Preliminary Engineering Report

Metropolitan Branch Trail: Piney Branch Road to Blair Road Design Alternatives

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GOVERNMENT OF THE DISTRICT OF COLUMBIA
MURIEL BOWSER, MAYOR

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Table of Contents

Contents

List of Figures

List of Tables

Appendices

Appendix A. Field Visit Images

Appendix B. 5 a.m. and 12 p.m. Parking % Occupancy Table

Appendix C. TMC Data and Speed/Volume Data

Appendix D. Alternatives Classification Code

Appendix E. Art & Design Manual

Appendix F. MOE Matrix

Appendix G. Alternatives Pros & Cons List

Appendix H. Outreach Report

Appendix I. Web Soil Survey

Appendix J. Parking Removal Impacts

Appendix K. – All Design Alternatives

Appendix L. – Cost Estimates

1. Introduction

This Preliminary Engineering Report is prepared in support of the completion of the Metropolitan Branch Trail (MBT) from Piney Branch Road NW to Blair Road NW in the District of Columbia. The report documents the existing conditions of the project area and presents a series of design alternatives to determine which bicycle and pedestrian facility types best accommodate the project need.

This project is compliant with current design standards and includes traffic and environmental impact studies for the project area. This report includes a description of existing conditions, design requirements, design alternatives, and an evaluation and screening process used to eliminate infeasible design options. Additionally, this report documents the technical analysis as required to complete the historic and environmental documentation.

1.1 Project Background & Context

Following the route of the Baltimore and Ohio Railroad's Metropolitan Branch rail line, the MBT is an 8-mile multi-use trail that shares a corridor with Metrorail Red Line, MARC commuter service, CSX freight trains, and Amtrak. **Figure 1** shows the timeline of the trail beginning with the construction of the John McCormack Drive section in 1999 and to the start of the conceptual phase of this project in 2021.

The project is a mix of on-street and off-street bicycle and pedestrian facilities that connects Union Station in the District of Columbia to Silver Spring, Maryland as shown in **Figure 2.**

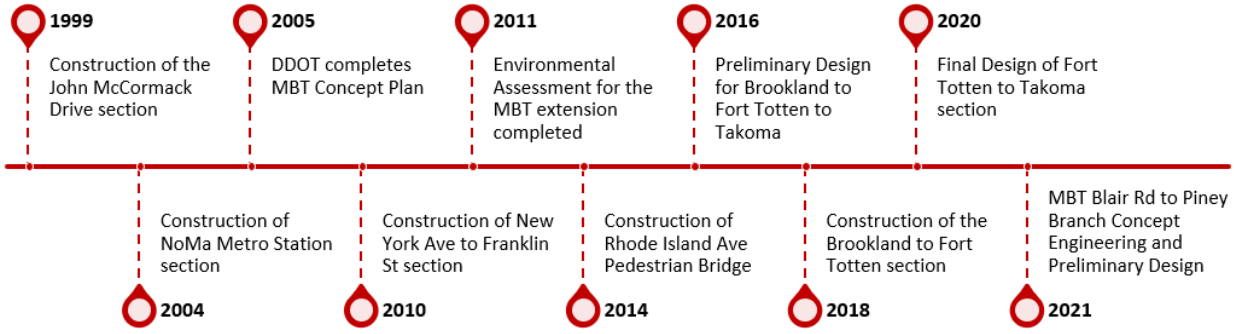

Figure 1. Timeline of Metropolitan Branch Trail Project

Note: The dates displayed are the initial start dates of the project and do not include the end dates.

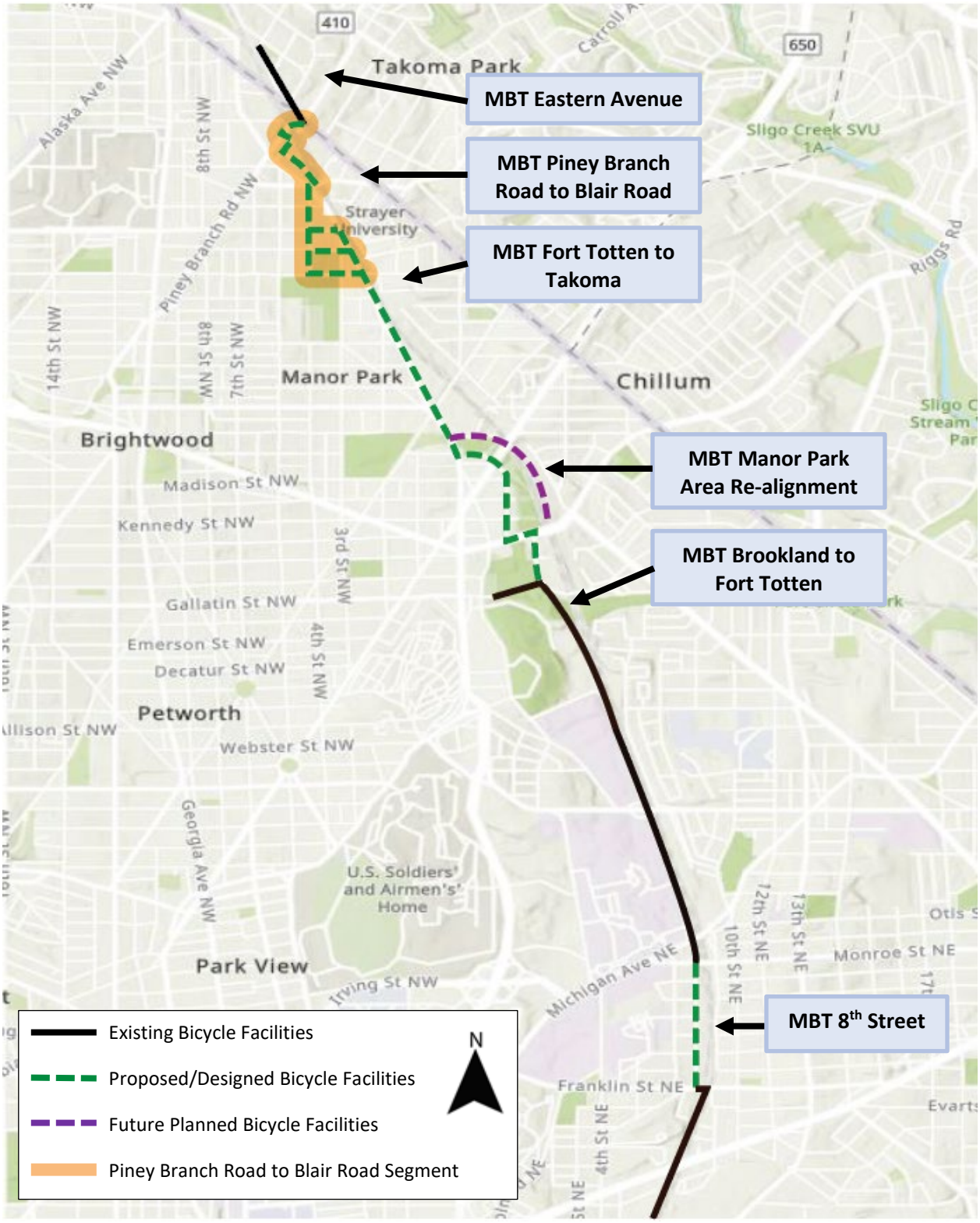

Figure 2. Metropolitan Branch Trail All Segments

The MBT Piney Branch Road to Blair Road segment is the final section of the overall MBT construction and is located near the Takoma Metrorail Station in Ward 4.

The project area is divided into six segments that can support an increase of bicycle and pedestrian facilities and infrastructure. **Figure 3** displays existing and proposed bicycle facility types for the project area and **Figure 4** displays the location of existing and proposed bike and transit facilities in the project area. Understanding the existing bike and transit facilities within the project area informed the designs of each alternative, with a particular focus to minimize conflict points and ensure transit routes are not disrupted.

The development and analysis of each segment alternative is based on a set of performance measures, stakeholder feedback, and community input as part of the conceptual design process. Through this process, the advancement of preferred concepts will be presented in the report.

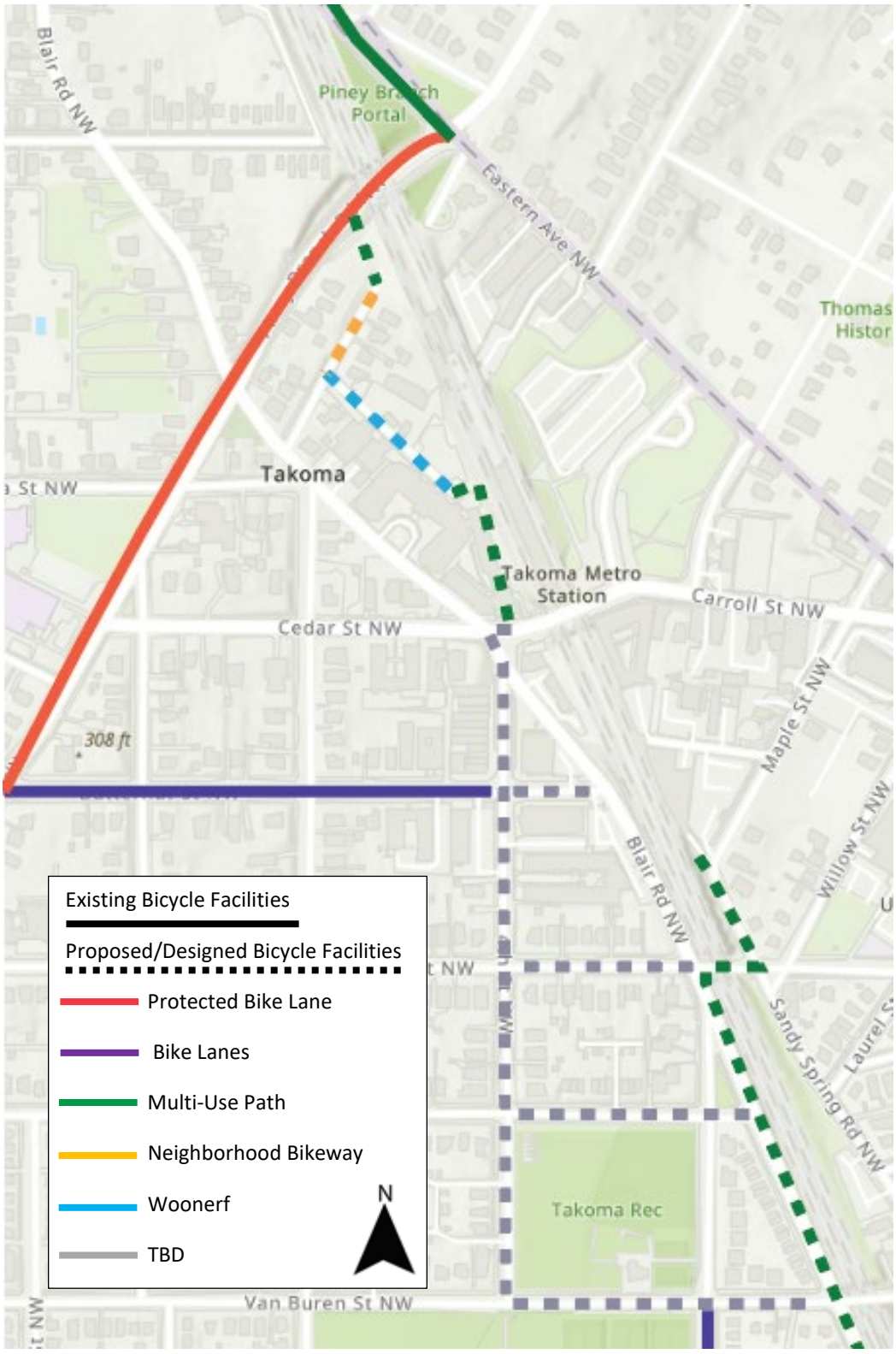

Figure 3. Existing and Proposed Bicycle Facility Types in Project Area

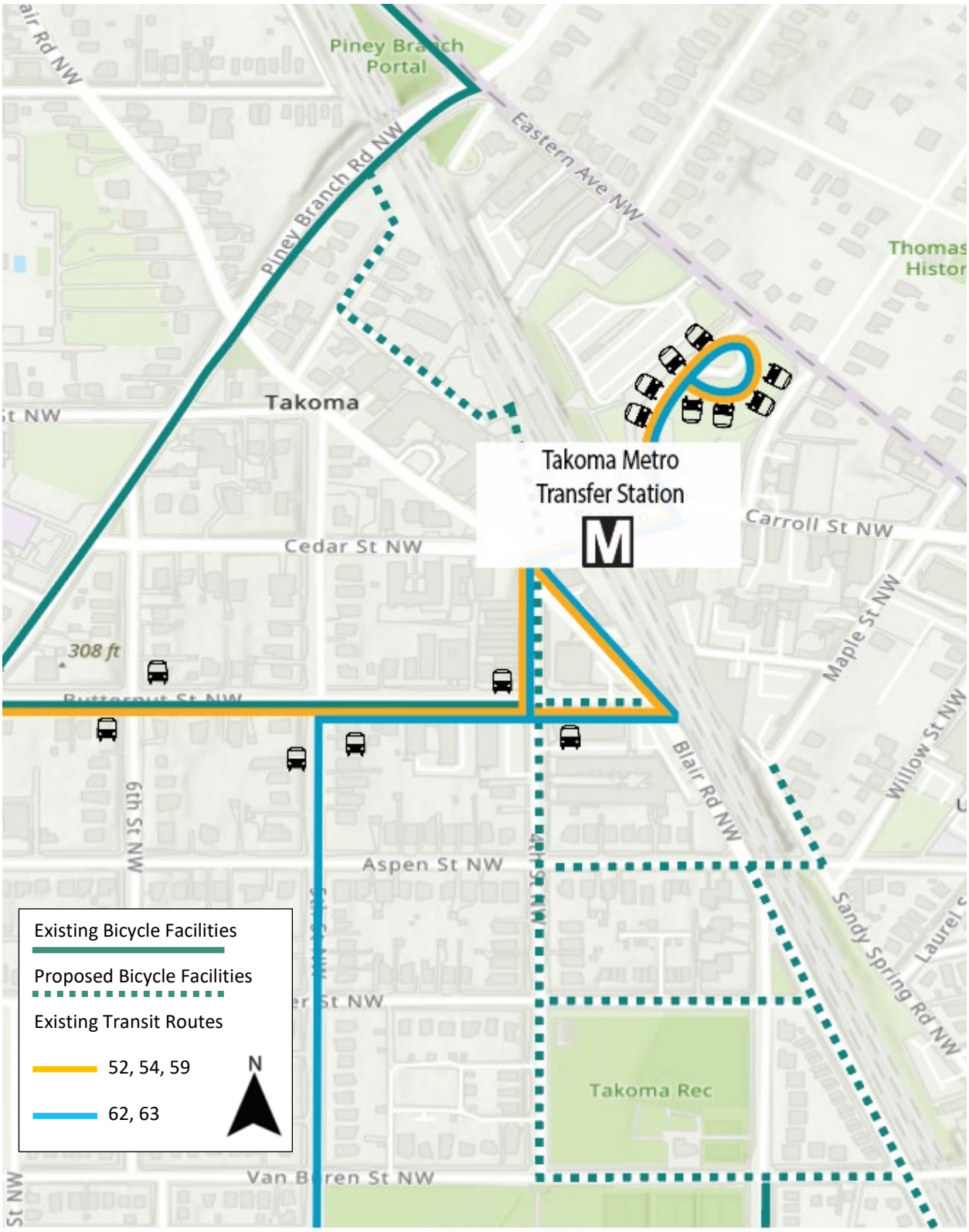

Figure 4. Existing and Proposed Bicycle and Transit Facilities in Project Area

2. Existing Conditions

2.1 Existing Roadway Conditions

To analyze existing conditions of the project area, the project team conducted field observations, right-of-way surveys, topographic surveys, historic research, and collected data related to parking, transit, bike, pedestrian facilities, and stormwater and drainage utilities. The project team conducted a field visit on August 5, 2021, from 8 a.m. to 10 a.m. to identify design constraints and opportunities. An inventory of parking regulations, traffic calming infrastructure (i.e., speed humps), bus stops, and existing bicycle and pedestrian infrastructure is documented. **Appendix A** documents the images collected during the site visit.

Segment 1: Piney Branch Road NW

Piney Branch Road is a minor arterial from Eastern Avenue to Blair Road with a posted 30 MPH speed limit. The travel lane widths range from 11 to 15 feet, there are 6-foot one-way protected bicycle lanes with 3- to 8-foot buffers, 8-foot metered parallel parking spaces, and a continuous 8- to 10-foot sidewalk on both sides of the street. **Figure 5** and **Figure 6** display the existing conditions underneath the rail line. When heading southwest, towards the Piney Branch Road and Blair Road intersection, the median becomes a centerline which accommodates the parallel parking spaces on both sides of the street.

Figure 5. Piney Branch Road -- Eastbound

Figure 6. Piney Branch Cross Section - Eastbound

Segment 2: Piney Branch Road to Chestnut Street NW

The trail will connect from Piney Branch Road to Chestnut Street via a multi-use path on two properties (Square 3184, Lots 0822 and 0823) currently owned by the Washington Metropolitan Area Transit Authority (WMATA) on the west side of Chestnut Street at its northern terminus. There is a significant change in elevation between Piney Branch Road and Chestnut Street as shown in **Figure 7**.

Figure 7. WMATA-owned Parcels

Segment 3: Chestnut Street NW

Chestnut Street is a local street serving residential parcels and connects to Spring Place. Between Spring Place and the north end of Chestnut Street, there is approximately 8-foot parallel parking on both sides and a 10-foot two-way travel lane as shown in **Figure 8**. The space is not delineated, and the curb-to-curb dimension is 26 feet. People biking currently share travel lanes with people driving.

Figure 8. Chestnut Street - Eastbound

Segment 4: Spring Place NW

Spring Place is a local street. For some properties, Spring Place is their primary access (e.g., Metro Village Apartments, 7052 Spring Place, 7058 Spring Place). For other properties, Spring Place is a "back of house" access (e.g., Gables Takoma Park, 343 Cedar Street). Spring Place does not consistently have a vertical curb along its length but generally has 20 to 26 feet of paved width, used variably for two-way travel, on-street parking, biking, and walking as shown in **Figure 9**.

Figure 9. Spring Place - Northbound

Segment 5: 343 Cedar Street NW

From Spring Place, the trail will connect to Cedar Street via a multi-use path on a property currently owned by WMATA east of 343 Cedar Street. There is currently an existing unpaved trail, as shown in **Figure 10**, used by people walking or biking from Spring Place to the Cedar Street and Blair Road intersection. During the field visit, it was noted that lighting, landscaping improvements, and altercations to the wingwall were needed for this segment.

Figure 10. WMATA-owned Parcel East of 343 Cedar Street - Northbound

Segment 6: Cedar Street, Blair Road, 4th Street, Butternut Street, Aspen Street, Whittier Street, and Van Buren Street NW

From Cedar Street, the MBT will become an on-street bikeway connecting to Blair Road using 4th Street and one of four possible east-west streets: Butternut Street, Aspen Street, Whittier Street, or Van Buren Street.

Cedar Street and Blair Road and 4th Street Intersections have connected signal timing operations. The east side of the Cedar Street and Blair Road intersection has three westbound lanes (a left-turn, through lane, and right-turn lane) and one eastbound lane. There is a bike box present across the westbound approach as shown in **Figure 11** and crosswalks across each leg of the intersection. The intersection has 10-foot lanes with wide 5- to 10-foot sidewalks as shown in **Figure 12.**

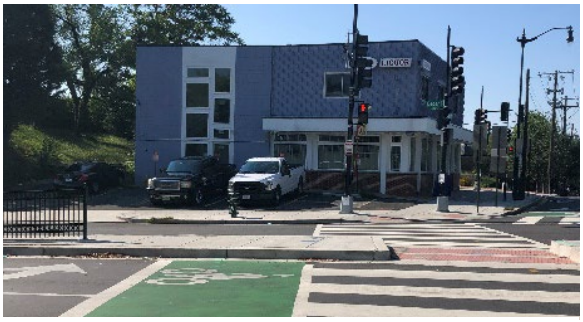

Figure 11. East side of Cedar Street and Blair Road Intersection

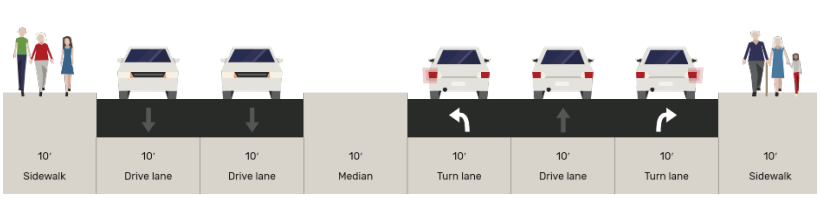

Figure 12. Cedar Street and Blair Road intersection – Westbound

4th Street from Cedar Street to Butternut Street is 66 feet from curb-to-curb, one-way (southbound) and features back-in angled parking, two southbound travel lanes (where people biking southbound share the lane with vehicles), parallel parking, and a contraflow (northbound) protected bike lane as shown in **Figure 14** and **Figure 17**. From Butternut Street to Aspen Street, 4th Street is 40 feet from curb-to-curb and features parallel parking on both sides and travel lanes for two-way travel as shown in **Figure 15**. People biking currently share travel lanes with people driving. South of Aspen Street, the travel lane configuration remains the same except the curb-to-curb width narrows to 30 feet as shown in **Figure 16** and **Figure 13**.

Figure 15. 4th Street Cedar Street to Butternut Street - Northbound

Figure 16. 4th Street Butternut Street to Aspen Street - Northbound

Figure 14. 4th Street Aspen Street to Whittier Street - Northbound

Figure 13. 4th Street Whittier Street to Van Buren Street - Northbound

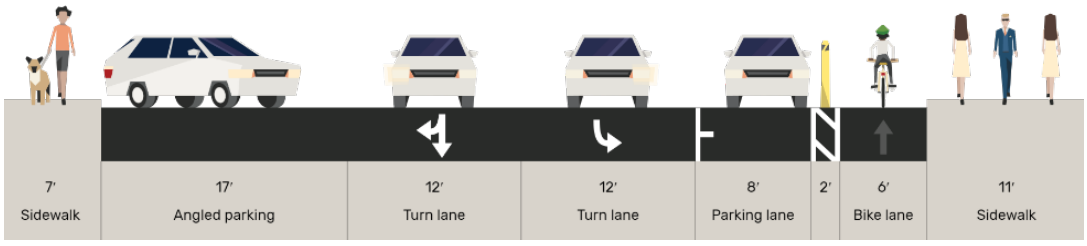

Figure 17. 4th Street from Cedar Street to Butternut Street - Northbound

Butternut Street is a collector street and is 50 feet from curb-to-curb and features 7-foot metered parallel parking on both sides and wide travel lanes for two-way travel (15 feet westbound and 21 feet eastbound). There is a bus stop on the south side of the street. The sidewalks range from 12 to 15 feet wide on both sides of the street as shown in **Figure 18.**

Figure 18. Butternut Street - Eastbound

Aspen Street is a collector street and is 30 feet from curb-to-curb and features 8-foot parallel parking spaces on the north side and travel lanes for two-way travel. There is residential housing with 5-foot sidewalks and street trees on both sides of the street as shown in **Figure 19**.

Figure 19. Aspen Street - Eastbound

Whittier Street is a local street and is 30 feet from curb-to-curb and features 8-foot parallel parking on both sides and travel lanes for two-way travel as shown in **Figure 20.** The north side of the street is residential, and the south side of the street is a 6-acre park directly adjacent to the Takoma Playground, Skatepark, and Takoma Mini Pitch field.

Figure 20. Whittier Street - Eastbound

Van Buren Street is a one-way (eastbound) local street from 4th Street to 3rd Street. It is 30 feet from curb-to-curb and has 8-foot parallel parking on both sides as shown in **Figure 21.** There is a speed hump present mid-block as well as a mid-block pedestrian crossing. The north side of the street has the Takoma Playground, Skatepark, and Takoma Mini Pitch. The south side of the street has the Takoma Recreation Center, Bryce Harper Field, and Takoma Community Center.

Figure 21. Van Buren Street - Eastbound

2.2 Existing Historic Landmarks

Takoma Park is notable for the architectural excellence of its buildings. The area was constructed with large, detached houses set back from the building line, as well as villas and cottages with verandas, large lawns, and privacy in the style of Jackson's pattern book houses. The Stick and Shingle styles, Queen Anne, Colonial Revival, and Bungalow are the predominant architectural styles featured in Takoma. Stick and Shingle styles, a popular architectural style on the east coast in the 1880s, and Victorian Cottage types were among the first homes built. The Lucinda Cady home, an independently recognized Category II monument listed on the National Register of Historic Places in Takoma Park, is an exemplary example of this architecture.

The extents for this project area are almost exclusively in public space. The project segments that are within existing parcels do not have historic structures as shown in **Figure 22**.

