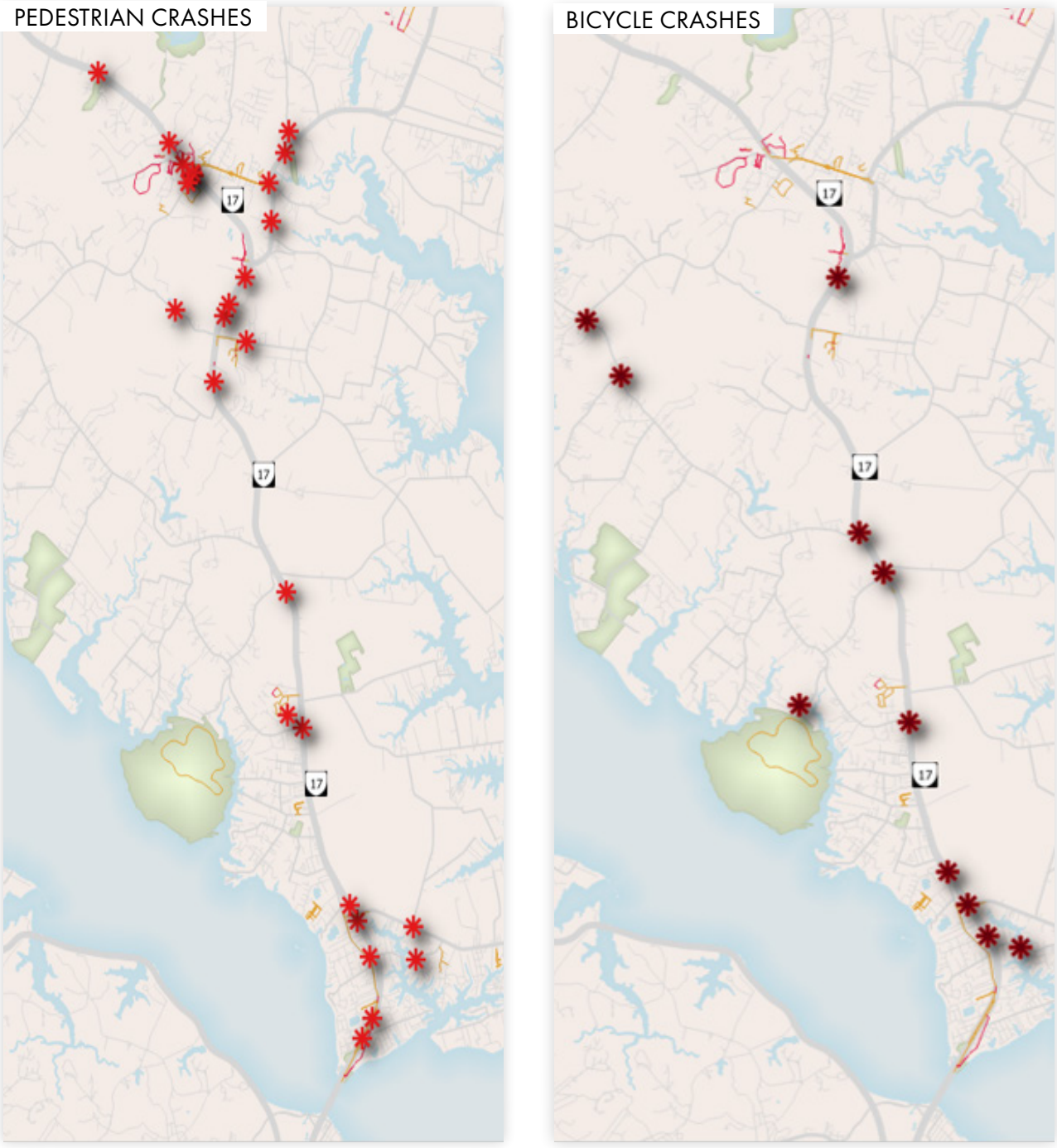
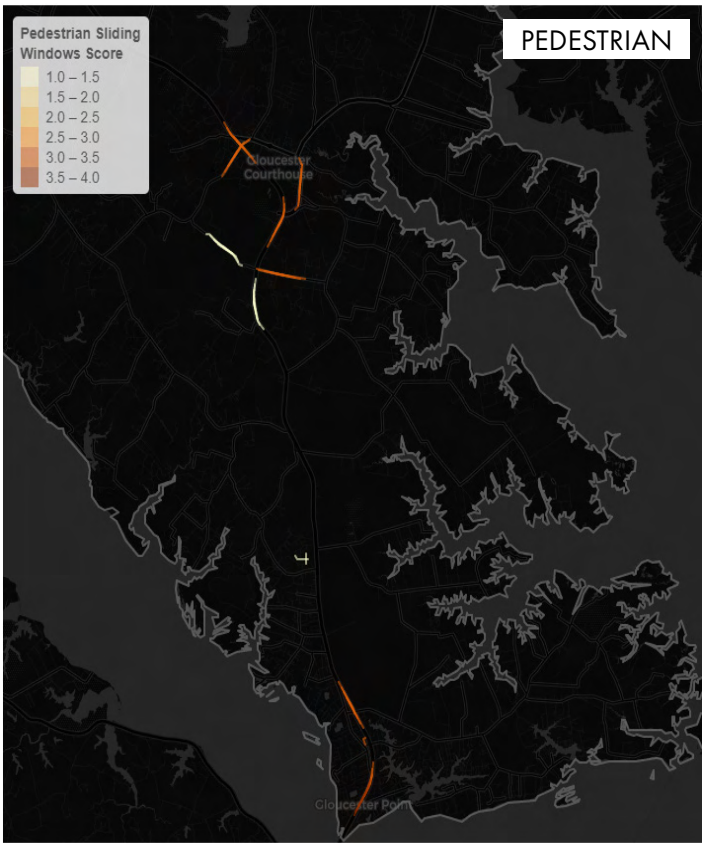
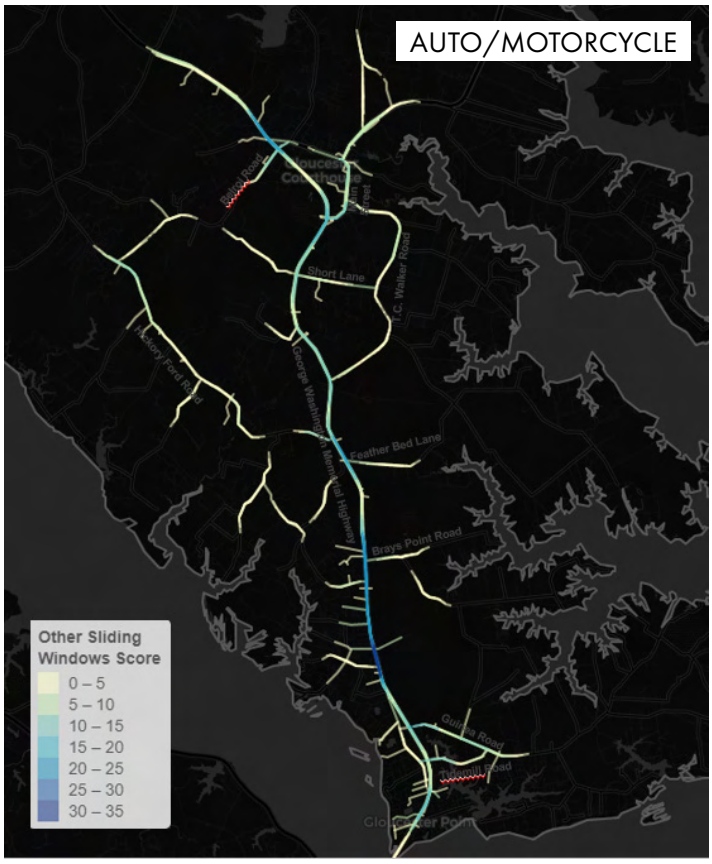


Figure 15: Sliding Window Analysis of Crashes, Jan 2014 – Jan 2021
(data source: Virginia Department of Transportation)





The study also included a "sliding window" analysis of crash data, which helps identify segments with the highest crash density. The analysis is done by determining the number and severity of crashes in a half-mile "window" on a roadway and shifting that window along the roadway 1/10 mile at a time. Crashes are weighted by severity (non-injury crashes are not reflected).[5] The result visualizes the roadway segments with the highest density and severity of crashes for each mode.

Figure 15 shows the findings from the sliding window analysis. Based on this analysis, the locations with the highest density and severity of crashes are:

Pedestrian Crashes:
- Route 17
- Main Street
- Short Lane
- Belroi Road

Bicycle Crashes:
- Route 17
- Tidemill Road

Auto/Motorcycle Crashes:
- Route 17
- Guinea Road
- Main Street

5 Crashes are weighted by multiplying the number of Fatal and Incapacitating Injury crashes by three, and multiplying the number of Non-Incapacitating Injury crashes by one. Non-injury crashes receive a score of zero. This methodology is established by the USDOT Safer Streets Priority Finder Tool (https://www.saferstreetspriorityfinder.com/).

VISION NETWORK

The input and analysis from this study was used to develop the Vision Network for Multimodal Transportation in Gloucester County (Figure 16). The Vision Network represents an unconstrained, long-term, community-based vision for where improved conditions are needed for walking and biking. The Vision Network stems from the UDAs and connects them to neighborhoods and other key destinations. Some individual improvements may be implemented as stand-alone bicycle and pedestrian projects, while others may be implemented as part of redevelopment, roadway reconstruction, or repaving. The goal is to seek opportunities over time to "chip away" at implementation so that, over time, a connected network of safe and comfortable places to walk and bike emerges in the County.

Routes included in the Vision network met these criteria:

a) they were identified as a VTrans 2021 Mid-Term need for either Bicycle Access, Pedestrian Access, Pedestrian Safety Improvement, Transit Access, or Equity Emphasis Area;[6]

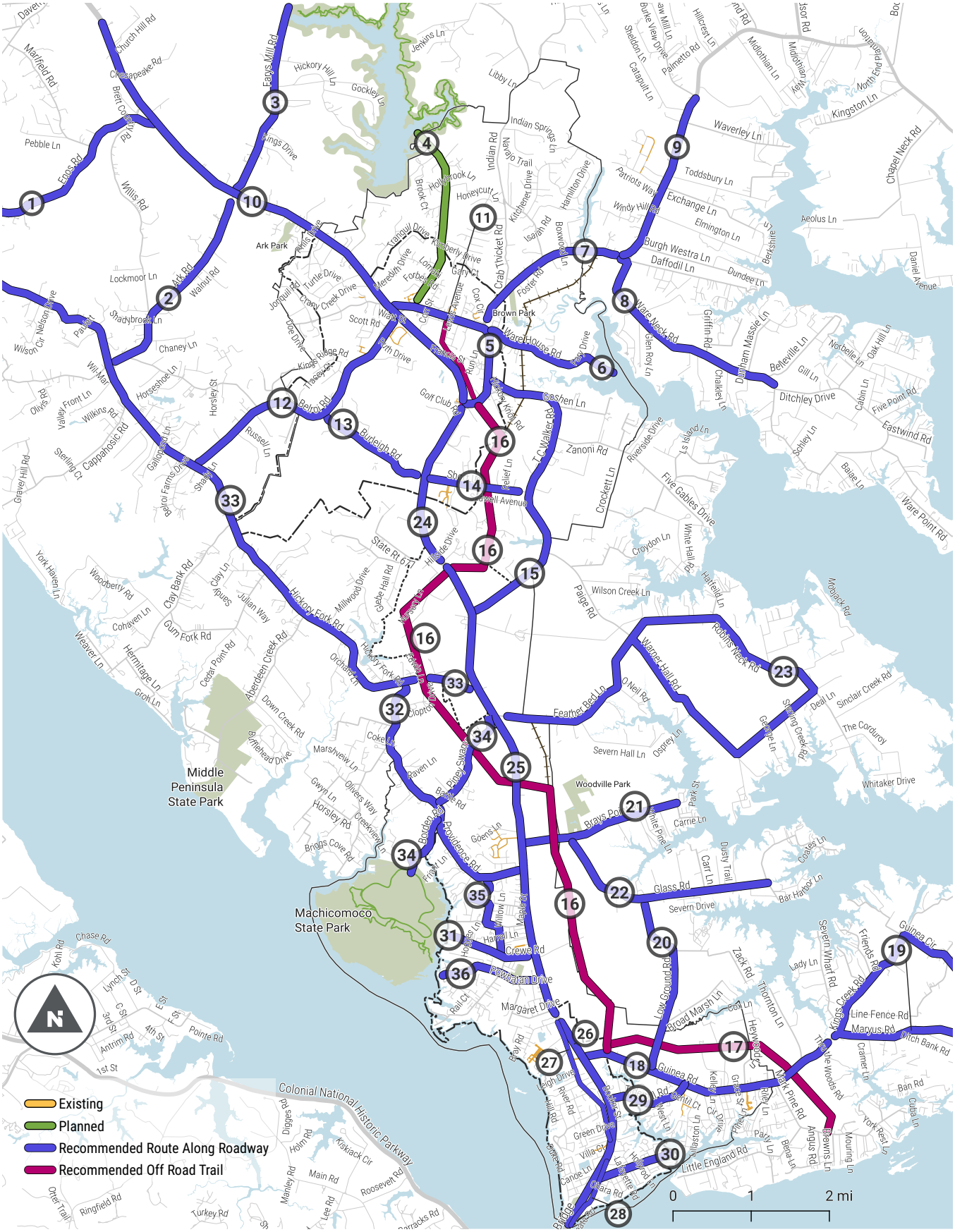
b) they provide critical connections between UDAs and residential areas and/or they provide a direct connection to a school or park,

c) they received multiple comments via public engagement, and

d) the data analysis conducted for this study found driving speeds in excess of posted speed limits and/or a history of reported crashes or safety concerns.

