Feasibility Study

Palisades Trolley Trail and Foundry Branch Trolley Trestle Bridge

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GOVERNMENT OF THE DISTRICT OF COLUMBIA
MURIEL BOWSER, MAYOR

Feasibility Study

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1.0 Executive Summary

The *Palisades Trolley Trail and Foundry Branch Trolley Trestle Bridge Feasibility Study* (the Study) is an effort by the District Department of Transportation (the District) to identify critical issues in developing a trail for pedestrians and bicyclists of all ages and abilities on the former Glen Echo Trolley line corridor, an area commonly referred to as the Palisades Trolley Trail (PTT). The proposed trail is located in the Palisades, Foxhall, and Georgetown neighborhoods in Northwest Washington, DC; if completed, it would provide a critical bicycle and pedestrian connection through the three neighborhoods.

The Study began in November 2018 and was completed in December 2019. Several tasks were completed as part of the study, including the following:

- Topographic, land ownership, and utility survey on the former trolley corridor
- Analysis of existing conditions in the surrounding context area
- Inspection of the existing Foundry Branch Trolley Trestle Bridge
- Research on relevant environmental resources
- Stakeholder engagement and public outreach
- Development of concept-level design plans and costs for the proposed trail and associated bridges

Stakeholder and public involvement were critical components of Study process. An inter-agency working group made up of land owners, public agencies, and other stakeholders met twice to discuss the Study and provide feedback. Inter-agency working group members provided input on opportunities and constraints associated with the trail, concept designs, next steps, and agency coordination needs. Two public meetings were held during the Study, one focused on the findings of the existing conditions analysis with 66 attendees, and the other to present the draft trail design concepts and next steps with 78 attendees. At both public meetings, robust feedback was received through question and answer

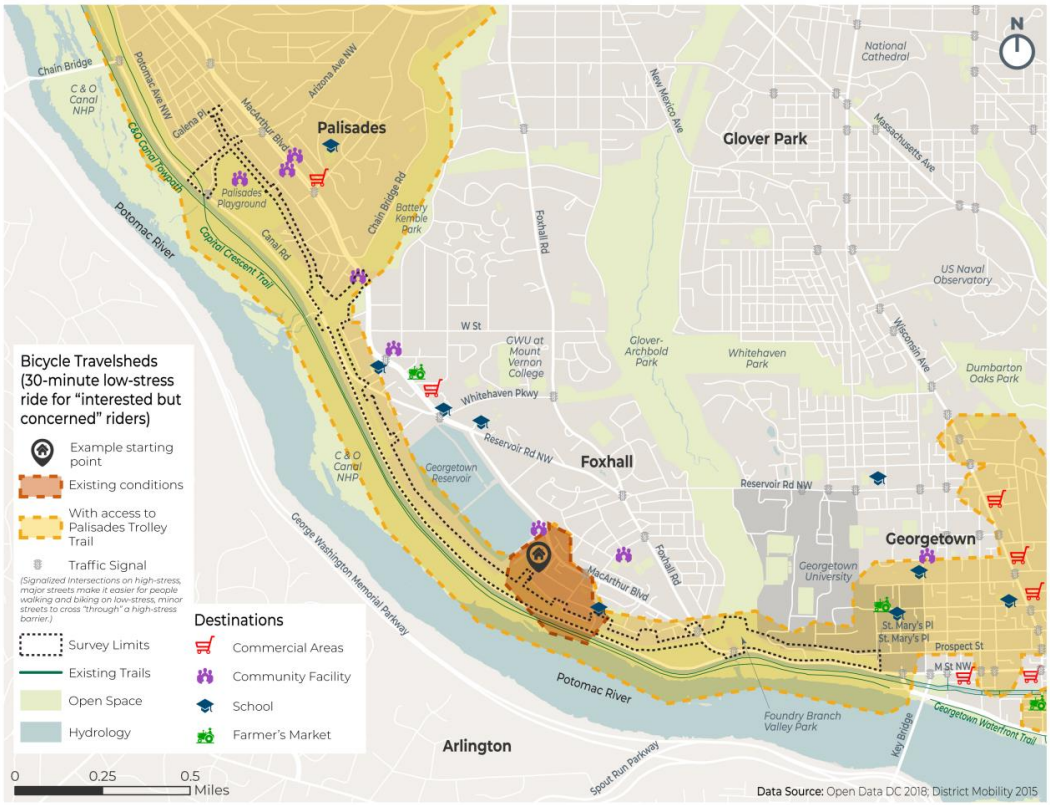
periods, Title VI comment forms, comment cards, and map markups. Public feedback on the Study was also solicited through an online community survey that received 499 responses, and an online comment map that received 162 comments.