The 2011 Finding of No Significant Impact (FONSI) documented that the District of Columbia State Historic Preservations Office (DC-SHPO) determined the Metropolitan Branch Trail will have no adverse effect on historic properties. However, due to the time lapse and potential changes to the design, an update will be completed during the 30 percent design phase of the project to comply with Section 106 of the National Historic Preservation Act (NHPA), as amended, by following the implementing regulations at 36 CFR Part 800.4. First, cultural resource professionals will conduct site visits to help define the area of potential effects (APE) and assess potential historic properties in the project area. Research will be conducted at the DC-SHPO primarily to identify resources previously identified for the National Register of Historic Places (NRHP) and additional archeological sites. This task will also include NRHP evaluations of resources greater than 45 years of age and not previously evaluated. Research, site visits, historic contexts, and integrity assessments will be part of the evaluation process. An assessment of archeological sensitivity within the archeological study area will also be prepared. The results of the background research and site visits will be used to evaluate and create GIS-based mapping that identifies areas of low, moderate, and high prehistoric and historic archeological sensitivity within the study area. The project team will help DDOT consult with DC-SHPO throughout the identification process. In addition, potential consulting parties will be identified and invited to participate in the Section 106 process. Public coordination will likely be done through the project public coordination process. The results of the Section 106 Evaluation will be documented in the reevaluation.

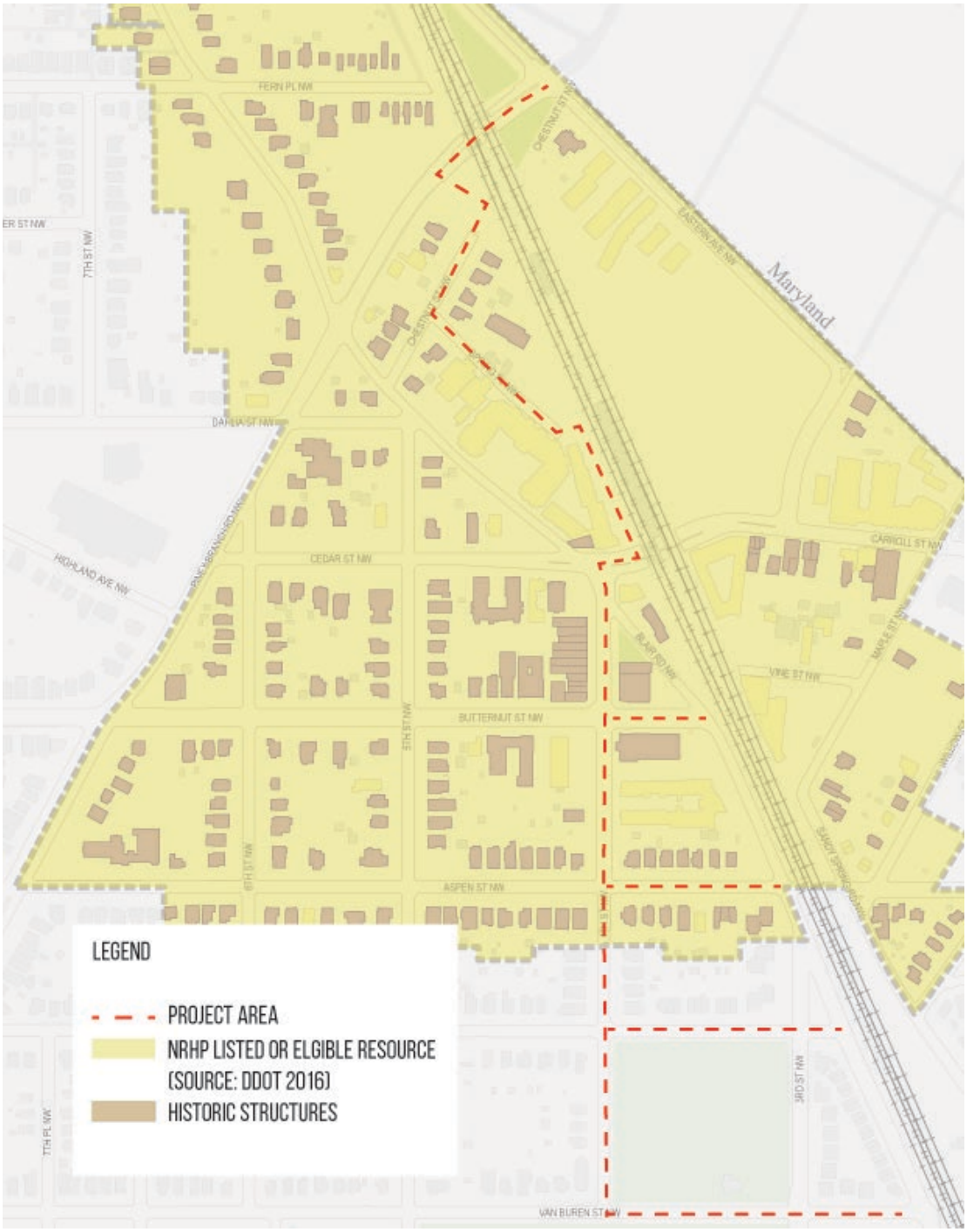

Figure 22. Historic Structures and NRHP Listed/Eligible Resource Map

2.3 Existing Drainage and Stormwater Conditions

Assessment of the existing drainage and stormwater management conditions in the project area is limited to data derived from field visits and desktop record reviews. A high-level analysis of potential land disturbing activities provides an estimated order of magnitude for the project's overall stormwater obligations. Each design alternative is evaluated for its contribution to the overall obligations, and its alignment with DDOT's Core Principle #9 "improving drainage and creating an environmentally friendly streetscape." In the 30 percent design phase report the design alternative selection and field survey data (topographic and utility) will be used to refine these understandings.

Most of the proposed work will take place within DDOT's existing public right-of-way and many of the design alternatives do not have associated land disturbance. However, nearly an acre of overall land disturbance is expected including the conversion of existing compacted cover areas from acquired lands. An initial consultation with the Department of Energy and Environment (DOEE) suggests an early predevelopment review meeting (PDRM) is required to determine if the MEP process applies to Segment 2.

The following factors from the DDOT *Engineering Manual* are suggested for consideration during this planning stage:

- Available space
- Safe access issues
- Pedestrian circulation requirements
- Impervious surface removal
- Locations of existing utilities
- Existing trees
- Soil characteristics
- Candidate BMP and land conversion areas
- Street profile analysis

We note three conditions when considering available space for drainage and stormwater:

- **Condition 1** – When alternate design actions are limited to lane redistribution within fixed curb lines and land disturbance, available space for BMP retrofits and tree planting is in existing grass planting strips. In locations without planting strips conversion of impervious sidewalk surfaces to planting strips may be possible. If reconditioning of existing pavement for bike lanes goes beyond re-striping and re-milling, then permeable pavements may be considered.
- **Condition 2** – Alternate design actions are within existing impervious right-of-way. However, lane redistribution requires curb line movement. Condition 2 opportunities may be expanded as

curb inlets are more viable and the space may have increased for BMP retrofits, tree planting in the grass planting strip or conversion of impervious sidewalk surfaces to planting strips.

- **Condition 3** – Alternate design actions proposed for existing compacted cover areas will have the greatest stormwater management opportunities. This include directing newly generated runoff to new BMP or preserved compacted cover areas. Additionally, preserving or planting new trees can be used to meet stormwater obligations.

Segment 1: Piney Branch Road NW

This segment extends for approximately 420 linear feet and passes under three railway lines. United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Based Soil Survey indicates a Chillum-Urban land complex, Hydrologic Soil Group Type C and according to the DOEE database, this segment drainage is divided between the Municipal Separate Storm Sewer System (MS4) and Combined Sewer System (CSS). The current drainage is served by two sets of double catch basins and a single catch basin, all located under the rail tracks crossing as shown in **Figure 23**.

Figure 23. Existing Stormwater Drainage Components – Piney Branch Road

Segment 2: Piney Branch Road to Chestnut Street NW

Segment 2 is located within two private plots (Square 3184, Lots 0822 and 0823) owned by WMATA, shown in **Figure 24** and **Figure 25**, and is anticipated to transfer to the District of Columbia. Currently, the tax assessment identifies the plot land area as 26,107 square feet or 0.6-acre and the land cover is unimproved grass throughout (compacted cover). The plot area has a steep slope transition to Piney Branch Road. The DOEE database indicates this segment drainage is divided between the MS4 and CSS and there are no existing drainage facilities observed within the plot boundary. NRCS USDA Web Based Soil Survey indicates Hydrologic Soil Group C, Chillum-Urban land complex (see **Appendix I**).

Figure 24. WMATA-owned Parcels – Entrance View from Chestnut Street

Figure 25. WMATA-owned Parcels – Overhead View

Segment 3: Chestnut Street NW

Segment 3 extends for approximately 260 linear feet. USDA NRCS Web Based Soil Survey indicates a Chillum-Urban land complex, Hydrologic Soil Group Type C. The DOEE database indicates this segment drainage is to the CSS. Current drainage is served by catch basins observed at the Spring Place and Chestnut Street intersection as shown in **Figure 26**. Existing sidewalk widths are narrow and do not support an existing grass planting strip or tree boxes.

Figure 26. Existing Stormwater Drainage Components – Chestnut Street

Segment 4: Spring Place NW

Segment 4 extends for approximately 480 linear feet. USDA NRCS Web Based Soil Survey indicates a 15 percent Chillum-Urban land complex and 85 percent Urban Land-Sassafras complex, both are Hydrologic Soil Group Type C. The DOEE database indicates this segment drainage is the CSS and the DOEE lost stream mapping project indicates this segment aligns with a historic stream (**Figure 27**) and soil borings to determine high water table are suggested. The current drainage is served by catch basins observed at the Spring Place and Chestnut Street intersection. A catch basin and field grate inlet are observed at the midway point in Spring Place (**Figure 28**). Field inlets are observed on adjacent private parcels and adjacent private building downspouts splash on grade throughout (**Figure 29**). A recently constructed adjacent apartment complex appears to have BMPs onsite.

Figure 27. Historic Stream Parallel to Spring Place

Figure 28. Catch Basin and Field Grade Inlet - Spring Place

Figure 29. Existing Properties - Spring Place

Segment 5: 343 Cedar Street NW

Segment 5 extends for approximately 320 linear feet as shown in **Figure 30**. USDA NRCS Web Based Soil Survey indicates Urban Land-Sassafras complex, Hydrologic Soil Group Type C and the DOEE database indicates this segment drainage is to the CSS. There are no existing drainage facilities along the segment. DOEE lost stream mapping project indicates this segment aligns with a historic stream and soil borings will be used to determine suggested high water table placement.

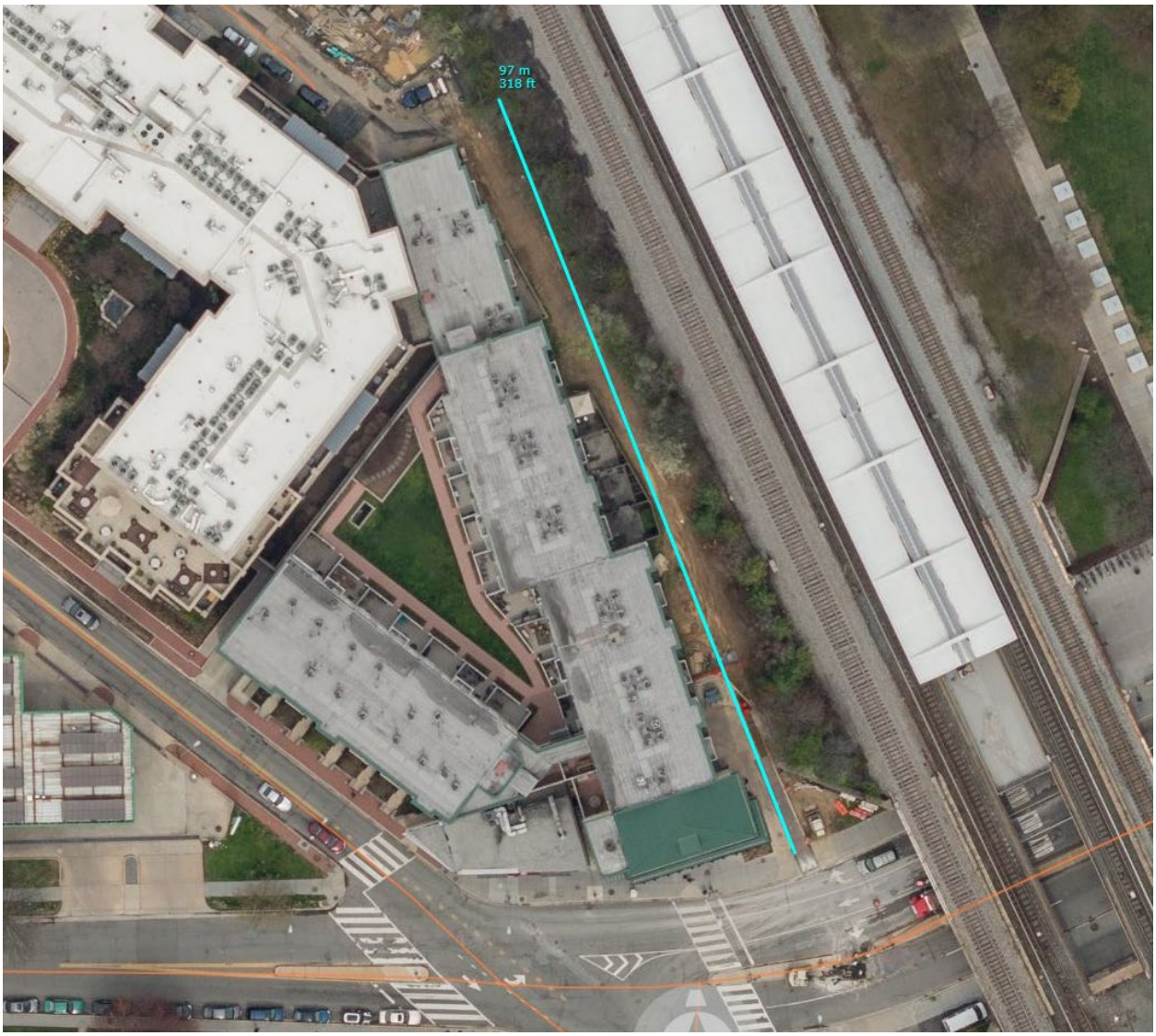

Figure 30. Existing Unpaved Trail – 343 Cedar Street

Segment 6: Cedar Street, Blair Road, 4th Street, Butternut Street, Aspen Street, Whittier Street, & Van Buren Street NW

Cedar Street and Blair Road and 4th Street Intersection

This segment is located in the CSS. The USDA NRCS Web Based Soil Survey indicates Urban Land-Sassafras complex, Hydrologic Soil Group Type C. During the field visit, the team noticed existing intersection catch basins and curbside bioretention. The DOEE lost stream mapping project indicates this segment aligns with a historic stream as shown in **Figure 31**. Soil borings to determine high water table are suggested.

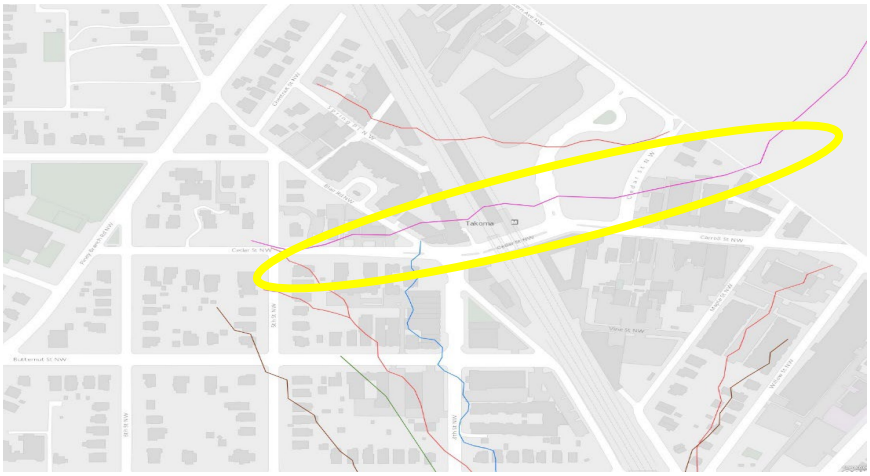

Figure 31. Historic Streams Parallel to Cedar Street

Figure 32. Cedar Street and Blair Road Intersection -- Eastbound

4th Street: Cedar Street to Butternut Street NW

During the field visit, the team observed drainage infrastructure with catch basins located at intersection low points. There are robust street trees on the east side of 4th Street. There are opportunities for impervious surface conversion to expand green space within the tree zone.

4th Street: Butternut Street to Aspen Street NW

During the field visit, the team noticed the limited drainage infrastructure, no street trees, or planting strips in this segment as shown in **Figure 33**. Single catch basins are located on either side of the Aspen Street and 4th Street intersection. However, they appear inadequate for the contributing drainage area. Further evaluation of existing drainage will be conducted in the 30 percent design phase. Designgreen and the Takoma Community Collaborative are supporting the community on a separate adjacent project to mitigate long term flood issues. DOEE is funding this project through two Community Stormwater Solutions grants and one mini grant. Assessment of the drainage and stormwater management and green and grey infrastructure conceptual design solutions are components of this project. Community members asked DDOT to make the grey infrastructure connection with the Metropolitan Branch Trail project for their proposed under-drained bioretention to manage offsite runoff and resolve street and sidewalk flooding. Updates will be provided in the 30 percent design phase.

Figure 33. Adjacent Flood Issue with 35% Green and Grey Infrastructure Concept Plan

Butternut Street: During the field visit, the team noted the limited drainage infrastructure, minimal street trees present, and lack of planting strips in this segment.

Aspen Street: During the field visit, the team observed that this segment has adequate drainage infrastructure, street trees, and continuous planting strips.

Whittier Street: During the field visit, the team noted the minimal drainage infrastructure along the segment. There are street trees and continuous planting strips. Adjacent Department of Parks and Recreation (DPR) park land offers unique retrofit opportunities.

Van Buren Street: During the field visit, the team noted minimal drainage infrastructure. There are street trees and continuous planting strips.

2.4 Existing Parking Conditions

Based on the project area's residential and commercial land uses, the anticipated peak parking occupancy is expected in the early morning and at mid-day. The project team completed on-street parking occupancy counts on September 14 to 16, 2021 (Tuesday, Wednesday, and Thursday) at 5 a.m. and 12 p.m. for the on-street Segments 1, 3, 4, and 6. **Appendix B** displays each segment, the parking supply, the 5 a.m. and 12 p.m. peak and average parking occupancies expressed as percentages. Since some design alternatives consider removal of on-street parking to accommodate on-street bicycle facilities, existing peak parking occupancy helps to understand whether the network has sufficient capacity to absorb any potential parking losses.

Segment 1: Piney Branch Road NW

Piney Branch Road has delineated metered 8-foot-wide parallel parking spaces. The east side has 15 available parking spaces, and the west side has 9 available parking spaces. Since this area is residential, it is assumed that this parking serves the existing residents and temporary visitors. The parking spaces provide an additional buffer between the existing one-way protected bike lanes on both sides of the street. Based on observations from the project team, this street has low parking occupancy rates from 0 percent to 27 percent with no vehicles parking on the west side of the segment as shown in **Table 1**.

Table 1. Parking Occupancy – Piney Branch Road

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
East	15 spaces	**14%**	**14%**	15 spaces	**27%**	**16%**
West	9 spaces	**0%**	**0%**	9 spaces	**0%**	**0%**

Segment 3: Chestnut Street NW

Chestnut Street has on-street parallel parking spaces with no striping. The east side has 9 available parking spaces, and the west side has 18 available parking spaces. Since this area is residential, it is assumed that this parking serves the existing residents and temporary visitors. There is a "no parking or standing" sign at the north and south end of the street and "2-hour parking limit from 7:00 a.m. to 8:30 p.m." signs along the street. Based on observations from the project team, this street has high parking occupancy rates from 81 percent to 110 percent as shown in **Table 2**.

Table 2. Parking Occupancy – Chestnut Street

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
East	9 spaces	**110%**	**99%**	9 spaces	**99%**	**81%**
West	18 spaces	**100%**	**96%**	18 spaces	**89%**	**85%**

Segment 4: Spring Place NW

At the time of data collection, no "no parking" signs were present on Spring Place. Although Spring Place is too narrow to allow on-street parking, people currently park in 28 parallel parking spaces and seven 90-degree parking spaces reserved for residents at the south end of Spring Place. Adjacent to the 90-degree spaces is a "Reserved Parking" sign for Metro Village Apartment residents as shown in **Figure 34**.

Figure 34. Reserved Parking Sign – Spring Place

In front of Gables Takoma Park, there are "no standing or parking anytime" signs. Since this area is a mix of residential and commercial uses, it is assumed that this parking serves the existing residents, temporary visitors, and employees. Based on observations from the project team, Spring Place has medium to high parking occupancy rates from 57 percent to 100 percent as shown in **Table 3**. The project team collected the 5 a.m. parking occupancy because it was assumed that there would be lower parking demand during the afternoon.

Table 3. Parking Occupancy – Spring Place

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy
North	19 spaces	**100%**
South	9 spaces	**57%**

Segment 6: Cedar Street, Blair Road, 4th Street, Butternut Street, Aspen Street, Whittier Street, and Van Buren Street NW

4th Street from Cedar Street to Aspen Street

From Cedar Street to Butternut Street, there are eight diagonal parking spaces on the west side adjacent to existing businesses and nine metered on-street parallel parking spaces on the east side of 4th Street. From Butternut Street to Aspen Street, there are 15 on-street parking spaces on the west side and east side of 4th Street with metered and 2-hour parking limit signage.

Since the segment on 4th Street from Cedar Street to Aspen Street is commercial and is nearby to the Takoma Metrorail Station, it is assumed that these parking spaces serves business employees and patrons. These segments have commercial uses on both sides of the street which aligns with lower parking occupancies in the morning and higher parking occupancies during mid-day caused by greater retail activity in the afternoons as shown in **Table 4**. The a.m. peak occupancy ranges from 0 percent to 75 percent and the p.m. peak occupancy ranges from 59 percent to 113 percent.

Table 4. Parking Occupancy – 4th Street from Cedar Street to Aspen Street

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
Blair - Butternut St East	9 spaces	**0%**	**0%**	9 spaces	**71%**	**59%**
Blair - Butternut St West	8 spaces	**75%**	**38%**	8 spaces	**113%**	**92%**
Butternut - Aspen St East	15 spaces	**67%**	**38%**	15 spaces	**100%**	**91%**
Butternut - Aspen St West	15 spaces	**55%**	**25%**	15 spaces	**103%**	**90%**

4th Street from Aspen Street to Van Buren Street

4th Street has continuous on-street parallel parking on the east and west side of the street with 2-hour parking limit signage from Aspen Street to Van Buren Street. This segment is residential and recreational, and the parking spaces are not metered. It is assumed that these parking spaces serve residents and temporary visitors. The peak a.m. parking occupancies ranges from zero percent to 71 percent with more vehicles parked on the block between Aspen Street to Whittier Street compared to the block between Whittier Street and Van Buren Street as shown in **Table 5**. The peak p.m. parking occupancies ranges from zero percent to 75 percent with more vehicles parked on the block between Aspen Street to Whittier Street. The east side of 4th Street from Whittier Street to Van Buren Street had no vehicles parked during the team's observations.