6 Office of Intermodal Planning and Investment, Interact VTrans Data Explorer, https://vtrans.org/interactvtrans/map-explorer

Figure 16: Unconstrained Community-based Vision Network for Multimodal Transportation in Gloucester County



NOTE: Routes 16 and 17 have notable challenges and may be infeasible; however, the County will explore other options for off-road trails.

Figure 17: Vision Network Map Key

1. Enos Road
2. Ark Road
3. Farys Mill Road
4. Roaring Springs Road
5. Main St
6. Ware House Road
7. Route 14 (Main St to Ware Neck Rd)
8. Ware Neck Road
9. Route 14 (north of Ware Neck Rd)
10. Route 17 (north of Main St)
11. trail along Route 17 near Fox Mill Run Creek
12. Belroi Road (Hickory Fork Rd to Route 17)
13. Burleigh Road (Belroi Rd to Route 17)
14. Short Lane
15. TC Walker Road
16. Utility corridor trail running north/south along Route 17 (feasibility is unclear – unlikely to advance)
17. Utility corridor trail running east/west along Guinea Road (feasibility is unclear – unlikely to advance)
18. Guinea Road
19. Guinea loop (Kings Creek Road, Guinea Circle, Maryus Road)
20. Low Ground Road
21. Bray Point Road
22. Glass Road
23. Warner Hall loop (Feather Bed Lane, Robins Neck Road, Free School Road, Warner Hill Road)
24. Route 17 (Hillside Drive to Main Street)
25. Route 17 (Hillside Drive to Margaret Drive)
26. Route 17 (Margaret Drive to the Coleman Bridge)
27. Hayes Road
28. Greate Road
29. Tidemill Road
30. Terrapin Cove Road
31. Williams Landing Road
32. Providence Road
33. Hickory Fork Road
34. Piney Swamp Road, Borden Road
35. connections between streets to create a north-south alternative to Rt. 17 from Williams Landing Rd to Providence Rd
36. Powhatan Road

PRIORITY PROJECTS

Using the Unconstrained Community-based Vision Network as a starting point, the County staff used the following inputs to select near-term priorities:

- VTrans 2021 Mid-Term Needs: Bicycle Access
- VTrans 2021 Mid-Term Needs: Pedestrian Access
- VTrans 2021 Mid-Term Needs: Transit Access
- VTrans Equity Emphasis Area
- Pedestrian Crashes (Jan 2014 – Jan 2021)
- Bicycle Crashes (Jan 2014 – Jan 2021)
- Bay Transit route and stop locations
- Corridors where driving speed (2020) was 10 MPH or more above posted speed
- Public input, gathered via a second online survey that asked members of the public to pick their top three routes from the Vision Network
- Feedback from the Transportation Planning Advisory Committee

County staff also considered how many homes or key destinations might be served by each route, as well as each route's potential to link with other existing or planned facilities.

THE PRIORITIES THAT WERE IDENTIFIED FOR FURTHER REVIEW INCLUDE:

a) Guinea Road / Tidemill Road,

b) Roaring Springs Road,

c) Route 17, and

d) developing a typical cross section for other through-roads in the Vision Network.

NOTE: Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change. Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein.

FACILITY TYPES AND SELECTION

Definitions

The definitions below describe the bicycle and pedestrian facilities that are the focus of the discussion in the following section, and which are most applicable to the context of Gloucester County.

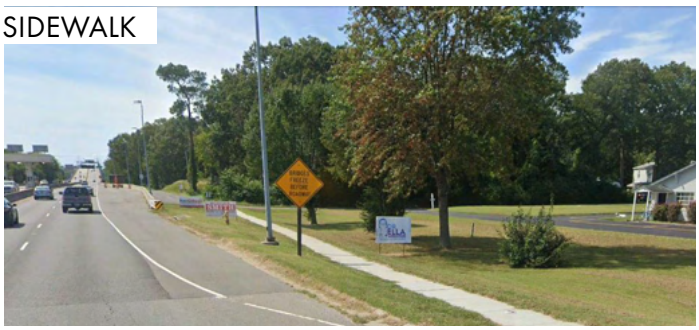
Sidewalk This is a paved, accessible surface typically parallel to the road. Sidewalks should be 5 feet wide minimum (wider near schools and in commercial areas). A buffer between the sidewalk and travel lanes improves safety and comfort for people walking. The Virginia Department of Rail and Public Transportation (DRPT) recommends a minimum buffer width of 6 feet and up to 20 or more feet along wider/faster roads.[7]

Shared Use Path or Trail These facilities accommodate people on bikes, pedestrians, and those using non-motorized devices on the same path. Shared Use Paths (also called Sidepaths) are paved and usually run parallel/adjacent to a roadway, though they do not preclude bicyclists from traveling in the parallel roadway. Trails may or may not be paved and typically run in a separate right-of-way (not along a road). The minimum width for a shared use path or trail is 8 feet, though 10 feet is recommended where higher bicycle or pedestrian traffic is expected.[8]

Shoulders Paved shoulders on the edge of roadways can be enhanced to serve as a functional space for bicyclists and pedestrians in the absence of other facilities with more separation. A buffer between the shoulder and the travel lane may be appropriate in areas with higher traffic speeds and volumes.

Advisory Shoulder Creates usable shoulders for bicyclists on a roadway that is otherwise too narrow to accommodate one. This treatment is only appropriate on low-volume, low-speed roads (see next section). Motorists travel in both directions in a shared center lane, encroaching into the advisory shoulders as needed to pass oncoming vehicles. Motorists may only enter the shoulder when no bicyclists are present and must overtake these users with caution due to potential oncoming traffic. This treatment requires a Request to Experiment in the FHWA experimentation process. For more information visit http://mutcd.fhwa.dot.gov/condexper.htm.

SIDEWALK



SHARED USE PATH

ADVISORY SHOULDER

SHOULDER

There are many other types of bicycle and pedestrian designs and facilities not described above, including Bike Lanes, Yield Roadways, Separated Bike Lanes, Bicycle Boulevards, Buffered Bike Lanes, Intersection and Crossing Treatments, Shared Lane Markings, and Traffic Calming. Guidance on the placement and design of multimodal facilities can be found in the following resources:

- Virginia Department of Transportation Complete Streets: Bicycle and Pedestrian Facility Guidelines, Bus Stop Design, and Parking Guidelines, https://www.virginiadot.org/business/resources/LocDes/RDM/Appenda1.pdf
- Virginia Department of Rail and Public Transportation, Multimodal System Guidelines Update (2020), https://www.drpt.virginia.gov/media/3105/drpt-mmdg-2020-04-27-web.pdf
- Federal Highway Administration (FHWA), Small Town and Rural Multimodal Networks, (Dec 2016), https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf

7 Federal Highway Administration, Small Towns and Rural Multimodal Networks (Dec 2016), https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf

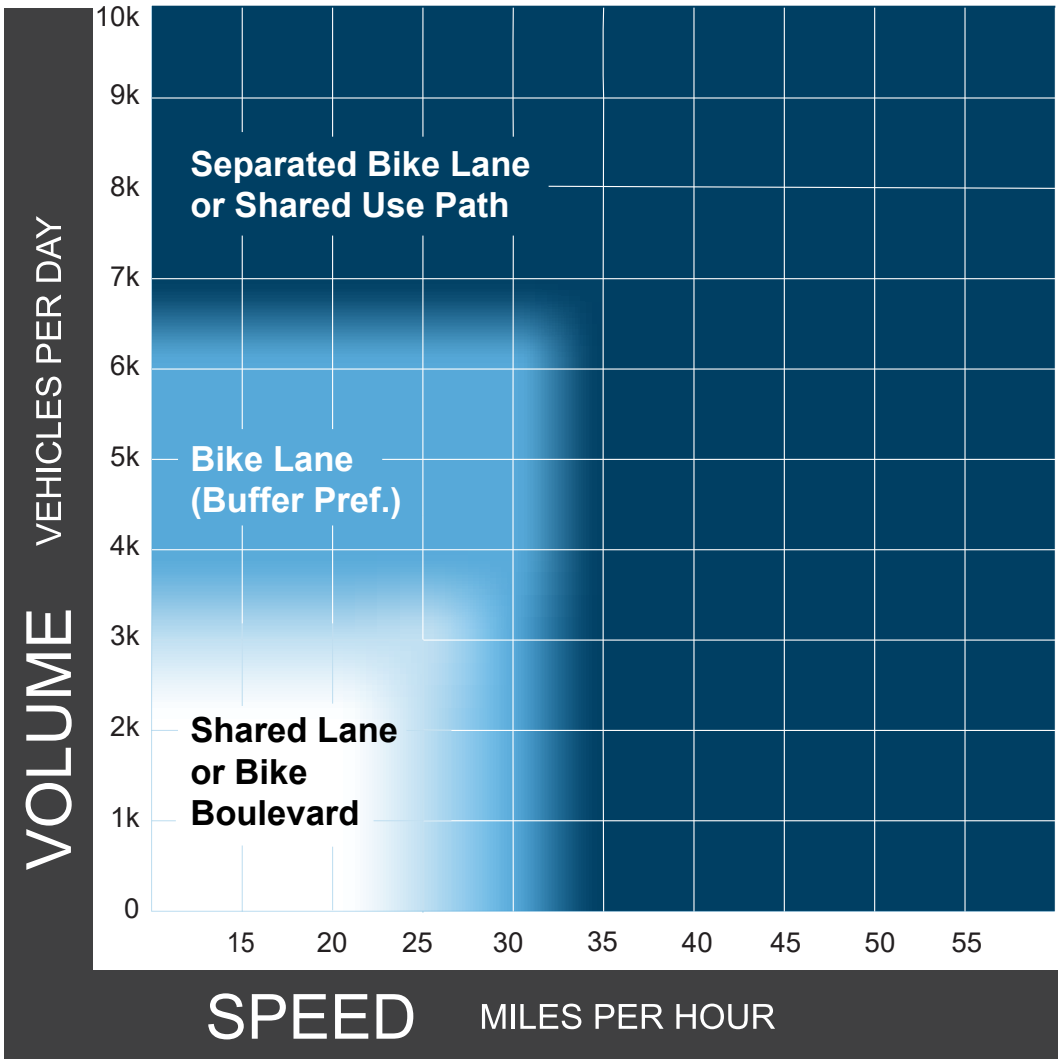
8 VDOT Complete Streets: Bicycle and Pedestrian Facility Guidelines, Bus Stop Design, and Parking Guidelines, https://www.virginiadot.org/business/resources/LocDes/RDM/Appenda1.pdf

Facility Selection

The Federal Highway Administration has released guidance for Bicycle Facility Selection based on the speed and volume of the roadway (Figure 18, Figure 19).[9] This guidance was incorporated into VDOT's Bicycle and Pedestrian Design Guidance.[10] This guidance was used to develop recommendations for the priority projects detailed in the next section. Gloucester County could adopt or reference this guidance in their Comprehensive Plan and use it to inform design decisions on other roads in the future.

Since the majority of the roads in Gloucester that were evaluated for this study have driving speeds of 45 MPH or higher (see Figure 11), conventional bike lanes, sidewalks without buffers, shared lane markings (i.e., sharrows), and other facilities that do not physically separate people walking and biking from traffic will not be considered comfortable facilities by most people in those locations. The exceptions (of the roads evaluated for this study) are Greate Road and Main Street. There are numerous other neighborhood streets in Gloucester that were not specifically evaluated for speed and volume as part of this study where shared-lane markings, conventional bike lanes, sidewalks without buffers, or other treatments that do not provide a buffer between users may be appropriate. Figure 18 and Figure 19 should be used to determine the appropriate facility for each place.