1.1. Opportunities and Constraints

Throughout the planning process, a comprehensive list of opportunities and constraints was developed around the proposed PTT. This list was based on property and existing conditions information and analysis, feedback from stakeholders and the public, review of environmental data, and draft concept designs. These opportunities and constraints are summarized below.

Trail Opportunities	Trail Constraints
• The Palisades Trolley Trail is in alignment with the goals established by moveDC, Sustainable DC 2.0, and Vision Zero DC • Approximately 400 to 500 people per day are expected to utilize the Palisades Trolley Trail to travel, commute, and recreate. • The Palisades Trolley Trail significantly expands the bicycle travelshed for 30-minute low-stress bicycle rides. • The Palisades Trolley Trail provides greater access to the Capital Crescent Trail for longer-distance bicycle trips. • The Palisades Trolley Trail provides an opportunity to preserve the Foundry Branch Trolley Trestle Bridge, a contributing resource to the Glover-Archbold Park Historic District • The Palisades Trolley Trail provides an opportunity to address known stormwater management issues along the DDOT ROW corridor • DC owns most of the ROW needed for the trail west of Foxhall Road.	• West of Foxhall Road a portion of the trail alignment traverses land owned by the Army Corps of Engineers or National Park Service; east of Foxhall Road the PTT impacts NPS, WMATA, and Georgetown University property • Manholes, utility covers, Pepco utility poles, and the 78" diameter Crosstown Water Main owned by DC Water would need to be accommodated • The trail requires the construction of three new bridges in constrained locations • There are construction and maintenance concerns associated with rehabilitating the existing Foundry Branch Trolley Trestle Bridge for bicycle and pedestrian use • The trail would have at-grade crossings at high stress roadways at Reservoir Road and Foxhall Road at MacArthur Boulevard • The trail would need to traverse steep, heavily wooded areas between Foxhall Road and Prospect Street/St. Mary's Place • A vocal contingent of residents in the Palisades and Foxhall community oppose the proposed trail and desire to keep the trail in its current grassy state and not be paved. • There are high costs associated with construction of the trail and required bridges • The trail will likely have higher maintenance costs compared to other trails due to the isolated nature of the trail and potential trail surfaces. • Environmental permitting with multiple local and federal agencies would be required to advance the trail, specifically Section 106 for rehabilitation of the Foundry Branch Trolley Trestle Bridge

The PTT will significantly expand the network of low-stress bicycle routes connecting the Palisades, Foxhall, and Georgetown neighborhoods. These areas are currently served by high-stress streets that are not comfortable for less experienced bicyclists. As illustrated on the map below, with the PTT a 30-minute bicycle ride starting in Foxhall will now be able to access commercial and recreation amenities in Palisades, downtown Georgetown and Georgetown University, and Glover-Archbold Park.



ACCESSIBILITY EXPANSION FOR 30-MINUTE BIKE RIDE ON LOW STRESS STREETS BEFORE/AFTER PTT

1.2. Concept Design

Based on the opportunities and constraints, concept designs were developed for the proposed PTT, which follows the same general alignment of the existing informal trail east of Foxhall Road on District owned right-of-way. Wherever possible, the trail is located on the flattest portions of the right-of-way to minimize grading required to construct the trail. Gentle curves are incorporated into the alignment to maintain slower bicycle speeds. Potential trail surface materials include stabilized decomposed granite, asphalt, and porous asphalt.