Table 5. Parking Occupancy – 4th Street from Aspen Street to Van Buren Street

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
Aspen - Whittier St East	12 spaces	**67%**	**61%**	12 spaces	**75%**	**64%**
Aspen - Whittier St West	11 spaces	**71%**	**56%**	11 spaces	**71%**	**68%**
Whittier - Van Buren St East	20 spaces	**0%**	**0%**	0 spaces	**0%**	**0%**
Whittier - Van Buren St West	17 spaces	**35%**	**29%**	17 spaces	**52%**	**41%**

Butternut Street

Butternut Street has delineated on-street metered parallel parking spaces. The north side has four available parking spaces, and the south side has seven available parking spaces. Since this is a commercial area, it is assumed that this parking serves business employees and patrons. Based on observations from the project team, this street has the highest peak parking occupancy rate at 70 percent at 12 p.m. on the north side of the street as shown in **Table 6.**

Table 6. Parking Occupancy – Butternut Street

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
Butternut St North	4 spaces	**0%**	**0%**	4 spaces	**70%**	**70%**
Butternut St South	7 spaces	**0%**	**0%**	7 spaces	**42%**	**28%**

Aspen Street

Aspen Street has on-street parallel parking spaces with no striping. There are a total of 15 available parking spaces on the north side and "no parking" signage on the south side of the street. Since this is a residential area, it is assumed that this parking serves residents and temporary visitors. Based on observations from the project team, this street has the highest peak parking occupancy rate at 79 percent at 5 a.m. on the north side of the street as shown in **Table 7.**

Table 7. Parking Occupancy – Aspen Street

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
Aspen St North	15 spaces	**79%**	**77%**	15 spaces	**60%**	**53%**
Aspen St South	0 spaces	**0%**	**0%**	0 spaces	**0%**	**0%**

Whittier Street

Whittier Street has on-street parallel parking spaces with no striping. There are a total of 19 available parking spaces on the north side and 22 available parking spaces on the south side of the street. Since this is a residential area, it is assumed that this parking serves residents and temporary visitors. Based on observations from the project team, this street has the highest peak parking occupancy rate at 90 percent at 12 p.m. on the south side of the street as shown in **Table 8.**

Table 8. Parking Occupancies – Whittier Street

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
Whittier St North	19 spaces	**80%**	**69%**	19 spaces	**53%**	**52%**
Whittier St South	22 spaces	**50%**	**45%**	22 spaces	**90%**	**89%**

Van Buren Street

Van Buren Street has on-street parallel parking spaces with no striping. There are a total of 13 available parking spaces on the north side and south side of the street from 4th Street to 3rd Street, ten available spaces on the north side from 3rd Street to Blair Road, and nine available spaces on the south side from 3rd Street to Blair Road. Since this is a residential area with a park, it is assumed that this parking serves residents, temporary visitors, and park visitors. Based on observations from the project team, this street has the highest peak parking occupancy rate at 62 percent at 12 p.m. on the south side of the street Van Buren Street from 4th Street to Blair Road as shown in **Table 9.**

Table 9. Parking Occupancies – Van Buren Street

Segment	5 a.m. Parking Supply	Peak 5 a.m. % Occupancy	Avg. 5 a.m. % Occupancy	12 p.m. Parking Supply	Peak 12 p.m. % Occupancy	Avg. 12 p.m. % Occupancy
4th Street to Blair Rd (EB/WB)						
Van Buren St North	13 spaces	**0%**	**0%**	13 spaces	**31%**	**13%**
Van Buren St South	13 spaces	**0%**	**0%**	13 spaces	**62%**	**36%**
3rd Street to Blair Rd (EB/WB)						
Van Buren St North	10 spaces	**53%**	**42%**	10 spaces	**42%**	**39%**
Van Buren St South	9 spaces	**64%**	**53%**	9 spaces	**53%**	**50%**

The segments with low 5 a.m. and 12 p.m. parking occupancy rates include:

Table 10. Low Parking Occupancy Rates in Project Area

Segment	Peak 5 a.m. % Occupancy	Peak 12 p.m. % Occupancy
Piney Branch Road NW	14%	27%
4th Street from Whittier Street to Van Buren Street NW	35%	52%
Van Buren Street from 4th Street to Blair Road	0%	31%

The segments with high 5 a.m. and 12 p.m. parking occupancy rates include:

Table 11. High Parking Occupancy Rates in Project Area

Segment	Peak 5 a.m. % Occupancy	Peak 12 p.m. % Occupancy
Chestnut Street NW	110%	99%
Spring Place NW	100%	N/A
4th Street from Blair Road and Cedar Street to Aspen Street	75%	113%
Whittier Street from 4th Street to Blair Road	80%	90%

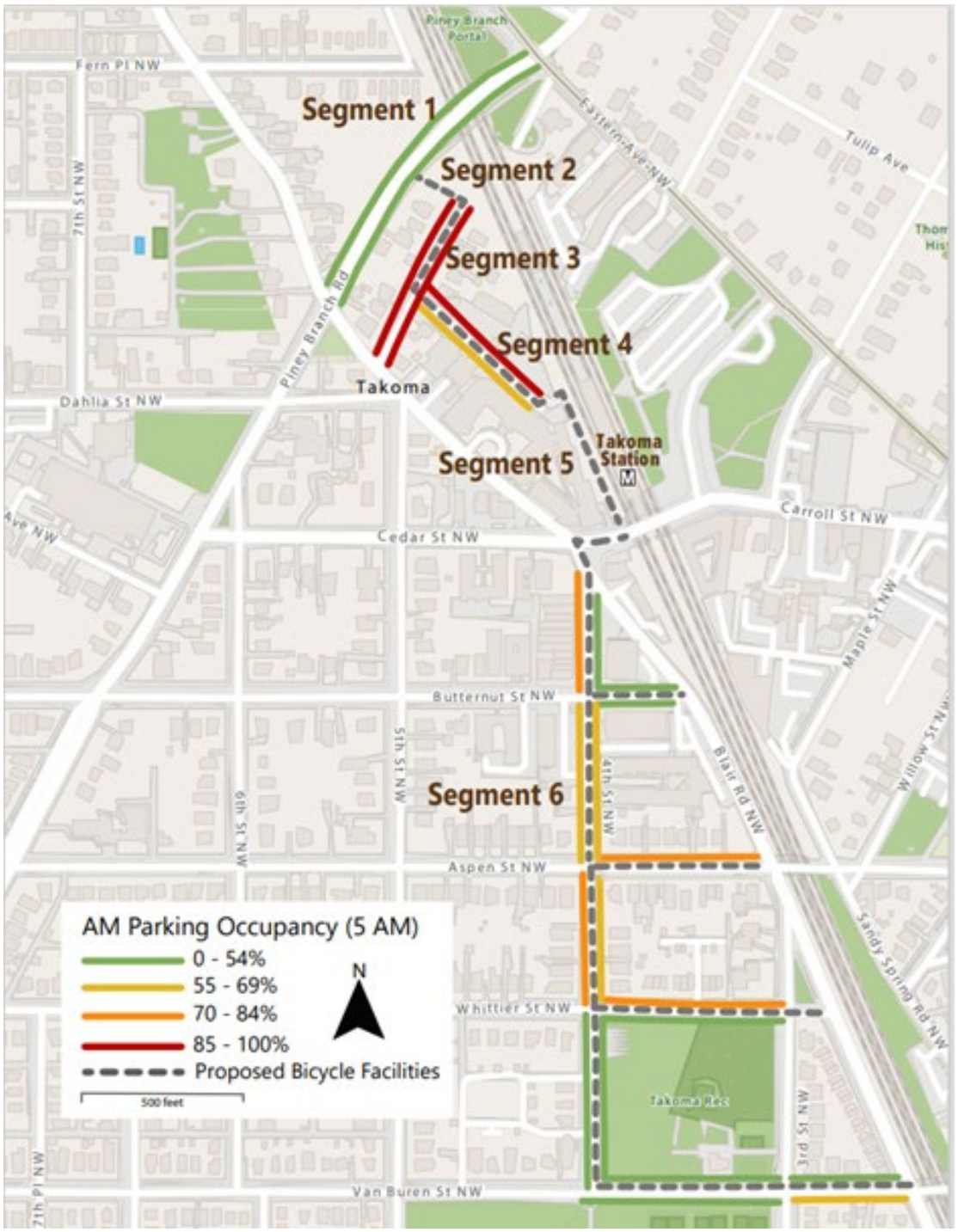

Figure 35. Project Area 5 a.m. Parking Occupancy %

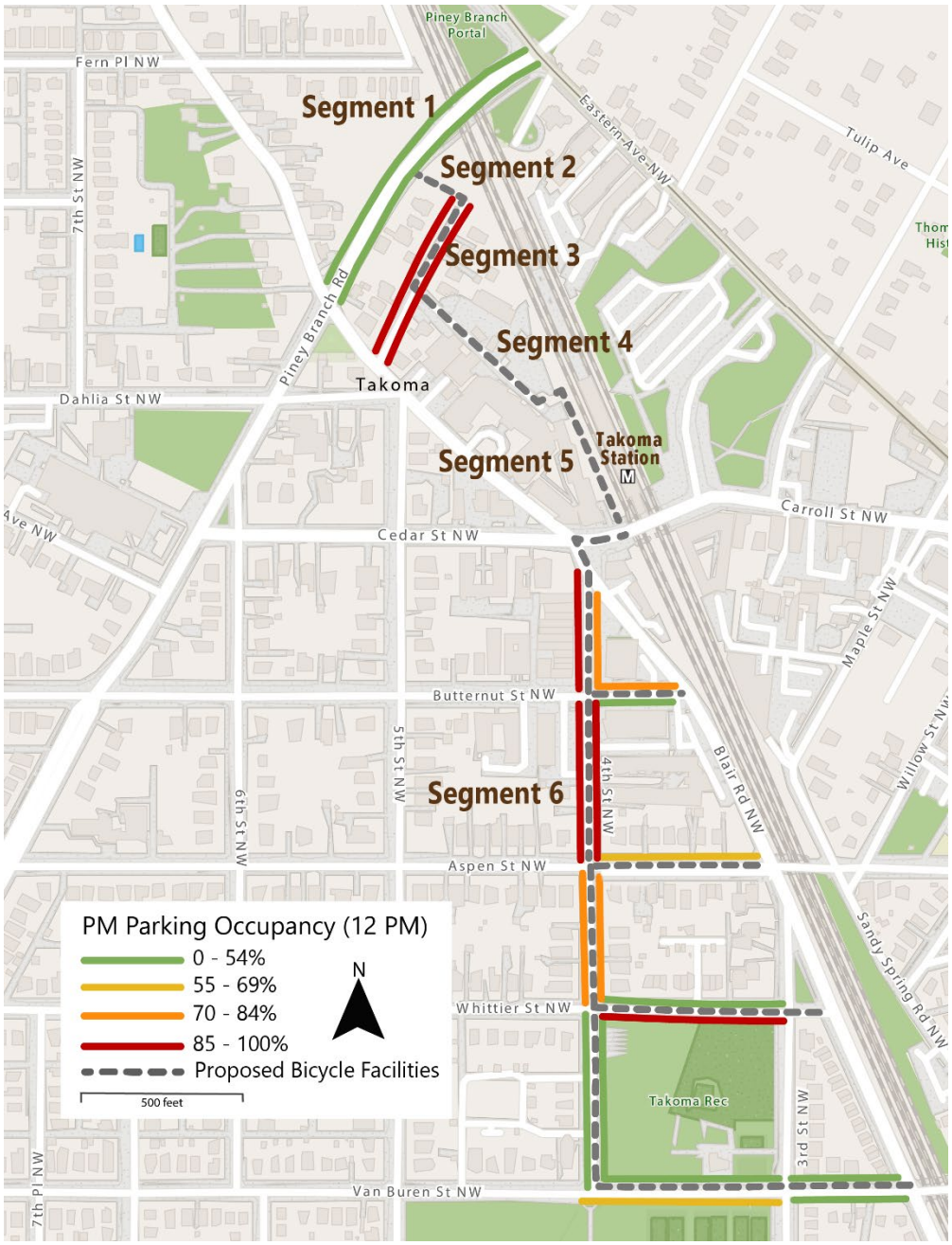

Figure 36. Project Area 12 p.m. Parking Occupancy %

2.5 Existing Traffic Operations

2.5.1 Turning Movement Counts Data

Fehr & Peers received available traffic data from the District of Columbia Department of Transportation (DDOT), including current signal timing plans and traffic volume counts for the project area. The project team performed weekday a.m. and p.m. peak period turning movement counts on Tuesday, September 7, 2021, from 7:30 to 8:15 a.m. and 5:30 to 6:15 p.m. peak periods for the following locations:

- 4th Street and Butternut Street NW
- 4th Street and Aspen Street NW
- 4th Street and Whittier Street NW
- 4th Street and Van Buren Street NW
- Blair Road and Butternut Street NW
- Blair Road and Aspen Street NW
- Blair Road and Whittier Street NW
- Blair Road and Van Buren Street NW

Additionally, the project team collected 72-hour volume counts and directional speed data from Tuesday, September 21 through Thursday, September 23, 2021, for the following locations:

- 300 block of Aspen Street
- 6700 block of 4th Street (Aspen Street to Whitter Street)
- 300 block of Whittier Street
- 300 block of Van Buren Street

Figure 37 shows the daily volumes and 85th percentile speeds for 4th Street, Aspen Street, Whittier Street, and Van Buren Street. While volumes are low on the four streets, the data helps to compare the tradeoffs between the east-west connection options to help prioritize a safe and comfortable facility. A full discussion of tradeoffs between segments is included later in this report. **Appendix C** provides the complete documentation of the turning movement counts, ADT data, and speed data.

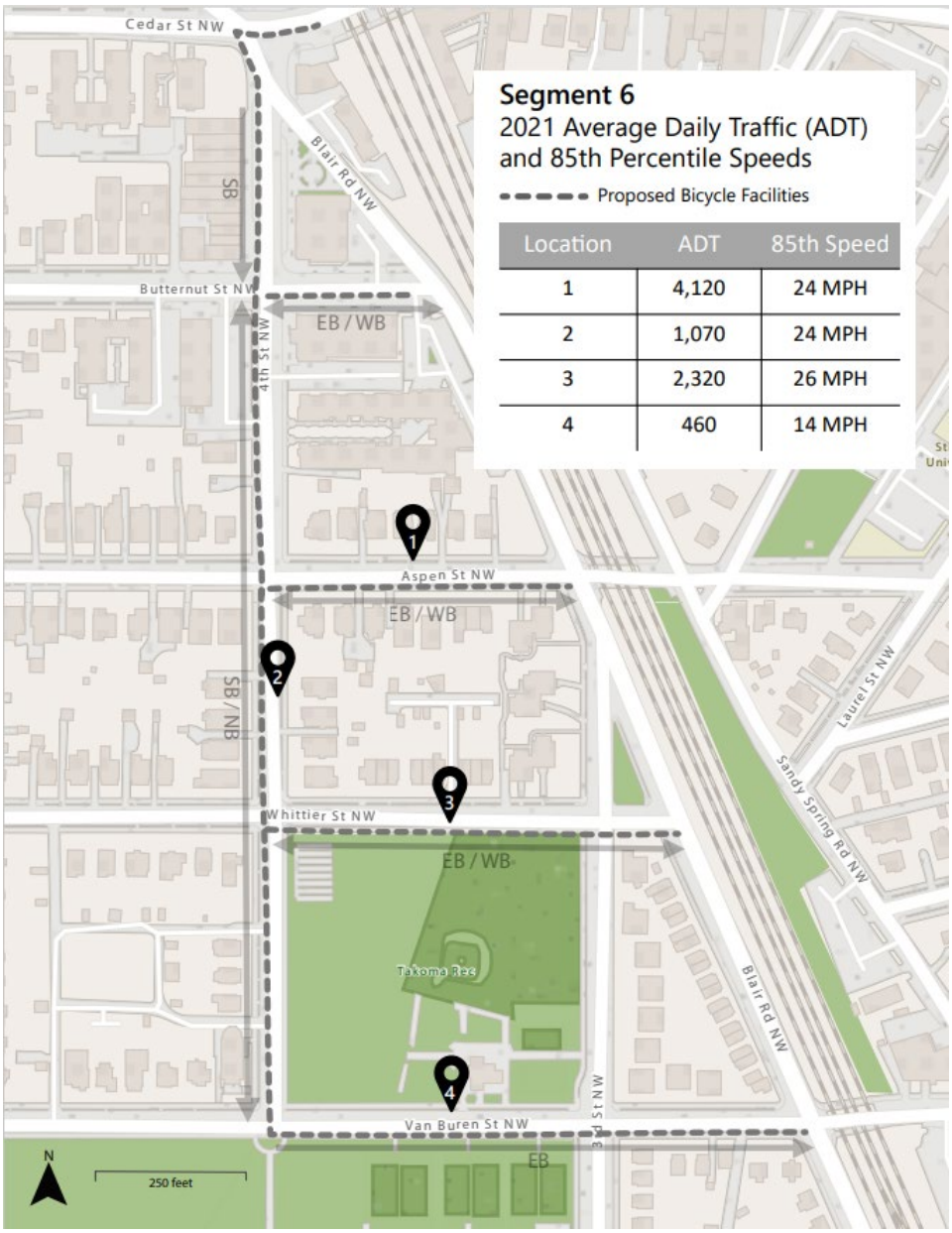

Figure 37. Daily Volumes and 85th Percentile Speeds on Segment 6 (2021)

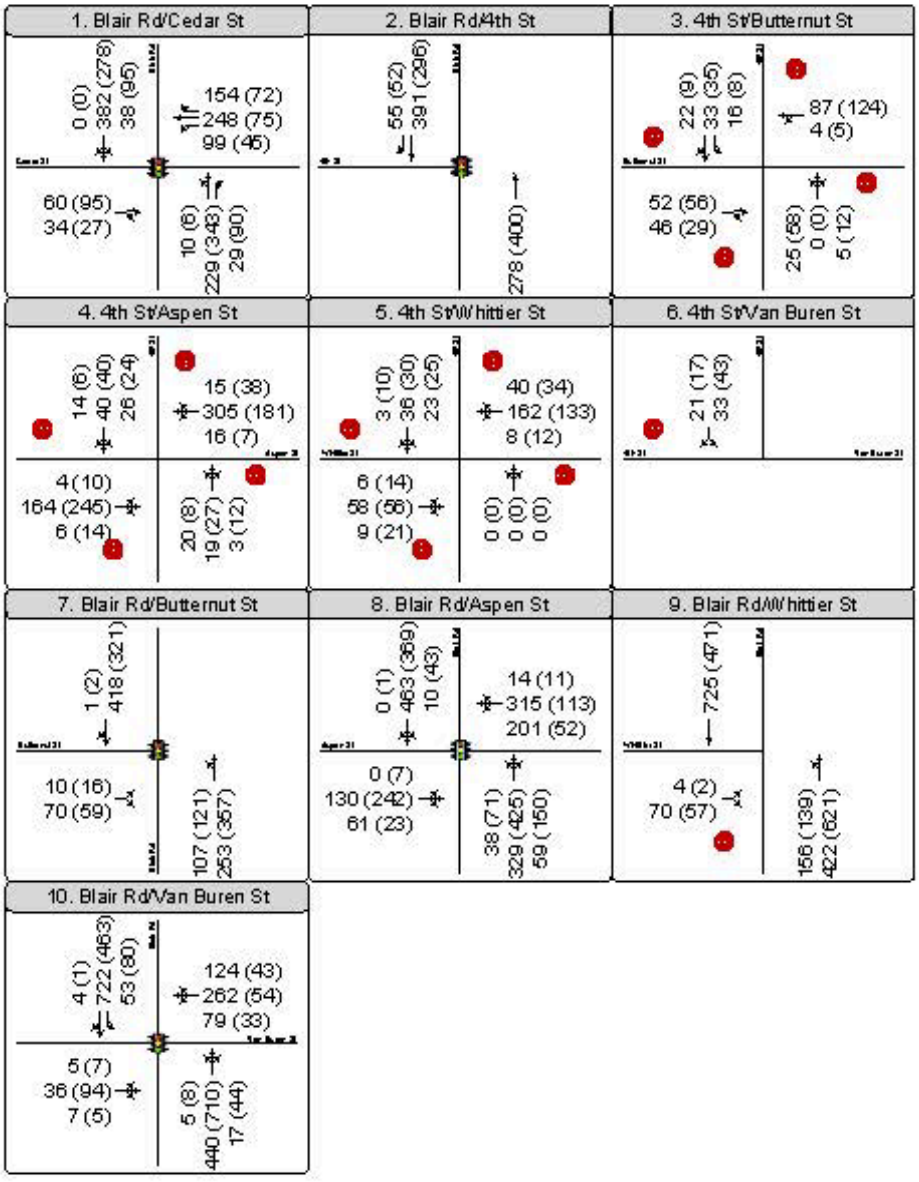

Figure 38. Peak Hour Turning Movement Counts (2021)

2.6 Existing Level of Service

Level of service (LOS) is a qualitative measure to analyze roadway and intersection traffic flow by assigning a value (A-F) based on performance measures such as vehicle speed, density, and congestion. A roadway labeled with an LOS A suggests free-flow traffic movements whereas LOS F suggests a highly congested area. **Table 12** provides a breakdown of LOS by delay levels, along with LOS definitions as described in the *Highway Capacity Manual* (HCM) and

Table 13 summarizes the existing conditions measured by vehicle seconds of delay and intersection level of service.

Table 12. Level of Service (LOS) Criteria for Intersections

Level of Service	Delay (sec/veh) Signalized Intersection	Delay (sec/veh) Unsignalized Intersection	Description of Traffic Operations
A	0-10	0-10	Free flow
B	> 10-20	> 10-15	Stable flow (slight delay)
C	> 20-35	> 15-25	Stable flow (acceptable delay)
D	> 35-55	> 25-35	Approaching unstable (tolerable delay)
E	>55-80	>35-50	Unstable flow (intolerable delay)
F	>80	>50	Forced flow (jammed)

Table 13. Existing Traffic LOS Operations

Intersection Name	Control Type	a.m. peak		p.m. peak	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Blair Rd. & Cedar St.	Signalized	47.1	D	33.4	C
Blair Rd. & 4th St.	Signalized	10.3	B	18.1	B
4th St. & Butternut St.	Unsignalized (all way-stop controlled)	7.8	A	8.1	A
4th St. & Aspen St.	Unsignalized (all way-stop controlled)	10.4	B	9.8	A
4th St. & Whittier St. (unsignalized, all way stop controlled)	Unsignalized (all way-stop controlled)	8.3	A	8.1	A
4th St. & Van Buren St.	Unsignalized (side street stop controlled)	5.0	A	5.0	A
Blair Rd. & Butternut St.	Signalized	6.5	A	6.5	A
Blair Rd. & Aspen St.	Signalized	63.2	E	28.3	C
Blair Rd. & Whittier St.	Unsignalized (all way-stop controlled)	2.3	A	1.6	A
Blair Rd. & Van Buren St.	Signalized	37.4	D	14.3	B

The Blair Road and Aspen Street intersection is the only intersection to operate at LOS E (during the a.m. peak hour) during existing conditions. These findings align with concerns related to congestion on Blair Road and Aspen Street mentioned during the public meeting on December 7th, 2021.

3. Design Criteria & Requirements

3.1 Design Criteria

The design alternatives presented in this report are based on DDOT *Design and Engineering Manual (DEM)* (2019), DDOT *Bicycle Facility Design Guide* (2020), American Association of State and Highway Transportation Office (AASHTO) *Guide for the Development of Bicycle Facilities* (2012), and National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide, 2nd Edition* (2014).

The project team referenced the Facility Treatment Selection Matrix (Table 1., pg. 1-12) in DDOT's Bicycle Facility Design Guide to create alternatives of various bicycle facility types. DDOT's Bicycle Facility Design Guide also provides preferred and minimum widths for various bicycle facilities. Each design alternative meets the existing DDOT requirements with the goal to provide consistent bicycle facilities for the entirety of the MBT. Based on the Bicycle Lane Preferred and Minimum Widths (Table 3., pg. 2-2) for a typical bike lane facility, the preference is a 6-foot bike lane with 3-foot buffers and the minimum is 5-foot bike lanes and an 18-inch buffer. Two-way protected bicycle lanes preferred widths are the same as the typical bike lane facility type, but minimums change to 4-foot bike lanes.

The on-street segments (1, 3, 4, and 6) and off-street segments (2 and 5) have various design alternatives that include bicycle and pedestrian facilities. To differentiate between each alternative for each segment, the team created a classification code shown in **Appendix D**.

3.2 Trail Branding, Wayfinding, and Signage Design Standards

In an effort to create visually engaging and consistent branding for the MBT, DDOT and the District of Columbia Commission on the Arts and Humanities developed design guidelines in a master plan document. As described in the "Art & Design Standards" in **Appendix E** the trail branding, wayfinding, and signage design standards are intended to enhance user experience by connecting the trail to surrounding communities through design. Additionally, enhancing public art and design along the trail brings more visibility to the trail.

4. Pedestrian & Bicycle Facility Types

The following pedestrian and bicycle facility types are considered for the project area: protected bicycle lanes, bicycle lanes, advisory bicycle lanes, multi-use paths, neighborhood bikeways, and Woonerfs. This section defines each bicycle facility type with an example image. Additionally, these images were included in the public survey to clearly show the differences between each facility type.

Protected bicycle lanes are bikeways that are at street level and are physically separated from motor vehicle traffic with a vertical element. Examples of vertical separation elements include bollards, wheel stops, or a vehicular parking lane (*Bicycle Facility Design Guide,* 2020). Currently, there are one way protected bicycle lanes on Segment 1: Piney Branch Road and Segment 6: 4th Street between Cedar Street and Butternut Street with vehicular parking as the separation element.

Figure 39. Two-Way Protected Bicycle Lanes

Advisory bicycle lanes are characterized by a dashed bike lane and a single shared vehicular lane (11-16 feet) for two-way travel with on-street parking on both sides (*Bicycle Facility Design Guide,* 2020). From curb to curb, it is expected that the road width ranges between 35-48 feet. Due to the allowable two-way travel, it is assumed that vehicles will slow down and yield while passing each other.

Figure 40. Advisory Bike Lanes

A multi-use path is a multimodal facility that is physically separated from motor vehicle traffic by an open space or barrier and is within right-of-way or within an independent right-of-way. These paths may be used by pedestrians, bicyclists, skaters, wheelchair users, joggers, and other nonmotorized users (*Bicycle Facility Design Guide,* 2020). There are no multi-use paths in the existing project area.

Figure 41. Multi-Use Path

Neighborhood bikeways are low-volume and low-speed streets optimized for bicycle travel through treatments such as traffic calming, wayfinding signage, and pavement markings (*Bicycle Facility Design Guide*, 2020). District of Columbia Neighborhood Bikeway signs function as an identifier and branding of the route while also providing familiarity to users.

