FAIR WOODS PARKWAY
NEIGHBORWAY CONCEPT DESIGN
CITY OF FAIRFAX, VA

FINAL REPORT
APRIL 2023

FAIRFAX CITY


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EXIT ONLY
SANG YI

Fair Woods Parkway

Neighborway Concept Design

Final Report

April 2023

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INTRODUCTION

In June 2021, the City of Fairfax adopted *Bike Fairfax City*. This plan recommended a comprehensive bicycle facilities network throughout the city. The plan included short-term and long-term recommended projects developed from a culmination of public engagement efforts and an analysis of existing conditions. Fair Woods Parkway is one of the corridors recommended for neighborway bicycle facilities in the *Bike Fairfax City* plan as part of the short-term recommendations. Neighborways are defined as "streets with low vehicle volumes and speeds that prioritize bicycle travel through signage, pavement markings, and/or traffic calming." The City initiated this project to advance and pilot the neighborway concept design along Fair Woods Parkway. This report documents existing conditions, identifies key issues and opportunities, illustrates design alternatives, documents public feedback, and explains the next steps in the project development and implementation process.

Project Background

This planning and design project is an effort to advance the goals outlined in the City's first bicycle master plan, *Bike Fairfax City*. Kittelson & Associates Inc. (Kittelson), in collaboration with Toole Design, provided support to the City of Fairfax for this planning and design project. The project team included members of the consultant team and staff from the City of Fairfax. The project team developed city-wide neighborway design and implementation guidelines and developed a neighborway concept design for Fair Woods Parkway.

Fair Woods Parkway acts as the primary road into and out of the Mosby Woods neighborhood. Additionally, it is a strategic connector in the city's overall bicycle network that currently serves as an informal, low-stress connection to the Vienna/Fairfax-George Mason University (GMU) Metrorail station, and an alternative to biking through Fairfax Circle. This project developed a neighborway concept design to enhance multi-modal safety and comfort and highlighted Fair Woods Parkway as a crucial bicycling route in the city's overall bicycle network.

Several previous plans were reviewed that analyzed bicycle connectivity of neighborhoods in the City of Fairfax and proposed future bicycle routes within the city. These studies have informed the development of ongoing projects and help to underscore the role the future Fair Woods Parkway neighborway could play in regional bicycle connectivity. This project built on previous recommendations and developed a concept design for the Fair Woods Parkway neighborway, cognizant of potential connections to ongoing projects.

The study corridor for this project spans Fair Woods Parkway from Fairfax Boulevard (Route 50 and 29) to the cul-de-sac just north of Jessie Court, with a trail connection to Five Oaks Road. The study area is shown in **Figure 1**.

Study Area Map

Figure 1. Study Area Map

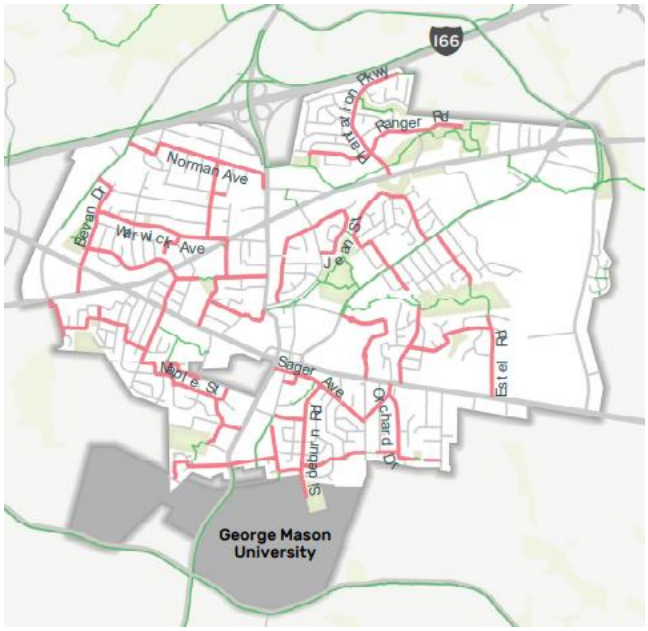
Review of Previous Studies and Ongoing Projects

Bike Fairfax City (2021)

Bike Fairfax City Cover
Source: City of Fairfax

The City of Fairfax adopted its first bicycle master plan, *Bike Fairfax City*, in June 2021. The City worked closely with the community to identify gaps and prioritize projects to connect and expand the existing bicycle network. The project evaluated existing conditions and planned projects and developed a map and a prioritized list of new projects for implementation.

The bicycle plan recommends five primary bicycle facility types: off-street trails, bicycle lanes, neighborways, intersection and other spot improvements, and long-term corridor projects. The bicycle plan recommends 19.7 miles of neighborways throughout the city, which are prioritized as short-term improvements. This project will advance the recommended neighborway network provided in this plan by developing design guidelines for the neighborway network and a pilot project concept for the Fair Woods Parkway neighborway.



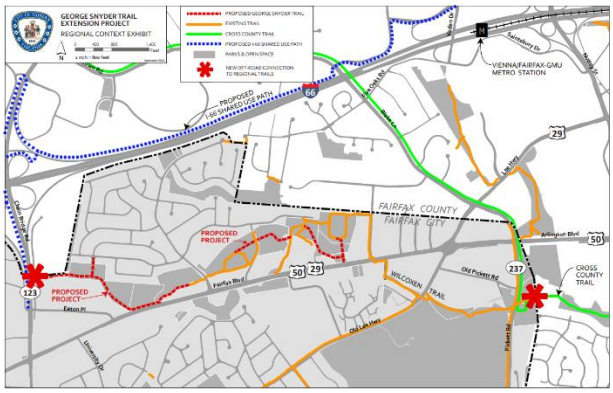
Map of Recommended Neighborways
Source: City of Fairfax

City of Fairfax Multimodal Transportation Plan (2017)

The 2017 City of Fairfax Multimodal Transportation Plan sets a vision for transportation in the City of Fairfax and is incorporated in the 2035 Livable Fairfax Comprehensive Plan. The goals identified in *Bike Fairfax City* (2021) are directly related to those listed in the 2017 plan. In this plan, a "Green Ribbon" concept was presented as a connected network providing access to neighborhoods and key destinations such as activity centers, parks, and trails. The development of the neighborway network in *Bike Fairfax City* will directly contribute to expanding the "Green Ribbon" network.

Multimodal Transportation Plan Cover
Source: City of Fairfax

George Snyder Trail (Ongoing)

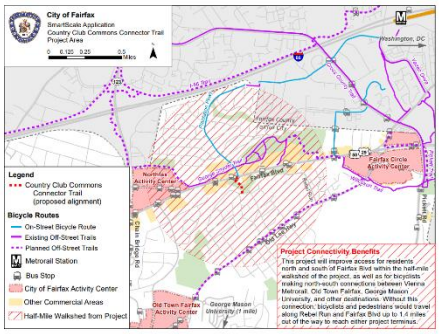


George Snyder Trail Extension Concept Plan
Source: City of Fairfax

The George Snyder Trail is a two-mile trail on the southern side of Accotink Creek between Chain Bridge Road (Route 123) and Fairfax Boulevard (Route 50 and 29). The City intends to connect this trail to the proposed shared use path along Chain Bridge Road (which connects to the I-66 path). The George Snyder Trail will intersect with Fair Woods Parkway north of Fairfax Boulevard and provide connections to the Northfax and Fairfax Circle Activity Centers. Construction for this trail is estimated to begin in 2023.

Country Club Commons Connector Trail (Ongoing)

The Country Club Commons Connector Trail will connect the Fair Woods Parkway neighborway to other bike routes south of Fairfax Boulevard, providing alternate bicycle and pedestrian routes to Old Town Fairfax, the Sherwood Center, and other community destinations via Old Lee Hwy. Design for this project is anticipated to begin in 2023.



Country Club Commons Connector Trail Concept Plan
Source: City of Fairfax

Capital Bikeshare Implementation (Ongoing)

The City has proposed a Capital Bikeshare station on Fair Woods Parkway as part of the new network of stations near Fairfax Circle and the Vienna Metrorail station. Installation of the network of stations and launch of operations is anticipated in 2023.

Fair Woods Parkway Fairfax Boulevard and Intersection Improvements (Proposed)

The *Bike Fairfax City* plan includes a preliminary concept sketch for bicycle and pedestrian improvements at the intersection of Fairfax Boulevard and Fair Woods Parkway. The intent of this concept is to bridge the gap between the Fair Woods Parkway neighborway (north of the George Snyder Trail) and the Country Club Commons Trail (south of Fairfax Boulevard). The concept shown in the bike plan may be revised following more detailed analysis and development, which is anticipated to begin in 2023.

Planning Process

The project team developed a planning process to guide the project through various tasks. The project began with a kick-off meeting held on June 6, 2022. Phase 1 of the project involves the development of neighborway design and implementation guidelines. Phase 2 of the project involves the development of the Fair Woods Parkway neighborway concept design, which includes the existing condition analysis and public engagement. The work from Phase 1 will also help to inform the design decisions in the concept plan produced in Phase 2. The overall planning process is shown in **Figure 2**.