1.2.1. Trail Alignment

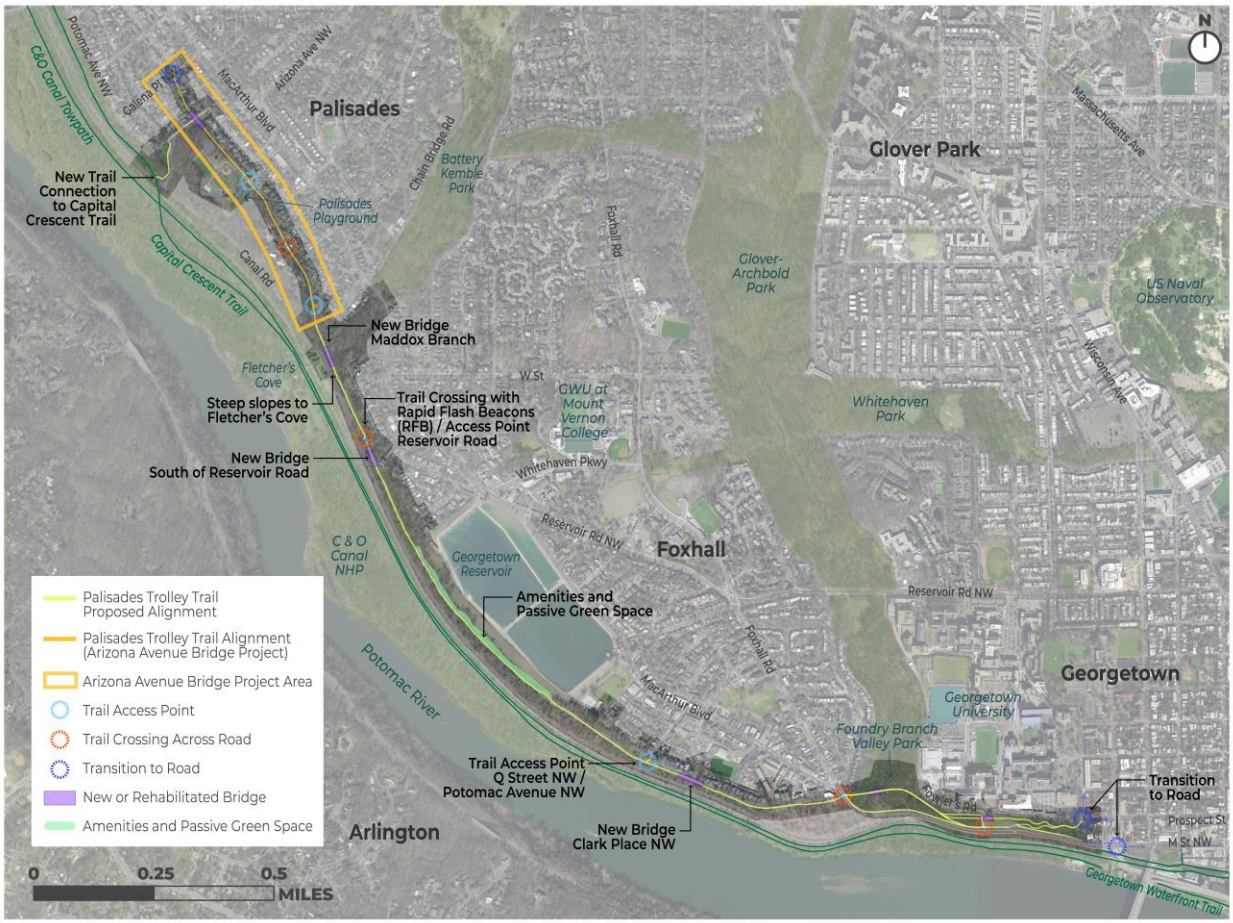
The typical trail section is 11' wide with 2' shoulders on either side. Where the trail right-of-way is more constrained, particularly in areas adjacent to existing homes, there is minimal landscaping and the trail footprint is limited to a 15' wide section. Where there is sufficient right-of-way, stormwater management best management practices (BMPs) are located adjacent to the trail to manage stormwater runoff. The widest portion of the trail around the Georgetown Reservoir includes areas for passive recreation and space for an informal walking trail adjacent to the formalized trail as below. This area also includes west-facing lookout areas that provide views of the Potomac River.

Due to steep topography and complex property ownership east of the current trail terminus at Foxhall Road, there are five potential trail alignments to connect the PTT to the Georgetown neighborhood. All the options use a rehabilitated Foundry Branch Trestle Bridge as part of the trail alignment except for Option 2. The eastern trail terminus for alignment Options 1-3 is at Canal Road/M Street and Whitehurst Freeway; Options 4-5 have a trail terminus at Prospect Street and St. Mary's Place. Canal Road/M Street is a very high stress road environment with over 30,000 AADT, multiple travel lanes, no dedicated


PROPOSED TRAIL EAST OF CLARK PLACE (LEFT) AND WEST OF GEORGETOWN RESERVOIR (RIGHT)

bicycle facilities, and one crosswalk across M Street. Prospect Street has significantly lower volumes with just over 4,000 AADT, two lanes of traffic, and a slower neighborhood/residential environment.