Figure 42. Neighborhood Bikeway

Woonerf is a Dutch term that means "living street" that encourages attractive people-friendly open space design (*NACTO, 2012*). The street is a social setting rather than a channel for vehicular mobility and is designed to allow pedestrians, bicyclists, and drivers to share the same space, making the street more welcoming to all. To eliminate the division between various modes of transportation, there are less signage, curbs, and pavement markings in Woonerf design concepts.

Figure 43. Woonerf

5. Design Alternatives & Evaluation

A total of 36 design alternatives were initially considered as part of the preliminary engineering phase. Analyzing traffic safety measures, identifying right-of-way and impacted properties in project area, and considering temporary construction permits and easements occurred during the initial planning stages as project considerations. Based on the findings from the initial analysis, the project team selected 30 design alternatives to move forward into the screening process. The screening process includes analyzing the measures of effectiveness and public input. Based on the findings from the screening process the project team evaluated, re-evaluated, and created additional alternatives for consideration. A total of 19 design alternatives remain and will be further analyzed in the 30 percent design phase. This section describes the project considerations and screening process and includes general statements about the entirety of the project area. **Sections 5.3 – 5.8** include a more detailed evaluation of each design alternative and the design process as a whole.

5.1 Project Considerations

Traffic Safety Measures

Each design alternative for this project is meant to improve the overall safety and connectivity of the transportation system from Piney Branch Road to Blair Road. Additionally, connectivity to the planned MBT Fort Totten to Takoma segment was a crucial factor in the decision-making process for the design alternatives.

Implementation of pedestrian and bicycle infrastructure and facilities provides safer transportation alternatives for the community to enhance safety, improve overall quality of life, and incorporate accessible transportation options. Implementing traffic calming measures, prioritizing bicycle and pedestrian travel on the streets, and making changes to the existing street configurations causes vehicular traffic to slow down.

Additionally, this project will bring Spring Place up to standards which improves the accessibility for emergency vehicles to provide such critical services to the residents in the area. `

Right-of-way and Impacted Properties in Project Area

Understanding the right-of-way and potentially impacted properties is important when evaluating the various design alternatives. The project will stay within right-of-way with a few exceptions.

Table 14 displays the properties that may be impacted by the project design alternatives. Below is the segment number, segment name, property square and lot number, a description of the project, the type of expected impact, and the certainty of the impact to the property.

Table 14. Impacted Property Table

Segment	Street	Property Square & Lot	Property Description	Impact Type	Certainty of Impact
Segment 2	Piney Branch Road to Chestnut Street	Square 3184, Lot 0822 (0.22 acres)	WMATA-owned parcel between Piney Branch Road and Chestnut Street	Acquisition	Definitely impacted
Segment 2	Piney Branch Road to Chestnut Street	Square 3184, Lot 0823 (0.37 acres)	WMATA-owned parcel between Piney Branch Road and Chestnut Street	Acquisition	Definitely impacted
Segment 3	Chestnut Street	Square 3185, Lot 0819	7119 Chestnut Street	TBD	Possibly impacted
Segment 5	Cedar Street	Square 3187, Lot 0838 (0.42 acres)	WMATA-owned parcel next to 343 Cedar Street	Easement	Definitely impacted
Segment 6	Whittier Street	Square 0000, Lot 0106	Takoma Recreation Center (Park)	TBD	Possibly impacted

In general, the project involves construction within the curb-to-curb of existing streets, on the street-side of existing sidewalks, or on properties that require acquisition or easements. Because of the project's nature, the project team is not aware of additional right-of-way encroachments affected by the project. The known area for analysis includes Spring Place adjacent to 7119 Chestnut Street (Square 3185, Lot 0819) to determine how the existing street and future improvements relate to the right-of-way boundary, and the area adjacent to the Takoma Recreation Center on Whittier Street (Square 0000, Lot 0106).

Temporary Construction Permits and Easements

For the entirety of the project area, construction easements may be necessary if the project team cannot design around the need for these easements in later design phases. The team plans to document easement needs upon completion of the 30 percent design phase report.

Stormwater Management regulations occur when the project activities exceed the threshold of 5,000 square feet of land disturbance, such as disturbance to pervious lands and to existing impervious surfaces that occur when roads, alleys, or sidewalks are restored beyond mill and overlay. Additionally, it includes the disturbance caused by any staging on pervious lands. The exact level of land disturbance is unknown at this stage. However, based on the extent of proposed new impervious surface, curb adjustments, existing pavement conditions and areas with known drainage issues, we anticipate there will be Stormwater Management regulatory obligations governed by the DDOT MEP process (DOEE Stormwater Guidance: Maximum Extent Practicable Process for Existing Public Right-of-Way).

An initial consultation with DOEE suggests an early predevelopment review meeting (PDRM) is required to determine if the MEP process applies to Segment 2 for work within the right-of-way acquired for the project. While regulations and guidance clearly identify existing railway tracks as MEP eligible, these adjacent rail lands are not included. It is possible this acquired land will have standard regulatory stormwater management obligations.

In terms of temporary construction easements, the project team is aware of two necessary temporary construction easements:

- From 343 Cedar Street, if all construction activities cannot be completed on the WMATA-owned parcel next to 343 Cedar Street (Square 3187, Lot 0838).
- A Memorandum of Agreement (MOA) may be necessary between DDOT and DPR for construction activities related to the multi-use path on the south side of Whittier Street adjacent to or in Takoma Recreation Center (Park).

As a part of the project, DDOT plans on the following acquisitions and easements from WMATA:

- DDOT plans to acquire Square 3184, Lots 0822 (0.22 acres) and 0823 (0.37 acres) on Chestnut Street.
- DDOT plans to obtain an easement on Square 3187, Lot 0838 (0.42 acres).

In addition to the acquisitions and easement from WMATA, a WMATA real estate permit is required for work within the WMATA zone of influence. Through the permitting process, the locations where

acquisition or easements of WMATA property will be obtained, as well as the crossing of Piney Branch Road beneath the WMATA tracks. Coordination with CSX and similar permits is required.

5.2 Screening Process

Measures of Effectiveness

Measures of Effectiveness (MOEs) are assessment indicators that are relevant and measurable to evaluate transportation system impacts and the level of quality produced by a service or an infrastructure change. To evaluate the design alternatives, the following factors are included in the MOE analysis:

- Bikeway type suitability
- Impact to curb location
- Number of signalized intersections
- Number of unsignalized intersections
- Number of turns
- Intersection level of service
- Intersection vehicle queueing
- Number of on-street parking spaces removed
- Parking removal impacts to available parking capacity
- Number of driveway conflicts
- Number of bus stops

A table listing each design alternative and documenting the MOEs is in **Appendix F.** More information on the parking removal impacts is in **Appendix J.** This section focuses on the main MOEs for each design alternative that the project team considered during evaluation.

Public Input

The project team met bi-weekly to coordinate the tasks for the scope of work and prepared the first community workshop. During the meetings, the team reviewed design alternatives and selected alternatives based on initial findings as part of the project considerations. While initial findings and preliminary assessments occurred, the team put together materials for community input, which is a crucial part of the planning process in selecting a preferred concept. The team presented a community workshop on Tuesday, December 7, 2021, discussing the project goals and shared the initial design alternatives. Additionally, a survey of the design alternatives was shared with participants in the meeting and published on DDOT's website. The survey was available for public comment from December 7, 2021, to January 7, 2022, and a total of 281 survey respondents provided input.

The survey asked the public how supportive they are of alternatives and to provide additional comments. The survey prompted the public to select one either A). strongly approve, B). approve, C). neither approve nor disapprove, D). disapprove, or E). strongly disapprove for each alternative. The survey also included the pros and cons of each alternative. A complete list of the pros and cons considered during the evaluation process is in **Appendix G** and a complete list of the concepts created for the survey are in **Appendix K.**

Feedback from the first public workshop, the public survey, the Washington Area Bicyclist Association (WABA), and the Advisory Neighborhood Commission (ANC) 4B, provides useful insight for the project team to move forward. **Appendix H** documents the outreach report which includes information about the first public presentation, a list of attendees, letters from WABA and ANC 4B, and the survey results.

5.3 Segment 1: Piney Branch Road Design Alternatives & Evaluation

The proposed alternatives are designed to improve safety and comfort for bicyclists approaching from the Blair Road and Piney Branch Road intersection and connecting to the multi-use path in Segment 2. The design alternatives considered for Segment 1 include the following:

1A 10-foot multi-use path on south side
1B 4-foot two-way protected bike lanes on south side, 12-foot travel lanes
1C 5-foot two-way protected bike lanes on south side, 11-foot travel lanes
1D Midblock crossing to connect existing one-way protected bike lanes to Segment 2 alternative
1E 5-foot curb extension, two-way 5-foot protected bike lanes with 6-foot sidewalk on south side
1F 5-foot curb extension, 14-foot multi-use path on south side

Measures of Effectiveness Findings

The project team eliminated the midblock crossing design alternative (1D) during initial planning stages due to sight distance limitations and increased conflict points, so it was not included in the public workshop or public survey. Design alternatives 1C, 1E, and 1F were based on feedback provided by community members after the first public meeting, and as such, were not included in the initial survey.

Design alternatives 1E and 1F both require moving the existing curb and gutter on the south side of Piney Branch Road by approximately 5 feet to accommodate either separated bicycle and pedestrian facilities (alternative 1E) or a wider multi-use path (alternative 1F).

Design alternatives 1B, 1C, and 1E all provide separate bicycle and pedestrian facilities which would have a high capacity for people walking and biking. Design alternatives 1A and 1F provide a multi-use path for use by both pedestrians and bicyclists; alternative 1A provides a 10-foot multi-use path and alternative 1F provides a 14-foot multi-use path.

As a part of the 30 percent design phase, the project team will consider the potential need to limit construction to within the existing curb to curb (alternatives 1B and 1C) to reduce potential impacts and coordination with the overhead railroad.

Community Feedback

The community workshop and survey included two design alternatives:

1A 10-foot multi-use path on south side
1B Two-way 4-foot protected bike lanes on south side, 12-foot travel lanes

Based on survey results, 56 percent of respondents strongly approve of design alternative 1A while 12 percent respondents strongly approve of design alternative 1B. WABA and ANC 4B support the design alternative 1A. Below are statements in support of the multi-use path design alternative from the survey:

"Multi-use path is safest and most consistent with MBT."

"I strongly believe that a mixed-use path is the best alternative for pedestrians, cyclists, and [drivers]."

A few comments recommended extending the existing curb to allow for increased bike lane widths or increased multi-use path widths. The public supported parking removal and street lane width reductions from 12-feet to 11-feet on the south side of Piney Branch Road to accommodate more pedestrian and bicycle travel space. Feedback from the meeting and survey, as well as project team deliberation, led to the addition of two 5-foot curb extension design alternatives (1E and 1F) and the two-way 5-foot protected bike lanes alternative (1C).

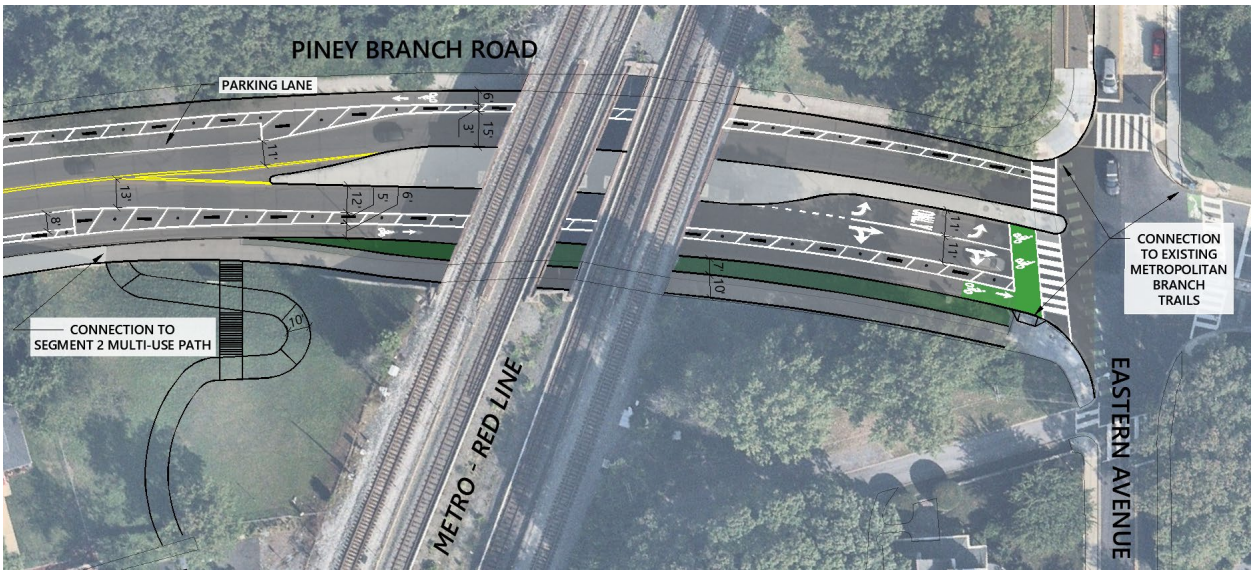

Figure 44. 10-foot Multi-use Path on South Side (1A)

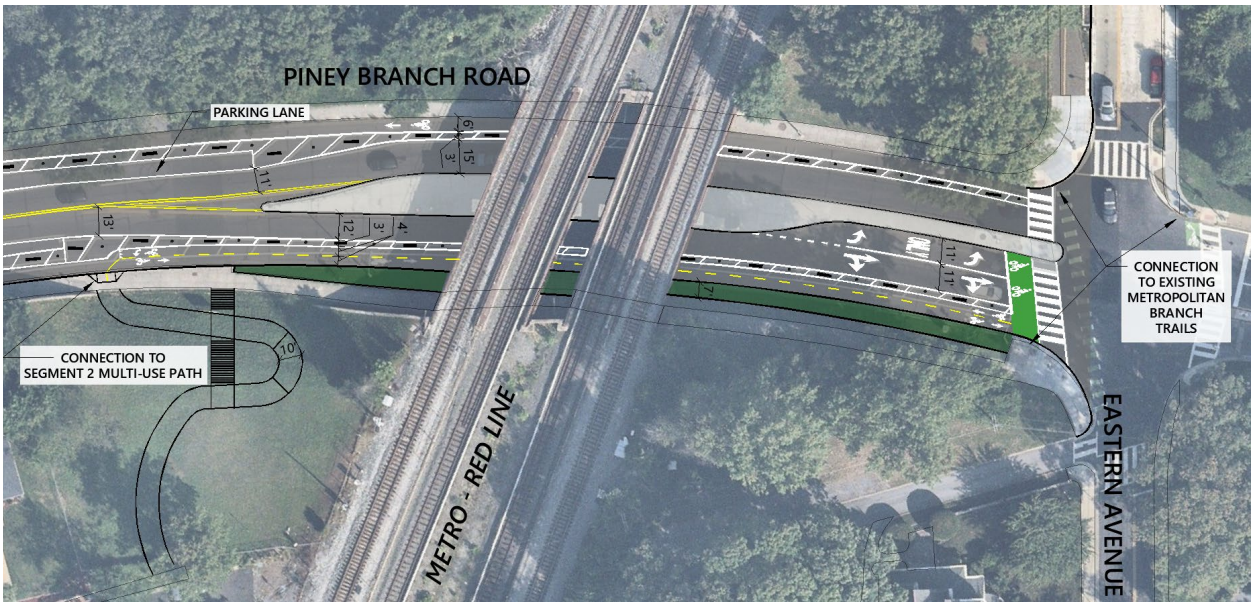

Figure 45. 4-foot Two-way Protected Bike Lanes on South Side, 12-foot Travel Lanes (1B)

Drainage and Stormwater Management Design Analysis

Design alternatives 1A, 1B, and 1C do not propose changes to curb lines or street and sidewalk widths and are not expected to impact drainage needs or stormwater management obligations. The existing grass planting strip on the south side of Piney Branch Road contains five street trees planted in 2019 and 2020, and are in good to excellent condition according to the UFD database. The existing grass planting strip may be suitable for BMP retrofits and if reconstruction is proposed for Segment 1, then consideration of a permeable pavement section is recommended.

Design alternatives 1E and 1F impact curb location which impacts drainage needs and stormwater management obligations. Any changes to the curb line affect catchment area drainage patterns, infrastructure location (e.g., catch basins, light pole, hydrant), stormwater obligations, and requires active erosion and sediment control (ESC) measures during the construction phase.

5.4 Segment 2: Piney Branch Road to Chestnut Street Design Alternatives & Evaluation

The proposed construction will be either a curvilinear path or switchback ramps to provide an accessible change in the grade. Multiple alternatives consider the inclusion of retaining walls for the trail. The design alternatives considered for Segment 2 include the following:

2A 10-foot multi-use path with staircase and 4,400 SF green space (5% slope, max.)
2B 10-foot multi-use path with staircase and 5,200 SF green space (8.33% slope, max.)
2C 10-foot multi-use switchback ramp, retaining wall and 7,300 SF green space (5% slope, max.)
2D 10-foot multi-use switchback ramp, retaining wall and 8,300 SF green space (5% slope, max.)
2E 10-foot multi-use switchback ramp, staircase and 4,600 SF green space (5% slope, max.)
2F 10-foot multi-use curvilinear path and 5,500 SF green space (5% slope, max.)
2G 10-foot multi-use curvilinear path, staircase and 5,500 SF green space (5% slope, max.)
2H 10-foot multi-use circular path and 6,400 SF green space (5% slope, max.)

Green space listed in these alternatives is based on usable green space that has flatter slopes that could be used for future programming or park space.

Measures of Effectiveness Findings

The three alternatives eliminated in the initial planning stages and that were not included in the public workshop and public survey include the following:

2A 10-foot multi-use path with staircase and 4,400 SF green space (5% slope, max.)
2B 10-foot multi-use path with staircase and 5,200 SF green space (8.33% slope, max.)
2H 10-foot multi-use circular path and 6,400 SF green space (5% slope, max.)

The design alternatives 2A and 2B were consolidated with other alternatives for the public workshop and survey for ease of understanding. Additionally, design alternative 2H was eliminated due to likely impacts on the CSX tracks.

Community Feedback

The community workshop and survey included the following five design alternatives:

2C 10-foot multi-use switchback ramp, retaining wall and 7,300 SF green space (5% slope, max.)
2D 10-foot multi-use switchback ramp, retaining wall and 8,300 SF green space (5% slope, max.)
2E 10-foot multi-use switchback ramp, staircase and 4,600 SF green space (5% slope, max.)
2F 10-foot multi-use curvilinear path and 5,500 SF green space (5% slope, max.)
2G 10-foot multi-use curvilinear path, staircase and 5,500 SF green space (5% slope, max.)

Based on survey results, 57 percent of respondents strongly approve of design alternative 2G and 37% strongly approve of design alternative 2F. WABA supports both alternatives and recommends selecting the alternative with the highest public approval. Below are statements in support of design alternative 2G:

"Staircase provides pedestrians a shortcut and cyclists a path to navigate. A+!"

"Curving pathway is aesthetically pleasing, has lowest grades, and widest curves, which are important design features."

A few comments recommended incorporating landscape design and art and to partner with DPR on including park amenities and facilities.

Figure 46. 10-foot Multi-use Curvilinear Path and 5,500 SF Green Space (5% slope, max.) (2F)

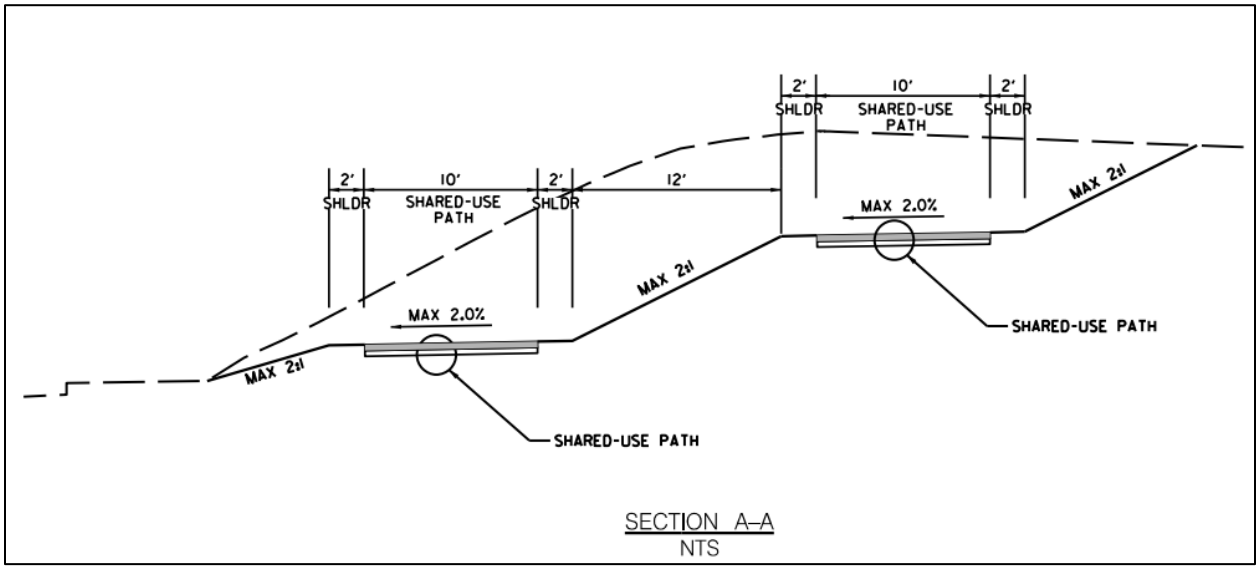

Figure 47. 2F Cross Section

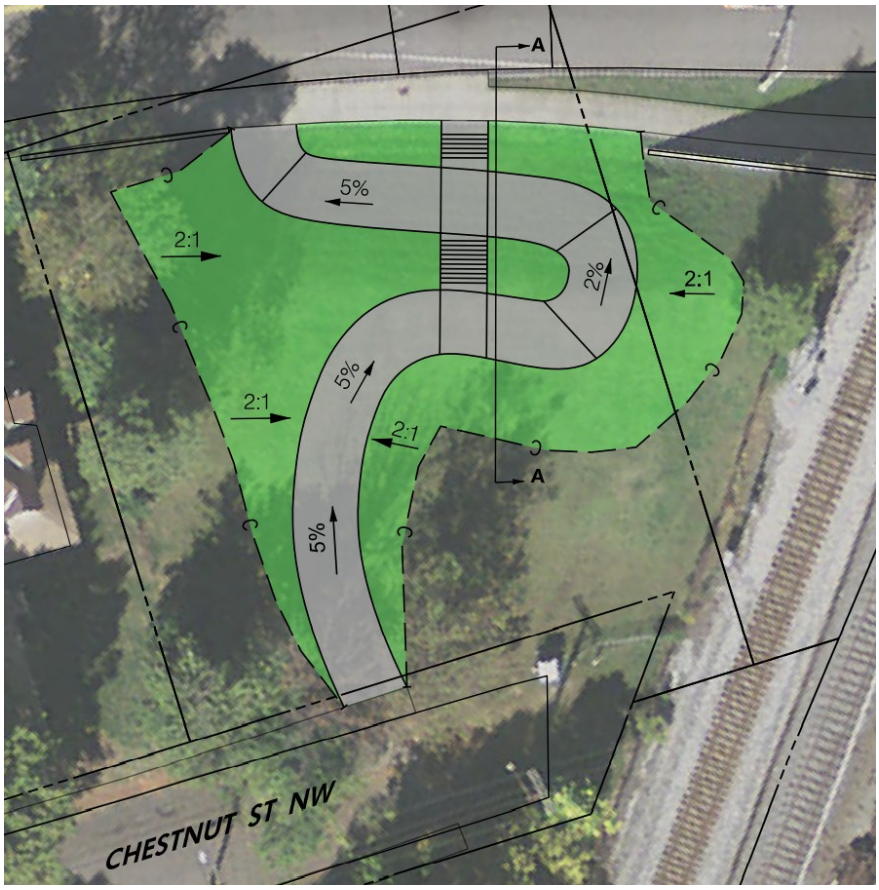

Figure 48. 10-ft Multi-use Curvilinear Path, Staircase and 5,500 SF Green Space (5% slope, max.) (2G)

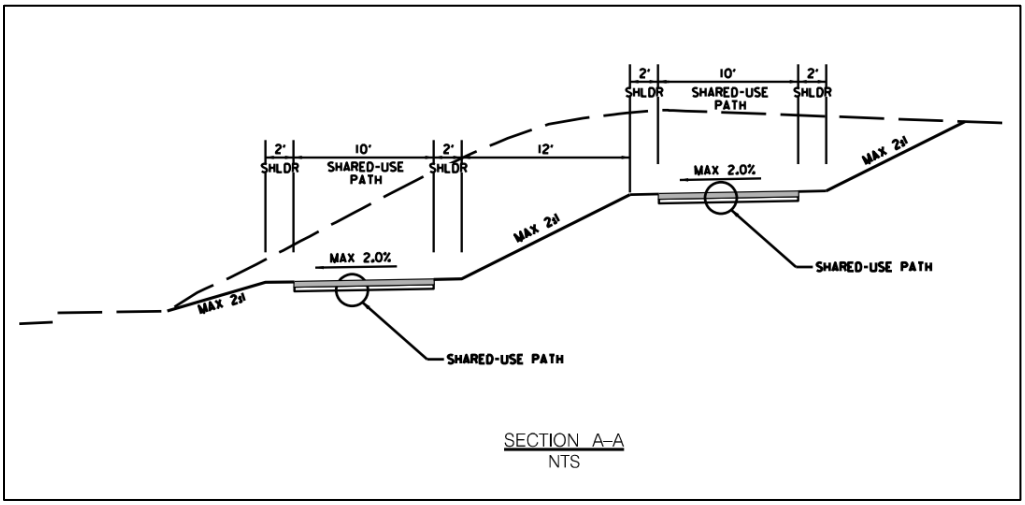

Figure 49. 2G Cross Section

Retaining Wall Design Analysis

The team analyzed the retaining wall impacts for design alternatives 2C and 2D to get an understanding of which alternative may be favorable if selected by community members.