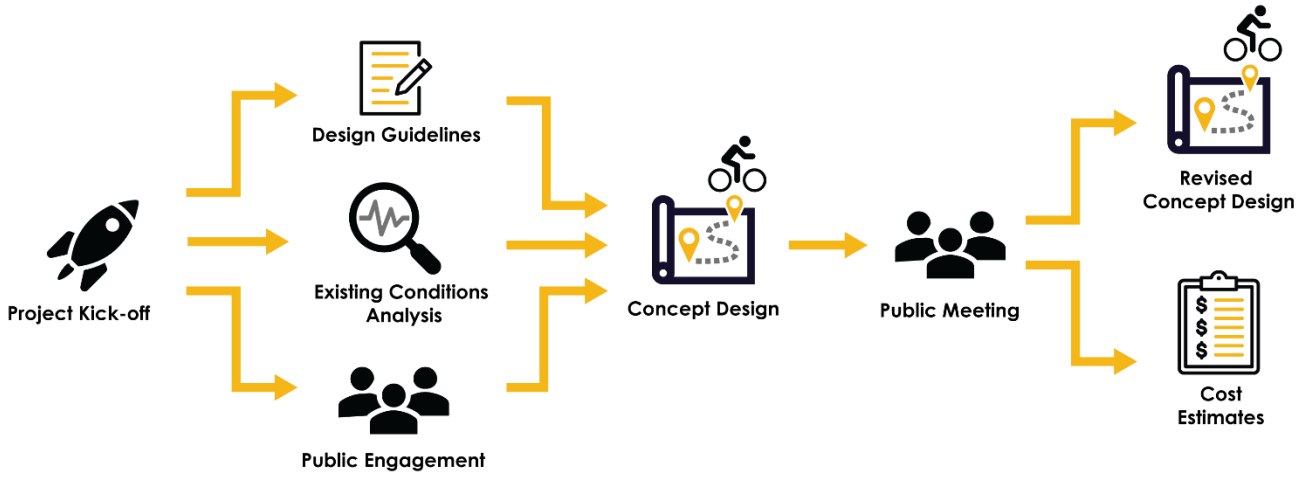


Figure 2. Planning Process

PROJECT GOALS & OBJECTIVES

The project team identified four goals for this project to further the overarching vision of creating a comprehensive neighborway network within the City of Fairfax:

- Develop neighborway design and implementation guidelines.
- Produce a conceptual design for the Fair Woods Parkway neighborway.
- Seek public feedback on the conceptual design.
- Finalize the conceptual design and prepare a cost estimate.

The outcome of this project was documented in this report and a separate neighborways design guidelines document. The concept plan is based on the existing condition analysis, public feedback, and the design guidelines developed in Phase 1.

EXISTING CONDITIONS ANALYSIS

This section provides a summary of the study corridor, focusing on the following topics:

- Roadway characteristics
- Land use
- Street typology
- Pedestrian facilities
- Traffic control devices
- Bicycle facilities
- Motor vehicle speeds
- Motor vehicle traffic volumes
- Crash history

The existing conditions analysis aimed to answer the following questions:

- Does vehicular speeding exist along Fair Woods Parkway, and if so, where?
- Do excessive vehicular traffic volumes exist along Fair Woods Parkway, and if so, where?
- Where have vehicular and bike/ped crashes occurred along Fair Woods Parkway?
- What locations along Fair Woods Parkway are good candidates for traffic calming treatments?
- What type of traffic calming treatments are appropriate for Fair Woods Parkway?

Existing Roadway Characteristics

The study corridor is approximately 0.85 miles long, from the George Snyder Trail crossing just north of Fairfax Boulevard to the cul-de-sac connector trail to Five Oaks Road. The typical street cross-section consists of one travel lane in each direction and a curb-to-curb width of around 32'. On-street parallel parking is permitted on both sides of the street. Additionally, 4' wide sidewalks are separated by landscape buffers of variable widths on both sides of the street.

The Fair Woods Parkway study corridor consists of two segments with slight variations in the typical cross-section. North of Cardinal Road, Fair Woods Parkway is unstriped, with bi-directional traffic sharing the travel lanes. This segment typically has wider landscape buffers and is primarily developed with detached single-family houses set back from the road. The segment south of Cardinal Road has a double-yellow center-line striping indicating higher traffic volume than the rest of the corridor. In this segment that crosses over the Accotink Creek, guard rails are present adjacent to the sidewalks due to the grading difference between the roadway and the wooded area surrounding the creek. This segment has narrower landscape buffers and generally feels more constrained with dense row of street tree closer to the road. The two cross-sections are illustrated in **Figure 3** and **Figure 4**.

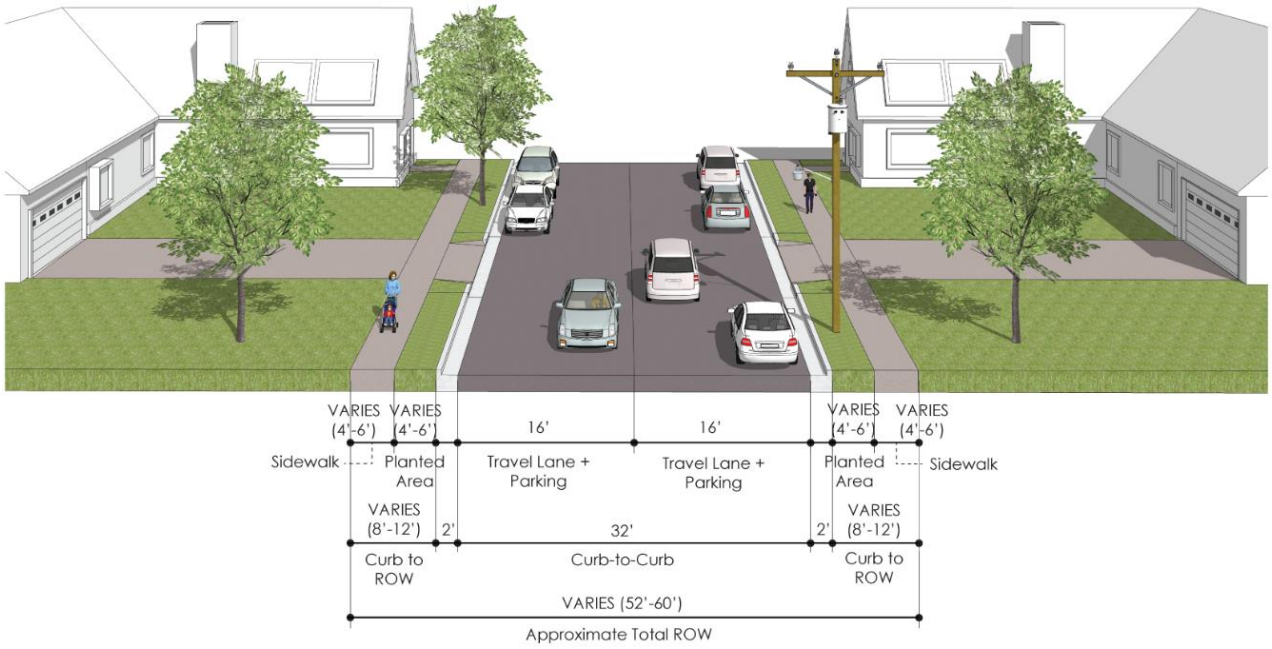


Figure 3. Existing Cross-Section North of Cardinal Road (Looking North)

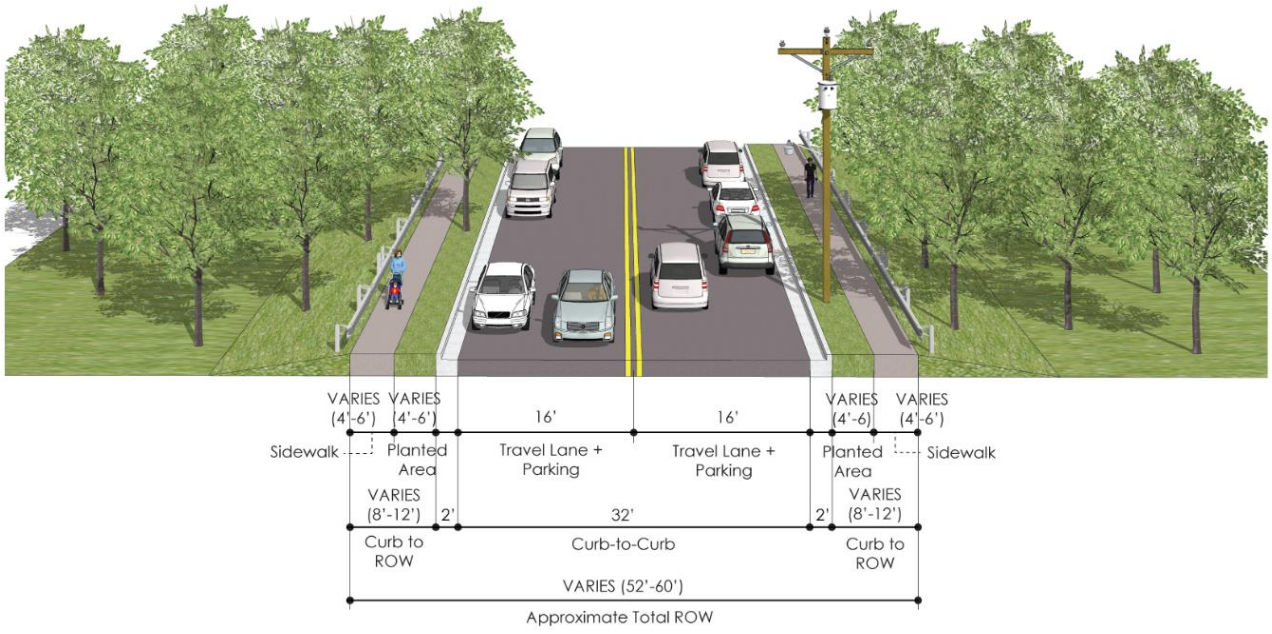


Figure 4. Existing Cross-Section South of Cardinal Road (Looking North)

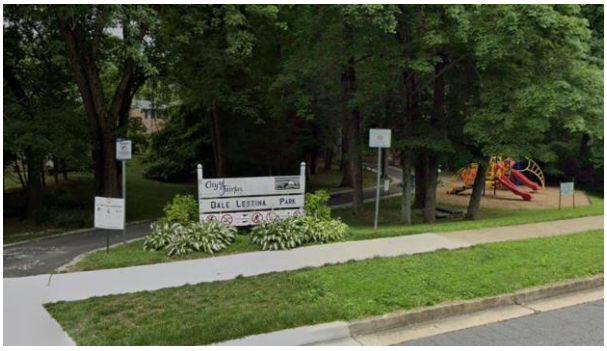
Existing Land Uses

The study corridor is mostly comprised of residential land uses with detached single-family residential houses with driveways fronting the corridor. There is also an access point to the Mosby Woods Garden Condominiums from Fair Woods Parkway south of Cardinal Road. Destinations directly adjacent to the neighborway are mostly recreational including the Mosby Woods Pool and Dale Lestina Park. There are also pedestrian and bicycle connections to other destinations beyond the immediate area via the George Snyder Trail and Five Oaks Road. The trail connection at the cul-de-sac to Five Oaks Road provides a connection to the Vienna/Fairfax-GMU Metrorail station as well as to Mosaic Elementary School, the Providence Community Center, and other destinations along Blake Lane. At the southern terminus of the corridor on Fairfax Boulevard, there is a cluster of retail destinations, including restaurants, pharmacies, and convenience stores.