Figure 18: Preferred Bikeway Type for Urban, Urban Core, Suburban and Rural Town Contexts (source: FHWA Bikeway Selection Guide)



Notes

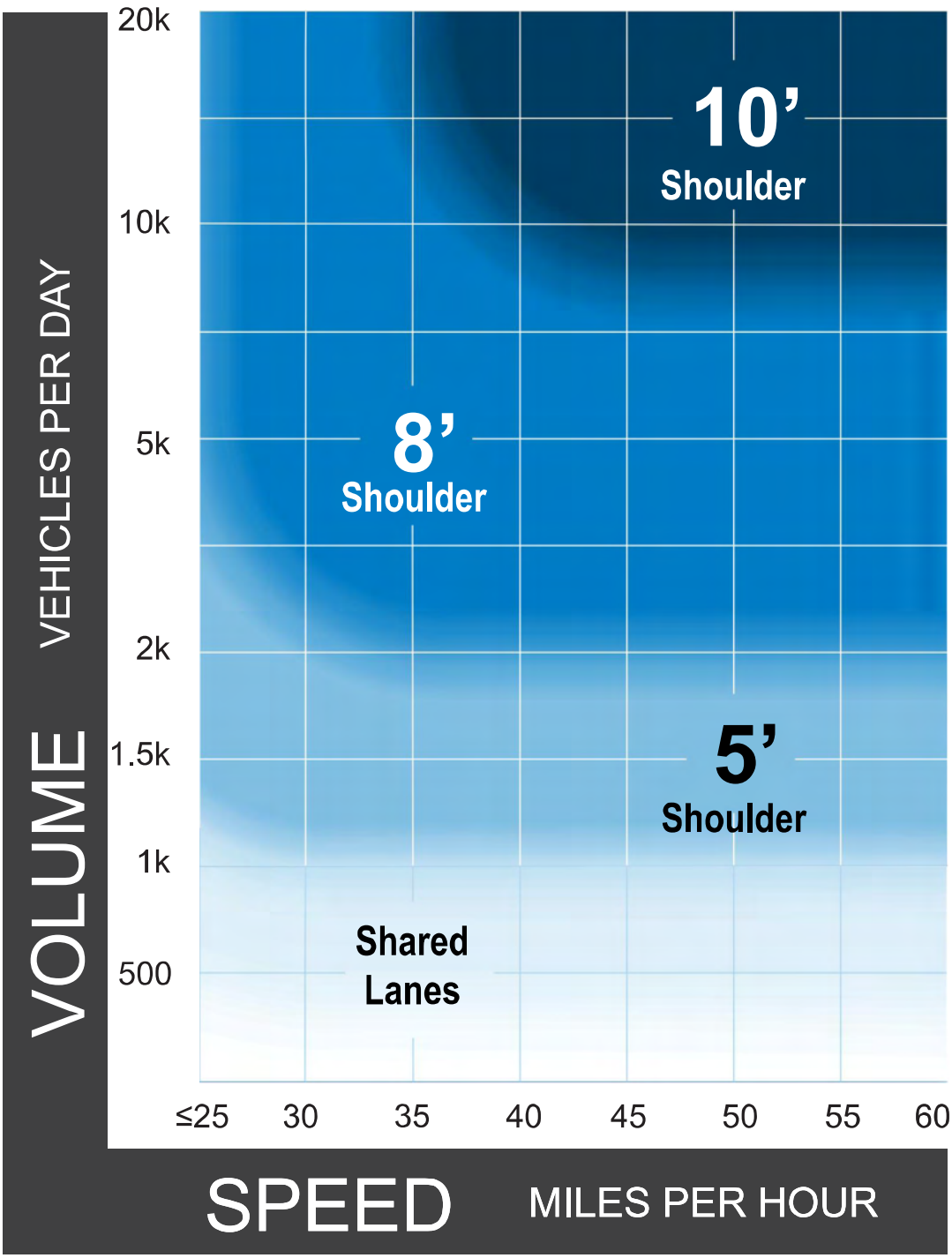
1 Chart assumes operating speeds are similar to posted speeds. If they differ, use operating speed rather than posted speed.

2 Advisory bike lanes may be an option where traffic volume is <3K ADT.

9 Federal Highway Administration, Bikeway Selection Guide, February 2019, https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

10 Virginia Department of Transportation Complete Streets: Bicycle and Pedestrian Facility Guidelines, Bus Stop Design, and Parking Guidelines, https://www.virginiadot.org/business/resources/LocDes/RDM/Appenda1.pdf

Figure 19: Preferred Shoulder Widths for Rural Roadways
(source: FHWA Bikeway Selection Guide)



Notes

1 This chart assumes the project involves reconstruction or retrofit in constrained conditions. For new construction, follow recommended shoulder widths in the AASHTO Green Book.

2 A separated shared use pathway is a suitable alternative to providing paved shoulders.

3 Chart assumes operating speeds are similar to posted speeds. If they differ, use operating speed rather than posted speed.

4 If the percentage of heavy vehicles is greater than 5%, consider providing a wider shoulder or a separated pathway.

PRIORITY ROUTES

This section presents the consultant team's recommended design concepts for the four priorities identified by Gloucester County staff as part of this project. The design concepts are consistent with VDOT Guidelines and Standards unless otherwise noted. The project team conducted one day of field work to explore the Vision Network and identify major barriers/constraints along priority routes. All dimensions and locations described below were approximated from GIS and aerial imagery. Further exploration, via survey and engineering analysis, is needed.

Guinea Road / Tidemill Road

Guinea Road (State Route 216) is a heavily traveled route that connects the Hayes/Gloucester Point Urban Development Area to an array of destinations on the Guinea Peninsula including Achilles Elementary School, the Abingdon Ruritan Club, numerous churches, Crown Point Marina, and the residential communities of Bena, Perrin, Maryus, and Severn (see Figure 20). In the surveys conducted for this project, Guinea Road received among the highest number of public comments related to the need for improved access for people walking and biking. Many respondents noted that a lot of people already walk and bike on Guinea Road and expressed concerns about safety. People also noted the desire to walk/bike to and between shops at York River Crossing and throughout the Hayes district in the vicinity of Guinea Road. Near the intersection with Route 17, the right-of-way along Guinea Road is 70-80 feet and features a roadway that is roughly 50 feet wide with curb and gutter, 2-3 travel lanes, turn lanes, and a 5-foot sidewalk (no buffer). East of the York River Crossing shopping center property, the right-of-way for most of Guinea Road is 50 feet featuring a 24-foot, two-lane roadway with drainage via ditches on both sides. The power lines run along the north side of the road in most of the alignment but switch to the south side in a segment east and west of Gregory Lane. The posted speed limit is 45 MPH, typical driving speed is 55 MPH, and the estimated daily traffic volume is 5,150 (west of Low Ground Road).[11]

Tidemill Road is a roughly one-mile connection between Route 17 and Guinea Road. Since the driving speeds and volumes are lower than on Guinea Road, Tidemill Road is considered a more comfortable alternative to Guinea Road for people walking and biking. It also features relatively compact residential communities, including over 200 homes, and provides access to the many waterfront homes including Dockside Condominiums. The right-of-way along Tidemill Road is 50 feet except on the northeastern segment, where it appears to go down to an estimated 40 feet (survey is required for verification). The road is a 24-foot paved cross section with two travel lanes. Drainage is handled via ditches on both sides of the road with power lines alternating between the north and the south side. There is a 32-foot-wide bridge at a mid-point on the road. The speed limit is 45 MPH, typical driving speed is 48 MPH, and the estimated daily traffic volume is 4,627.[12]

According to the FHWA Bicycle Facility Selection Guidance, the driving speeds on Guinea Road and Tidemill Road are above the threshold recommended for an on-road bicycle facility. For this reason, this study recommends a shared use path on the south side of Tidemill Road and on the south side of Guinea Road from Route 17 to Maryus Road. The shared use path is recommended on the south side of Tidemill Road because of fewer anticipated impacts/conflicts with the utility poles. On Guinea Road, the driveway and utility conflicts seem to be roughly comparable between the north and the south side; however, the south side is recommended because it provides more direct access to York River Crossing, Achilles Elementary School, and significantly more housing than the north side of the road.

Along the "Guinea Loop" formed by Maryus Road, Guinea Road east of Achilles, and Guinea Circle, this study recommends the installation of Shared Lane Markings (a.k.a. sharrows), BICYCLES MAY USE FULL LANE signs, and PEDESTRIAN warning sign with the ON ROADWAY legend plaque. While research shows that shared lane markings and signs do not have a notable impact on safety, they can be useful at reminding drivers to stay alert for bicyclists/pedestrians and support wayfinding for circuitous routes like this. Another consideration for the loop is to install an Advisory Shoulder treatment the next time the road is resurfaced. This may require reducing the speed limit and other measures to keep driving speed at 35 MPH or lower. As discussed in the Facility Selection section of this report, Advisory Shoulders are appropriate on low-volume, low-speed streets and create a designated space along the edge of the roadway for people to walk and bike. This treatment could be implemented without widening the paved section or acquiring additional right-of-way. Because it is a new facility type in Gloucester and will be unfamiliar to most people, a robust public outreach and education campaign would need to accompany its installation. Further study is needed to confirm the applicability of this treatment in this location.

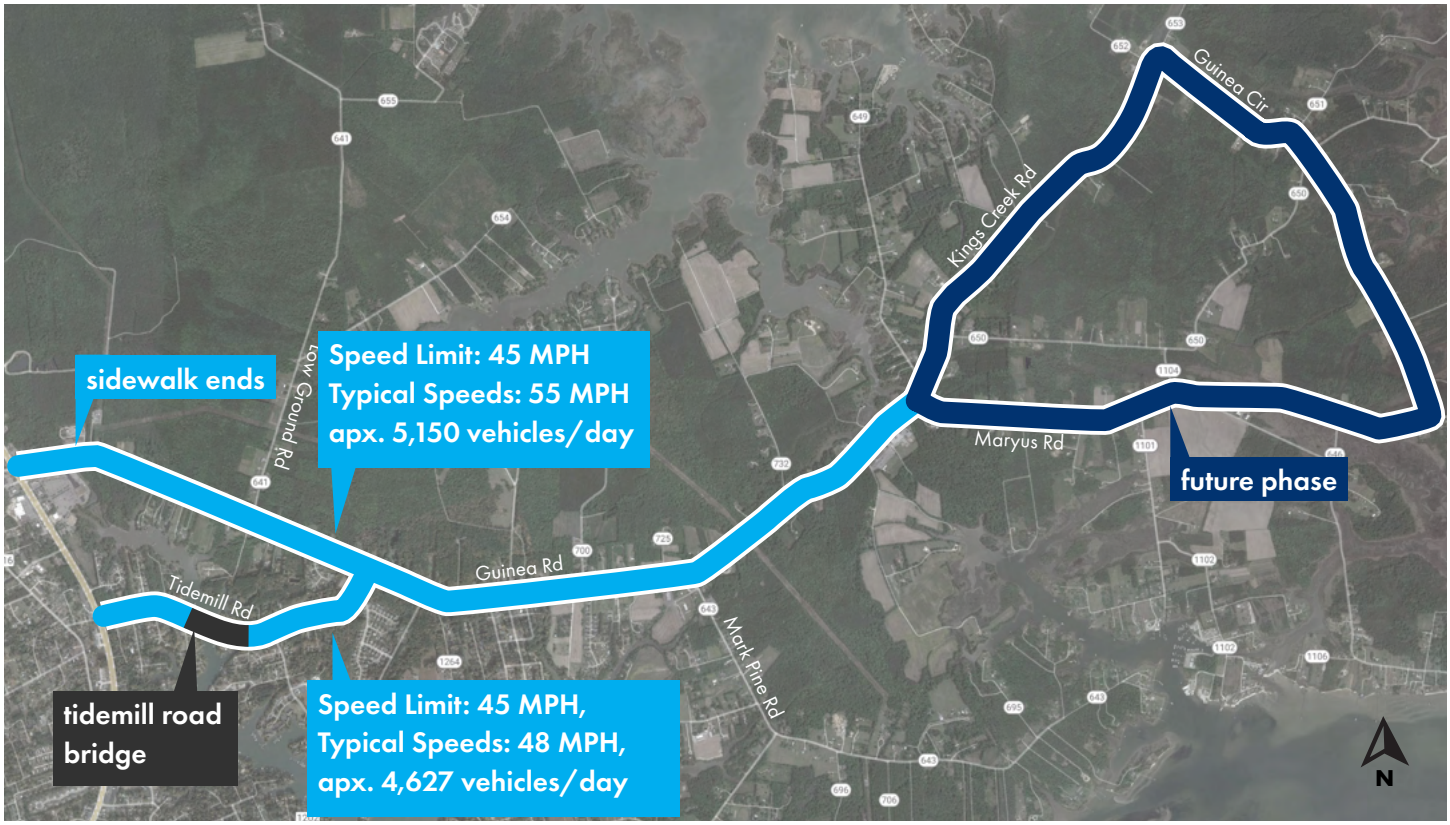
Figure 21 shows the proposed design concept for Guinea Road and Tidemill Road. This concept would require acquisition or easements for an estimated 5–13 feet of right-of-way (field survey is required to verify and refine this estimate). A 32-foot cross section is shown for the Tidemill Bridge, where the shared use path converts into a buffered shoulder. At a future point when the Tidemill Bridge is reconstructed, the deck should be widened to accommodate the shared use path and buffer.

This report recommends as the first phase of implementation the segment on Tidemill Road from Route 17 to Guinea Road. The estimated planning-level cost to construct this concept is $3.6 to $4.9 million (further study needed to refine cost estimates based on survey and additional engineering analysis.)[13]

11 Streetlight analysis conducted as part of this study (2019 and 2020 data). Driving speed = 85th percentile speeds.
12 Streetlight analysis conducted as part of this study (2019 and 2020 data). Driving speed = 85th percentile speeds.
13 Planning-level costs derived from VDOT Cost Estimate Workbook. See Appendix A for cost estimate assumptions and inputs.