In general, the trail alignment options that end at Prospect Street, Options 4 and 5, are the most desirable because they terminate in a lower stress road environment with significantly lower vehicular volumes. This will facilitate the transition of pedestrians and bicyclists between the trail and the road network and provide a more comfortable connection into Georgetown. These options both have high costs, would require a property agreement with Georgetown University and an additional bridge structure (Option 4) or significant grading and earthwork on NPS property to reach Prospect Street (Options 4 and 5). Options 1-3 are less desirable due to the trail termination point on M Street with 30,000 AADT and no bicycle facilities.



PROPOSED TRAIL ALIGNMENT

1.2.2. New Bridges

New multi-use trail bridges are proposed at the three locations along the trail where the former trolley bridges were demolished: Maddox Branch, Reservoir Road, and Clark Place. The preferred concept design at each location is a single span Prefabricated Steel H Truss bridge with a concrete deck and an uncoated weathering steel finish. The alignment and layout for each of the bridges follows the existing trail with only minor deviations to avoid foundation conflicts with the 78" Water Main. For all locations, the deck width on the bridge for the trail is 12 feet with a pedestrian railing on both sides to meet ADA and other requirements for pedestrian and bicyclist safety. Where the 78" diameter Water Main is present at an abutment location, the abutment is proposed to straddle the Water Main or be shifted to one side to avoid conflict

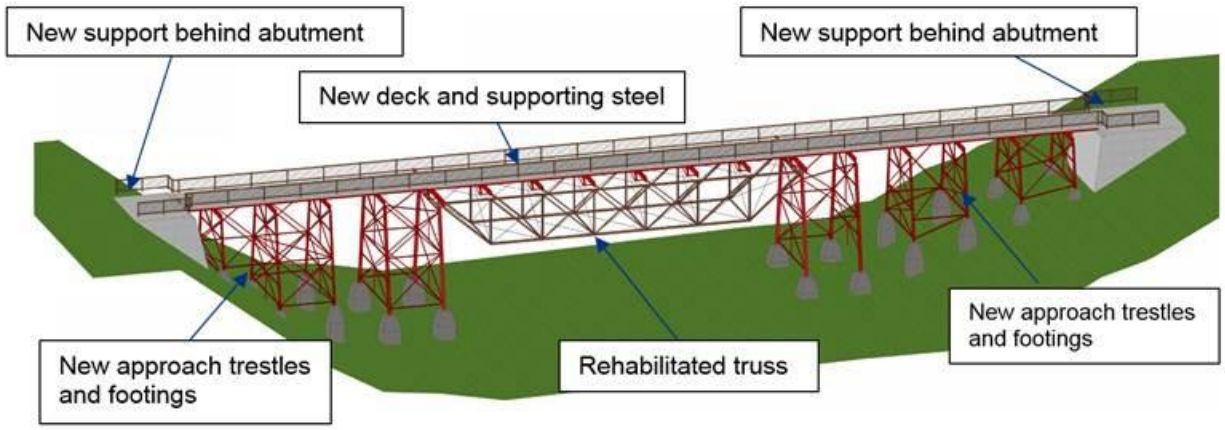
RENDERING OF PROPOSED TRAIL BRIDGE AT MADDOX BRANCH

1.2.3. Foundry Trestle Bridge

Most of the trail alignment options include rehabilitation of the Foundry Branch Trolley Trestle Bridge for use as a bicycle and pedestrian bridge. Rehabilitation options were developed based upon a 12 feet wide trail to match the three proposed new bridges further along the trail. The feasibility study evaluates four options for adaptive re-use of the bridge as a pedestrian / bike crossing. Consistent across each option is that the truss span is currently in reasonable condition and able to be reused for the bridge rehabilitation. The four options evaluated include:

- Option 1 - Rehabilitate the approach trestles steelwork
- Option 2 - Replace the approach trestles with new structures to match existing
- Option 3 - Replace the approach trestles with new longer spans
- Option 4 - Retain the approach trestles as facades supported by new structure