Detached single-family houses fronting Fair Woods Parkway. Source: Google Earth.

Access point to Mosby Woods Garden Condominiums fronting Fair Woods Parkway. Source: Google Earth.

Mosby Woods Pool fronting Fair Woods Parkway at Blue Coat Drive. Source: Google Earth.

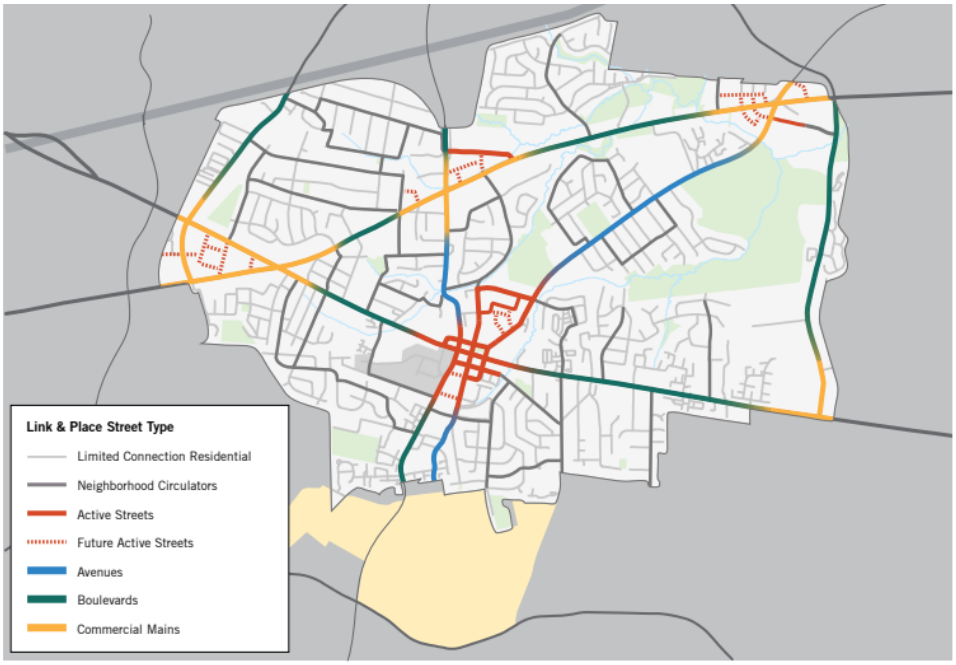


Access point to Dale Lestina Park fronting Fair Woods Parkway south of Blue Coat Drive. Source: Google Earth.

Street Typology

The City of Fairfax 2035 Comprehensive Plan developed a street typology assigning a type for each street based on context and function. The intention behind the street typology framework is to improve street design decisions by recommending design elements and features in coordination with the land use context. **Figure 5** displays City's street typology and designations.

As shown in the map below, Fair Woods Parkway is classified as a neighborhood circulator. **Figure 6** illustrates a typical cross-section of a neighborhood circulator. Neighborhood circulators are defined as residential streets that contribute to community connectivity and are mostly used for local vehicular traffic. Typical elements of a neighborhood circulator include single-family residential houses, unmarked on-street parking, sidewalks, and bicycle boulevard treatments. (Bicycle boulevards are similar to neighborways). It will be crucial to assess whether traffic calming treatments, especially speed management strategies, are required along the study corridor to develop an effective neighborway design.



VDOT Classification	Link + Place Street Type
Local	Limited Connection Residential
Minor Collector	Neighborhood Circulators
Major Collector	Active Streets
Minor + Major Arterial	Avenues, Boulevards
Minor + Major Arterial	Commercial Mains

Figure 5. Street Typology & Designations

Source: City of Fairfax

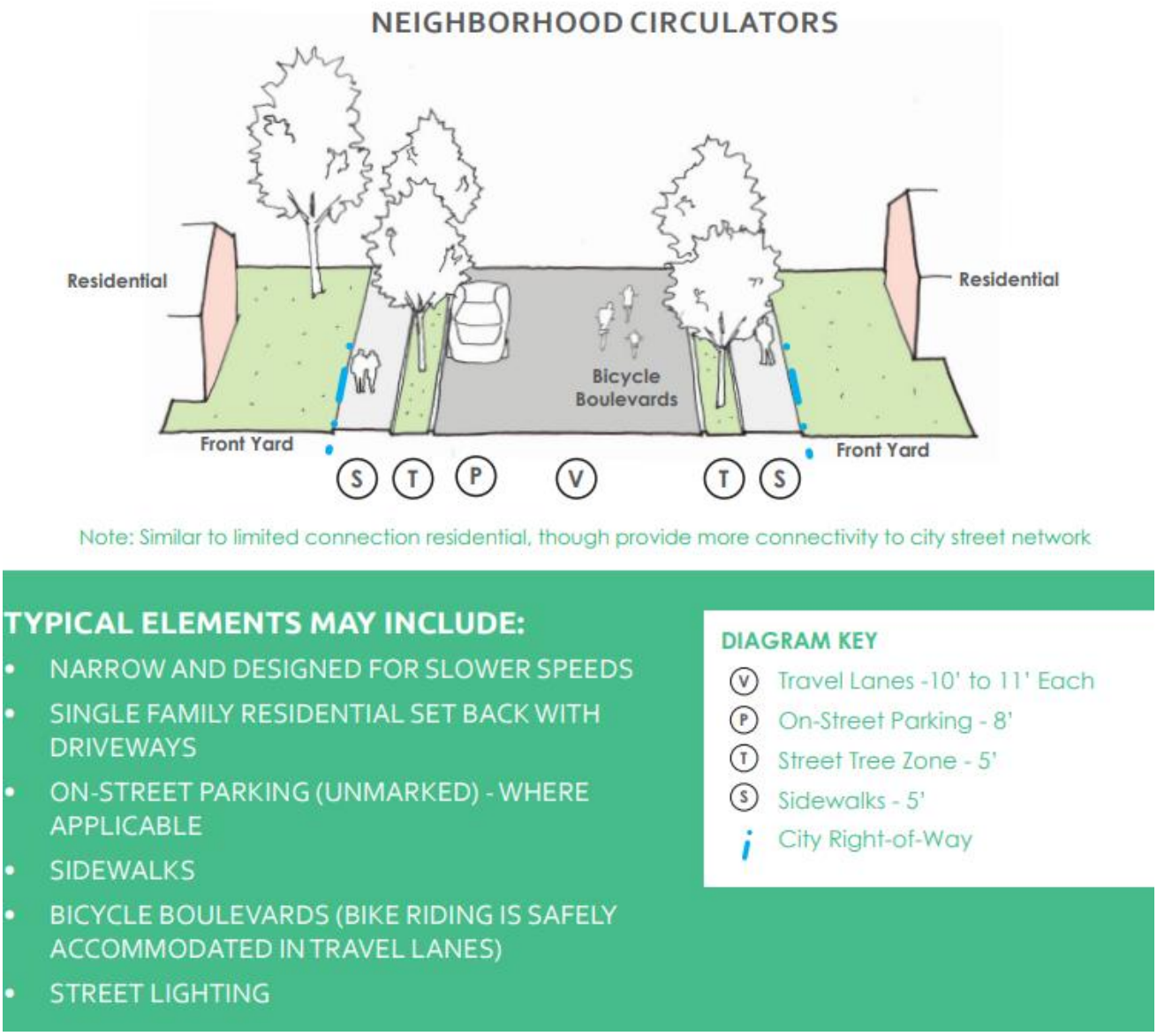


Figure 6. Neighborhood Circulators

Source: City of Fairfax

Existing, Planned, and Proposed Bicycle Facilities

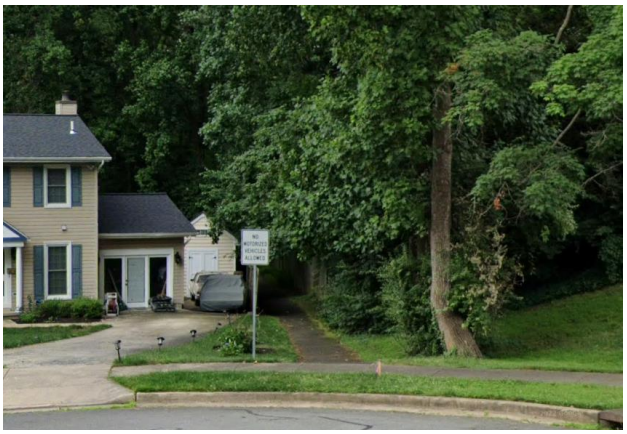
There are no dedicated on-street bicycle facilities along the study corridor. As discussed in the previous section, Fair Woods Parkway is classified as a neighborhood circulator, and typically bicyclists and vehicles are expected to share the road.

North of Cardinal Road, Fair Woods Parkway is a low-speed and low-traffic volume residential yield street with on-street parking located on both sides. This segment of the study corridor can function well as a shared road with most bicyclists feeling comfortable. Additional traffic calming treatments can also enhance bicycling comfort. South of Cardinal Road, Fair Woods Parkway has double-yellow centerline striping and experiences higher traffic volumes due to its connection to the Mosby Woods Condos and other higher density residential areas, Fairfax Boulevard, and the commercial area at the intersection. This segment of the study corridor may be uncomfortable for less confident bicyclists, who might choose to ride on the sidewalk instead of the road.