2C 10-foot multi-use switchback ramp, retaining wall and 7,300 SF green space (5% slope, max.)
2D 10-foot multi-use switchback ramp, retaining wall and 8,300 SF green space (5% slope, max.)

The design alternative 2C consists of a single 70-foot-long wall retaining soil from 0-9 feet in height. The design alternative 2D consists of multiple retaining walls ranging from 35-70 feet in length and 0-12 feet in height. The proposed footing for the 35-foot long retaining wall shown in 2D may conflict with the existing footing of the southwest wingwall of the bridge spanning over Piney Branch Road. It is anticipated that design alternative 2D will have higher construction and design costs than design alternative 2C due to the increased quantity of walls.

Soil test borings and infiltration testing may be required for any BMP features proposed along the project alignment. Pavement widening and pavement design are not anticipated; however, pavement cores at selected locations may be prudent to determine the thickness and composition of the existing pavement to be demolished or resurfaced as part of the project scope.

From a structural standpoint if retaining walls are to be used for this segment, it is recommended to choose alternative 2C.

Drainage and Stormwater Management Design Analysis

All design alternatives produce similar drainage and stormwater outcomes. Each alternative will result in land conversion from compacted to impervious impacting the stormwater obligation. Opportunities within the plot are suitable for BMP retrofits (e.g., tree planting, permeable paving, bioswales) and drainage improvements will be identified at the 30 percent design phase.

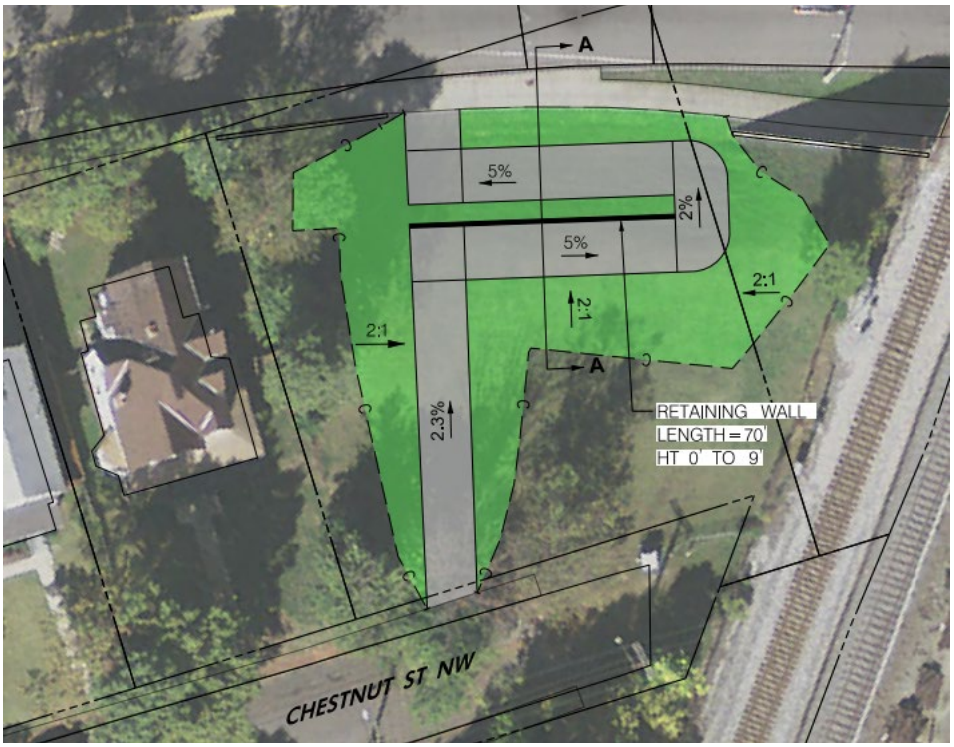

Figure 50. 10-foot Multi-use Switchback Ramp with Retaining Wall and 7,300 SF Green Space (5% slope, max.) (2C)

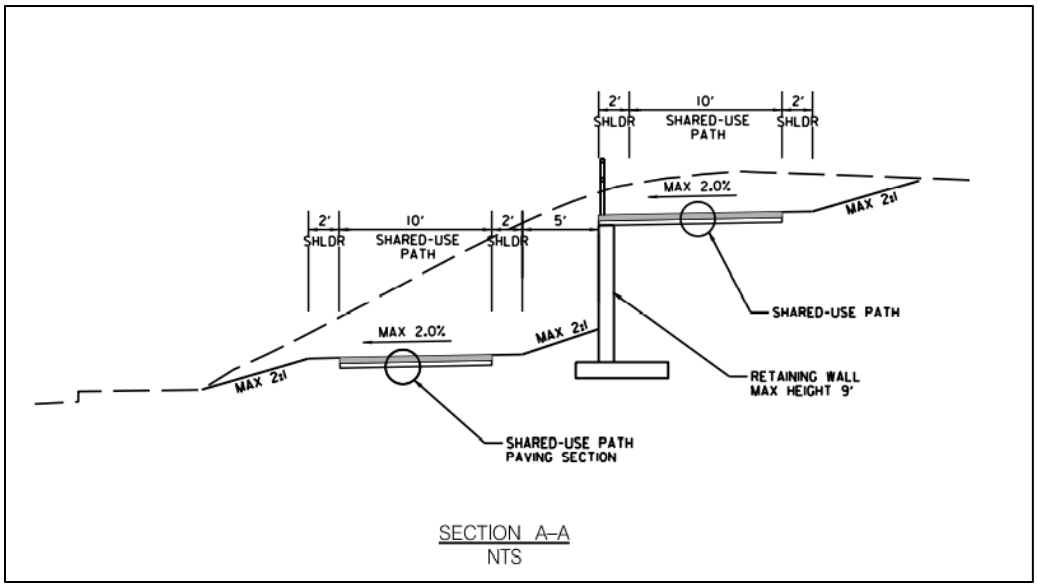

Figure 51. Design Alternative 2C Cross Section

5.5 Segment 3: Chestnut Street Design Alternatives & Evaluation

The proposed alternative is intended to connect trail users from the Segment 2 trail to Spring Place through a residential neighborhood. Retaining parking for the residents is an important factor as well as minimizing additional street changes for the neighborhood.

3A Neighborhood bikeway

Figure 52. Neighborhood Bikeway (3A)

Measures of Effectiveness Findings

There are a total of 9 residential driveways on both sides of Chestnut Street which present conflict points between pedestrians, bicyclists, and vehicles. However, given that this street has low traffic volumes and slow speeds, a neighborhood bikeway with speed humps, signage, and pavement markings is anticipated to reduce or eliminate the safety concerns related to the number of driveways.

Community Feedback

Based on survey results, 31 percent of respondents approve of the design alternative 3A. WABA approves of design alternative 3A due to the low vehicle traffic and recommends adding MBT branded wayfinding signage. Below are the statements in support of design alternative 3A:

"I am not a fan of making cyclists and drivers share the same space, but I think it might be okay here since Chestnut is so low-traffic."

"Consider additional speed control measures like speed bumps, as well as more street marking like shared lane marks, wayfinding signs, and striped chicanes or bulb outs."

A few comments suggested to add a multi-use path or two-way protected bike lane facility as alternatives. There was an emphasis on adding raised crosswalks, wayfinding, and traffic calming measures on Chestnut Street. The feedback was divided about parking with some comments suggesting a high need to maintain available parking spaces for residents while others supported parking removal for the purpose of adding a multi-use path or two-way protected bike lanes.

Drainage and Stormwater Management Design Analysis

Design alternative 3A does not propose changes to curb lines or street and sidewalk widths and is located within the existing street. There is no land disturbance identified, so active Erosion and Sediment controls is not anticipated unless BMP opportunities or material staging is identified in future design stages. Bikeway improvements are not expected to impact drainage. If reconstruction is considered, the team recommends considering a permeable pavement section option. Opportunities for drainage improvements and BMP retrofits will be further evaluated in the 30 percent design phase.

5.6 Segment 4: Spring Place Design Alternatives & Evaluation

The proposed alternatives include a variety of bicycle facility types such as chicanes, chokers, and a Woonerf to enhance the safety and accessibility for all users along the narrow street.

4A Neighborhood bikeway treatment with gateway
4B Woonerf with chokers
4C Woonerf with chicanes
4D Alley, maximum amenity space
4E Alley, maximum green space

Measures of Effectiveness Findings

The three alternatives eliminated in the initial planning stages and that were not included in the public workshop and public survey are the following:

4C Woonerf with chicanes
4D Alley, maximum amenity space
4E Alley, maximum green space

The project team eliminated design alternative 4C because chicanes reduce travel lane widths for the entirety of the segment which may cause emergency vehicle clearance issues. The design alternatives 4D and 4E were eliminated due to the project team's decision to not reclassify the street from a local street to an alley.

Further analysis of Spring Place revealed that Spring Place is too narrow to safely accommodate on-street parking and emergency vehicle access based on the *DEM*. Given Spring Place's limited visibility from larger streets such as Piney Branch Road and Blair Road, on-street parking enforcement can be difficult. Design alternative 4B is a significant design intervention that may dissuade people from parking on-street by design. Design alternative 4A is a low-cost alternative.

Community Feedback

The community workshop and survey included the following two design alternatives:

4A Neighborhood bikeway treatment with gateway
4B Woonerf with chokers

Based on survey results, 33 percent of respondents approve of the design alternative 4B. WABA approves of design alternative 4B due to the low vehicle traffic and to prevent on-street parking while supporting safety for all users. ANC 4B recommends design alternative 4B and to use chokers for bioswale or other green infrastructure and stormwater mitigation strategies, to explore textured pavement or pavers, and to ensure proposed public art is installed. Below are the statements in support of design alternative 4B:

"I support this. Please maximize the use of curb narrowing the calm vehicle traffic. I support whatever on-street parking removal is necessary to make the safest road."

"As a resident of Takoma Park, MD, which has used chicanes to narrow the city streets. I've noticed that they are effective. Driver behavior on [these] streets is much more tolerable than comparable streets without them. Let's do this!"

A few comments suggested creating a multi-way path by widening the existing sidewalk or to create an alternative with protected bike lanes. There were comments that were skeptical about the safety of chokers since bicyclists and drivers have to share the street.

Drainage and Stormwater Management Design Analysis

Implementing chokers, chicanes, and green spaces to slow traffic may involve land disturbance but the extent of land disturbance is unclear for each design alternative. If reconstruction occurs, it will have stormwater management obligations and active erosion and sediment controls are anticipated. There are silt marks on the street which indicate routine nuisance flooding. If reconstruction is considered, the team recommends considering a permeable pavement section option if the high-water table allows.

Design Issues

Spring Place is classified as a local street and is mostly 20 feet wide. As a part of the team's field visits, vehicles were parked on Spring Place at both 5 a.m. and 12 p.m. Since Spring Place is mainly residential, 12 p.m. parking occupancy was not collected because of the assumption that parking demand is lower in the afternoon.

Per the DDOT *DEM*, 27 feet of width is required for a Local Street with parking on one side. All design alternatives assumed removal of on-street parking from Spring Place to ensure safe emergency vehicle access and to comply with the *DEM.*

Figure 53. Neighborhood Bikeway Treatment with Gateway (4A)

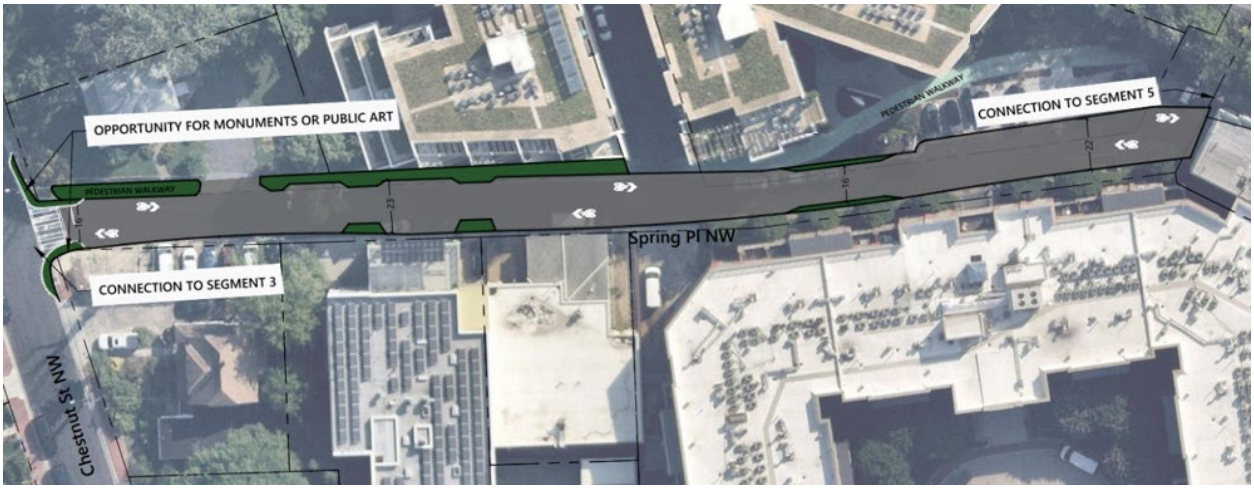

Figure 54. Woonerf with Chokers (4B)

5.7 Segment 5: 343 Cedar Street

A multi-use path is proposed along the 343 Cedar Street property. To locate the trail away from the footprint of the driveway at 343 Cedar Street, modifications to the northwest wingwall of the WMATA aerial structure over Cedar Street and the adjacent approach embankment are required. A retaining wall cut into the WMATA embankment will create the available width for construction of the trail parallel to the adjacent driveway. Following are the alternatives considered for the construction of the multi-use paths:

5A 10-foot multi-use path with 5-foot retaining wall (8.3% slope, max.)
5B 12-foot multi-use path with 6-foot retaining wall (8.3% slope, max.)
5C 12-foot multi-use path with 6-foot retaining wall along CSX embankment and 3-foot retaining wall along 343 Cedar Street property (5% slope, max.)

Measures of Effectiveness Findings

Based on the MOEs, none of the design alternatives have parking, curb location, or driveway conflicts since Segment 5 is an off-street segment. Based on initial considerations, 5A has the least impacts to the railroad embankment, 5B has more impacts to the railroad embankment, and 5C has the most impacts to both the railroad embankment and the 343 Cedar Street property.

Community Feedback

All three design alternatives were shared at the community workshop and public survey. Based on the results of the survey, 54 percent strongly approve of alternative 5C, 20 percent strongly approve of alternative 5B, and 6 percent strongly approve of alternative 5A. WABA supports design alternative 5C due to the gentler slope at a 5 percent maximum and additional multi-use path width for comfort near the retaining wall. ANC 4B supports design alternative 5C and recommends coordination with WMATA and DC Water to explore stormwater mitigation efforts through permeable pavement and green infrastructure. ANC 4B recommends using in-wall lighting or other lower lighting solutions to mitigate light pollution for nearby residents. Below are the statements in support of design alternative 5C:

"This is my favorite alternative. I want the widest trail possible and the lowest gradient possible."

"The shallowed slope and widest design is a fantastic choice, that will provide great potential for new users and the most room for growth. The retaining wall will be no higher than any other wall proposed for this section."

A few comments mentioned that the aesthetics of the retaining wall are not a priority and there was general preference for a wide, 12-foot multi-use path with gentler slopes.

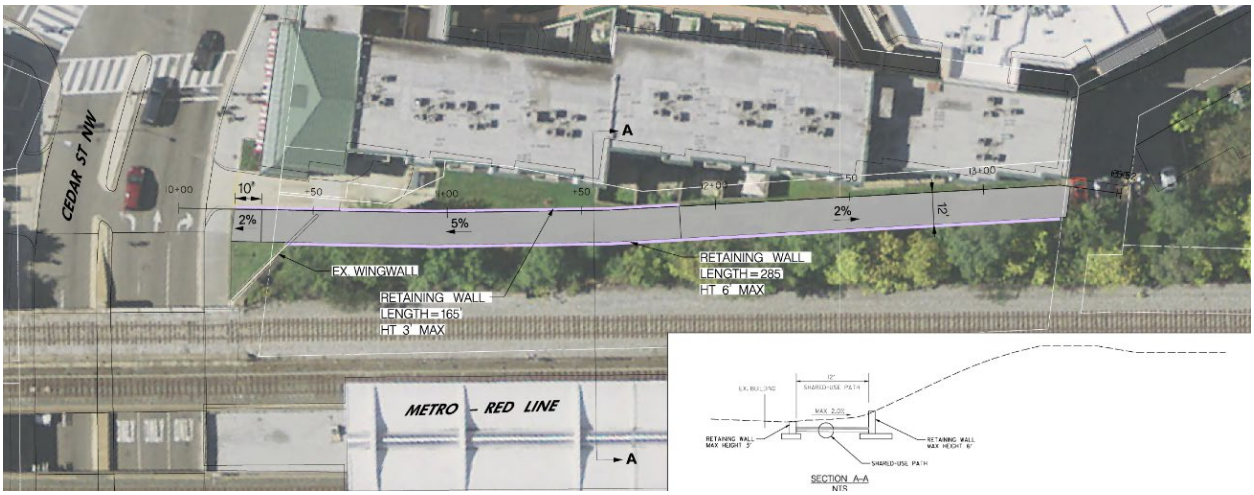

Figure 55. 12-foot Multi-use Path with 6-foot Retaining Wall along CSX Embankment and 3-Foot Retaining Wall along 343 Cedar Street Property (5% slope, max.) (5C)

Design Issues

Segment 5 is in a constrained area between 343 Cedar Street and the railroad embankment. At the segment's south end, near where it meets Cedar Street, there is a wingwall for the Cedar Street underpass. Feasibility of the trail in Segment 5 will depend on the ability to modify this wingwall while maintaining integrity of the structure and operations of rail traffic. The design team will be completing more detailed structural design and analysis and coordination with CSX and WMATA as a part of the 30 percent design to ensure design and construction feasibility.

Additionally, retaining walls are needed on both sides of the trail.

Retaining Wall Design Analysis

The team analyzed the retaining wall impacts for the design alternatives to get an understanding of which alternative may be favorable if selected by community members.

Due to the slope of the existing embankment, constructing a traditional cantilever retaining wall in this area will required a large amount of excavation behind the footing to install it. This existing slope is supporting CSX tracks and will require additional shoring as well as a slope stability analysis to prove that

the tracks will not be compromised during construction. The proposed footing for the cantilever retaining walls may conflict with the existing footing of the northwest wingwall of the bridge spanning over Cedar Street. The soldier pile and lagging wall consists of steel piles spaced at an equal spacing with concrete or timber panels placed between them. A form-liner or some other type of finished face can be applied to the exposed face of the wall after constructed and in place. The soldier pile and lagging wall uses a top-down construction method, so the wall can be installed on the low side of the slope without having to excavate behind the wall. This process will eliminate concerns of slope stability during construction. After installation, the portion of the existing Cedar Street northwest wingwall crossing the proposed pathway may be demolished and tied into the new wall.

The material and installation cost per linear foot of wall may be higher for the soldier pile wall compared to the cantilever wall. However, due to the uncertainty involved with maintaining slope stability, the overall costs may be comparable between the two wall types. The concrete cantilever wall may be more difficult to construct. Therefore, the project team supports construction of a soldier pile wall.

Design alternative 5A will consist of a single 285-foot-long wall retaining up to 5 feet of soil. Alternative 5B proposes a 285-foot-long wall retaining up to 6 feet of soil. Alternative 5C will consist of two retaining walls, one 285-foot-long wall retaining up to 6 feet of soil and one 165-foot-long wall retaining up to 3 feet of soil.

As part of the 30 percent design phase, the team anticipates performing standard penetration test (SPT) soil borings and laboratory testing on the collected soil samples to characterize the subsurface soil and groundwater conditions for Segment 5. The design of the retaining walls and slops will require geotechnical recommendations. To complete the field investigation for the proposed retaining walls at 343 Cedar Street at the top of the existing embankment slope supporting the Takoma Metrorail Station, permits from WMATA may need to be procured and extensive coordination with WMATA and the adjacent property owners is required.

Soil test borings and infiltration testing may be required for any best managemnt practices (BMP) features proposed along the project alignment. Pavement widening and pavement design are not anticipated; however, pavement cores at selected locations may be prudent to determine the thickness and composition of the existing pavement to be demolished or resurfaced as part of the project scope.

Drainage and Stormwater Management Design Analysis

All design alternatives are located within the existing WMATA right-of-way and further clarification on DDOT ownership will occur in the 30 percent design phase. If this is acquired lands, there may be additional stormwater obligations. The paving and location of retaining walls will have stormwater management obligations and active erosion and sediment controls are anticipated. The silt marks from Segment 4: Spring Place indicates sediment load from the embankment. The trail and retaining wall improvements may be an opportunity to address runoff issues. Permeable pavement is not recommended given the proximity to foundations and the potentially high-water table.

5.8 Segment 6: Cedar Street, Blair Road, 4th Street, 3rd Street, Butternut Street, Aspen Street, Whittier Street, and Van Buren Street Design Alternatives & Evaluation

The proposed alternatives are intended to provide a safe, accessible, and direct route from the multi-use path on Segment 5 to the Fort Totten to Takoma section of the MBT. For the connection from 4th Street to Blair Road, bicycle facilities on Aspen Street, Whittier Street, and Van Buren Street are considered and. Segment 6 is divided into 8 sections with different bicycle facilities being considered for each block. The various bicycle facility types considered for this segment are as follows:

6A.1	Multi-use path north side (2 westbound lanes) with one-way crossings of Cedar Street	Cedar Street and Blair Road and 4th Street Intersection
6B.1	Multi-use path north side (2 westbound lanes) with two-way crossing of Cedar Street west of east crosswalk	
6C.1	Multi-use path north side (2 westbound lanes) with two-way crossing of Cedar Street east of east crosswalk	
6D.1	Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 12-ft eastbound offset	
6E.1	Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 8-ft eastbound offset	
6F.1	Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 4-ft eastbound offset	
6A.2	5-ft two-way protected bike lanes on the east side	4th Street from Cedar Street to Butternut Street
6B.2	5-ft one-way bike lane on east and west sides	
6A.3	Neighborhood bikeway	4th Street from Butternut Street to Aspen Street
6B.3	6-ft two-way protected bike lanes on the east side (one-way conversion)	
6C.3	6-ft one-way bike lanes on east and west sides	
6A.4	5-ft advisory bike lanes on east and west sides	4th Street from Aspen Street to Van Buren Street
6B.4	Neighborhood bikeway	
6C.4	5-ft two-way protected bike lanes on the east side (one-way conversion)	

6A.5 6B.5	5-ft one-way bike lanes on north and south sides Neighborhood bikeway	Butternut Street from 4th Street to Blair Road
6A.6 6B.6	5-ft one-way bike lanes on north and south sides Neighborhood bikeway	Aspen Street from 4th Street to Blair Road
6A.7 6B.7 6C.7	5-ft advisory bike lanes on north and south sides Neighborhood bikeway 10-ft multi-use path on the south side	Whittier Street from 4th Street to Blair Road
6A.8 6B.8 6C.8 6D.8	5-ft advisory bike lanes on north and south sides Neighborhood bikeway 7-ft contraflow bike lane on the north side 5-ft two-way protected bike lanes on the north side	Van Buren Street from 4th Street to 3rd Street (or Blair Road)

Existing and Future Conditions Traffic Analysis

Segment 6 design alternatives require street configuration changes which resulted in the project team analyzing the traffic impacts for each scenario. Analyses were conducted for the weekday a.m. and p.m. peak hours for the following scenarios:

- Existing Scenario
- Existing Plus Project Scenario
- 2045 Scenario
- 2045 Plus Project Scenario

The project team developed 2045 traffic volume forecasts for the Cedar Street, Blair Road, 4th Street, Butternut Street, Aspen Street, Whittier Street, and Van Buren Street intersections along Segment 6. The Metropolitan Washington Council of Governments (MWCOG) Travel Demand Model (v. 2.3.57a) outputs generated a 2017 to 2045 (28 years) growth rate to apply to existing counts to estimate 2045 traffic volumes along Segment 6. The combined a.m. (0.20%) and p.m. (0.29%) growth rates average to 0.25%. This combined growth rate informed the growth factor calculation:

$$Growth\ Factor\ = (1 + 0.25\%)\text{^}28$$

The growth factor for this study area is equal to 1.07 which was then multiplied by existing counts to produce the 2045 forecast volumes.