Figure 20: Guinea Road / Tidemill Road

Existing



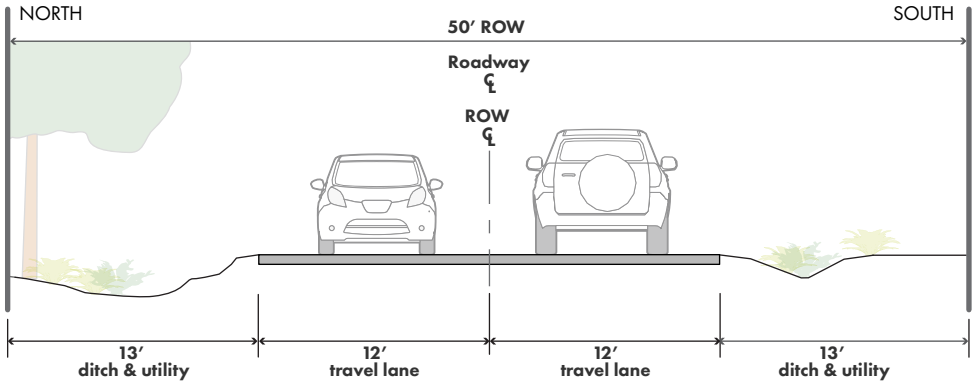
Design Concepts

ROW = Right-of-way

Figure 21: Recommendations for Guinea Road and Tidemill Road

Existing
Guinea & Tidemill Rd

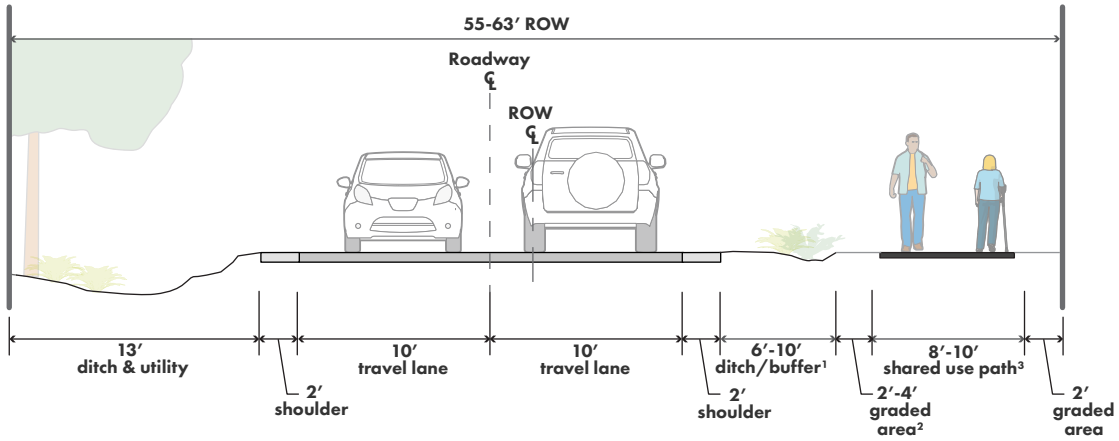
Right-of-way may vary along corridor – verification via survey is needed. The graphics and concepts on this page assume that the road is in the center of the right-of-way.



SECTION A

Guinea & Tidemill Rd

Maintains the centerline to reduce construction impacts. Utilities may require relocation or easement in some locations.

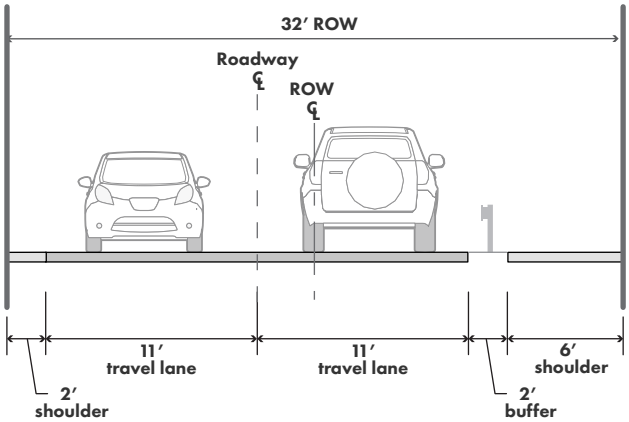


NOTES:
1. Ditch dimensions depend on local conditions and may need to be wider than this in some locations. Further study is needed.
2. Vertical obstructions (signs, poles, etc.) located in this zone must be at least 2′ (3′ preferred) from the shared use path. If less than 3′, a VDOT waiver is required.
3. A shared use path less than 10′ wide requires a VDOT waiver.

SECTION B

Tidemill Road (bridge)

Near term, the bridge is resurfaced to create a vertical buffer (i.e. guard rail) and shoulder. In the future when bridge is replaced, deck should be widened to accommodate the buffer and shared use path in **Section A**.



CL = Centerline. Concepts assume the centerline is in the middle of the right-of-way. Survey is required to confirm.

Figure 22: Illustration of the Advisory Shoulder treatment that may be considered along the "Guinea Loop"

Figure 23: Illustration of a possible shared use path along Guinea Road, connecting to Achilles Elementary School and the Gloucester Point/Hayes Urban Development Area

Roaring Springs Road

The Courthouse UDA is the historic heart of Gloucester and features one of the most compact development pattern in the County. For this reason, lots of people currently walk and bike in the Courthouse and there is significant potential for increased active travel in this area. There are existing plans to install a shared use path along Main Street from Fox Mill Centre to Main Street Center, which would connect to existing sidewalks that run along both sides of Main Street from Route 14 to Route 17 near Riverside Walter Reed Hospital. These connecting facilities will link three bus stops, restaurants, shops, the County Administration buildings, and hundreds of homes. They will also help improve equity, by increasing safety and access to affordable shopping/groceries for people who depend on walking, biking, and transit for transportation.

The next logical extension of this blossoming multimodal network in the Courthouse Urban Development Area is a biking and walking connection along Roaring Springs Road (State Route 616) to connect the Courthouse to the main entrance to Beaverdam Park. Beaverdam Park is a popular regional destination for hiking, trail running, fishing, horseback riding, and mountain biking. The park also features picnic areas, a boat launch, activities hosted by the Parks and Recreation department, and a group lodge. Roaring Springs Road is the only way to access the eastern entrance of Beaverdam Park. An improved pedestrian/bicycle connection along Roaring Springs Road has been under consideration for over 20 years and the County has secured funding from the Congestion Mitigation and Air Quality (CMAQ) program to design and construct a portion of this route.

As shown in Figure 24, the existing right-of-way along Roaring Springs Road is 40 feet for most of the route, widening to 45 and then 50 feet in the southern-most portion of the road. The posted speed limit is 25 MPH near Botetourt Elementary School and 35 MPH in the northern segment near Beaverdam Park. The existing cross section features two travel lanes, estimated driving speeds of 39 MPH, and estimated traffic volume of 1,999 vehicles/day south of Holly Springs Road and 940 vehicles/day north of that point.[14] The roadway design varies, including a southern portion with curb and gutter, existing sidewalks, and a 30-foot paved cross section; a central curbless portion with a 24-foot paved cross section with a centerline; and, and a northern curbless portion with an 18-foot unmarked paved section. Drainage is handled via ditches on both sides of the road, and the power lines parallel the road alternating between the west and the east side at several points. There are two pinch points: a) a 35-foot-wide bridge, and b) a 30-foot-wide section featuring steep slopes, a road culvert, and guardrails on both sides (see Figure 24).

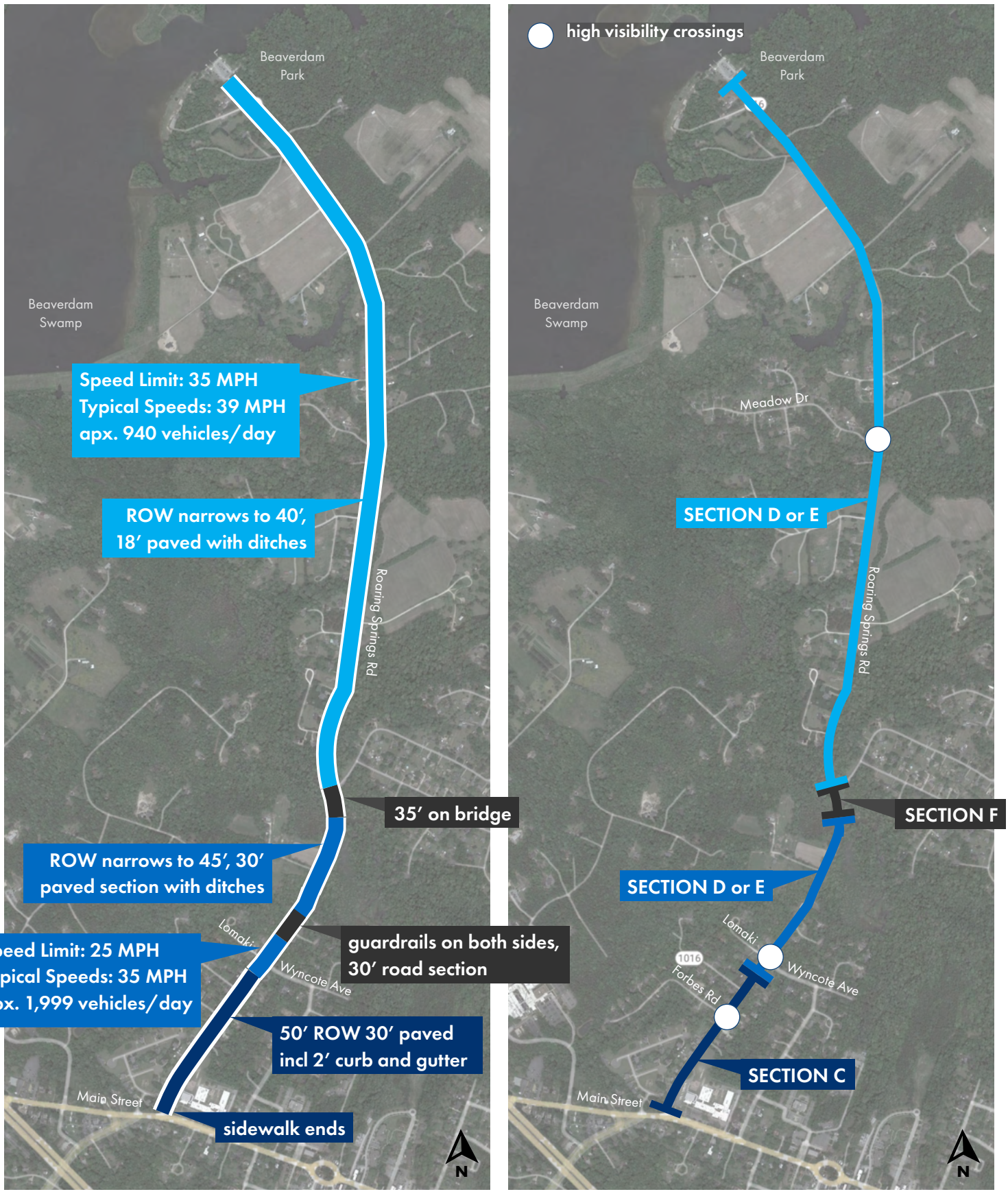
A 2002 study evaluated the feasibility of improving pedestrian and bicycle access along Roaring Springs Road.[15] After exploring five alternatives, the study recommended widened shoulders on Roaring Springs Road from Wyncote Avenue to Beaverdam Park, new sidewalks on the east side of Roaring Springs Road from Wyncote Avenue to Botetourt Elementary School, and Bike Route signs to direct people through the neighborhoods at Cary Avenue/South Street/Martin Street.

The 2002 study predates federal and VDOT guidance related to "low-stress" bicycle facilities (i.e., facilities that may attract a wider audience than just strong/confident bicycle riders). According to current guidance from the FHWA Bicycle Facility Selection Matrix, the AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, and the DVRPT Multimodal System Guidelines, the driving speeds on Roaring Springs Road make it unlikely that a paved shoulder will be widely used by a broader audience including joggers, families out for a casual bike ride, people walking their dogs, and children walking/biking to Botetourt Elementary School. For this reason, **this study recommends a separated, buffered sidewalk or shared use path along the east side of the road from Main Street to Beaverdam Park.** The east side was selected because of the direct connection to Botetourt Elementary and the Holly Springs neighborhood, and because there are slightly fewer properties/driveways compared to the west side.

The preferred cross section along the entirety of this route is an 8- to 10-foot shared use path separated from the roadway by a buffer (see Figure 26, Section D).[16] However, implementing this cross section requires either eliminating ditches by adding curb-and-gutter or acquiring an estimated 7–16 feet of additional right-of-way along most of Roaring Springs Road (field survey is needed to verify and refine this estimate). This study does not recommend the curb-and-gutter option, due to high cost and complexity. Additional right-of-way acquisition should be explored where possible in order to achieve the preferred design. However, recognizing that right-of-way acquisition can be costly and complex, **this study also provides an alternative that could be implemented as an interim design.** The interim design features a sidewalk separated from the road by a buffer (Figure 26, Section E). South of Wyncotte Avenue, where there is existing curb and gutter, the recommended buffer is a grass strip. North of Wyncotte Avenue, the buffer would contain the drainage ditch. From Main Street to Holly Springs, this design may be feasible within the existing right-of-way and maintains the location of the road centerline (i.e., minimal or no roadway reconstruction is required, though further study is needed to determine whether additional easements are required for utility relocations). North of Holly Springs, where the existing right-of-way is 40 feet, the recommended design would require additional right-of-way acquisition. Planning-level cost estimates for the first phase that is recommended for implementation, from Main Street to Holly Springs, are $1.7–$2.7 million (further study needed to refine cost estimates).[17]

14 Streetlight analysis conducted as part of this study (2019 and 2020 data). Driving speed = 85th percentile speeds.
15 Buchart Horn, Inc. Pedestrian/Bicycle Path Feasibility Study for the Gloucester County Courthouse and Beaverdam Park Area (2002).
16 VDOT design standards require a waiver for a shared use path less than 10 feet wide. https://www.virginiadot.org/business/resources/LocDes/RDM/Appenda1.pdf
17 Planning-level costs derived from VDOT Cost Estimate Workbook. See Appendix A for cost estimate assumptions and inputs.