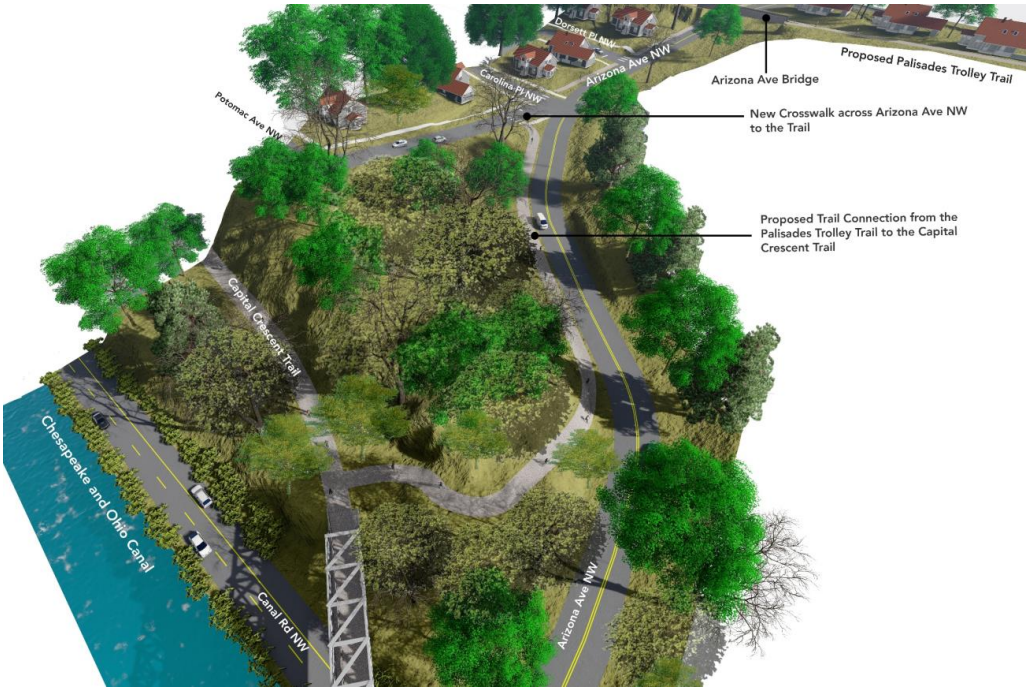
Option 2 is the preferred rehabilitation option for the bridge.



FOUNDRY TRESTLE BRIDGE REHABILITATION OPTION 2

1.2.4. New Connection to CCT

A new multi-use trail connection to the Capital Crescent Trail (CCT) is proposed from the PTT and Palisades neighborhood at Arizona Avenue and Sherier Place to the CCT bridge over Canal Road and the C&O Canal north of Arizona Avenue. From the base of the Arizona Avenue Bridge access ramp at Sherier Place, the proposed trail follows new sidewalks on the north side of Arizona Avenue to Carolina Place. A new crosswalk across Arizona Avenue connects to a new multi-use trail on NPS property that parallels Arizona Avenue and gradually traverses the grade to connect to the CCT at its current grade approximately 15' above Arizona Avenue. Grading and retaining walls on NPS property will be required to maintain an ADA accessible trail through this area with a maximum 5% grade.



RENDERING OF PROPOSED ARIZONA AVENUE CONNECTION TO CCT

1.2.5. Cost Estimates

The total cost for the trail and three new bridges west of Foxhall Road is estimated at $8.5 million. East of Foxhall Road, the total costs for the five trail alignment options, some of which include the rehabilitation of the Foundry Branch Trolley Trestle Bridge, range from $2.1 million to $8.75 million. The total cost for the new Arizona Avenue trail connection to the Capital Crescent Trail is estimated at $1.2 million.

2.0 Introduction

2.1. Project Background

The existing Palisades Trolley Trail is located along the right-of-way of the former Glen Echo Trolley Line. The historic trolley line was constructed in 1896 by the Washington & Great Falls Electric Railway Company and ran along the north shore of the Potomac River between Georgetown and Cabin John, Maryland. The trolley line operated until 1960 when the streetcar service was terminated, and the Foundry Branch Trolley Trestle Bridge just east of Foxhall Road, was taken out of service.