There are multiple trail and bicycle connections along the study corridor.

- The cul-de-sac trail connection to Five Oaks Road is located at the northern terminus of Fair Woods Parkway and provides a bicycle connection to the Vienna/Fairfax-GMU Metrorail station, as well as to the future I-66 path (via Blake Lane). Although there is currently no curb ramp located at the entry to the trail connection, the residential driveway adjacent to the trail connection is currently used as a bicycle ramp.
- The George Snyder Trail connection is located near the southern terminus of Fair Woods Parkway. As discussed earlier, it will be extended to the east and west, providing future connections to the I-66 path (via Chain Bridge Road) and to the Cross County Trail (via the Willcoxon Trail).
- The Dale Lestina Park trail is located south of Blue Coat Drive with an entry point on Fair Woods Parkway. The bike plan recommends an extension of this trail to neighborhoods east of the park.
- The planned Country Club Commons Connector trail will connect the Fair Woods Parkway neighborway to other bike routes south of Fairfax Boulevard.
- The proposed Cardinal Road neighborway intersects the Fair Woods Parkway neighborway connecting the bike network east and west of the corridor.

Figure 7 maps the existing, planned, and proposed bicycle facilities within the study area, illustrating the strategic location of Fair Woods Parkway and its existing and future bicycle connections.



Cul-de-sac trail connection to Five Oaks Road fronting Fair Woods Parkway lacking curb ramp Source: Google Earth.

George Snyder Trail crossing on Fair Woods Parkway. Source: Google Earth

Figure 7. Existing, Planned, and Proposed Bicycle Facilities

Existing Pedestrian Facilities and Traffic Control Devices

There are pedestrian facilities along and around the study corridor. Sidewalks are present on both sides of Fair Woods Parkway, with a tree-lined landscape buffer separating the sidewalks from the travel lanes. Sidewalks are generally well-connected, and the presence of off-street trails expands pedestrian connectivity beyond the study corridor.

Marked crosswalks exist at Blue Coat Drive, Cardinal Road, the George Snyder Trail crossing, and Fairfax Boulevard. However, at Blue Coat Drive, there is no marked crosswalk on the southern leg of the intersection. Crosswalks at all other intersections along the study corridor are unmarked.

Three intersections along the study corridor are all-way stop controlled (AWSC): Blue Coat Drive, Scout Drive, and Cardinal Road. The intersection at Fair Woods Parkway and Scout Drive is the only AWSC intersection in this corridor without any marked crosswalks.

Three T-intersections along the study corridor are one-way stop controlled: Cavalry Drive, Continental Lane, and Antietam Avenue. There are no marked crosswalks at these intersections.

Figure 8 shows the existing pedestrian facilities and traffic control devices within the study area.

Marked crosswalks at Blue Coat Drive & Fair Woods Parkway.

Unmarked crossings with curb ramps Scout Drive & Fair Woods Parkway.

Existing Pedestrian Facilities and Traffic Control Devices

Figure 8. Existing Pedestrian Facilities and Traffic Control Devices

Crash History (2014-2019)

The City of Fairfax provided crash data between 2014 and 2019. The crash data presented in this section only accounts for crashes recorded in this dataset and should act as a reference. Additional crash details were available for the crashes from 2015 to 2019 from VDOT's crash map. **Figure 9** shows crashes by severity and type.

Between 2014 and 2019, there were seven crashes along Fair Woods Parkway. Four of the seven crashes involved a driver who was impaired by drinking. Three of the seven crashes involved a driver who was fatigued or distracted (i.e., eyes not on the road). In this five-year period, there were no fatal crashes or pedestrian crashes. However, there was one angle crash involving a bicycle, which resulted in a visible injury, in 2019. This crash occurred south of the George Snyder Trail crossing. According to the report, the driver did not conduct improper action, while the bicyclist did not have the right-of-way.

Existing Speed Analysis

The City of Fairfax collected speed and volume data at two different locations on Fair Woods Parkway during February and March 2022. The posted speed limit, 85th percentile speed, and a daily average number of vehicles going 10 MPH or over above the speed limit are summarized in **Figure 10**.

The posted speed is 25 MPH along the study corridor. The 85th percentile speed in both directions ranges from 29 to 31 MPH. More vehicles are observed to excessively drive over the speed limit in the southbound direction on Fair Woods Parkway headed towards Fairfax Boulevard. In the southbound direction, the daily average number of vehicles driving at 10 MPH or above the speed limit is 22 north of Continental Lane and 80 south of Cardinal Road, illustrating an average of 2-3% of vehicles speeding towards Fairfax Boulevard . On the other hand, in the northbound direction, the average number of vehicles driving at 10 MPH or over the speed limit is ten north of Continental Lane and 17 south of Cardinal Road, displaying vehicles slowing down further into the neighborhood.

Existing Average Annual Daily Traffic (AADT)

AADT volume data was collected at two locations along the study corridor by the City of Fairfax. The AADT volumes are summarized in **Figure 11**. Along the study corridor, the AADT north of Continental Lane was recorded at 1,564, while the AADT south of Cardinal Road was recorded at 4,114 vehicles in 2022. Since Fair Woods Parkway is the primary road into and out of the Mosby Woods neighborhood, the traffic volumes are much higher south of Cardinal Road near the southern terminus of the corridor. Many vehicles likely filter throughout the neighborhood from Fair Woods Parkway, starting from Cardinal Road. The higher traffic volumes may also be attributed to the section's proximity to Fairfax Boulevard and the commercial area at that intersection.

Figure 9. Fair Woods Parkway Crashes (2014-2019)

Speed Analysis Map

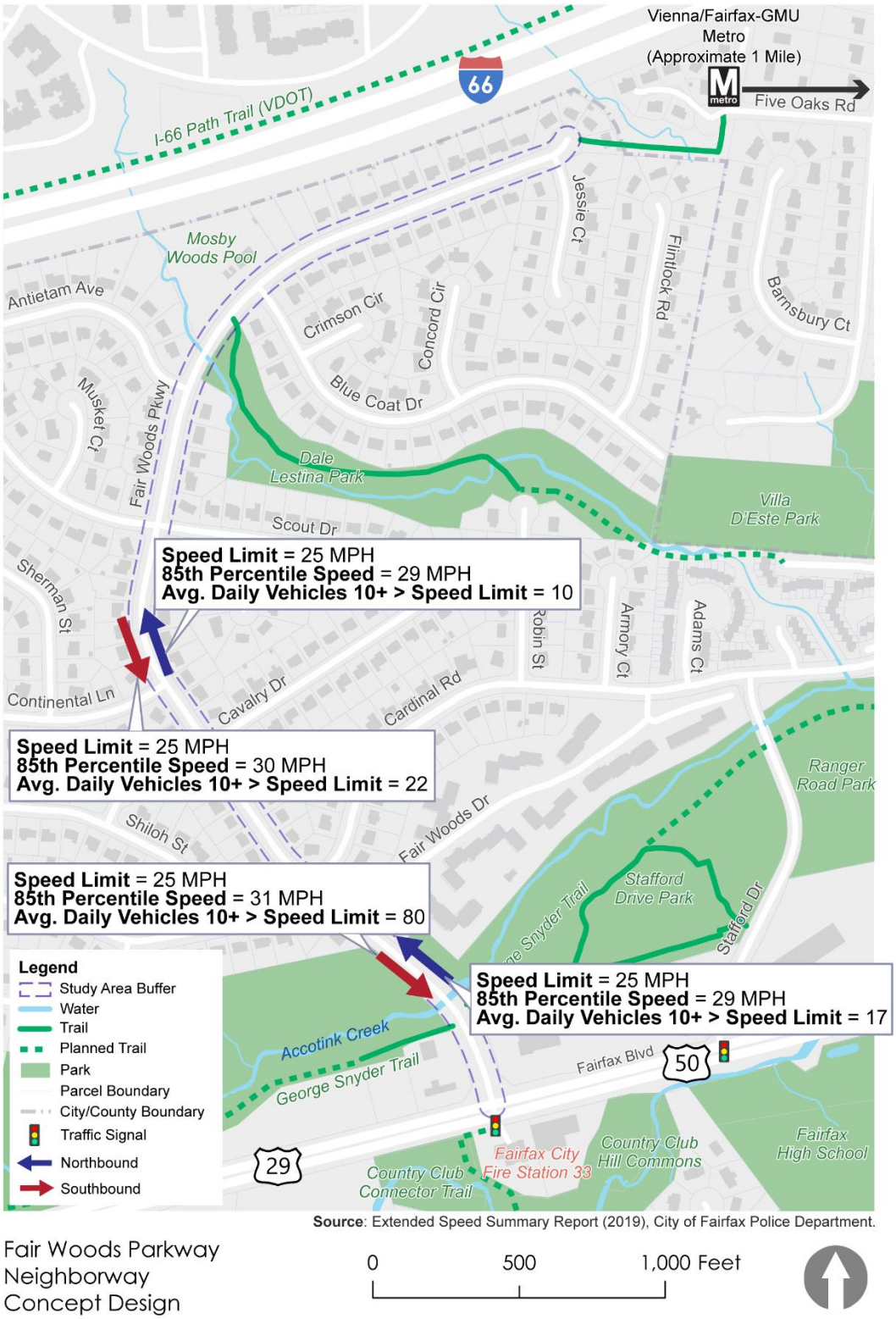


Figure 10. Speed Analysis Map

Average Annual Daily Traffic (AADT) Map

Figure 11. Average Annual Daily Traffic (AADT) Map

Walking Tour

The project team led a walking tour of Fair Woods Parkway on Thursday, September 1, from 5:30-7:00 PM as part of the project's public engagement efforts. The walking tour began at the intersection of Fair Woods Parkway and the George Snyder Trail, north of Fairfax Boulevard, and ended at the cul-de-sac. Twenty-six community members attended, along with two (2) City Council members, five (5) City staff, and three (3) consultant team members.