Figure 24: Roaring Springs Road

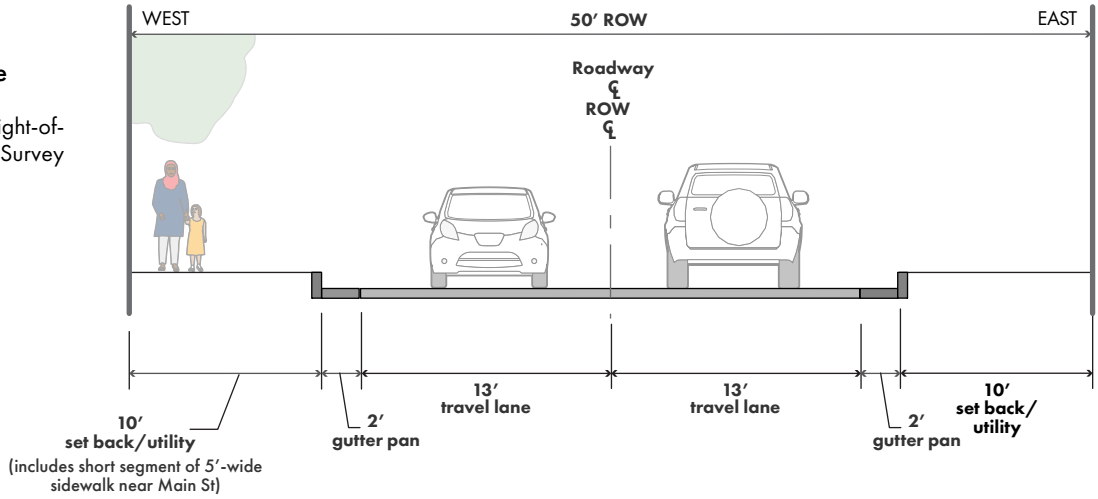


ROW = Right-of-way

Figure 25: Recommendations for Roaring Springs Road (Main Street to Wyncote Avenue)

Existing
Main St to Wyncote Ave

Existing cross section and right-of-way varies along corridor. Survey needed for verification.



SECTION C

Main St to Wyncote Ave

Requires a 1′ easement or waiver for graded area. If roadway reconstruction is possible, narrow travel lanes to 11′ consistent with VDOT Road Design Manual and widen buffer (6′) and sidewalk (8′).

CL = Centerline. ROW CL is approximated, survey is required to confirm.

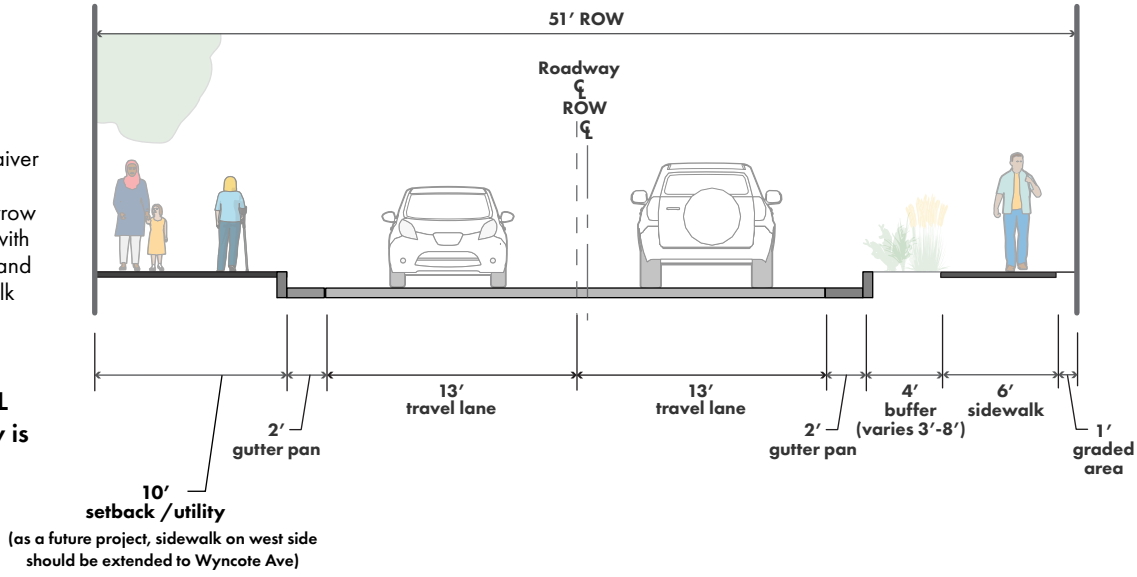
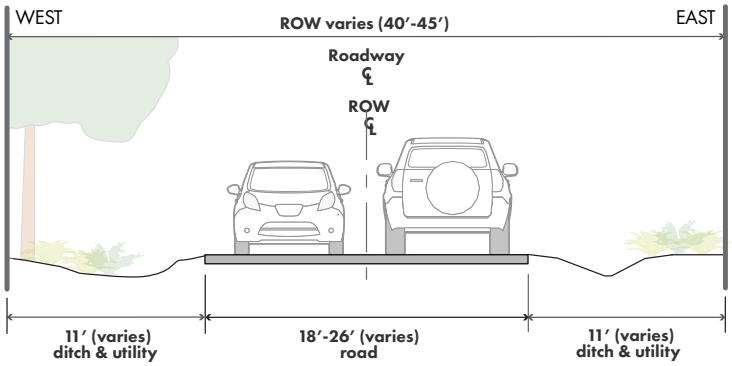


Figure 26: Recommendations for Roaring Springs Road (Wyncote Avenue to Beaverdam Park)

Existing Wyncote Ave to Beaverdam Park

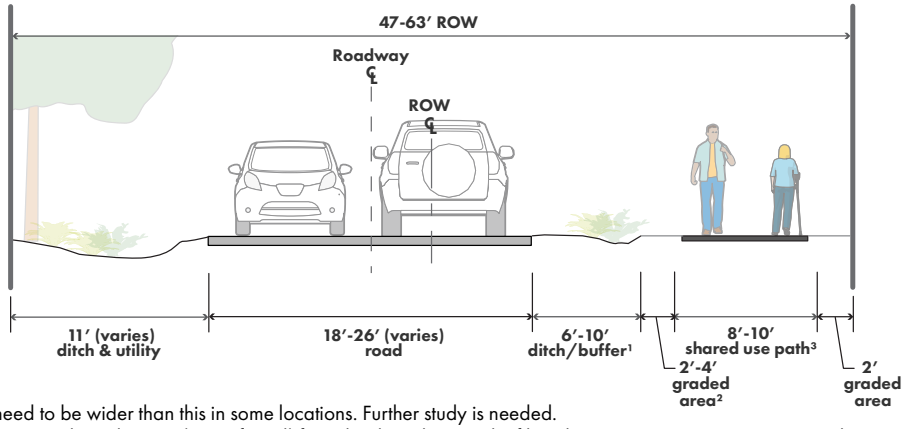
Existing cross section and right-of-way varies along corridor. Survey needed for verification.



SECTION D

Wyncote Ave to Beaverdam Park: Preferred

Maintains the centerline to minimize construction impacts. Utilities may require relocation or easements in some areas.

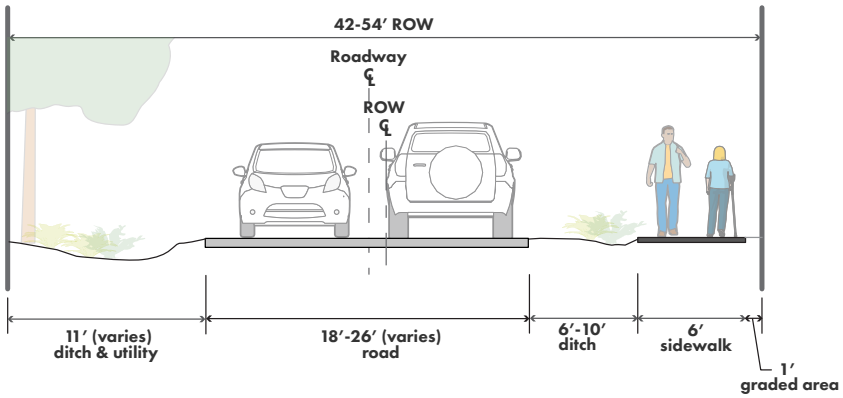


NOTES:
1. Ditch dimensions depend on local conditions and may need to be wider than this in some locations. Further study is needed.
2. Vertical obstructions (signs, poles, etc.) located in this zone must be at least 2′ (3′ preferred) from the shared use path. If less than 3′, a VDOT waiver is required.
3. A shared use path less than 10′ wide requires a VDOT waiver.

SECTION E

Alternative if Section D is not feasible

Maintains the centerline to reduce construction/right-of-way impacts. From Wyncote Ave to Holly Springs, this may be feasible within the existing right-of-way (field study is needed to confirm). Ditch dimensions require further study. Vertical obstructions (signs, poles, etc.) located alongside the sidewalk would require additional right-of-way or easements.



SECTION F

Pinch Points

Recommended at bridge and area with guard rails on both sides of roadway. In the future when bridge is replaced, deck should be widened to accommodate and 8′ shared use path and a 6′ buffer. Another alternative is a pedestrian bridge in this area.

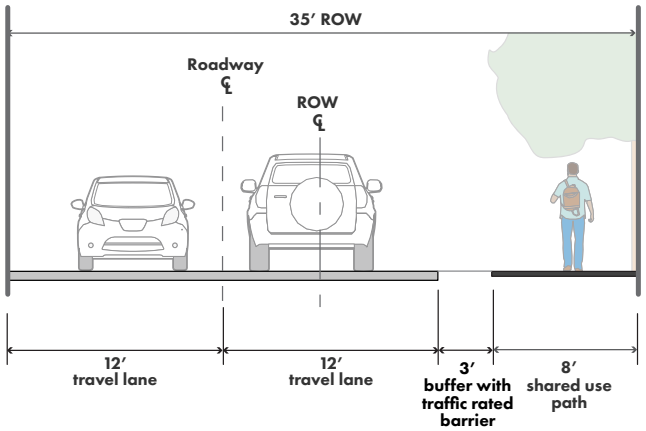


Figure 27: Illustration of a possible buffered sidewalk along Roaring Springs Road, connecting to Botetourt Elementary School and the Courthouse

Route 17

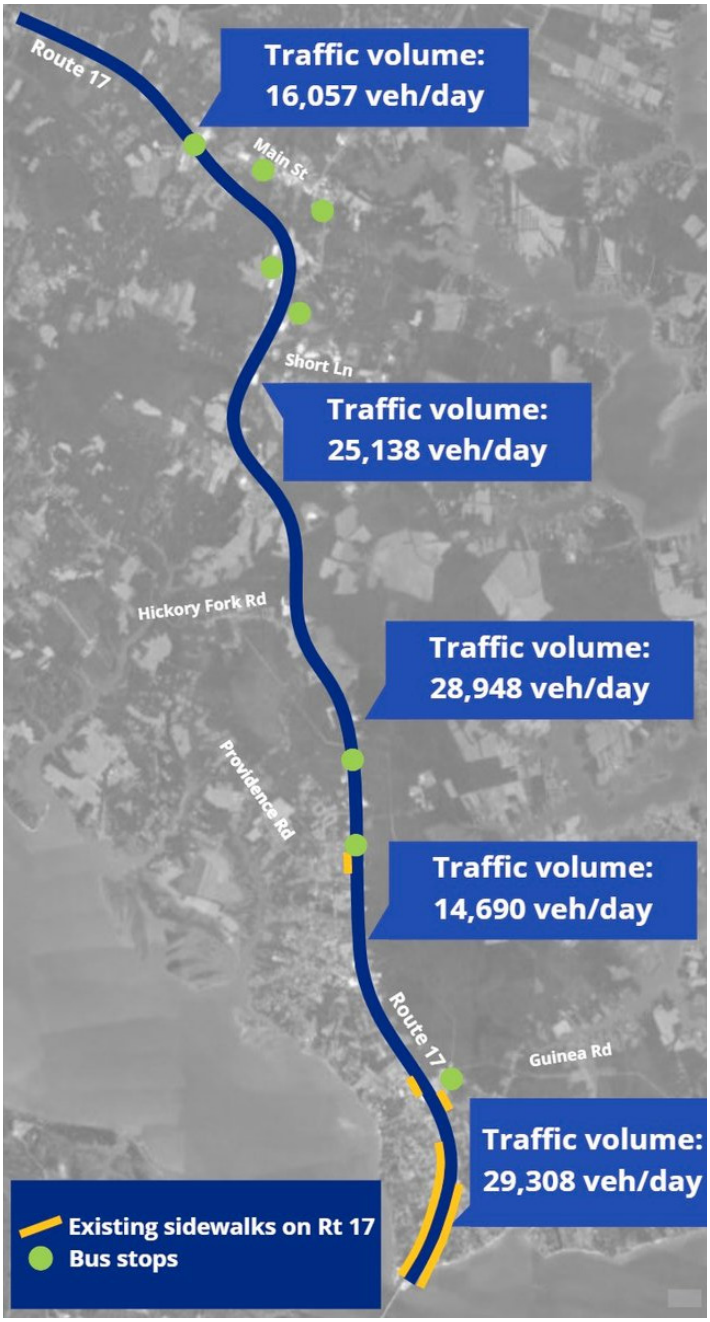
Route 17 (George Washington Memorial Highway) is the central artery for travel in Gloucester. It is a four-lane divided highway with frequent turn lanes at intersection approaches. The right-of-way varies but is 162 feet for much of its length through Gloucester. The posted speed limit varies between 45 MPH and 55 MPH and the driving speeds are typically 60–65 MPH.[18] The average daily traffic volumes vary significantly along the corridor (see Figure 28).[19]

Route 17 is one of twelve corridors designated in VTrans as a Cooridor of Statewide Signifigance, defined as "An integrated, multimodal network of transportation facilities that connect major centers of activity within and through the Commonwealth and promote the movement of people and goods essential to the economic prosperity of the state." The road is designated as a Principal Arterial, which makes it part of the National Highway System and thus eligible for additional federal funding programs.