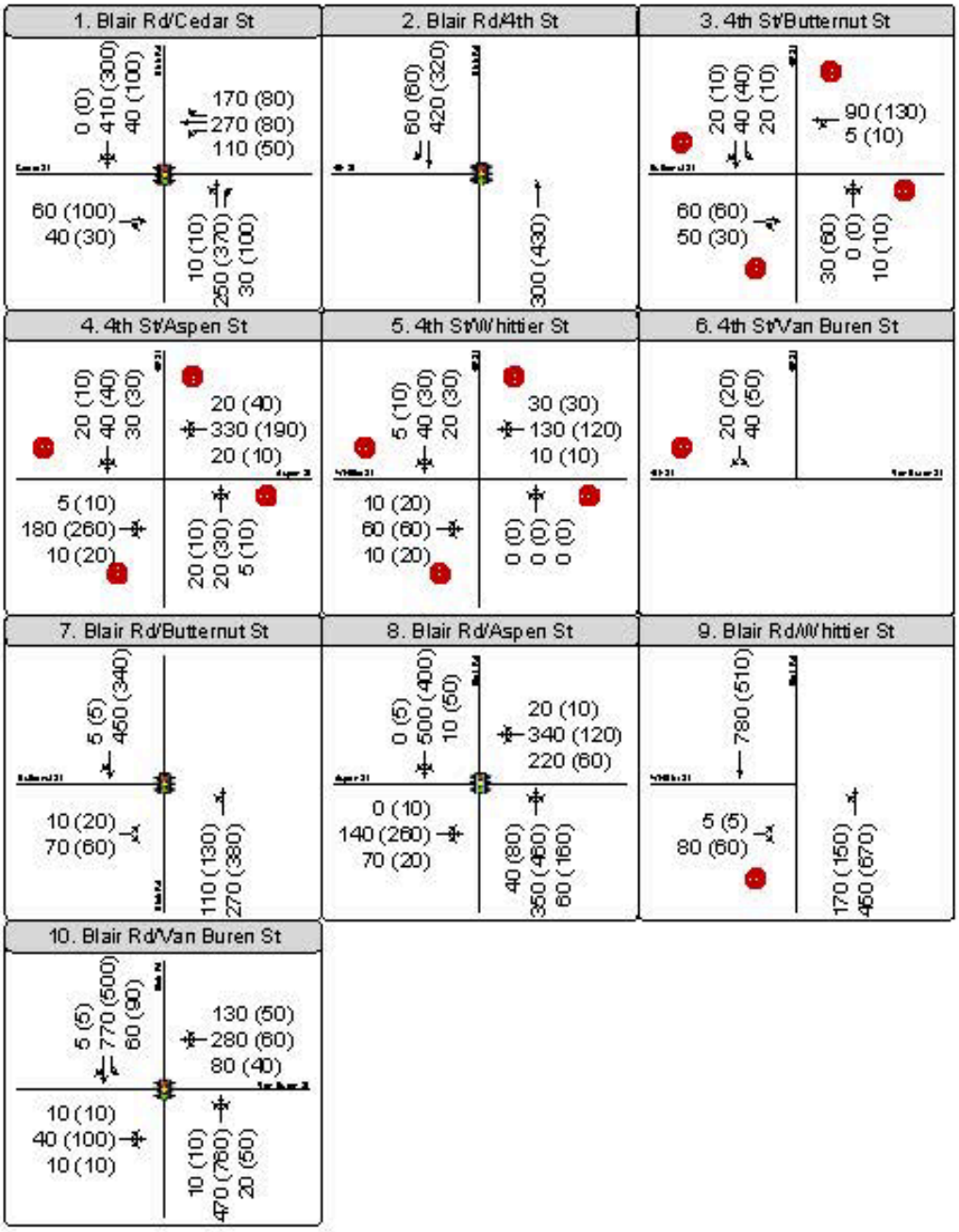

Figure 56. Peak Hour Turning Movement Forecasts (2045)

5.8.1 Cedar Street and Blair Road intersection

A multi-use path on the north side of Cedar Street and changes to the median and eastbound through lane offsets are proposed for alternatives for the Cedar Street and Blair Road intersection. The alternatives are as follows:

6A.1	Multi-use path north side (2 westbound lanes) with one-way crossings of Cedar Street
6B.1	Multi-use path north side (2 westbound lanes) with two-way crossing of Cedar Street west of east crosswalk
6C.1	Multi-use path north side (2 westbound lanes) with two-way crossing of Cedar Street east of east crosswalk
6D.1	Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 12-ft eastbound offset
6E.1	Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 8-ft eastbound offset
6F.1	Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 4-ft eastbound offset

Measures of Effectiveness Findings

Analysis of alternatives for the block of 4th Street from Cedar Street to Butternut Street resulted in dismissing one-way bike lanes on 4th Street; therefore, the project team dismissed design alternative 6A.1 which featured one-way crossings of Cedar Street.

Based on the MOEs, all alternatives impact curb location and create the same conflict with the driveway to 343 Cedar Street.

Alternatives 6D.1 and 6E.1 both remove a parking space on the south side of Cedar Street east of Blair Road. Alternative 6F.1 removes this parking space as well as four parking spaces on the south side of Cedar Street west of 4th Street.

Alternative 6C.1 creates extra turning maneuvers for bicyclists connecting between 4th Street and the multi-use path on Segment 5. This alternative also requires more costly relocation of an existing fire hydrant and traffic signal poles.

Therefore, extending the two-way protected bike lane into the south end of the intersection was eliminated due to right turn conflicts with buses. Additionally, relocation of the fire hydrant and traffic signal pole on the south corner presents unique costs compared to the other alternatives.

Community Feedback

The community workshop and survey included the following two design alternatives:

6B.1 Multi-use path north side (2 westbound lanes) with two-way crossing of Cedar Street west of east crosswalk

6C.1 Multi-use path north side (2 westbound lanes) with two-way crossing of Cedar Street east of east crosswalk

Based on the survey, 38 percent of respondents strongly approved of design alternative 6B.1 and 12 percent strongly approved of design alternative 6C.1. WABA supports design alternative 6B.1 which directs people to cross Cedar Street to the west of the pedestrian crosswalk and recommends reconfiguring the median island if the westbound right-turn lane removal is not feasible due to traffic conditions. ANC 4B supports design alternative 6B.1 to preserve pedestrian safety and eliminate confusing movement for trail users. Below are the statements in support of design alternative 6B.1:

"Having a straight as possible path for cyclists is the safest approach."
"Definitely prefer this straight bikeway path across the road."

The comments supported maintenance of two-way protected bike lanes through the intersection and were in support of extending the sidewalk to create a 20-ft multi-use path.

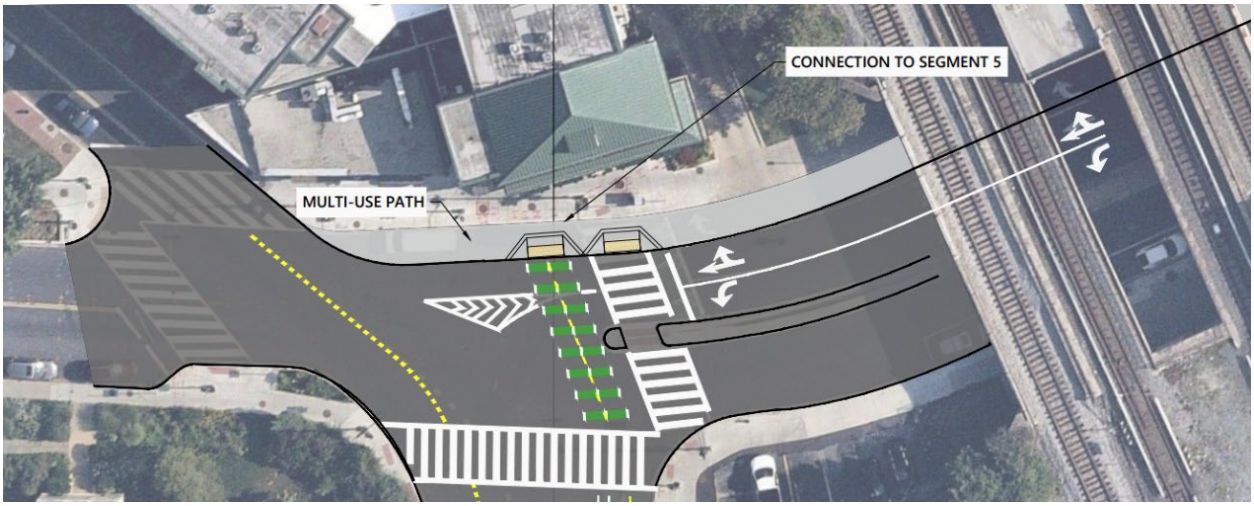

Figure 57. Multi-use Path North Side (2 Westbound Lanes) with Two-way Crossing of Cedar Street West of East Crosswalk (6B.1)

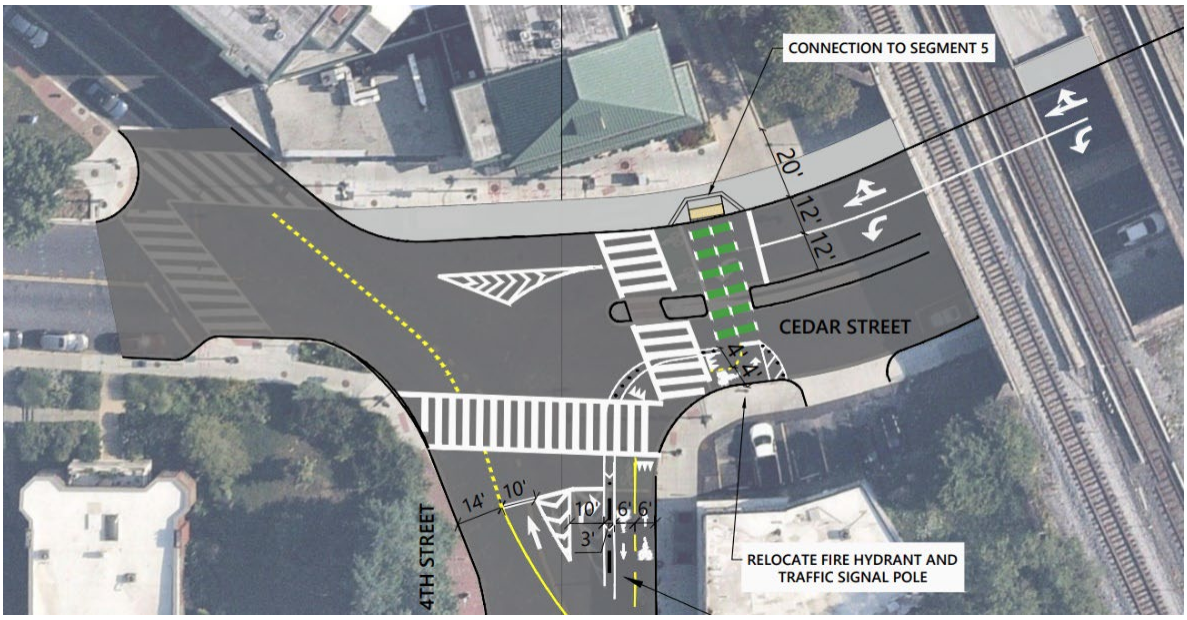

Figure 58. Multi-use Path North Side (2 Westbound Lanes) with Two-way Crossing of Cedar Street East of East Crosswalk (6C.1)

Bicycle Crossing Time Analysis

To evaluate if the intersection's existing signal timings could accommodate the bicycle crossing, the team used the following equation:

$$BCT_{Standing} = PRT + \left(\frac{V}{2a}\right) + \left(\frac{W + L}{V}\right)$$

$BCT_{Standing}$ = bicycle crossing time (seconds)

W = intersection width (feet)

L = typical bicycle length = 6 feet

V = attained bicycle crossing speed (feet/second)

PRT = perception reaction time = 1 second

a = bicycle acceleration (1.5 feet/second^2)

With the construction of the multi-use path on the north side, the northbound crossing distance across Cedar Street is approximately 155 feet. The DDOT *Bicycle Facility Design Guide* recommends using a design speed of 14.7 feet per second in the absence of local data. The other values for typical bicycle

length, perception reaction time, and bicycle acceleration are based on the AASHTO *Guide for the Development of Bicycle Facilities* Table 4-2.

$$BCT_{Standing} = 1 + \left(\frac{14.7}{2 * 1.5}\right) + \left(\frac{155 + 6}{14.7}\right)$$

$$BCT_{Standing} = 18.5\ seconds$$

Using these values, the standing bicycle crossing time for the Cedar Street and Blair Road intersection is 17 seconds. According to Synchro files provided by DDOT that contain signal timings for the intersection, this intersection features a 19 second pedestrian phase for the crosswalk across Blair Road south of Cedar Street (given the intersection's geometric and signal design, no vehicles can enter the intersection while pedestrians are crossing in this crosswalk). Based on this analysis, a two-way bike crossing from 4th Street to the north side of Cedar Street can be accommodated within the signal's existing timings.

Existing and Future Conditions Scenario Analysis Findings

To evaluate traffic impacts of the removal of the westbound right-turn lane to create the 20-foot multi-use path on the north side of the intersection for design alternatives 6A.1, 6B.1, and 6C.1, the project team used Synchro to understand the LOS and delay times (seconds/vehicle) for the Cedar Street and Blair Road intersection. **Table 15** shows that the right-turn lane removal has significant effect to a.m. peak hour LOS and delay times for Existing Plus Project and Future Plus Project conditions. In both scenarios, the intersection goes from an LOS D to LOS F which is "unstable flows" and "forced flows" with intolerable delays.

Table 15. Cedar Street and Blair Road Intersection Alternatives 6A.1, 6B.1, and 6C.1 Impacts

Intersection	Peak Hour	Existing		Existing + Project		2045		2045 + Project	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Difference in Delays (sec/veh)	LOS	Delay (sec/veh)	LOS
1. Blair Rd. & Cedar St.	a.m.	42	D	**82**	**F**	48	D	**101**	**F**
	p.m.	34	C	34	C	44	D	44	D
2. Blair Rd. & 4th St.	a.m.	27	C	27	C	29	C	28	C
	p.m.	22	C	21	C	25	C	23	B

Due to the traffic impact caused by removal of the westbound right-turn lane, the project team eliminated design alternatives 6A.1, 6B.1, and 6C.1 from further consideration. The project team created three new alternatives that consider median reconfiguration and parking removal with varying levels of eastbound through lane offset.

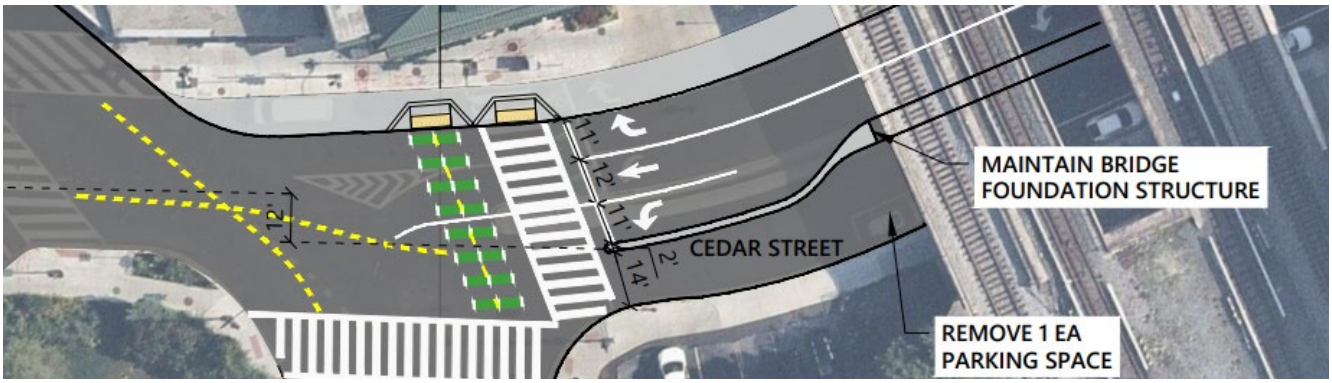

Figure 59. Multi-use Path North Side (3 westbound lanes) with Two-way Crossing of Cedar Street and 12-ft Eastbound Offset (6D.1)

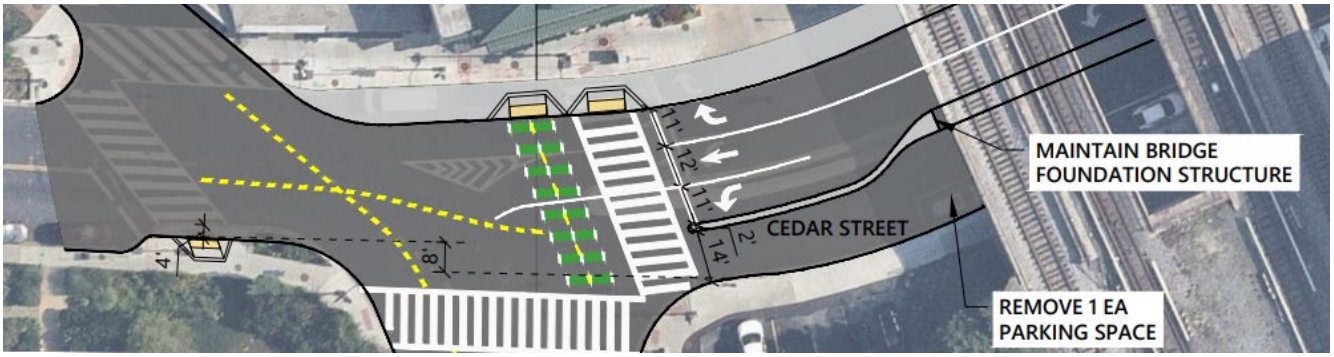

Figure 60. Multi-use Path North Side (3 westbound lanes) with Two-way Crossing of Cedar Street and 8-ft Eastbound Offset (6E.1)

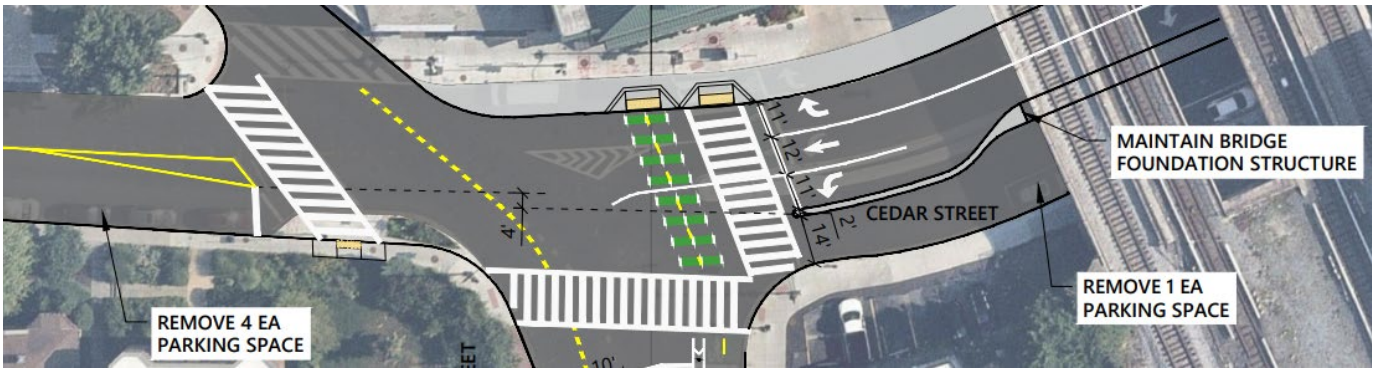

Figure 61. Multi-use Path North Side (3 westbound lanes) with Two-way Crossing of Cedar Street and 4-ft Eastbound Offset (6F.1)

Focusing on design alternatives 6D.1, 6E.1, and 6F.1, the changes to the median impact the eastbound offset from 4-feet to 12-feet and removing one on-street parking space on the east side of the intersection (design alternatives 6D.1 and 6E.1) and four on-street parking spaces on the west side of the intersection (design alternative 6F.1). The median changes would occur on the east side of the intersection, near the railroad overpass. **Table 16** shows that median changes have no significant effect to the traffic conditions at the Cedar Street and Blair Road intersection.

Table 16. Cedar Street and Blair Road Intersection Alternatives 6D.1, 6E.1, and 6F.1 Impacts

Intersection	Peak Hour	Existing		Existing + Project		2045		2045 + Project	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Difference in Delays (sec/veh)	LOS	Delay (sec/veh)	LOS
1. Blair Rd. & Cedar St.	a.m.	42	D	N/A – no changes to lane configurations or signal timings		48	D	N/A – no changes to lane configurations or signal timings	
	p.m.	34	C			44	D		
2. Blair Rd. & 4th St.	a.m.	27	C			29	C		
	p.m.	22	C			25	C		

Because these alternatives retain the same lane configurations and signal timings as existing conditions, they would not cause a change in level of service. Given the short length of the westbound left-turn pocket (approximately 50-feet), the project team produced queueing reports for the westbound left-turn movement (99 a.m. peak hour vehicles and 45 p.m. peak hour vehicles). Those results are:

- Existing Plus Project a.m.
  - 50th Percentile – 65-ft
  - 95th Percentile – 114-ft
- Existing Plus Project p.m.
  - 50th Percentile – 29-ft
  - 95th Percentile – 62-ft
- 2045 Plus Project a.m.
  - 50th Percentile – 75-ft
  - 95th Percentile – 130-ft
- 2045 Plus Project p.m.
  - 50th Percentile – 33-ft
  - 95th Percentile – 68-ft

The results show that in the a.m. peak hour, in both 2021 and 2045, the 50th percentile queue length will exceed the available storage by approximately one vehicle. The 95th percentile queues, likely a once-per-hour event, will exceed the available storage by approximately three vehicles.

Drainage and Stormwater Management Design Analysis

The proposed design alternatives appear to drain down slope to the catch basin below the railroad overpass. Any changes to the curb line will affect the catchment area drainage patterns and infrastructure location (catch basins, light pole, hydrant). Changes to the curb line will impact stormwater obligations and changes to curb line will require active ESC measures during construction. The 30 percent design phase will evaluate these impacts.

If the existing median or bulbout are modified with techniques that cause land disturbance this will contribute to the project's erosion sediment control and stormwater management obligation. This disturbance may provide an opportunity to provide stormwater management with impervious surface conversion and an infiltration BMP.

5.8.2 4th Street from Cedar Street and Blair Road intersection to Van Buren Street

The project team developed and analyzed multiple alternatives for 4th Street. Because the existing street configuration, curb-to-curb width, and adjacent land uses change from Cedar Street to Van Buren Street, different alternatives were developed for the segments from Cedar Street to Butternut Street, Butternut Street to Aspen Street, and Aspen Street to Van Buren Street.

6A.2 6B.2	5-ft two-way protected bike lanes on the east side 5-ft one-way bike lane on east and west sides	4th Street from Cedar Street to Butternut Street
6A.3 6B.3 6C.3	Neighborhood bikeway 6-ft two-way protected bike lanes on the east side (one-way conversion) 6-ft one-way bike lanes on east and west sides	4th Street from Butternut Street to Aspen Street
6A.4 6B.4 6C.4	5-ft advisory bike lanes on east and west sides Neighborhood bikeway 5-ft two-way protected bike lanes on the east side (one-way conversion)	4th Street from Aspen Street to Van Buren Street

Measures of Effectiveness Findings

On-street parking is the MOE most affected by the project alternatives for design alternative 6C.3 (6-foot one-way bike lanes on the east and west sides) for the Butternut Street to Aspen Street block and

design alternatives 6A.4 (5-foot advisory bike lanes on the east and west sides) and 6C.4 (5-foot two-way protected bike lanes on the east side) for the Aspen Street to Van Buren Street blocks. Though not specifically addressed by the MOEs, the two-way protected bike lane alternative requires converting 4th Street to southbound operation from Butternut Street to Van Buren Street.

Parking Occupancy Analysis

Design alternative 6C.3 (6-foot one-way bike lanes on the east and west sides) for the Butternut Street to Aspen Street block requires removing 15 parking spaces from the east side of 4th Street. The average 5 a.m. occupancy of these spaces is 38 percent and the average 12 p.m. occupancy of these spaces is 91 percent.

Design alternatives 6A.4 (5-foot advisory bike lanes on the east and west sides) and 6C.4 (5-foot two-way protected bike lanes on the east side) require removing parking on the east side of 4th Street from Aspen Street to Van Buren Street. From Aspen Street to Whittier Street, the average 5 a.m. occupancy of these spaces is 61 percent and the average 12 p.m. occupancy of these spaces is 64 percent. From Whittier Street to Van Buren Street, the east side parking was unoccupied during the team's parking data collection.