The main takeaways and observations from the walking tour are listed below:

- There was consensus on the need for traffic calming treatments and better crossing opportunities.
- Road geometry (i.e., horizontal curves) and topography (i.e., hills) lead to sight distance issues around the segment of Fair Woods Parkway between Continental Lane and Scout Drive.
- Vehicles tend to perform rolling stops at AWSC intersections as cross traffic isn't expected and was observed at Scout Drive and Cardinal Road during the walking tour.
- Concerns were expressed about the potential removal of on-street parking and driveway access impacts.
- Residents tend not to park on the southbound side of Fair Woods Parkway between Scout Drive and Antietam Avenue due to anecdotal crashes occurring with parked cars. Residents also mentioned that some of these crashes are underreported in the existing crash data.
- Concerns were expressed regarding certain types of traffic calming treatments, such as chicanes.
- Wayfinding signage would be helpful to provide clarity to road users but should not encourage through vehicular traffic.

Photos from the Walking Tour

Issues & Opportunities

Based on the existing conditions analysis, designing a neighborway on Fair Woods Parkway would enhance regional connectivity by creating a formal, low-stress bicycle route that connects to the Vienna/Fairfax-GMU Metrorail station and existing off-street trail connections. Future trail connections to the George Snyder Trail extension, Country Club Commons Connector trail, and the I-66 path will also increase connectivity significantly beyond the study corridor. Issues and opportunities on Fair Woods Parkway are summarized in this section. The walking tour additionally enhanced the project team's understanding of the street's context and the challenges faced by residents and bicycle commuters on Fair Woods Parkway.

The street typology of Fair Woods Parkway as a neighborhood circulator is typically well-suited for shared lanes or neighborways. However, Fair Woods Parkway experiences higher volumes and more vehicles driving at excessive speeds south of Cardinal Road. **Figure 12** illustrates the Federal Highway Administration (FHWA) Bikeway Selection Guide that provides guidance on selecting low-stress bicycle facilities for users of all ages and abilities based on motor vehicle speeds and volumes. This guidance suggests that a neighborway is an appropriate facility type for Fair Woods Parkway north of Cardinal Road.

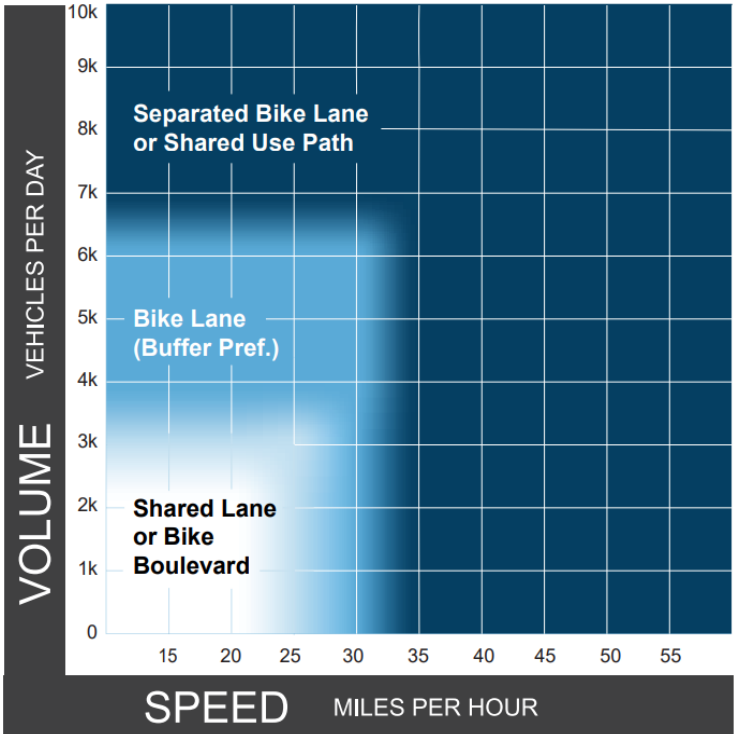


Figure 12. Bikeway Selection Guide

Source: FHWA

However, a neighborway may not be an appropriate option for the segment of the corridor south of Cardinal Road. Given the shift in traffic conditions at Cardinal Road, less confident bicyclists may shift to sidewalks for this stretch of the study corridor. Traffic calming treatments and signage south of Cardinal Road may help improve the neighborway connection on Fair Woods Parkway for more confident cyclists, as well as increasing driver awareness of bicyclists sharing the road. In the long term, the city could explore the feasibility of separated bike facilities in this segment to further advance the goal of providing a bicycle network for bicyclists of all ages and abilities.

Additional traffic calming treatments may be necessary along the entire corridor. The 85th percentile speeds observed at the two data collection points (north of Continental Lane and south of Cardinal Road) were higher than the posted speed limit and higher than recommended in FHWA's guidance. During the walking tour, many rolling stops were observed at AWSC intersections, and attendees shared

that rolling stops are common, with some drivers ignoring the stop sign at Scout Drive. This behavior may be due to the lack of unmarked crosswalks at Scout Drive, which doesn't warn drivers of potential pedestrian crossings. Coupled with the context of low-volume side streets in a residential neighborhood, drivers may not expect cross-traffic. Further study may be necessary on whether existing stop signs are warranted and how they affect the experiences and behaviors of drivers, cyclists, and pedestrians.

Better crossing opportunities can also be incorporated along the study corridor. Improvements could include:

- Marking the crosswalks at Scout Drive intersection.
- Adding a crosswalk on the southern leg of Blue Coat Drive to better connect Dale Lestina Park and the Mosby Woods pool and discourage unexpected midblock crossings.
- Striping additional high visibility crosswalks at T-intersections.
- Adding traffic calming elements, such as raised crosswalks, curb extensions, median islands, neighborhood traffic circles, etc.
- Installing long term treatments south of Cardinal Road, such as separated bike facilities.
- Adding wayfinding signage to provide guidance to bicyclists.

Because of the limited sample size, no overarching patterns could be identified related to crashes. However, sight distance concerns were observed during the walking tour due to topography and roadway geometry between Continental Lane and Scout Drive. Additional traffic calming and signage can assist in mitigating impacts related to sight distance issues.

Wayfinding signage would help provide direction to bicyclists who are less familiar with the area as well as increasing visibility and awareness of bicyclists on Fair Woods Parkway. Other types of signage may be needed to increase driver awareness that Fair Woods Parkway is not a through route for vehicles. At the trail connection to Five Oaks Road, existing signage for no motorized vehicles seems to be ignored based on anecdotal observations of motorcycles using the path. The City may also need to conduct community outreach through the city to clarify the definition of motorized vehicles and what type of vehicles are allowed on trails (such as e-bikes and e-scooters). Along the study corridor, potential signs such as "no outlet" signs would notify and remind drivers sooner that Fair Woods Parkway is not a through route.

CONCEPTUAL DESIGN ALTERNATIVES

Based on the issues and opportunities identified in the existing conditions analysis, the project team identified various preliminary traffic calming treatments for the Fair Woods Parkway neighborway using the Neighborway Guidelines as a reference. The alternatives included treatments at intersections along the study corridor and were grouped based on the following treatment typologies:

1. Neighborhood Mini-Roundabouts
2. Horizontal Deflections (i.e., Treatments with Narrowing/Shifting Effect)
    - Curb extensions, chicanes, and spot median islands
3. Raised Treatments (i.e., Vertical Deflections)
    - Raised crosswalks and raised intersections.
4. Wayfinding Locations

Figure 14, **Figure 18**, and **Figure 21** displays the conceptual design alternatives by treatment typology and proposed locations. The project team determined the proposed locations for specific treatments while considering impacts on large/emergency vehicle access, stormwater drainage, on-street parking, and general feasibility based on available curb-to-curb space. The Fairfax City Neighborhood Bikeways Tool Kit was referenced to provide information on each treatment.

The Neighborway Guidelines provide performance targets for neighborways and inform the decision-making process on proposed treatments. The performance targets are summarized in **Table 1**. Based on the existing conditions analysis and performance targets, the following considerations were noted in the process of selecting appropriate traffic calming and crossing improvements for the Fair Woods Parkway neighborway for targets that were not met:

- Based on **Figure 10**, 85th percentile speeds on Fair Woods Parkway are above the maximum target of 25 mph, indicating general need for traffic calming treatments.
- Based on **Figure 11**, the AADT south of Cardinal Road is above the maximum target of 3000, indicating this section of Fair Woods Parkway as a significant location for improvements.

Table 1. Performance Targets for Neighborways in the City of Fairfax (Source: Neighborway Guidelines)

Measurement	Target(s)	Rationale	Data Sources	Notes
Operating/Prevailing Vehicle Speed (mph)	**Preferred: 15** **Acceptable: 20** **Maximum: 25 (at 85th percentile)**	Reducing speed differential reduces crash severity should a collision occur. Works in combination with volume to reduce number of events of motor vehicles passing bicyclists on shared roadways.	**Speed study**	Keep speed difference between motorists and bicyclists to less than 15 mph. Design speed of typical adult is 15 mph, seniors/ children/novice bicyclists ride slower (~10 mph). Lower speeds are consistent with Safer Speeds objective of Safe Systems Approach.
Average Daily Traffic Volume (ADT)	**Preferred: 1000** **Acceptable: 2000** **Maximum*: 3000**	Works in combination with speed to reduce number of events of motor vehicles passing bicyclists on shared roadways.	**Vehicle counts**	*Maximum value OK only if operating speed is <25 mph.
Peak Hourly Traffic Volume (vehicles/hr)	**Preferred: 150 (up to 2.5 vehicles/min)** **Acceptable: 300 (up to 5 vehicles/min)** **Maximum*: 450 (up to 7.5 vehicles/min)**	Maintains number of events of motorists passing bicyclists during peak hours at levels similar to off-peak hours.	**Vehicle counts**	*Maximum value OK only if operating speed is <25 mph. Target assumed to be 15% of ADT target. Peak hour may be higher depending on local context.
Unsignalized Crossing Opportunities per Hour	**Preferred: 120 (up to 30 second wait)** **Acceptable: 60 (up to 1 minute wait)**	Providing ample safe crossing opportunities at intersections reduces likelihood of higher risk crossing behaviors. Increased crossing opportunities improves efficiency and connectivity.	**Traffic study, field observation**	Crossing opportunities vary depending on mode, naturally occurring traffic gaps (see Table 2), motorist yielding rates, signage, and crossing distance. If acceptable value cannot be met, consider signalization.
Signalized Crossing Opportunities per Hour	**Preferred: 60 (up to 1-minute wait)** **Acceptable: 30 (up to 2-minute wait)** **Minimum*: 15 (up to 4-minute wait)**	Providing ample safe crossing opportunities at intersections reduces pedestrian and bike delay and likelihood of higher risk crossing behaviors. Increased crossing opportunities improves efficiency and connectivity.	**Traffic study, signal timings, field observation**	*Minimum should only apply to signalized crossings of streets where users reasonably expect longer signal timings and signal progression is a priority (e.g., Fairfax Blvd).