Just as Route 17 serves as the backbone of the transportation system for drivers, it is similarly critical for people walking, biking, and using transit in Gloucester. It provides the only direct connection between the Urban Development Areas. There are six Bay Transit stops along the corridor in (or near) the UDAs, which most transit users access on foot. Currently, there are intermittent sidewalks that are typically 5 to 6 feet wide. The existing sidewalks are located immediately adjacent to the roadway or feature a grass buffer ranging from 3 to 6 feet (one exception exists at the intersection of Route 17 and Guinea Road, where one property on the west side features a sidewalk that is set back from the road by a 50 to 55-foot grass buffer.) Most of the existing sidewalks on 17 have been implemented using a piecemeal approach through individual development proposals or allocations of funds through the Congestion Mitigation and Air Quality Improvement (CMAQ) Program. The county desires to have a uniform plan for active transportation along Route 17 so that future development can contribute to and benefit from increased and safe pedestrian and bicycle access.

There are no bicycle facilities on Route 17; people typically bike in the shoulder. Crashes for all modes (2014-2021) were concentrated along Route 17 and research indicates that a crash involving driving speeds of 60–65 MPH has a very high likelihood of resulting in a serious injury or fatality, particularly if the crash involves people walking or biking. In addition to being inconsistent with VDOT and FHWA guidance for pedestrian and bicycle design,[20] the conditions along Route 17 do not create a level of comfort that will appeal to most potential walkers and bike riders. (Note: Although further study is needed, much of the guidance in this section is also applicable to Route 14 which is also a four-lane divided highway.)

Figure 28: Route 17 Traffic Volumes, Existing Sidewalks, and Bus Stops



18 Streetlight analysis conductd as part of this study (2019 and 2020 data). Driving speed = 85th percentile speeds.

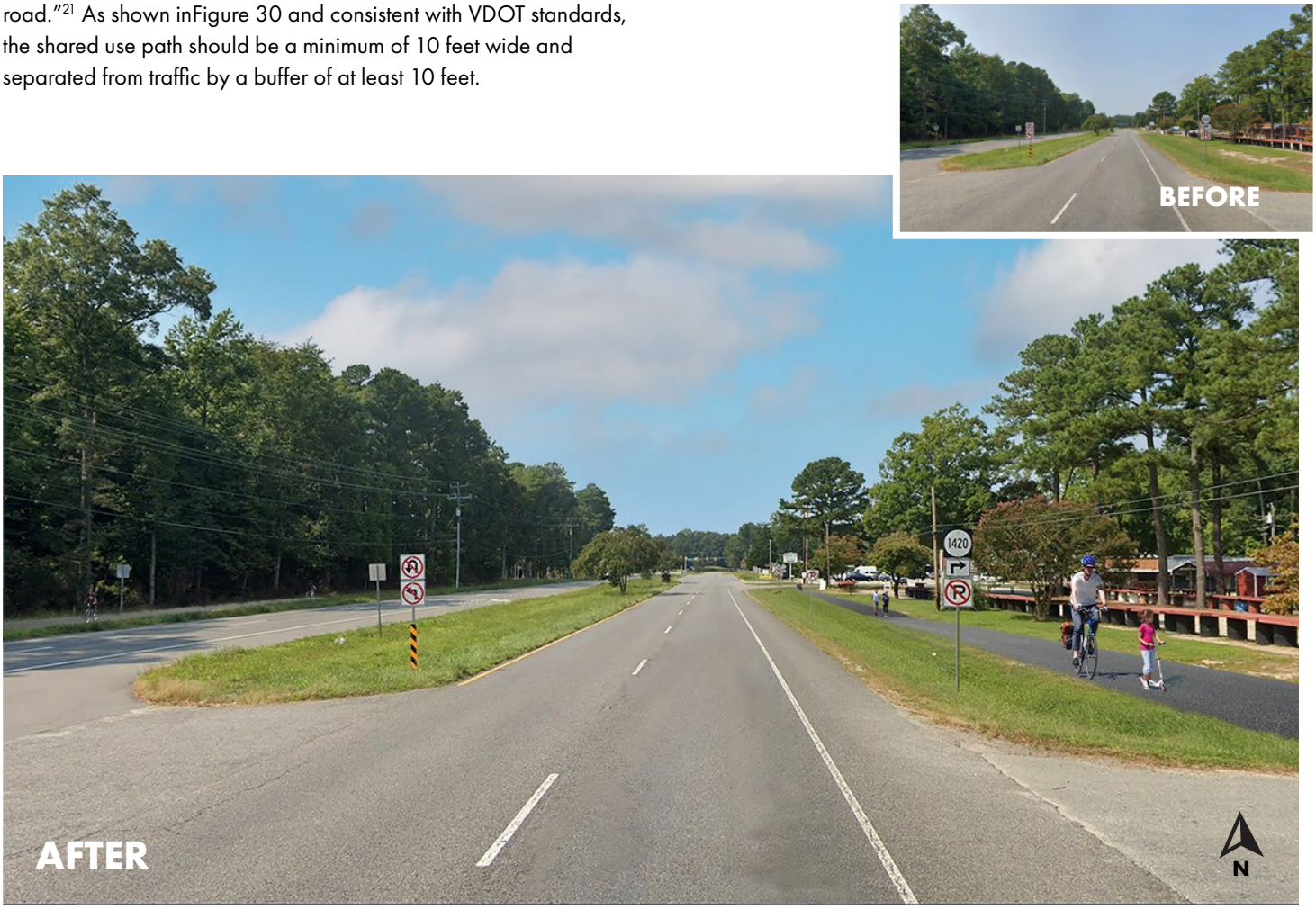
19 Streetlight analysis conductd as part of this study (2019 and 2020 data). Driving speed = 85th percentile speeds.

20 Virginia Department of Transportation, Road Design Manual Appendix A: Bicycle Facility Guidelines, https://nrvrc.org/nrvmpo/resources/VDOT-RoadDesignManual-AppA.pdf; Appendix A1: VDOT Complete Streets: Bicycle and Pedestrian Facility Guidelines, Bus Stop Design, and Parking Guidelines, https://www.virginiadot.org/business/resources/locdes/rdm/Appenda1.pdf; Federal Highway Administration, Bikeway Selection Guide, https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

Figure 29: Illustration of Proposed Shared Use Paths along Route 17

FHWA guidance indicates that, given the speed of traffic on Route 17, the appropriate bicycle facility is one that provides separation from traffic. Given the current and anticipated volumes of people walking and biking, a shared use path that is used by pedestrians and bicyclists is a more space-efficient and appropriate design than providing both a buffered sidewalk and a separated bikeway. However, because of the width of Route 17 (and thus the time and exposure associated with crossing the road), this study recommends shared use paths on both sides of Route 17. This is consistent with VDOT guidance, which states that "when (shared use) paths are planned, it is desirable to provide paths on both sides of the roadway to decrease the likelihood of children crossing the road."[21] As shown inFigure 30 and consistent with VDOT standards, the shared use path should be a minimum of 10 feet wide and separated from traffic by a buffer of at least 10 feet.

While the existing width of the roadway varies because of turn lanes along the route, in much of the corridor this design could be implemented without the need to acquire additional right-of-way or disturb the existing roadway. (Survey and engineering analysis is needed to confirm this.) The planning-level cost estimate for this concept is approximately $5.2 to $8.4 million per mile (further study needed to refine cost estimates).[22]



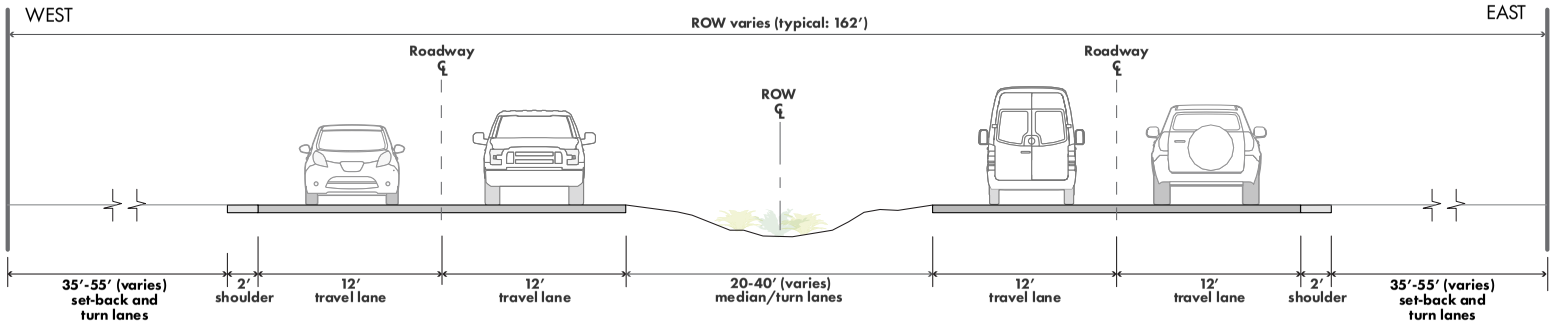
21 Virginia Department of Transportation, Appendix A1: VDOT Complete Streets: Bicycle and Pedestrian Facility Guidelines, Bus Stop Design, and Parking Guidelines, https://www.virginiadot.org/business/resources/locdes/rdm/Appenda1.pdf (page 24)

22 Planning-level costs derived from VDOT Cost Estimate Workbook. See Appendix A for cost estimate assumptions and inputs.

Figure 30: Recommendations for Route 17

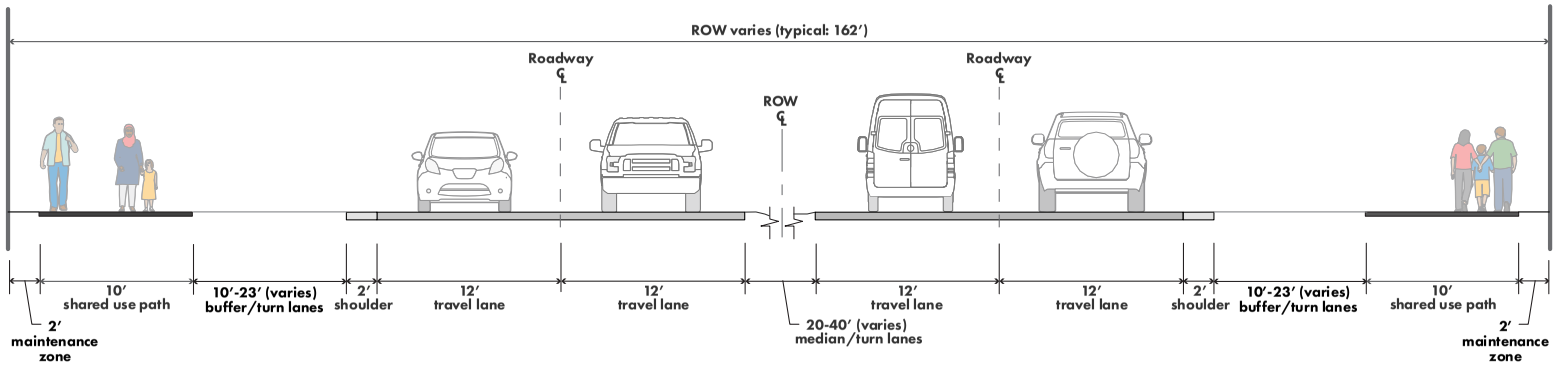
Existing

Existing cross section and right-of-way varies along corridor. Survey needed for verification. Turn lanes at signalized intersections create a wider existing cross section.



SECTION G

In many segments of Route 17, this design may be feasible without disturbing the existing roadway.