Where parking would be removed, surrounding blocks with available parking spaces and lower occupancy rates would absorb the displaced parking demand.

Community Feedback

The community workshop and survey included the following seven design alternatives:

6A.2 5-ft two-way protected bike lanes on the east side
6B.2 5-ft one-way bike lane on east and west sides
6A.3 Neighborhood bikeway
6B.3 6-ft two-way protected bike lanes on the east side
6C.3 6-ft one-way bike lanes on east and west sides
6A.4 5-ft advisory bike lanes on east and west sides
6B.4 Neighborhood bikeway

For 4th Street, the public, WABA, and ANC 4B are in support of providing a 5-foot to 6-foot two-way protected bike lane facility from the Cedar Street and Blair Road intersection to Van Buren Street. Rather than selecting a preferred alternative for each block, the public recommended to implement a consistent and connected bike facility throughout the entirety of 4th Street to avoid confusion between various bikeway types. Overall, 45 percent of the respondents strongly support design alternative 6A.2

and recommended to continue the facility type to Van Buren Street. Below are comments to demonstrate the communities desire for a continuous and protected bicycle facility on 4th Street:

"There should be a continuous two-way protected bike lane along the east curb of 4th Street."

"Fully protected and separated traffic is the best choice."

"There should be dedicated, protected bike facilities along the entire route."

Many of the comments were against neighborhood bikeway, advisory bike lane, and one-way bike lane design alternatives which eliminated 6B.2, 6A.3, 6C.3, 6A.4, and 6B.4 from further consideration. Survey takers were in support of parking removal on the east side of 4th Street.

Figure 62. 5-ft Two-way Protected Bike Lanes on the East Side, Cedar Street to Butternut Street (6A.2)

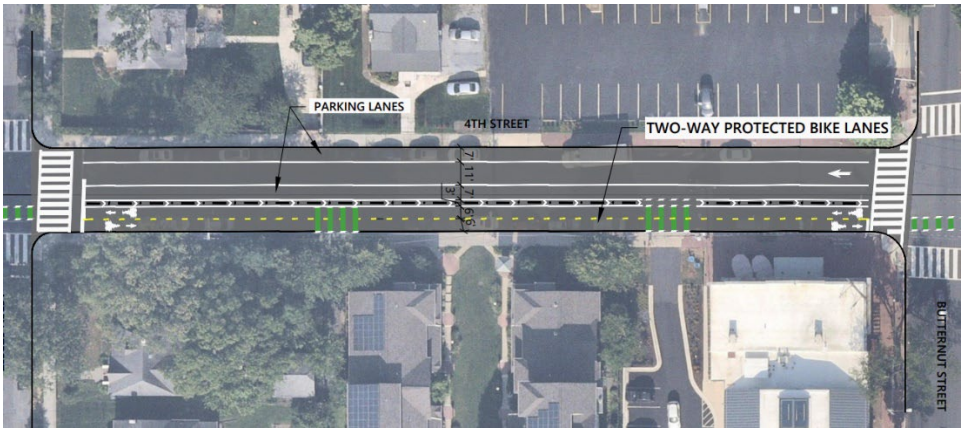

Figure 63. 6-ft Two-way Protected Bike Lanes on the East Side, Butternut Street to Aspen Street (6B.3)

Drainage and Stormwater Management Design Analysis

The proposed design alternatives do not include changes to the street and sidewalk configuration. The erosion, sediment control, and stormwater obligations are not impacted by the proposed design alternatives. If pavement reconstruction is needed for the bike lanes and high-water table, then consideration for a permeable pavement section option is suggested. Opportunities for BMP retrofits and drainage improvements will be considered in the 30 percent design phase.

Existing and Future Conditions Traffic Analysis Findings

To evaluate traffic impacts of the one-way conversion on 4th Street from Butternut Street to Van Buren Street, the project team used Synchro to understand the LOS and delay times (seconds/vehicle). **Table 17 shows** that the one-way conversion has no significant effect to a.m. or p.m. peak hour LOS and delay times for Existing Plus Project conditions or 2045 Plus Project conditions with the exception of Blair Road and Aspen Street in the a.m. peak hour that is LOS E in the Existing and Existing Plus Project scenarios and LOS F in the 2045 and 2045 Plus Project scenarios. Regardless of the project conditions, the LOS at Blair Road and Aspen Street is congested. The project team explored intersection improvements to mitigate the intersection's operations to background LOS or better; however, physical expansion of the streets is not possible due to the elevated railroad tracks, narrow Aspen Street underpass, extension of the Metropolitan Branch Trail from Fort Totten, and limited right-of-way. Based on survey feedback and comments from WABA and ANC 4B, there is support to convert 4th Street to one-way southbound from Cedar Street and Blair Road intersection to Van Buren Street.

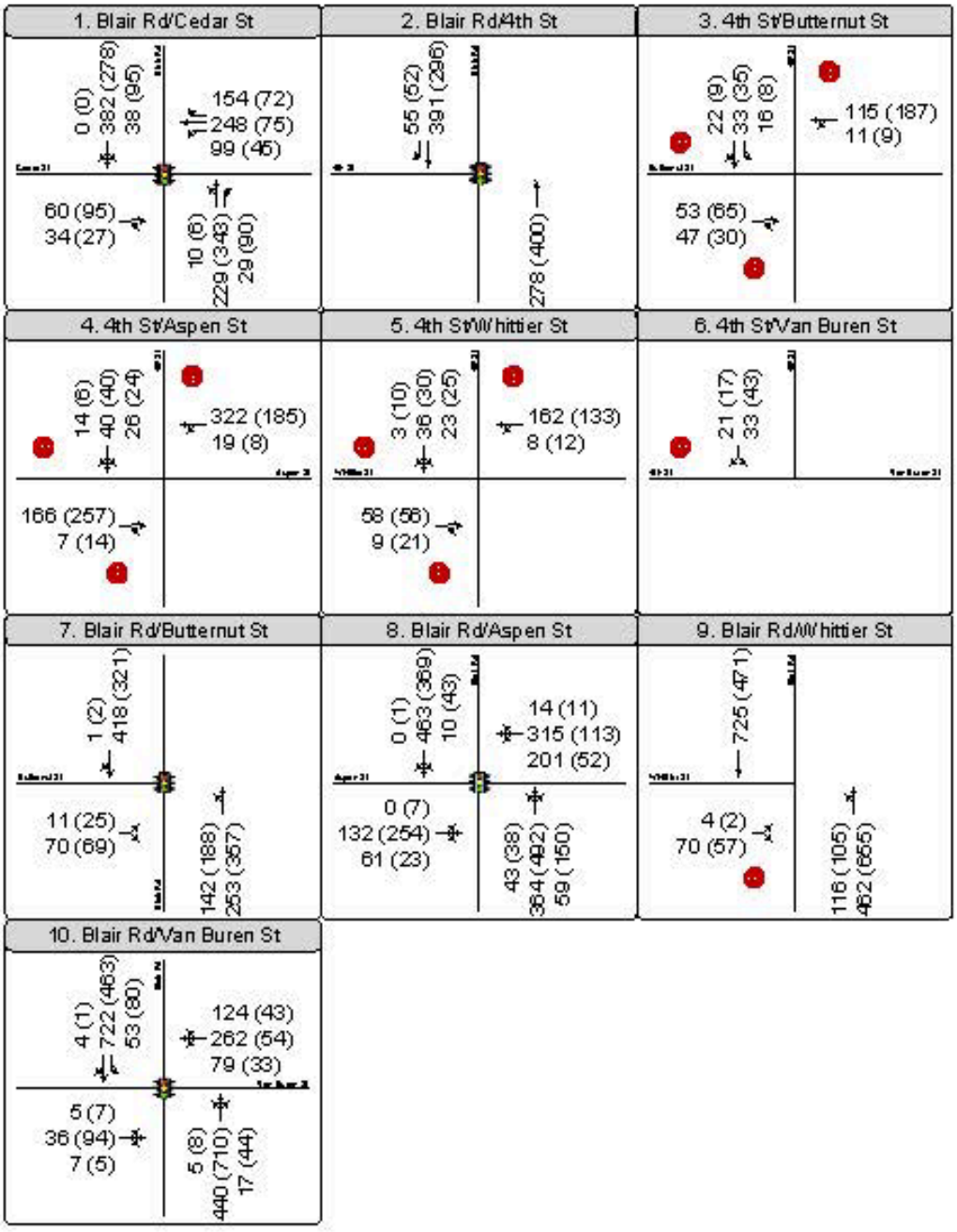

Figure 64. Peak Hour Turning Movement Forecasts (Existing Plus Project)

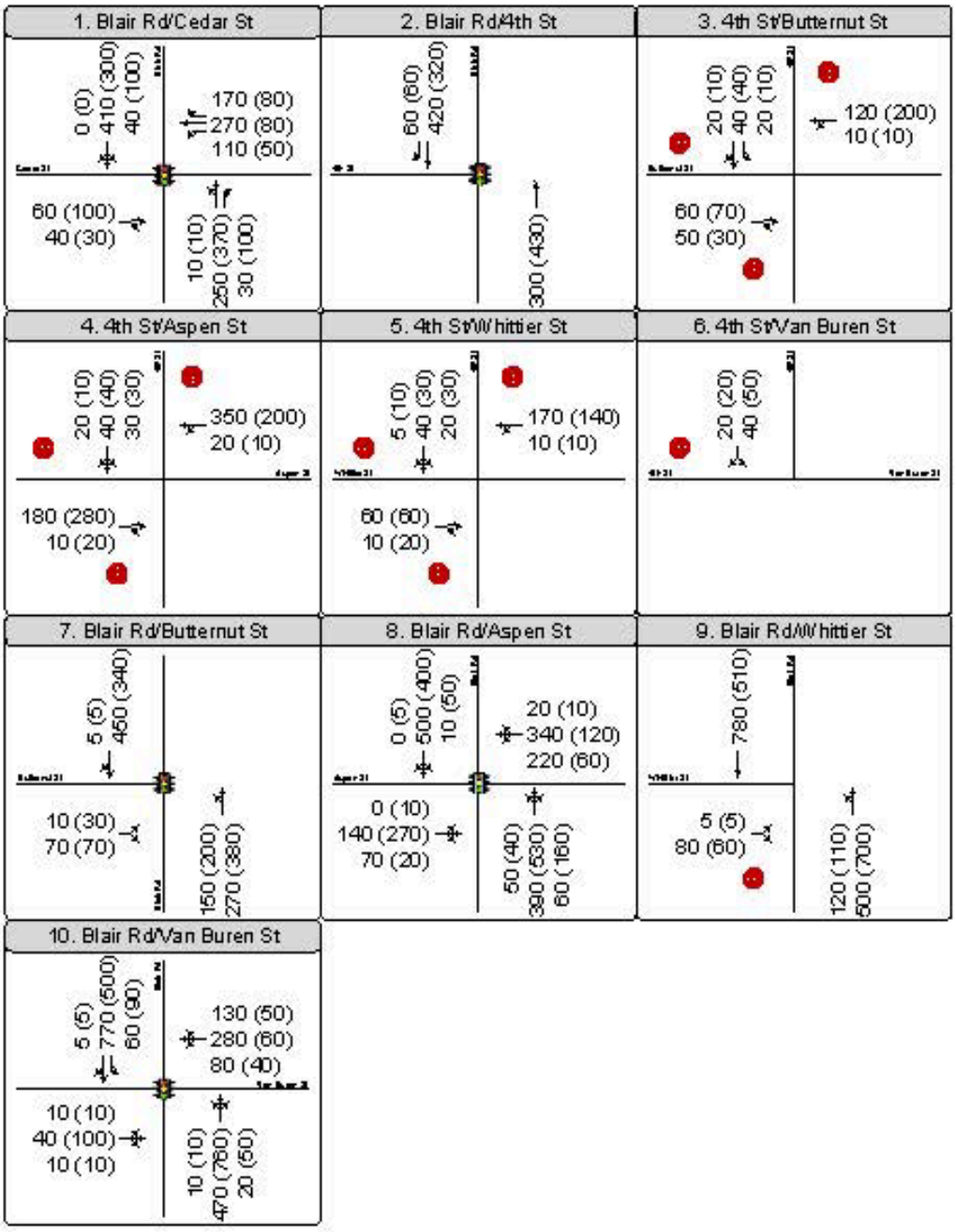

Figure 65. Peak Hour Turning Movement Forecasts (2045 Plus Project)

Table 17. 4th Street A.M. and P.M. Hour LOS and Delay (sec/veh) for All Scenarios

Intersection	Peak Hour	Existing		Existing + Project		2045		2045 + Project	
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Difference in Delays (sec/veh)	LOS	Delay (sec/veh)	LOS
3. 4th St. & Butternut St.	a.m.	8	A	8	A	8	A	8	A
	p.m.	8	A	8	A	8	A	9	A
4. 4th St. & Aspen St.	a.m.	10	B	10	B	11	B	11	B
	p.m.	10	A	9	A	10	B	10	A
5. 4th St. & Whittier St.	a.m.	8	A	8	A	8	A	8	A
	p.m.	8	A	8	A	8	A	8	A
6. 4th St. & Van Buren St.	a.m.	5	A	5	A	5	A	5	A
	p.m.	5	A	5	A	5	A	5	A
7. Blair Rd. & Butternut St.	a.m.	8	A	8	A	8	A	8	A
	p.m.	6	A	7	A	6	A	7	A
8. Blair Rd. & Aspen St.	a.m.	**73**	**E**	**74**	**E**	**100**	**F**	**102**	**F**
	p.m.	28	C	28	C	35	C	33	C
9. Blair Rd. & Whittier St. (EB lane)	a.m.	21	C	20	C	25	D	24	C
	p.m.	14	B	14	B	18	C	17	C
10. Blair Rd. & Van Buren St.	a.m.	35	C	35	C	40	D	40	D
	p.m.	17	B	17	B	19	B	18	B

5.8.3 Aspen Street, Whittier Street, and Van Buren Street from 4th Street to Blair Road

The team explored multiple design alternatives to connect a facility on 4th Street to the Fort Totten to Takoma MBT segment on Blair Road south of Aspen Street.

6A.5 6B.5	5-ft one-way bike lanes on north and south sides Neighborhood bikeway	Butternut Street from 4th Street to Blair Road
6A.6 6B.6	5-ft one-way bike lanes on north and south sides Neighborhood bikeway	Aspen Street from 4th Street to Blair Road
6A.7 6B.7 6C.7	5-ft advisory bike lanes on north and south sides Neighborhood bikeway 10-ft multi-use path on the south side	Whittier Street from 4th Street to Blair Road
6A.8 6B.8 6C.8 6D.8	5-ft advisory bike lanes on north and south sides Neighborhood bikeway 7-ft contraflow bike lane on the north side 5-ft two-way protected bike lanes on the north side	Van Buren Street from 4th Street to 3rd Street (or Blair Road)

Following DDOT review of these design alternatives, the team dismissed Butternut Street (design alternatives 6A.5 and 6B.5) from further analysis since the Fort Totten to Takoma MBT segment will not extend north of Aspen Street.

Measures of Effectiveness Findings

Analysis of MOEs for these streets revealed that Aspen Street requires users to potentially stop at one additional traffic signal. Additionally, Aspen Street has the highest number of driveway conflicts.

Parking Occupancy Analysis

Parking is the MOE most significantly affected by the design alternatives. In general, neighborhood bikeways do not remove parking whereas alternatives that add bike lanes, advisory bike lanes, contraflow bike lanes, or two-way protected bike lanes do remove parking. Given the residential nature of these blocks, the 5 a.m. parking occupancy is most important for understanding parking impacts. The relevant average 5 a.m. parking occupancies for blocks in this area are:

- Aspen Street (north side) from 4th Street to Blair Road: 15 spaces, 77 percent average occupancy
- Whittier Street (north side) from 4th Street to 3rd Street: 19 spaces, 69 percent average occupancy
- Whittier Street (south side) from 4th Street to 3rd Street: 22 spaces, 45 percent average occupancy

- Van Buren Street (north side) from 4th Street to 3rd Street: 13 spaces, 0 percent average occupancy
- Van Buren Street (south side) from 4th Street to 3rd Street: 13 spaces, 0 percent average occupancy
- Van Buren Street (north side) from 3rd Street to Blair Road: 10 spaces, 42 percent average occupancy
- Van Buren Street (south side) from 3rd Street to Blair Road: 9 spaces, 53 percent average occupancy

Community Feedback

The community workshop and survey included the following two design alternatives:

6A.6 5-ft one-way bike lanes (Aspen Street)
6B.6 Neighborhood bikeway (Aspen Street)
6A.7 5-ft advisory bike lanes on north and south sides (Whittier Street)
6B.7 Neighborhood bikeway (Whittier Street)
6A.8 5-ft advisory bike lanes on north and south sides (Van Buren Street)
6B.8 Neighborhood bikeway (Van Buren Street)

The comments for these streets were like the comments received for 4th Street from Cedar Street to Van Buren Street. The public was not in favor of the neighborhood bikeway or advisory bike lane design alternatives. The one-way bike lanes on Aspen Street were more favorable but did not have strong approval due to the lack of protective barriers. Based on the survey results, 21 percent strongly approved of design alternative 6A.6, 3 percent strongly approve of 6B.6, and 6 percent strongly approve of 6A.7. Here are comments that are in support of 5-foot one-way bike lanes:

"Of the options, this is by far the best. Better would be to have some protection."

"I strongly support one-way bike lanes. I believe they are the best solution. Aspen Street is the best connection to Blair Road because of the existing traffic signal at that intersection."

Overall, the public recommended adding alternatives with protected bike lanes and suggested to connect to the Fort Totten to Takoma section using either Aspen Street or Whittier Street. WABA proposed multiple new alternatives that will be evaluated in the 30 percent design phase: to add a multi-use trail on the south side of Whittier Street (6C.7), consider new alternatives for Van Buren Street (6C.8 and 6D.8), and install a new traffic signal at the Whittier Street and Blair Road intersection to facilitate safe trail crossings. ANC 4B supports connecting the trail at Van Buren Street and Whittier St as

the east-west route to Blair Road and 4th Street. ANC 4B recommends traffic calming measures throughout, and recommends contraflow bike lanes along Van Buren Street and a multi-use path on the south side of Whittier Street.

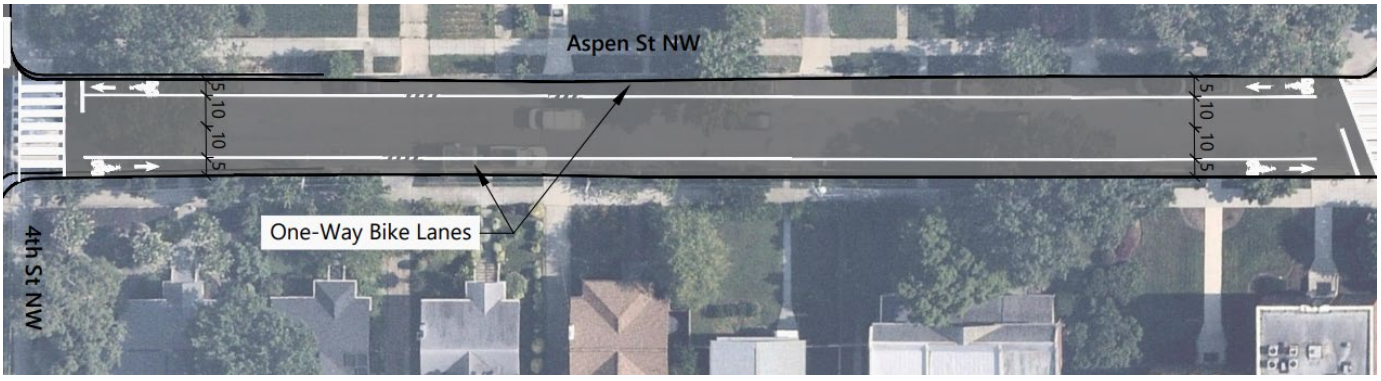

Figure 66. 5-ft One-way Bike Lanes (6A.6)

Drainage and Stormwater Management Design Analysis

With the exception of design alternative 6C.7 (10-foot multi-use path on the south side of Whitter Street), there are no changes to street and sidewalk configuration and no stormwater obligation impacts.

For design alternative 6C.7 on Whittier Street, there are changes to sidewalk configuration to widen the existing sidewalk on the south side into a multi-use path. Further evaluation of existing drainage and identification of areas suitable for BMP retrofit and stormwater conveyance will be included in the 30 percent design phase.

6. Recommendations & Next Steps

This section documents the preferred alternatives for each segment that will move forward into the 30 percent design phase and a brief discussion on the project team's plan moving forward with the analysis and evaluation process for the remaining design alternatives.

6.1 Segment 1: Piney Branch Road Preferred Alternatives

The team will proceed with design alternative 1B, the 4-foot two-way protected bike lanes on the south side with 12-foot travel lanes as shown in **Figure 67.** This alternative is not consistent with the recommendations from the public, WABA, or ANC 4B of feasibility issues associated with building a trail underneath an active railroad.

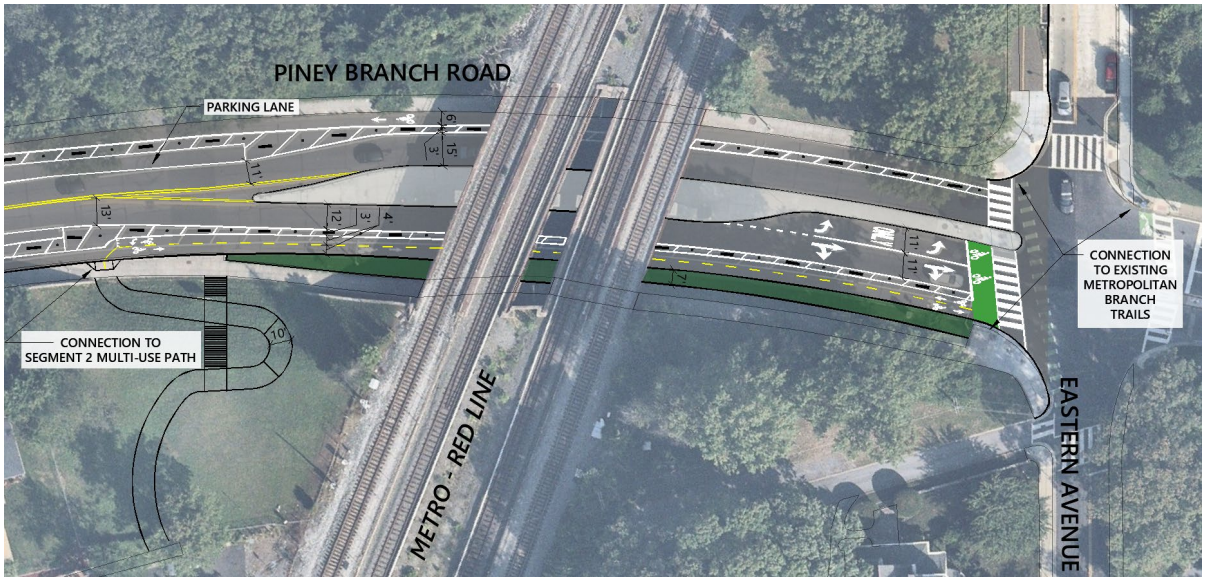

Figure 67. 4-foot Two-way Protected Bike Lanes on South Side, 12-foot Travel Lanes (1B)

6.2 Segment 2: Piney Branch Road to Chestnut Street Recommended Alternative

The team will proceed with design alternative 2G (10-foot multi-use curvilinear path, staircase and 5,500 SF green space, 5% slope).

As part of the 30 percent design phase, the team anticipates performing standard penetration test (SPT) soil borings and laboratory testing on the collected soil samples to characterize the subsurface soil and groundwater conditions for Segment 2. Geotechnical recommendations will then be provided for the

design of the retaining walls and slopes. To complete the field investigation for the proposed retaining walls or slopes, permits from WMATA may need to be procured and extensive coordination with WMTA and the adjacent property owners is required.

Upon completion of the required geotechnical field investigation and laboratory testing, a Draft Geotechnical Engineering Report will be prepared and submitted for review. Review comments will be addressed, and a Final Geotechnical Engineering Report will then be submitted. The alternative continuing for evaluation in the 30 percent design phase is the 10-ft multi-use curvilinear path with a staircase (2G) shown in **Figure 68**.