Alternative 1: Neighborhood Mini-Roundabouts

Neighborhood mini-roundabouts are intersections with a circular central island, requiring left-turning vehicles to navigate around the circle to complete their movement. The circular island may be curbed. In instances where space may be limited for larger vehicles (i.e., emergency vehicles) to make a turn, the circular island can be made mountable.

Benefits of neighborhood mini-roundabouts include:

- Speed management by introducing a horizontal deflection in a vehicle's path,
- Crossing improvements for bicyclists and pedestrians by introducing yield behavior instead of stop signs, and
- Limited impacts to stormwater drainage.

Figure 13 illustrates an example of a mini-roundabout.

Figure 13. Example of a Mini-Roundabout in Hardin County, KY (Source: Times-Tribune)

As shown in **Figure 14,** neighborhood mini-roundabouts were proposed at the following intersections:

- Cardinal Road
- Scout Drive
- Blue Coat Drive

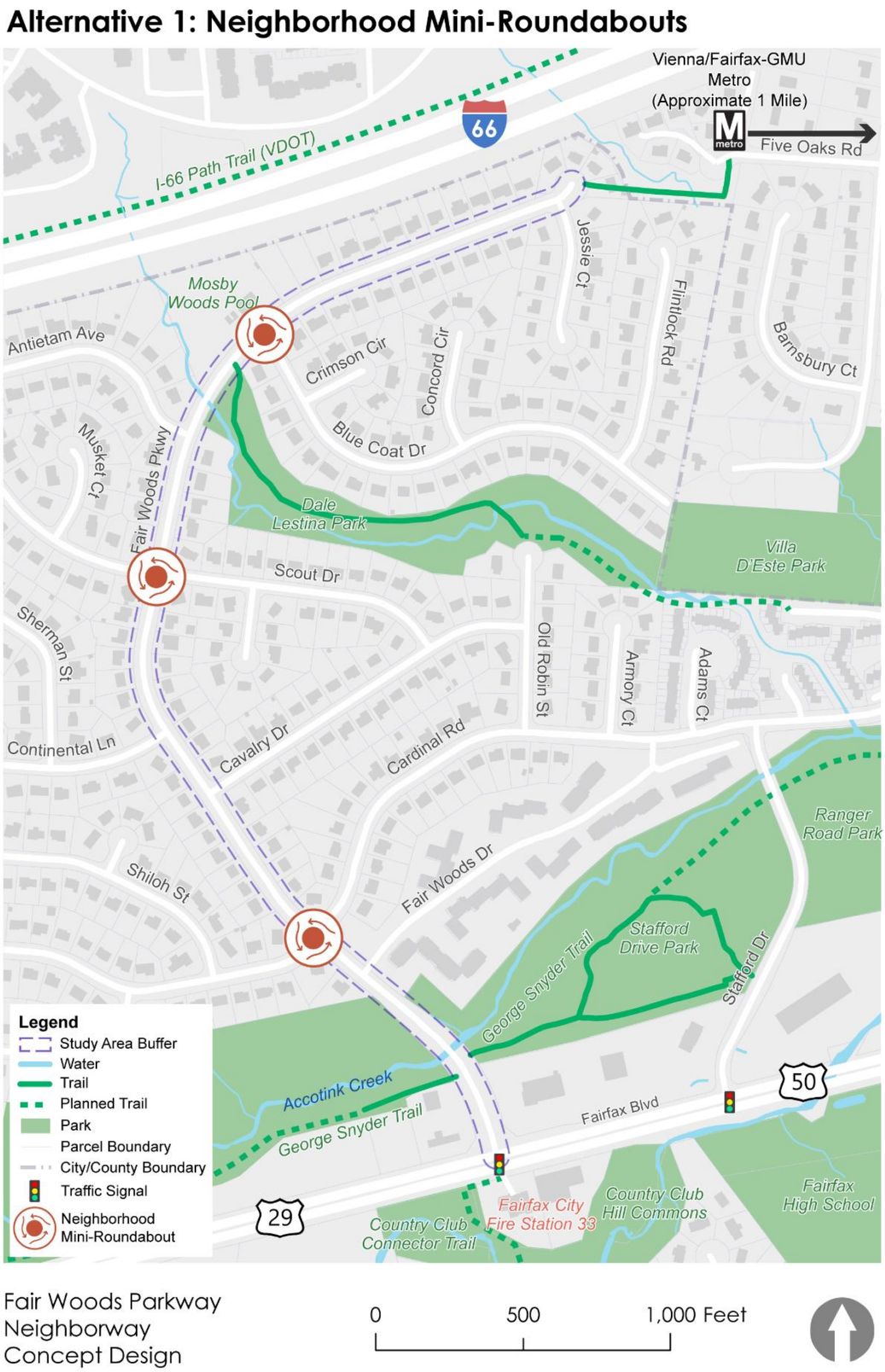


Figure 14. Alternative 1: Neighborhood Mini-Roundabouts

Alternative 2: Horizontal Deflections

Horizontal deflections, or treatments with a narrowing/shifting effect, include curb extensions, spot median islands, and chicanes.

Spot median islands, or pedestrian refuge islands, are curbed islands placed between opposing travel lanes. Implementing spot median islands are intersections may require additional consideration on turning movements for larger vehicles. **Figure 15** displays an example of a spot median island. Benefits of spot median islands include:

- Speed management by creating a minor shift in a vehicle's path,
- Crossing improvements by introducing a refuge island and two-stage pedestrian crossing, and
- Limited impacts on stormwater drainage.

Figure 15. Example of a Spot Median Island

Curb extensions extend the sidewalk and/or curb line towards the roadway. **Figure 16** displays an example of a curb extension. Benefits of curb extensions include:

- Speed management by slowing down turning traffic through introducing tighter curb radii,
- Crossing improvements by decreasing the pedestrian crossing distance and increasing visibility of pedestrians, and
- On-street parking regulation by blocking off space where vehicles should not park or turn from.

Figure 16. Example of a Curb Extension (Source: NACTO)

Similar to curb extensions, chicanes extend the curbline in a staggered pattern. **Figure 17** displays an example of a chicane. Benefits of chicanes include:

- Speed management by slowing down traffic through introducing a small shift in a vehicle's path,
- Volume management as some may prefer to drive on a route without chicanes, and
- Limited impact on large/emergency vehicles.

Figure 17. Example of a Chicane

Alternative 2: Horizontal Deflections

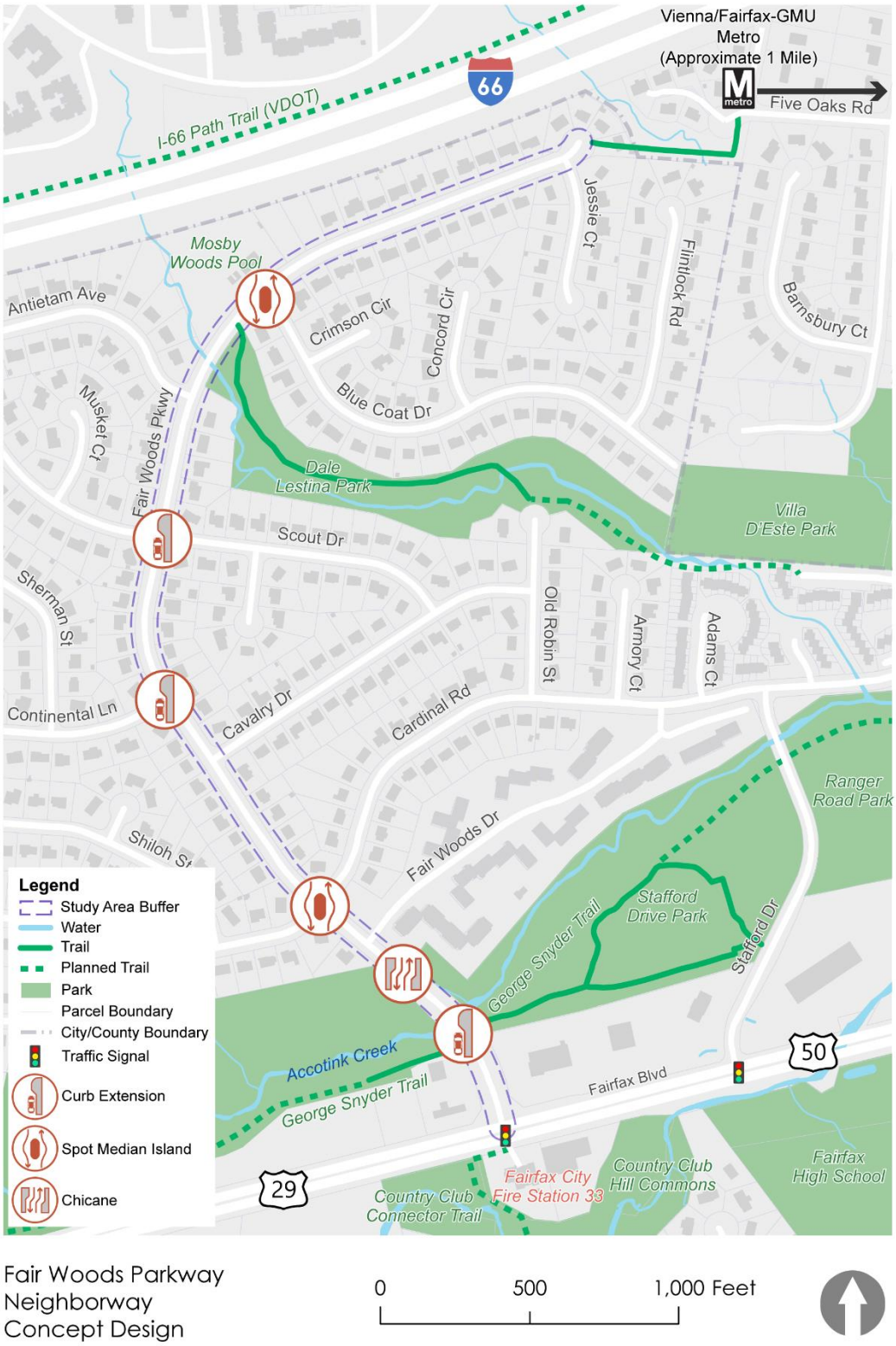


Figure 18. Alternative 2: Horizontal Deflections

As shown in **Figure 18**, horizontal deflections were proposed at the following locations:

- Curb Extensions
  - George Snyder Trail Crossing
  - Continental Lane
  - Scout Drive
- Chicane between George Snyder Trail Crossing and Mosby Woods Drive
- Spot Median Islands
  - Cardinal Road
  - Blue Coat Drive

Alternative 3: Vertical Deflections

Vertical deflections include raised treatments, such as raised intersections and raised crosswalks. **Figure 19** and **Figure 20** illustrate examples of a raised intersection and raised crosswalk respectively. Raised intersections act as a speed table, providing a flat central zone with marked crosswalks and shallow slopes on each approach. As raised intersections impact the level of the roadway from curb to curb, stormwater drainage impacts should be considered to determine feasibility. Benefits of raised intersections include:

- Speed management by introducing a speed table,
- Volume management as some may prefer to drive on a route without raised intersections, and
- Crossing improvements by encouraging vehicles to slow down upon approach.

Figure 19. Example of a Raised Intersection

Raised crosswalks are speed tables with marked crossings in the flat area and share the same benefits and considerations as raised intersections.

Figure 20. Example of a Raised Crosswalk

As shown in **Figure 21**, vertical deflections were proposed at the following locations:

- Raised Intersections
  - Scout Drive
  - Cardinal Road
- Raised Crosswalks
  - Blue Coat Drive
  - Continental Lane
  - George Snyder Trail Crossing

Figure 21. Alternative 3: Vertical Deflections

Wayfinding Signs

Wayfinding signs provide guidance for people navigating through a network and can be helpful for those who are unfamiliar with an area or route. Wayfinding signs may be route-based, symbolizing the current route the person is on, or destination-based, displaying the route and directionality to a specified destination.

As shown in **Figure 22**, potential locations for wayfinding signs were determined qualitatively based on locations where people may commonly make decisions on which direction to take in their path. Potential locations include:

- Fairfax Boulevard and Fair Woods Parkway
- George Snyder Trail Crossing
- Cardinal Road and Fair Woods Parkway
- Blue Coat Drive and Fair Woods Parkway

Potential destinations on these signs include:

- Vienna/Fairfax-GMU Metro Station
- Mosby Woods Pool
- Dale Lestina Pool
- Cardinal Road Neighborway
- George Snyder Trail
- Stafford Drive Park
- Fairfax Boulevard
- Country Club Commons Connector Trail
- Fairfax High School
- Fairfax Circle
- Northfax
- Old Town

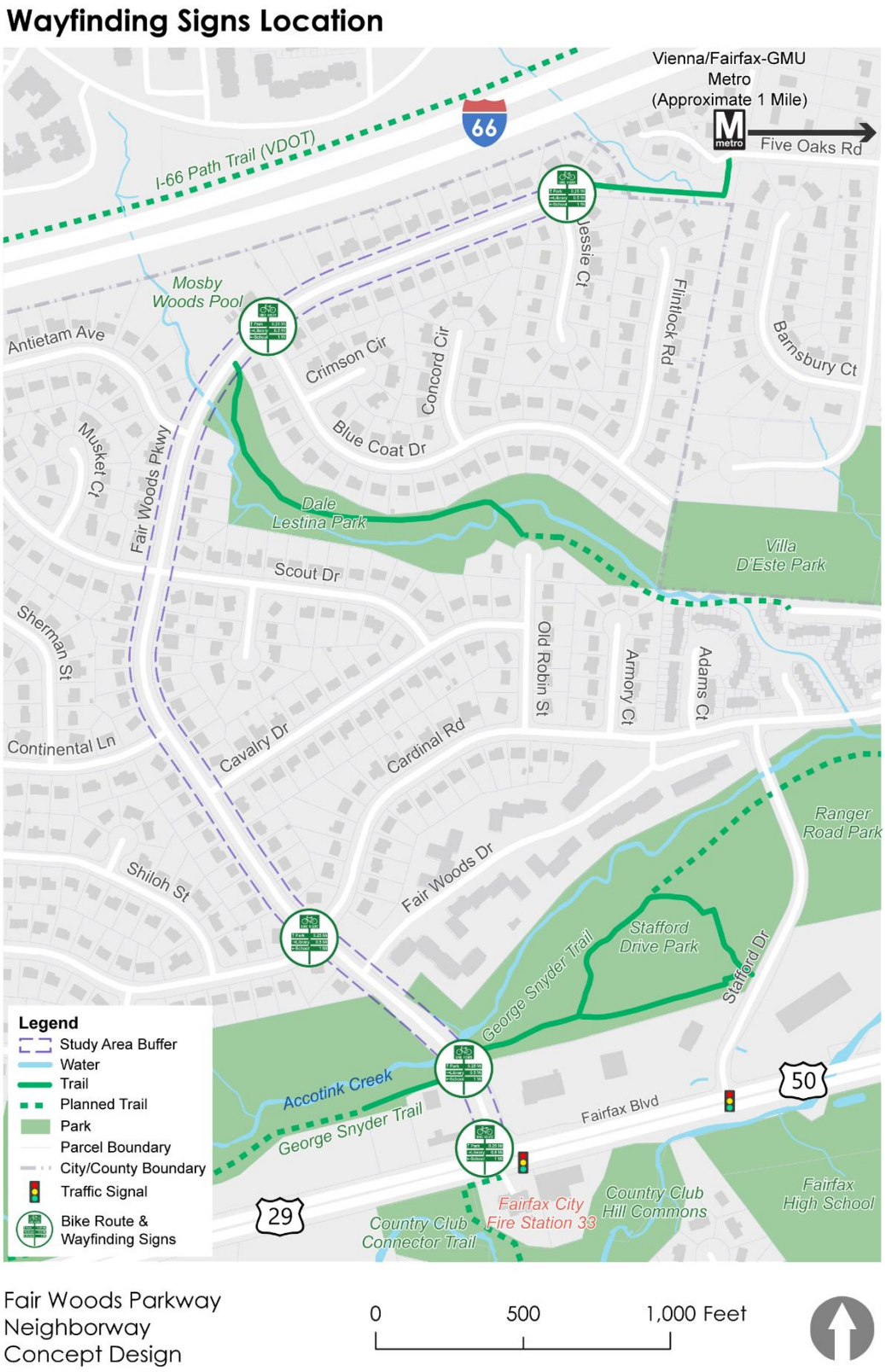


Figure 22. Potential Wayfinding Sign Locations

These conceptual design alternatives were presented to City staff for initial feedback prior to the public meeting. Through a series of public and agency stakeholder discussions, the treatment typologies were further evaluated to determine a preferred recommended alternative that combines different treatment typologies along the corridor. Discussions on the alternatives in stakeholder and public engagement meetings are summarized in the next section.

PUBLIC & STAKEHOLDER FEEDBACK

Initial City Staff and Agency Coordination Meeting

The project team held an initial City staff and agency coordination meeting on Thursday, November 10, 2022, from 3:00-4:00 PM. The meeting was held virtually on Microsoft Teams and started with an introduction to the project and work completed to date. The conceptual design alternatives presented in the previous section were shared in this meeting to determine any design preferences and/or limitations based on specific agency concerns (i.e., emergency vehicle access). Thirteen (13) total people attended the meeting, including five (5) City staff, three (3) police department staff, one (1) fire department staff, one (1) parks & recreation staff, and three (3) consultant team members.

The main takeaways from this meeting are summarized below:

- City staff from the Police and Fire departments did not express any major concerns over the concept design alternatives besides general design considerations. The central island of any mini-roundabout should be mountable. Likewise, raised treatments should be designed accordingly to not collide with any pipes or drains on fire trucks.
- Chicanes were discussed and concluded to not have a desirable effect as a traffic-calming treatment. Based on anecdotal evidence, many drivers do not seem to slow down and/or drive straight across.
- In cases of heavy snow, treatments will need to be delineated appropriately with signage and/or vertical delineators.
- There was a consensus among City staff that neighborhood mini-roundabouts was a preferred solution.
- Temporary and/or pilot treatments can be considered and may be beneficial for residents to get a sense of what each alternative looks like if implemented.

Public Open House

The project team hosted a public open house on Wednesday, December 28, 2022, from 6:30-8:30 PM at the Sherwood Community Center in the City of Fairfax, VA. The goal of this meeting was to share information, including a summary of the existing conditions analysis, neighborway design guidelines, and preliminary design alternatives. Feedback on feasibility and preferences collected from the previous coordination meeting was implemented prior to the open house. Community members, City staff, and consultant team members attended the public open house. The project team collected feedback on preferred traffic calming treatments at the public open house.