ROW = Right-of-way

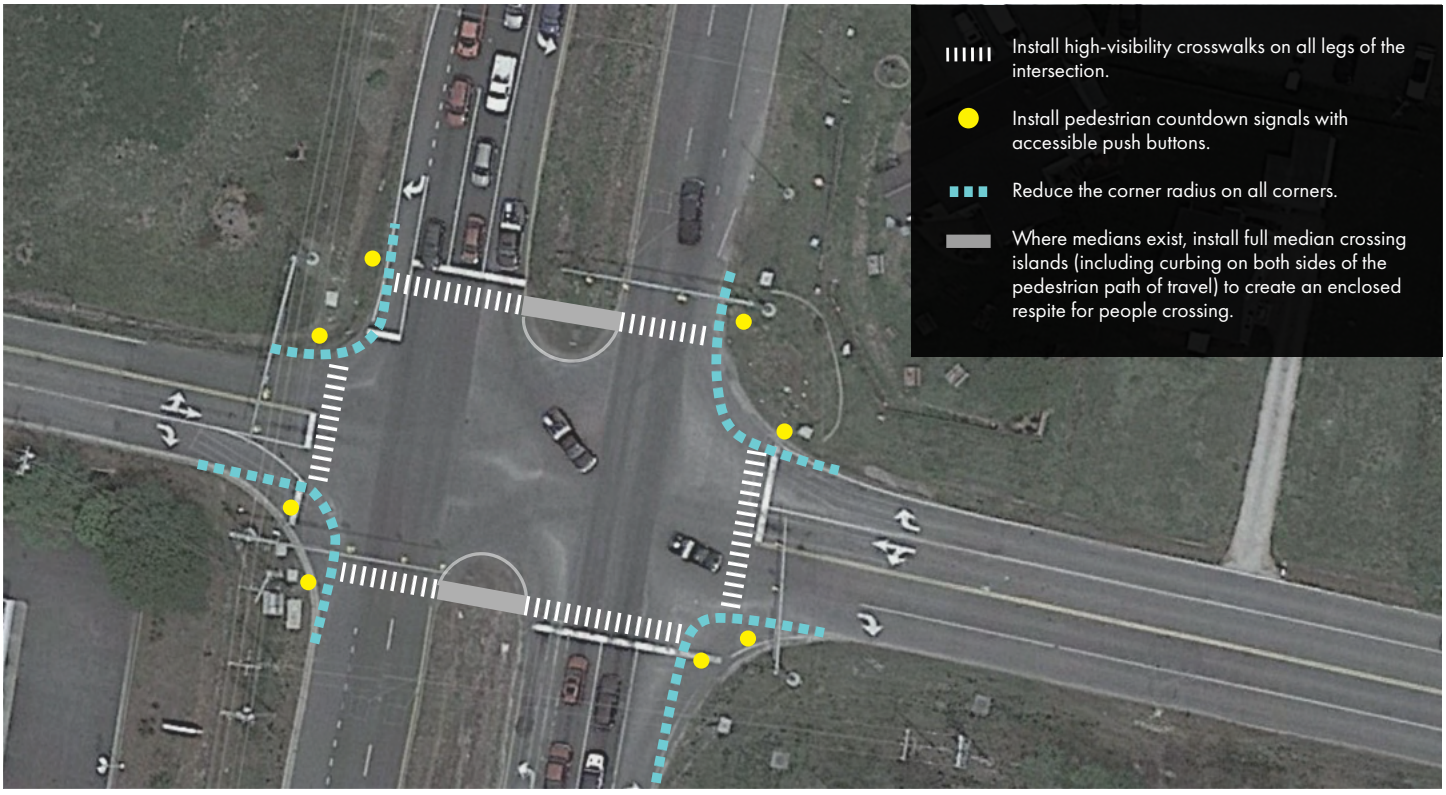
CL = Centerline. ROW CL is approximated, survey is required to confirm.

According to VDOT, careful design of driveways and intersections along a shared use path "is of paramount importance to the safety of path users and motorists."[23] The design of driveways and intersections should follow VDOT and FHWA guidance. Additionally, to create a functional network that maximizes safety and enables people to reach destinations on both sides of Route 17, this study recommends the following design changes at all current and future signalized intersections along Route 17 (see Figure 31):

a. Install high-visibility crosswalks at all legs of the intersection.
b. Install pedestrian countdown signals with accessible push buttons.
c. Reduce the corner radius to improve drivers' ability and likelihood to yield to pedestrians and to encourage slower turning speeds. Minimize the use of free flow right turn lanes (i.e., slip lanes) since they increase potential conflicts between vehicles and people walking/biking.
d. Where medians exist, install full median crossing islands (including curbing on both sides of the pedestrian path of travel) to create an enclosed respite for people crossing. However, signal timing should enable people walking and biking to cross the full leg of the intersection (rather than a two-stage crossing where pedestrians must wait in the middle of the road for a signal cycle).

Uncontrolled crossings (i.e., crossings without a signal or other form of traffic control) are not appropriate along Route 17 because of the number of travel lanes and the speed/volume of traffic. In additional to traffic signals, VDOT and FHWA guidance indicate that Pedestrian Hybrid Beacons (which can be activated by a pedestrian and use a signal to stop traffic) may be applicable in some locations along Route 17.[24] Further engineering analysis is needed to determine applicability in specific locations.

Figure 31: Recommended Changes to Signalized Intersections on Route 17



23 Virginia Department of Transportation, Appendix A1: VDOT Complete Streets: Bicycle and Pedestrian Facility Guidelines, Bus Stop Design, and Parking Guidelines, https://www.virginiadot.org/business/resources/locdes/rdm/Appenda1.pdf (page 24)

24 Virginia Department of Transportation, Pedestrian Hybrid Beacon (PHB), https://www.virginiadot.org/programs/resources/BikePed/PHB_Brochure_-_Final-acc11012021.pdf; Federal Highway Administration, Manal on Uniform Traffic Control Devices (Chapter 4F), https://mutcd.fhwa.dot.gov/htm/2009/part4/part4f.htm

TYPICAL CROSS SECTIONS FOR OTHER THROUGH-ROADS IN THE VISION NETWORK

Transportation in Gloucester depends on a network of secondary roads that connect neighborhoods and local roads to Route 17 and the Urban Development Areas. These roads, called major and minor collectors, provide crucial, daily connections for the majority of Gloucester residents and, similarly, are essential to pedestrian and bicycle connectivity. Many of these roads are already places where people walk and bike, particularly people who depend on low-cost transportation to reach jobs and services and bicyclists on recreational/fitness rides. Major and minor collector roads that are part of the Vision Network include (numbers correspond to labels on the Vision Network map – Figure 16):

1	Enos Road (SR 613)	14	Short Lane (SR 615)	32	Providence Road (SR 636)
2	Ark Road (SR 606)	15	TC Walker Road (SR 629)	33	Hickory Fork Road (SR 614)
3	Farys Mill Road (SR 606)	18	Guinea Road (SR 216)	34	Piney Swamp Road (SR 635)
4	Roaring Springs Road (SR 616)	20	Low Ground Road (SR 641)	34	Borden Road (SR 635)
6	Ware Neck Road (SR 623)	22	Glass Road (SR 656)	28	Greate Road (SR 1208)
12	Belroi Road (SR 616)	23	Feather Bed Lane (SR 614)		
13	Burleigh Road (SR 615)	29	Tidemill Road (SR 641)		

While the design and right-of-way along these roads varies, the majority of these roads feature a curbless two-lane cross section and a right-of-way of between 40 to 50 feet.[25] The traffic volumes vary significantly, from around 1,000 vehicles per day (e.g, Piney Swamp Road and Feather Bed Lane) to as high as 4,000 or 5,000 vehicles per day (e.g, Hickory Fork Road, Guinea Road).[26] However, typical driving speeds are all in the 45 – 62 MPH range.[27] For this reason, FHWA guidance indicates that pedestrian and bicycle facilities that provide separation from motor vehicles are appropriate in these locations.

This study recommends the adoption into the Comprehensive Plan of a typical cross section for these prevalent and essential roads. When opportunities to implement changes arise, either through redevelopment, repaving, or reconstruction, the typical cross section can serve as the default to guide design choices. To maximize safety and comfort for people walking and biking, a shared use path on one side of the road is the preferred alternative in these locations (Figure 32, Section H). Where limited right-of-way or other constraints make this infeasible, a buffered sidewalk (Figure 25, Section C or Figure 26, Section E) or a paved shoulder (Figure 32, Section I) is recommended. FHWA guidance suggests that shoulders intended for use by people biking and walking should be a minimum of 5 feet wide[28] and may include edge line rumble strips.[29]

Implementing these concepts on all the secondary through-roads in the Vision Network is an ambitious, long-term endeavor. Given budget realities and other constraints, implementation will likely be opportunistic (i.e., tied to redevelopment or other roadway reconstruction projects). The priority for implementation should be roads that directly connect to the Urban Development Areas, schools, and parks, as well as roads with higher traffic volumes and speeds.

As discussed in the previous section, design at driveways and intersections will be key to safety on these facilities.Figure 33 and Figure 34 show examples of this treatment from a shared use path in Williamsburg, VA. At these intersections, FHWA guidance emphasizes the need to: a) maintain a buffer zone between the shared use path and the road, and b) ensure adequate sight distance and visibility for and of people using the path.[30]

The typical cross sections described here are not applicable or practical for all roads in the County. Local roads like Powhatan Drive and others, which primarily provide access to homes and do not intersect with other through-roadways, warrant a different design solution due to their lower traffic volumes. On these roads, sidewalks should be provided in areas near schools and Urban Development Areas. In other locations, it is assumed that people bike and walk in the travel lane or at the road edge, which means that managing travel speeds is the most practical way to improve pedestrian and bicycle comfort and safety. Advisory shoulders Figure 22) may be considered in these locations.

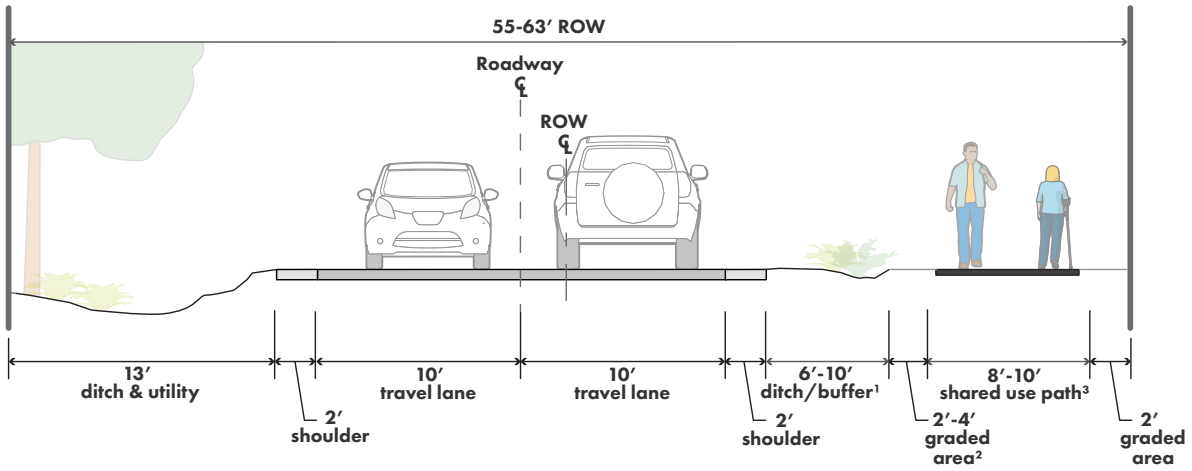
25 Estimated via measurements from GIS and aerial imagery. Verification via survey is required.
26 Streetlight analysis conducted as part of this study (2019 and 2020 data). Driving speed = 85th percentile speeds.
27 Streetlight analysis conducted as part of this study (2019 and 2020 data). Driving speed = 85th percentile speeds
28 Federal Highway Administration, Bicycle Facility Selection Guide, https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf
29 Federal Highway Administration, Small Town and Rural Multimodal Networks (2015), https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf
30 Federal Highway Administration, Small Town and Rural Multimodal Networks (2015), https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf

Figure 32: Typical Sections for Major and Minor Collectors

A separated shard use path or sidewalk is the preferred cross section for these roadways (see Section H below). Section I is the alternative for when a shared use path or sidewalk is not feasible.

SECTION H

Preferred Concept for Major and Minor Collector Roads in the Vision Network.



NOTES:
1. Ditch dimensions depend on local conditions and may need to be wider than this in some locations. Further study is needed.
2. Vertical obstructions (signs, poles, etc.) located in this zone must be at least 2′ (3′ preferred) from the shared use path. If less than 3′, a VDOT waiver is required.
3. A shared use path less than 10′ wide requires a VDOT waiver.

SECTION I

Alternative for Major and Minor Collector Roads in the Vision Network when Section H is infeasible.