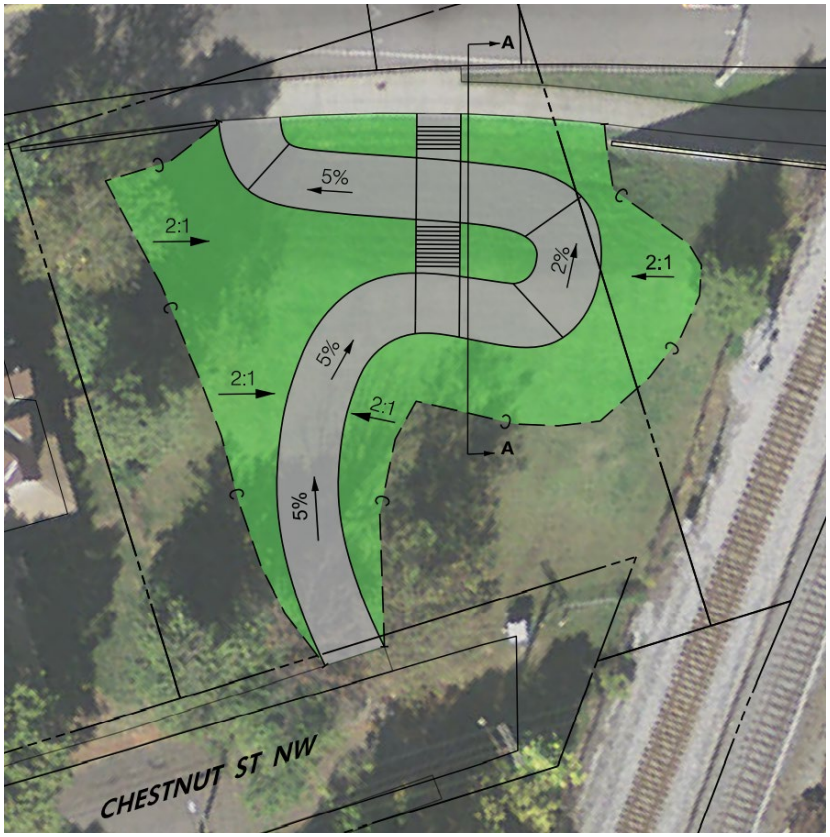

Figure 68. 10-foot Multi-use Curvilinear Path, Staircase and 5,500 SF Green Space (5% slope, max) (2G)

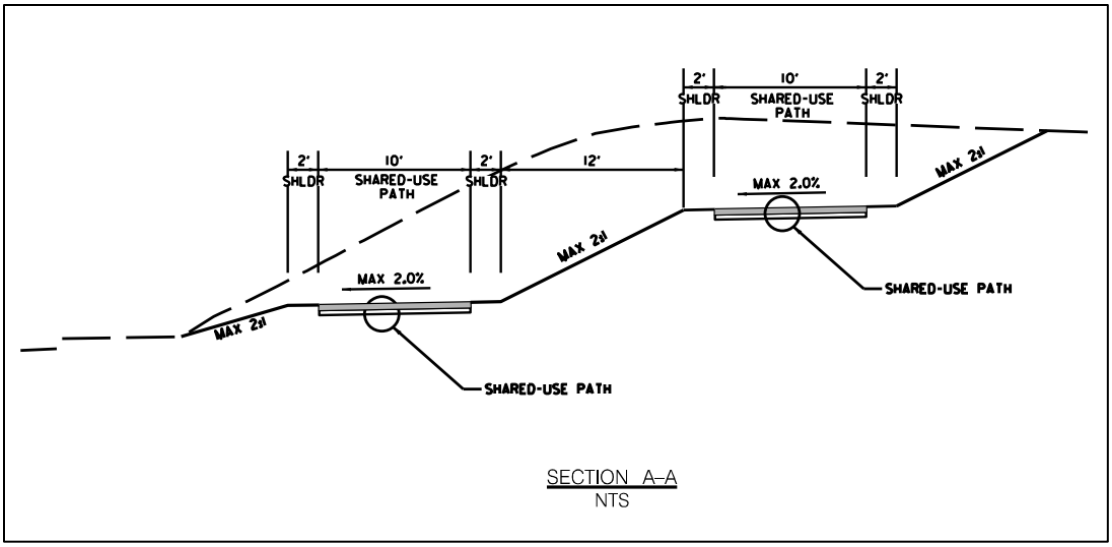

Figure 69. Alternative 2G Cross Section

6.3 Segment 3: Chestnut Street Recommended Alternative

The alternative advancing to the 30 percent design phase is the neighborhood bikeway (3A) and is shown in **Figure 70**.

Figure 70. Neighborhood Bikeway (3A)

6.4 Segment 4: Spring Place Recommended Alternative

The alternative advancing to the 30 percent design phase is the Woonerf with chokers (4B) and is shown in **Figure 71**. Based on the MOEs and public input, this alternative was preferred due to the addition of traffic calming measures and is in alignment with both WABA and ANC4B's recommendations. As part of the 30 percent design phase, there will be an evaluation of the adequacy of the existing drainage. Roadway pavement improvements may be an opportunity to address drainage issues on Spring Place.

Additionally, opportunities for drainage improvements and BMP retrofits will be further evaluated in the 30 percent design phase.

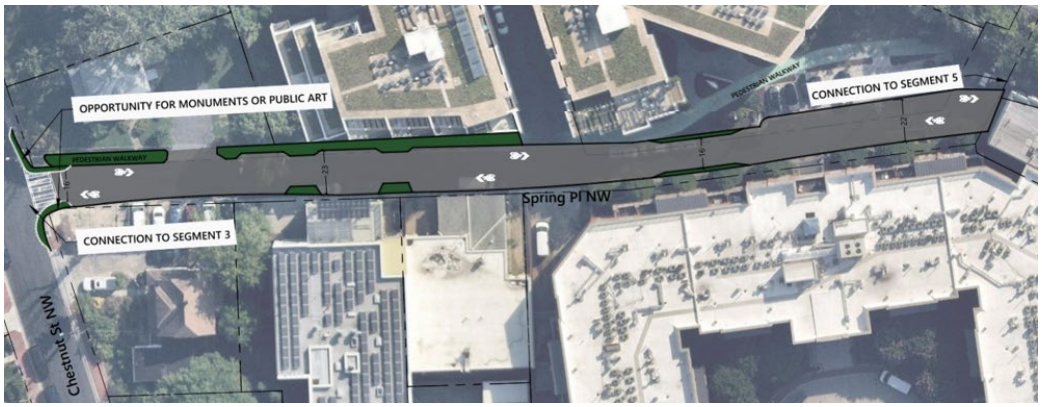

Figure 71. Woonerf with Chokers (4B)

6.5 Segment 5: 343 Cedar Street Recommended Alternative

The alternative advancing to the 30 percent design phase is the 12-foot multi-use path with 6-foot retaining wall along the railroad embankment and a 3-foot retaining wall along the 343 Cedar Street property (5C) and is displayed in **Figure 72**. This alternative aligns with public feedback and recommendations from WABA and ANC 4B. As part of the 30 percent design phase, the extent of the stormwater obligations will be determined and opportunities for drainage improvements and BMP retrofits will be further evaluated. Additionally, the trees on the adjacent embankment need to be evaluated for protection, preservation, or removal.

As part of the 30 percent design phase, the team anticipates performing standard penetration test (SPT) soil borings and laboratory testing on the collected soil samples to characterize the subsurface soil and groundwater conditions for Segment 5. Geotechnical recommendations will then be provided for the design of the retaining walls and slopes. To complete the field investigation for the proposed retaining walls or slopes, permits from WMATA may need to be procured and extensive coordination with WMTA and the adjacent property owners is required.

Upon completion of the required geotechnical field investigation and laboratory testing, a Draft Geotechnical Engineering Report will be prepared and submitted for review. Review comments will be addressed, and a Final Geotechnical Engineering Report will then be submitted.

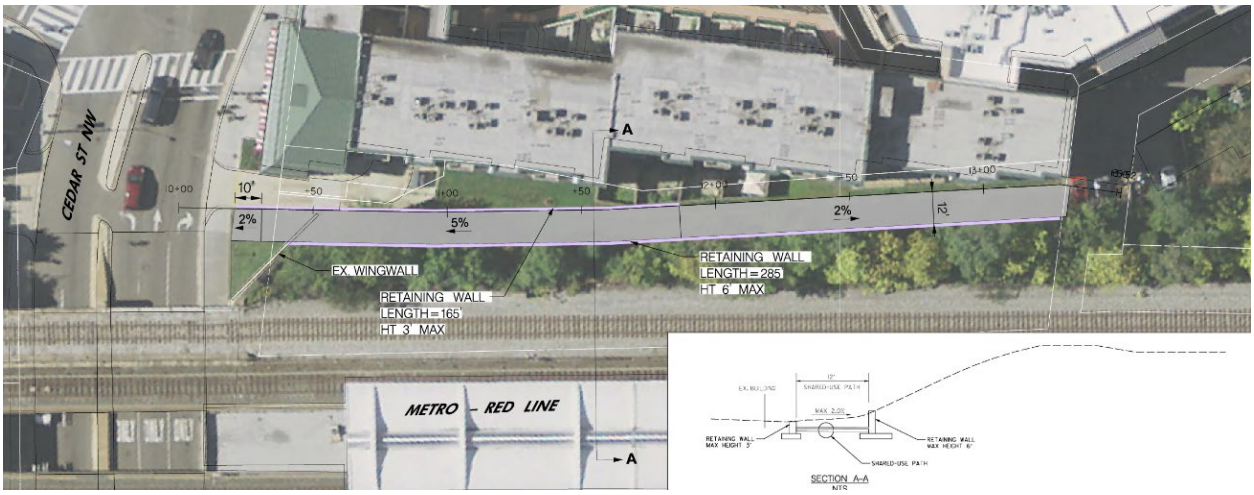

Figure 72. 12-foot Multi-use Path with 6-foot Retaining Wall Along CSX Embankment and 3-foot Retaining Wall Along 343 Cedar Street Property (5% slope, max.) (5C)

6.6 Segment 6: Cedar Street, Blair Road, 4th Street, 3rd Street, Butternut Street, Aspen Street, Whittier Street, and Van Buren Street Design Recommended Alternatives

6.6.1 Cedar Street and Blair Road intersection

The alternatives continuing for evaluation in the 30 percent design phase include the following:

6D.1 Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 12-ft eastbound offset

6E.1 Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 8-ft eastbound offset

6F.1 Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 4-ft eastbound offset

DDOT will consult with its Traffic Engineering and Signals Division (TESD) to select a preferred alternative.

6.6.2 4th Street from Butternut Street to Van Buren Street

Based on community feedback, the project team proposes a one-way lane conversion on 4th Street from Butternut Street to Van Buren Street to support the implementation of a 5-foot two-way protected bike lane on the east side of 4th Street. This decision aligns with recommendations from WABA and ANC 4B. Removal of on-street parking spaces on the east side of 4th Street is required to accommodate this

change except for the segment between Cedar Street and Aspen Street since the street width is from 40 to 66 feet wide. On the segment between Aspen Street and Van Buren Street, the street width decreases to 30 feet wide.

For consistency, it is recommended to incorporate 5-foot bike lanes throughout the east side of 4th Street with a 2- or 3-foot buffer, 11-foot one-way travel lane, and a 7-foot parking lane on the west side of 4th Street. Below are example images of the dimensions of the one-way travel lane on 4th Street from Aspen Street to Van Buren Street.

Figure 73. Extension of One-way Lane Conversion on 4th Street from Aspen Street to Whittier Street

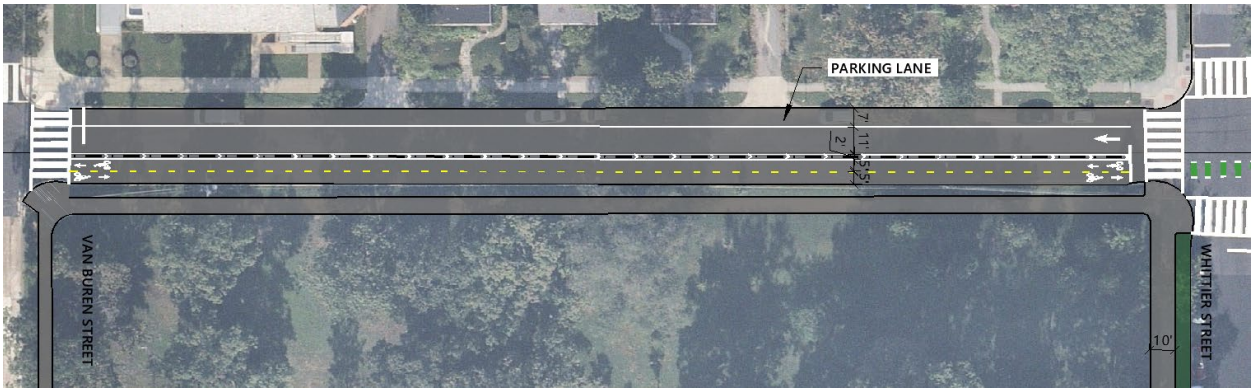

Figure 74. Extension of One-way Conversion on 4th Street from Whittier Street to Van Buren Street

6.6.3 Aspen Street, Whittier Street, and Van Buren Street from 4th Street to Blair Road

Based on recommendations from WABA, ANC 4B, and community members, the following alternatives will advance to the 30 percent design phase:

6C.7 10-ft multi-use path on the south side (Whittier Street)
6C.8 7-ft contraflow bike lane on the north side (Van Buren Street)
6D.8 5-ft two-way protected bike lanes on the north side (Van Buren Street)

Initially, the project team planned to implement bicycle facilities on one street, either choosing Butternut Street, Aspen Street, Whittier Street, or Van Buren Street. But after continued conversations with community members, it is favorable to implement bicycle facilities on both Whittier Street and Van Buren Street.

Design alternative 6C.7 is a 10-foot multi-use path on the south side of Whittier Street and is shown in **Figure 75**. The project team anticipates potential impacts to the park located in Square 0000, Lot 0106 and further analysis on right-of-way boundaries will be part of the 30 percent design phase. If the sidewalk configuration proposed will cause land disturbance this will contribute to the project's erosion sediment control and stormwater management obligation. This disturbance may provide an opportunity to provide stormwater management with impervious surface conversion and an infiltration BMP.

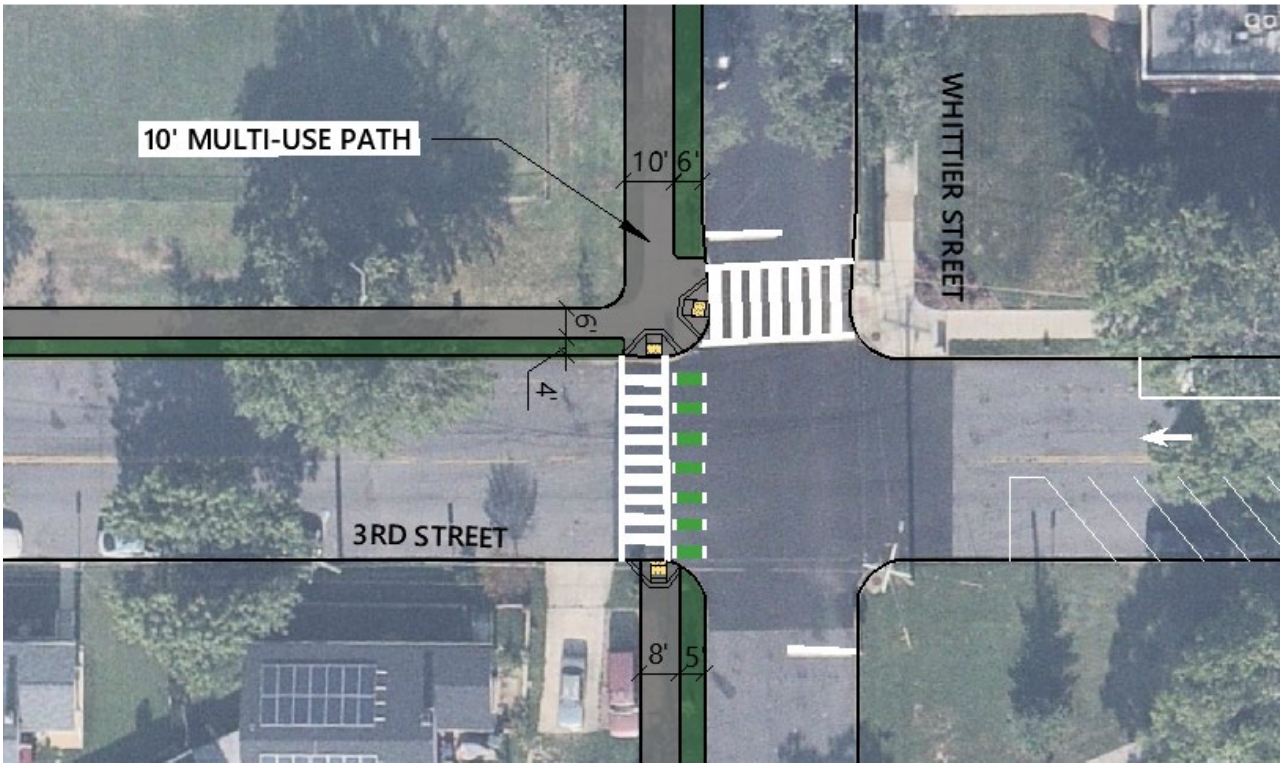

Figure 75. 10-foot Multi-use Path on the South Side (6C.7)

Design alternatives advancing for the north side of Van Buren Street include a 7-foot contraflow bike lane (6C.8) and 5-foot two-way protected bike lanes (6D.8) as shown in **Figure 76 and Figure 77.** These alternatives are currently being evaluated by the project team and a list of pros and cons are found in **Appendix G.**

From 4th Street to 3rd Street, both alternatives require the removal of a parking lane on the north side which has little impact based on the observed parking occupancy rates. The 5 a.m. peak parking occupancy is 0 percent and the 12 p.m. peak parking occupancy is 31 percent.

From 3rd Street to Blair Road, design alternative 6D.8 (two-way protected bike lane) requires parking removal on the north side of the street to continue the two-way protected bike lane to Blair Road. However, the parking occupancy is 42 percent on the north side which is higher than the parking occupancies from 4th Street to 3rd Street. Alternative 6C.8 (contraflow one-way protected bike lane) does not require parking removal or additional street configuration changes.

Figure 76. 7-ft Contraflow Bike Lane (6C.8)

Figure 77. 5-ft Two-way Protected Bike Lanes (6D.8)

7. Order of Magnitude Cost Estimates

Appendix L shows the cost estimates for each design alternative per segment in the project area. The cost estimates are based on a 40 percent construction contingency. **Table 18** summarizes cost estimates for each of the design alternative advancing to the 30 percent design phase.

Table 18. Cost Estimates for Design Alternatives

Segment	Design Alternative	Cost Estimate
Segment 1: Piney Branch Road	**1A.** 10-foot multi-use path on south side	$91,000
	1B or 1C. 4-foot or 5-foot two-way protected bike lanes on south side, 11-foot or 12-foot travel lanes	$57,400
	1E. 5-foot curb extension, two-way 5-foot protected bike lanes with 6-foot sidewalk on south side	$309,400
	1F. 5-foot curb extension, 14-foot multi-use path on south side	$326,200
Segment 2: Piney Branch Road to Chestnut Street	**2G.** 10-foot multi-use curvilinear path, staircase, and 5,500 SF green space (5% slope, max.)	$716,800
Segment 3: Chestnut Street	**3A.** Neighborhood bikeway	$9,800
Segment 4: Spring Place	**4B.** Woonerf with chokers	$708,400
Segment 5: 343 Cedar Street	**5C.** 12-foot multi-use path with 6-foot retaining wall along CSX embankment and 3-foot retaining wall along 343 Cedar Street property (5% slope, max.)	$852,600
Segment 6: Cedar Street & Blair Road Intersection	**6D.1, 6E.1, or 6F.1.** Multi-use path north side (3 westbound lanes) with two-way crossing of Cedar Street and 4- to 12-foot eastbound offset.	$658,000
Segment 6: 4th Street from Cedar Street to Butternut Street	**6A.2.** 5-foot two-way protected bike lanes on the east side	$63,000
Segment 6: 4th Street Butternut Street to Van Buren Street	**6B.3 and 6C.4.** 5-foot and 6-foot protected bike lanes on the east side	$117,600
Segment 6: Whittier Street	**6C.7 and 6B.7.** 10-foot multi-use path on the south side and neighborhood bikeway.	$149,800
Segment 6: Van Buren Street	**6D.8.** 5-foot two-way protected bike lane on the north side.	$67,200
	6C.8. 7-foot contraflow bike lane on the north side.	$37,800

These cost estimates suggest that the total cost of the Takoma segment of the MBT will be between $3 million and $4 million.

8. Lighting

The project team will develop lighting plans as a part of the 30 percent design phase. The team plans to use DDOT standard light fixtures for ease of maintenance. Coordination is necessary for lighting on Segments 2 and 5, where DDOT plans to obtain an easement (on Square 3187, Lot 0838, east of 343 Spring Place) to ensure that DDOT can install lighting and carry out its normal maintenance activities.

9. Constructability

Constructability issues will be better understood once the 30 percent design phase is complete. The project team is not aware of issues at this time.

The project team will coordinate with CSX and WMATA to ensure that modifications to the wingwall adjacent to 343 Cedar Street and associated retaining wall do not affect rail operations. Additionally, any construction activities on Spring Place must ensure that fire access is still possible.

In terms of impacts to nearby residents, the contractor will need to follow District of Columbia restrictions related to nighttime work hours and noise regulations when working within residential areas. Work hour and noise restrictions need to be considered when the contractor is choosing the methods for the construction of the trail. Additionally, minimizing the project impacts near property lines is important, unless needed and cleared by the DDOT right-of-way team through the design process.

10. Maintenance of Traffic Plan

10.1 Staging and Construction Sequence Requirements

The project team will determine staging and construction sequence requirements during the 30 percent design phase.

10.2 Detour Routes

Based on the alternatives presented in the first public presentation, the ones that involve detour routes if selected to proceed to 30 percent design phase are:

Segment 1: Piney Branch Road

All alternatives will have construction on the south side of Piney Branch Road. These alternatives require that the eastbound travel lane remain open during construction.

Segment 4: Spring Place

Emergency vehicle access will need to be accommodated during construction.

Segment 6: Cedar Street, Blair Road, 4th Street, 3rd Street, Butternut Street, Aspen Street, Whittier Street, & Van Buren Street

Alternatives near the Cedar Street and Blair Road intersection and along 4th Street will need to allow space for pedestrians to access the local business is the area. Additionally, any temporary rerouting of bus routes will also need to be drafted as part of the 30 percent design phase.

11. Environmental Documentation

11.1 Environmental Documentation Requirements

In 2011, the Federal Highway Administration (FHWA) and DDOT issued a Finding of No Significant Impact (FONSI) for the Metropolitan Branch Trail Project and in 2012, the National Park Service (NPS) issued their own FONSI. The 2011 FONSI document disclosed the project to be constructed in phases and presented impacts by alternative in three areas. The subject scope of work covers the area identified in the FONSI as Area C.

Due to the lapse in time and potential changes to the design presented in the 2011 FONSI, the National Environmental Policy Act (NEPA) requires Federal agencies to consider and disclose the environmental impacts of their proposed actions as part of their decision-making, which may trigger the need to revisit the NEPA analysis if there is a remaining Federal action. Following the August 14, 2019 guidance and as outlined in 23 CFR 771.129, a reevaluation of the environmental document and decision to determine whether the original document or decision remains valid, or if a supplemental or new analysis is needed, is necessary.

Based on the preliminary engineering analysis in this report, a reevaluation is assumed to be the appropriate level of documentation for NEPA compliance and not a supplemental Environmental Assessment; however, this will need to be confirmed between DDOT and FHWA. The reevaluation will document changes to the engineering and design, as well as changes in socioeconomic, cultural, and natural environmental existing conditions that have occurred since the 2011 FONSI and will update impacts to those resources in accordance with requirements of 23 CFR 771.129.

11.2 Preliminary Research Results

One of the first steps the NEPA team members will conduct in the next phase of the project will be a review of the existing environmental conditions along the preferred alternative corridor. The resources reviewed will include, but not limited to the following:

- Trees, vegetation, and habitat
- Wetlands and waters features
- Cultural resources
- Environmental justice populations
- Land uses, communities and community facilities (including parks)
- Hazardous materials and soils

The existing environmental resources will be mapped and documented in the reevaluation.

11.3 Environmental Permitting Requirements

The required permits and approvals will be determined in the next phase of the project following the analysis and impacts to environmental resources.

11.4 Environmental Coordination

Coordination with environmental agencies and stakeholders will occur concurrent with the preparation of the reevaluation. Agencies and stakeholders that will likely need to coordinate with include, but not limited to:

- WMATA
- National Park Service
- District of Columbia State Historic Preservation Office (SHPO)
- National Capital Planning Commission
- District of Columbia Department of Parks and Recreation

Agency coordination will be documented in the reevaluation.

12. Quality of Assurance Statement

According to Section 3.3.1. in the DDOT *DEM*, the Quality Assurance Statement is as such:

With each review submittal, the Professional Engineer whose signature and seal will appear on the contract drawings must submit a statement with the transmittal letter that:

- The standards, codes and criteria applicable to the design have been observed.
- The QA/QC Plan has been implemented, and the designs, computations, drawings and other contract elements have been checked thoroughly and backchecked.

References

DDOT *Bicycle Facility Design* (2020)

DDOT *Design and Engineering Manual* (2019)

AASHTO *Guide for the Development of Bicycle Facilities* (2012)

NACTO *Urban Bikeway Design Guide (2nd Edition)* (2014)

NACTO *The Woonerf Concept Rethinking a Residential Street in Somerville* (2012)

Acknowledgements

DDOT

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