The main takeaways from this meeting are summarized below:

- Preferred treatments in order of number of votes:
  - Cardinal Road
    - Mini-Roundabout (9), Raised Intersection/Crosswalk (3), Curb Extension/Median Island (0)
  - Continental Lane
    - Raised Intersection/Crosswalk (3), Curb Extension/Median Island (2), Mini-Roundabout (0)
  - Scout Drive
    - Mini-Roundabout (7), Raised Intersection/Crosswalk (6), Curb Extension/Median Island (1)
  - Blue Coat Drive
    - Curb Extension/Median Island (8), Mini-Roundabout (6), Raised Intersection/Crosswalk (0)


Photos from the Public Open House

Online Survey and Engage Fairfax Page Comments

In conjunction with the public open house, an online survey and Engage Fairfax page was created to allow for public comments on the preliminary concept design alternatives.

The main takeaways from the online survey and comments are summarized below:

- Concerns were expressed about the intersection of Cavalry Drive and Fair Woods Parkway, which was not included in the initial concept design alternatives. Residents mentioned vehicles speeding, poor visibility with their location at the crest of the hill, and many people, specifically kids, cross at this location.
- Concerns were reiterated about the potential removal of on-street parking.
- Residents mentioned the need for more street lighting to benefit from any proposed treatments.
- Crossing improvements, such as flashing beacons and high-visibility crosswalks,
- One comment noted that drivers generally do not stop at the slip turn lane from Fair Woods onto Route 50, resulting in a near miss with a biker. Closing the slip turn lane should be considered.

- Preferred treatments in order of number of votes:
    - Cardinal Road
        - Mini-Roundabout (33), Raised Intersection (28), No Change (25), Median with Refuge Island (16)
    - Continental Lane
        - Raised crosswalk (41), No Change (32), Curb Extension (14), Mini-Roundabout (8)
    - Scout Drive
        - Raised Intersection (40), No Change (30), Curb Extension (14), Mini-Roundabout (13)
    - Blue Coat Drive
        - Raised Crosswalk (31), Median with Refuge Island (30), No Change (28), Mini-Roundabout (16)

City Staff and Agency Coordination Meeting #2

The project team held a second City staff and agency coordination meeting on Thursday February 9, 2023 from 2:00-3:00 PM. The goal of this meeting was to confirm preferred alternatives and treatments for the Fair Woods Parkway neighborway.

The main takeaways from this meeting are summarized below:

- The project team presented the final recommended alternatives, and the City confirmed that they want to move ahead with the recommended alternatives.
- The roundabout will be designed with the City's fire truck as a control vehicle and the school bus as a design vehicle. The school bus will not mount the central island. Turning movements will be tested using AutoTurn with the developed concept design.
- The City understands that raised intersections and roundabouts and the shared use path may not be part of the resurfacing project and may need more capital funding. The City may have additional capital funding for this project in the next year's budget/CIP.
- Raised treatments may impact drainage. Drainage impacts will be documented in the form of identifying existing inlets and pipes/culverts on the plan set. Though a detailed drainage design plan will not be included, the project team will connect with design engineers to understand any additional drainage impacts that can be shown on the plan sets. An order of magnitude cost will be included for the implications of additional inlets for drainage.
- The City confirmed that the raised intersection design should include curb extensions but keep it as a separate line item in cost estimates so the City understands costs with curb extensions and without curb extensions.

RECOMMENDED ALTERNATIVE

The recommended alternative for the Fair Woods Parkway neighborway was developed based on the public and agency stakeholder's feedback on conceptual design alternatives. The proposed treatments are summarized in **Figure 23** and **Table 2**. The benefits of the recommended treatments are summarized below by location:

- At the Fair Woods Parkway and Fairfax Boulevard intersection:
  - Closing the right turn slip lanes and tightening the curb radii will tighten the roadway width, decreasing the length that a pedestrian would have to walk to cross Fair Woods Parkway. Additionally, the intersection will be safer for people crossing at this location, as right turning vehicles will need to stop at the intersection prior to turning right.
  - Realigning and adding high visibility crosswalks will improve pedestrian safety and alert road users to a pedestrian crossing.
- At George Snyder Trail Crossing:
  - Installing curb extensions, a raised crossing, high-visibility crosswalk, and rectangular rapid flashing beacon (RRFB) at this location will provide crossing improvements and enhance pedestrian and bicyclist safety and visibility. This crossing will continue to be well-used by trail users with existing and planned trails in the area. Given the higher AADT in this section of Fair Woods Parkway south of Cardinal Road, a combination of treatments at this location will provide additional safety for all road users.
  - Installing wayfinding signs at this location will help guide those using the trails and/or exiting/entering the trail at Fair Woods Parkway.
- At Cardinal Road:
  - Installing a neighborhood mini-roundabout can provide speed management and crossing improvements with the addition of pedestrian refuge islands. Additionally, implementing a mini-roundabout at this location can help to signal the start of the neighborhood street for those entering the Mosby Woods neighborhood off of Fairfax Boulevard.
- At Cavalry Drive, Continental Lane, Scout Drive, and Blue Coat Drive:
  - Installing curb extensions can help with speed management and crossing improvements on all legs of the intersection with the addition of high-visibility crosswalks. These improvements will improve safety conditions for pedestrians and bicyclists given the curvature within this section of Fair Woods Parkway.
- At the cul-de-sac:
  - Installing wayfinding signs at this location will help guide those using the neighborway to get to the Vienna-Fairfax GMU metro station via the trail connection to Five Oaks Road and other destinations. In existing conditions, there is currently no signage indicating the trail connection and potential destinations. For those unfamiliar with the area, people may be inclined to navigate through Jessie Court, which is a dead-end road.

Proposed Treatments Map

Figure 23. Proposed Treatments Map

Table 2. Proposed Treatments

#	Location	Type	Notes
1	Fair Woods Pkwy and Fairfax Blvd Intersection	Tighten Curb Radii & Slip Lane Removal	Close right turn slip lanes and tighten turn radii
		High Visibility Crosswalks	Realign and install high visibility crosswalks
2	Fair Woods Pkwy between Fairfax Blvd and George Snyder Trail Crossing	Shared Use Path	Widen or replace existing sidewalk to a 10' wide shared use path on the west side
3	Fair Woods Pkwy and George Snyder Trail Crossing	Raised Crossing	Relocate the crossing closer to driveways and realign trail in east side. Install raised crossing with high visibility crosswalk.
		High Visibility Crosswalk	
		Curb Extensions	Add bollards along the curb extension
		Rectangular Rapid Flashing Beacon	-
		Wayfinding and Branding Sign	-
4	Fair Woods Pkwy and Cardinal Rd Intersection	Neighborhood Mini-Roundabout	-
5	Fair Woods Pkwy and Cavalry Dr Intersection	Curb Extensions	Add bollards along the curb extension
		High Visibility Crosswalks	Install high visibility crosswalks with ADA-compliant curb ramps
6	Fair Woods Pkwy and Continental Ln Intersection	Curb Extensions	Add bollards along the curb extension
		High Visibility Crosswalks	Install high visibility crosswalks with ADA-compliant curb ramps
7	Fair Woods Pkwy and Scout Dr Intersection	Curb Extensions	Add bollards along the curb extension
		High Visibility Crosswalks	Install high visibility crosswalks with ADA-compliant curb ramps
8	Fair Woods Pkwy and Blue Coat Dr Intersection	Curb Extensions	Add bollards along the curb extension
		High Visibility Crosswalks	Install high visibility crosswalks with ADA-compliant curb ramps
9	Cul-de-sac	Wayfinding and Branding Sign	-

Evaluation of Additional Treatments at Fair Woods Parkway and Fairfax Boulevard

The following items were evaluated at the Fair Woods Parkway and Fairfax Boulevard through a traffic analysis:

- Feasibility of adding a pedestrian crossing on the eastern leg of the intersection,
- Appropriate pedestrian crossing time on the pedestrian crossing at the existing western leg of the intersection, and
- Feasibility and impact of reducing the intersection's cycle length in the PM peak period.

The traffic analysis was conducted using Synchro, signal timing plans provided by the City, and guidelines for pedestrian traffic timing at traffic signals provided by the VDOT Northern Region Traffic Engineering Practice.[1] The intersection was analyzed only at the PM peak period for the last item regarding reduction of the cycle length, which had the highest existing cycle length of 220 seconds. Based on the team's analysis, findings are summarized below:

- It is feasible to add a crosswalk on the eastern leg of the intersection. The crosswalk would run with Phase 4. As Phase 4 and Phase 8 run concurrently, the same pedestrian clearance time can be provided to the eastern leg crosswalk, similar to that provided to the western leg crosswalk which runs with Phase 8.
- The existing pedestrian time provided to cross Fairfax Boulevard is sufficient for both crosswalks, regardless of whether a crosswalk on the eastern leg is installed. Guidelines for pedestrian traffic timing at traffic signals by VDOT Northern Region Traffic Engineering Practice were used as a reference to evaluate the crossing time.[1] Based on these guidelines, for curb-to-curb distances less than 112 feet, the walk time should be at least 7 seconds and the flash don't walk time should be at least 23 seconds. In all time periods, the existing signal timing plans provide sufficient pedestrian crossing times.
- In the PM period, cutting the cycle length in half from 220 seconds to 110 seconds allows for improvements in operations considering the intersection alone. However, additional consideration will be necessary to determine any impacts on adjacent intersections (i.e., offsets) given that they are located less than 1000 feet way from the study intersection and Phase 2 and Phase 6 are coordinated at the study intersection.

[1] https://projects.vhb.com/vdotnova/pdf/nro%20practices/NRO%20TEP%20401.1%20Ped%20crossing%20time.pdf

IMPLEMENTATION

Cost Estimate and Next Steps

The consultant team developed an estimate of probable cost for the recommended treatments identified in the Recommended Alternative section. The total project cost is estimated to be $1,200,000, which includes a 30 % planning-level project contingency.

This estimate includes the elements shown in Figure 23 and Table 2. Based on the public and agency stakeholder discussions, the original proposed concept also included raised intersections. However, due to storm drainage concerns and additional costs of drainage mitigation, this element was removed from the recommended concept. Raised intersections may be considered in a future phase.

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