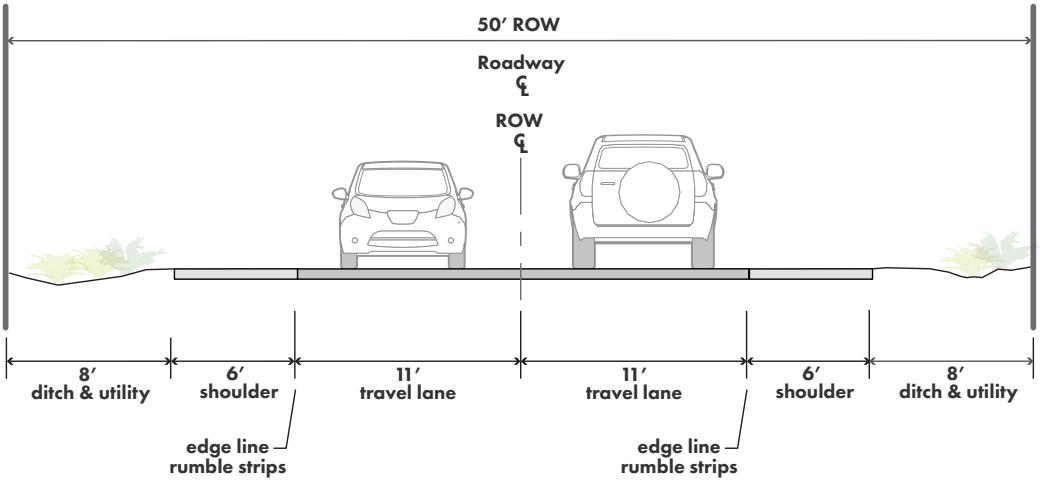


Figure 33: **Image of roadway intersection with shared use path**

(image: Williamsburg, VA, Google Earth)

Figure 34: **Image of driveway intersection with shared use path**

(image: Williamsburg, VA, Google Earth)

SUMMARY AND IMPLEMENTATION

Although there are already a lot of people who walk and bike in Gloucester, the public engagement conducted for this study indicates a significant desire amongst participants for improved multimodal safety and access. This is reflected in the County's 2016 Comprehensive Plan, which includes goals around promoting pedestrian- and transit-friendly land use patterns, encouraging mobility for all segments of the community, improving transportation safety, and developing "alternative" transportation methods.[31] The sub-areas plans for the Urban Development Areas, including the Court House Village Sub-Area Plan (2013) and the Gloucester Point Hayes Village Development Area Plan (2011), emphasize improved walkability and safety as central to the success of the UDAs. This study focuses on achieving those goals by outlining both a long-term vision and near-term priority actions.

The implementation of multimodal networks is a long-term endeavor, particularly in places that are starting with a relatively sparse network of comfortable sidewalks, bikeways, and trails. At first, as individual segments of new sidewalk, bikeways, and trails are implemented, the network will continue to be patchy and disconnected. In some communities, initial investments in short stretches of sidewalks or bikeways that do not connect to other multimodal facilities may be met with public skepticism, since their function is not immediately apparent. **However, even short stretches of facilities can improve safety and comfort for people already walking and biking in these areas and, over time, they will begin to connect and form a network that will attract more people to walk and bike**. Communities that have made the greatest strides toward improved multimodal safety and increased walking/biking over time have done so by a) mapping out a vision for the type of long-term network they want to accomplish over time, and then b) seizing every opportunity to implement small portions of that network in an incremental fashion. Achieving the goals of the Gloucester Comprehensive Plan and UDA sub-area plans will require a steadfast focus on designing pedestrian and bicycle facilities that appeal to average people of all ages and abilities. As this network is built out over time, it will help facilitate a healthier, more equitable, economically stable, and sustainable future for Gloucester residents.

31 Gloucester County Comprehensive Plan, 2016–2036, https://www.gloucesterva.info/DocumentCenter/View/5777/2016-Gloucester-County-Comprehensive-Plan


GLOUCESTER COUNTY
VIRGINIA ESTAB. 1651

APPENDIX A: COST ESTIMATE DETAILS

The opinions of probable cost presented in this report were developed by identifying major pay items and establishing rough quantities to determine a rough order of magnitude cost. Additional pay items have been assigned approximate lump sum prices based on a percentage of the anticipated construction cost. Planning-level cost opinions include a contingency mark-up to cover items that are undefined or are typically unknown early in the planning phase of a project (details provided on following pages). Unit costs are based on 2022 dollars and were assigned based on historical cost data from the VDOT Statewide Planning Level Cost Estimate workbook. Where applicable, rough estimates for residential right-of-way acquisition have been applied. Other than the right-of-way acquisition estimates and contingency mark-up, these estimates do not specifically account for permitting, inspection, or construction management; engineering, surveying, geotechnical investigation, environmental documentation, special site remediation, escalation, or the cost for ongoing maintenance. A cost range has been assigned to certain general categories such as utility relocations; however, these costs can vary widely depending on the exact details and nature of the work. The overall cost opinions are intended to be general and used only for planning purposes. Toole Design Group, LLC makes no guarantees or warranties regarding the cost estimate herein. Construction costs will vary based on the ultimate project scope, actual site conditions and constraints, schedule, and economic conditions at the time of construction.

For Tidemill Road and Roaring Springs Road, two methods were used to estimate costs. Method 1 uses a general contingency mark-up of 55% to estimate the costs of right-of-way, utility and construction easements, and general contingencies. Method 2 includes a 35% mark-up for construction easements and general contingencies, as well as ballpark estimates for residential right-of-way acquisition. These two methods were used to compare/check results. The higher of the two estimates was used in the report.

Tidemill Road: Shared Use Path from Route 17 to Guinea Road

Length: 1.08 miles

Assumptions:

- Estimate assumes drainage/ditch work on one of roadway; clearing and grubbing on one side of the road; and driveway and minor intersection crossing treatments. No existing signalized intersections.
- SPLCE matrix assumes 5% annual inflation (costs shown are for 2022). Per mile costs include 25% for preliminary engineering and construction contingencies.
- Consultants assume VDOT's line item cost for the 10' paved shared use path includes costs for the construction materials, earthwork, driveway and intersection crossing treatments, pavement markings and signage.
- Consultants assume VDOT's line item cost for the 10' paved shared use path does not include utility modifications, lighting and other trail amenities.
- Consultants applied percentage for Right of Way and Utility Cost per the SPLCE matrix, using the "Residential/Suburban Low Density" figures.

Cost items not specifically included in the estimate include: Environmental permitting (including design and environmental review costs), erosion and sediment control, maintenance of traffic, structures (railings, boardwalk, etc.), significant land acquisition, etc.

METHOD 1 *(Source: VDOT SPLCE Workbook)*	Cost Per Mile:	
	Low	High
Provide 10 ft.* paved shared use path off road (per mi)	$ 1,576,000	$ 2,533,000
Length of design	.98 mi	.98 mi
Base cost of shared use path segment	$1,544,000	$2,482,000
Bridge Section (per mi)**	$2,533,000	
Length of design	0.1 mi	
Base cost of bridge segment	$253,000	
Contingency / Right of Way & Utilities Cost (Residential/Suburban Low Density)	55%	
Total for project – Method 1 (rounded)	**$ 2,790,000**	**$ 4,320,000**

METHOD 2 *(Source VDOT SPLCE Workbook, ROW typical costs provided by VDOT)*		
Additional ROW:	Width: 9 ft (avg); Length: 5,174 ft; SF: 46,570 sf	
Number of non-waterfront parcels impacted:	33 non-waterfront, 2 waterfront	
Estimated per parcel cost for VDOT administrative costs		$15,000
Estimated cost of right-of-way (purchase) - non-waterfront		$7 per sf
Estimated cost of right-of-way (purchase) - waterfront		$14 per sf
ROW cost		$345,744
Admin costs		$525,000
Total ROW estimate		$870,744
	Low	High
Base cost of shared use path segment	$1,544,000	$2,482,000
Base cost of bridge segment	$253,000	
Contingency (Residential/Suburban Low Density)	35%	
TOTAL for project – Method 2 (rounded)	**$3,600,000**	**$4,870,000**

*For the purpose of estimating, assume 10' paved section

**Assume no impacts to bridge superstructure or expansion; all proposed work will be within tolerable limits. Consultants utilized high end SUP cost as proxy for surface (non-structural) work on bridge.

***Utility poles are on the south side of Tidemill Road for approximately 0.6 miles (from just east of the bridge to Merrick Drive) and the north side for the remainder of the corridor. This contingency mark-up includes/anticipated some drainage/ditch/utility relocations along portions of the corridor.

Roaring Springs Road: Sidewalk / SUP from Main Street to Holly Springs Drive

Length: Approximately 1 mile (*Assumes the design is a 6' sidewalk from Main St to Wyncotte Ave and a 8' SUP from Wyncotte Ave to Holly Spring Drive. SUP segment requires ROW acquisition.)*
Assumptions:

- Assume drainage/ditch work, clearing and grubbing, and utility pole relocations on one side of roadway, driveway crossing and intersection crossings needed. No existing signalized intersections.
- SPLCE matrix assumes 5% annual inflation (costs shown are for 2022) and includes 25% for preliminary engineering and construction contingencies.
- Consultants assume the line item cost for the 10' paved shared use path includes costs for the construction materials, clearing/earthwork, driveway and intersection crossing treatments, pavement markings and signage. Consultants assume line item costs does not include utility modifications, lighting and other trail amenities.
- Consultants assume the line item cost for the sidewalk includes costs for curb and gutter, the construction materials, clearing/earthwork, driveway and intersection crossing treatments.

Cost items not specifically included in the estimate include: Environmental permitting (including design and environmental review costs), erosion and sediment control, maintenance of traffic, structures (railings, boardwalk, etc.), significant land acquisition, etc.

METHOD 1 *(Source: VDOT SPLCE Workbook)*	Cost Per Mile:	
	Low	High
Provide 6 ft. sidewalk, Main to Wyncotte (per mi)	$ 600,000	$ 1,700,000
Length of design	.38 mi	.38 mi
Base cost of sidewalk segment	$227,000	$643,000
Provide 10 ft. SUP, Wyncotte to Holly Springs (per mi)	$1,576,000	$2,533,000
Length of design	.38 mi	.38 mi
Base cost of SUP segment	$597,000	$960,000
Bridge Section (per mi)*	$2,533,000	
Length of design	0.04 mi	
Base cost of bridge segment	$96,000	
Contingency / Right of Way (Residential/Suburban Low Density)	55%	
Total for project – Method 1 (rounded)	**$ 1,430,000**	**$ 2,630,000**

METHOD 2 *(Source VDOT SPLCE Workbook, ROW typical costs provided by VDOT)*		
Additional ROW:	Width: 12.5 (avg); Length: 2,001 ft; SF: 25,013 sf	
Number of non-waterfront parcels impacted:	10 non-waterfront, 0 waterfront	
Estimated per parcel cost for VDOT administrative costs		$15,000
Estimated cost of right-of-way (purchase) - non-waterfront		$7 per sf
Estimated cost of right-of-way (purchase) - waterfront		$14 per sf
ROW cost		$175,088
Admin costs		$150,000
Total ROW estimate		$325,088
	Low	High
Base cost of sidewalk segment	$227,000	$643,000
Base cost of shared use path segment	$597,000	$960,000
Base cost of bridge segment*	$96,000	
Contingency (Residential/Suburban Low Density)	35%	
TOTAL for project – Method 2 (rounded)	**$1,680,000**	**$2,730,000**

*Assume no impacts to bridge superstructure or any expansion of bridge and all proposed work will be within tolerable limits. Consultants utilized high end SUP cost as proxy for surface (non-structural) work on bridge.

Route 17: Typical Per Mile Cost for Shared Use Paths on Both Sides of the Road

Length: Typical 1 mile segment
Assumptions:

- Assume drainage/ditch work on both sides of roadway
- Assume utility pole relocations on both sides of the roadway
- Assume driveway crossing treatments and intersection crossings are needed
- Assume clearing and grubbing on one side of the road (**Assumed cost accommodated within SUP per mile cost line item)
- SPLCE matrix assumes 5% annual inflation (costs shown are for 2022) and includes 25% for preliminary engineering and construction contingencies.
- Consultants assume the line item cost for the 10' paved shared use path includes costs for the construction materials, clearing/earthwork, driveway and intersection crossing treatments, pavement markings and signage.
- Consultants assume the line item cost for the 10' paved shared use path does not include utility modifications, lighting and other trail amenities.

Cost items not specifically included in the estimate include: Environmental permitting (including design and environmental review costs), erosion and sediment control, maintenance of traffic, structures (railings, boardwalk, etc.), significant land acquisition, etc.

Source: VDOT SPLCE Workbook	Cost Per Mile:	
	Low	High
Provide 10 ft. paved shared use path off road	$ 1,576,000	$ 2,533,000
x 2 (both sides of the road)	$ 3,152,000	$5,066,000
Contingency / Right of Way & Utilities Cost % of Cost Estimate (Residential/Suburban Low Density – high end of the range provided in the VDOT SPLCE workbook was used, given the greater complexity of this corridor)	65%	
Total per mile	**$5,200,000**	**$8,359,000**

TYPICAL CROSS SECTIONS FOR OTHER THROUGH-ROADS IN THE VISION NETWORK

Length: Typical 1 mile segment

Since this recommendation applies to numerous roads with varying conditions and contexts throughout the County, it is not feasible to create a planning-level cost estimate with any level of reliability. The cost of these projects will vary depending on the available right-of-way, drainage, environmental considerations, and many other local conditions. However, the preferred design that is recommended – a shared use path along one side of the roadway – is the same design that was recommended for Tidemill Road. For that reason, the planning-level cost estimate for that project (an estimated $3.6 to $4.9 million per mile) can be used as a very rough and generalized ballpark that may be applicable for order-of-magnitude budgeting purposes. More study on specific corridors, including ROW and utility survey, will be needed in order to develop more accurate and place-based estimates.