SOURCE: SCHUMINWEB

GLEN ECHO TROLLEY AT ARIZONA AVENUE (LEFT); EXISTING TRAIL (CENTER); FOUNDRY BRANCH TROLLEY TRESTLE BRIDGE (RIGHT)

In the 1980s, trolley bridges at Reservoir Road, Battery Kemble Park/Maddox Branch, and Clark Place were removed, and the former trolley right-of-way was acquired by the District Department of Transportation ("the District") for construction of the District of Columbia Water and Sewer Authority's (DC Water) Crosstown Water Main. A proposed bike trail to be built in conjunction with the water main project was abandoned due to community resistance. Since then, the Palisades and Foxhall neighborhoods have used the former trolley right-of-way as an informal walking trail that runs behind

private homes, the Palisades Recreation Center, and the Georgetown Reservoir between Galena Place and Foxhall Road.

The only remaining trolley bridge in the District on the Glen Echo line, the Foundry Branch Trolley Trestle Bridge, is a contributing resource in the historic Glover-Archbold Park. The bridge was acquired by the Washington Metropolitan Area Transit Authority (WMATA) in 1997 from D.C. Transit, and in 2003 WMATA fenced off ends of the bridge to deter trespassers. In 2008 with the bridge's condition deteriorating and no foreseeable transit use available, WMATA began looking for potential owners of the bridge. A 2014 structural analysis confirmed that the trestle portion of the bridge is in poor condition, and in 2016, WMATA installed fences to restrict access under the bridge due to safety concerns.

In 2018, concerns by historic preservation and other groups about the potential demolition of the bridge led the District to undertake the *Palisades Trolley Trail and Foundry Branch Trolley Trestle Bridge Feasibility Study* (the Study) to determine whether the Foundry Branch Trolley Trestle Bridge could be repurposed into a bicycle-pedestrian bridge as part of a connected multi-use trail between Galena Place in the Palisades and St. Mary's Place in Georgetown. At the beginning of the Study, WMATA applied for a raze permit to demolish the bridge, which was denied by DC's Historic Preservation Review Board (HPRB). The Mayor's Agent issued a continuance on the subsequent appeal by WMATA, thus allowing the District to finish the Study and have the findings made part of the demolition hearing.

2.2. Study Purpose

The purpose of the Study is to evaluate the issues and challenges in developing a multi-use trail for people of all ages and abilities to walk and bike on the former Glen Echo Trolley line, commonly referred to as the Palisades Trolley Trail (PTT). The Study helps identify the transportation utility of the PTT and

identifies potential environmental and community concerns in the process, along with likely environmental actions by various agencies.

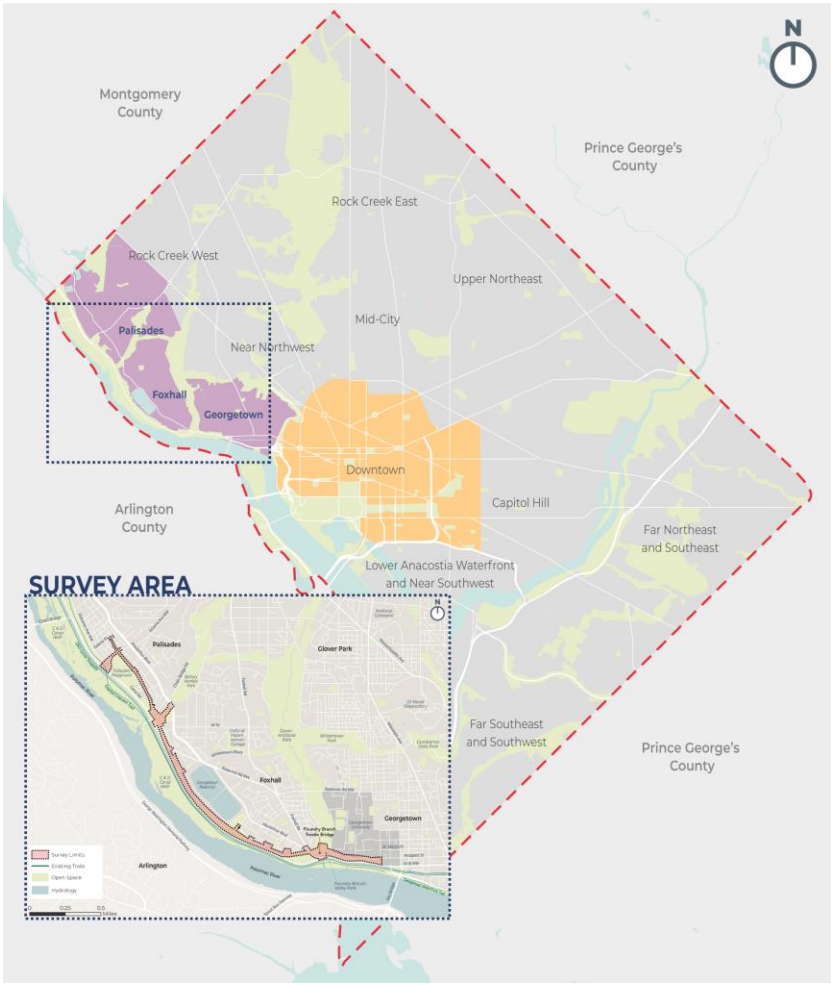
The project team completed the following tasks to aid in the determination of the feasibility of the PTT:

- Topographic and utility surveys of the trail study area
- Analysis of existing conditions of the trail context area
- Structural assessment of existing Foundry Branch Trestle Bridge, including a 3D laser scan
- A desktop research of relevant existing environmental resources in the trail study area
- Stakeholder engagement and public outreach
- Identification of opportunities and constraints of constructing the PTT
- Concept-level design plans for the trail and associated bridges
- Cost estimates and implementation actions for construction of the PTT

2.3. Neighborhood Context

The study area includes parts of the Palisades, Foxhall, and Georgetown neighborhoods, all of which lie on the north shore of the Potomac River in the Northwest quadrant of the District as shown in Figure 1. (All references to streets in this document assume a suffix unless otherwise noted.)

Figure 1 | Neighborhood Context



Palisades and Foxhall are predominantly low-density single-family residential neighborhoods with some neighborhood commercial uses along MacArthur Boulevard. They have numerous cultural and

recreational assets, including Glover-Archbold Park, Battery Kemble Park, and C&O Canal Park. Georgetown is southeast of Palisades and Foxhall and is a commercial and entertainment district home to the main campus of Georgetown University, the M Street commercial corridor, and the Georgetown Historic District. The West End, Foggy Bottom, and Downtown neighborhoods located east of Georgetown contain employment and institutional uses with some residential closer to Georgetown.

Residents of the Palisades and Foxhall neighborhoods predominantly take trips in single-occupancy vehicles according to the Census, and there are limited non-vehicular connections into Georgetown and Downtown. Battery Kemble Park and Glover-Archbold Park create natural barriers between the neighborhoods and steep topography south and east of Canal Road limits accessibility to the adjacent Capital Crescent Trail (CCT) and C&O Canal Towpath (the Towpath).

2.4. Review of Other Planning Documents

2.4.1. MoveDC

The 2014 *moveDC* plan is the 25-year vision plan for the District's transportation system that guides investment as the District grows. Its vision is to develop a transportation system that makes the District more livable, sustainable, prosperous, and attractive by offering everyone visiting, working in, and living in the District exceptional travel choices. *MoveDC* aims to achieve this vision by expanding transportation choices and improving the reliability of all transportation modes. Among other expansions, the plan adds 200 miles of on-street bicycle facilities or trails, as well as sidewalks on at least one side of every street, by 2040. The Palisades Trolley Trail is recommended as a proposed facility in the *moveDC* plan, as shown in Figure 2. The District has quadrupled commute trips by bicycle from 2000 to 2012 by building a citywide network of on-street bicycle lanes, signed routes, and other bicycle facilities. The plan identifies bridge improvements, barrier and conflict reduction, expansion of

investments beyond downtown, and improved safety as opportunities for improving the District's cycling network.

Figure 2 | *MoveDC* Recommendations

2.4.2. Vision Zero

The 2015 *Vision Zero Action Plan* aims to eliminate all fatalities and serious injuries in the Washington, D.C. transportation system by the year 2024. The plan focuses on the themes of Creating Safe Streets, Protecting Vulnerable Users, Preventing Dangerous Driving, and Being Transparent and Responsive. Among the objectives of Protecting Vulnerable Users is to install or upgrade 20 miles of on-street bicycle facilities and to prioritize improvements using injury and crash data. Of these 20 miles, five of the installed miles must be separated/protected bikeways.

2.4.3. Sustainable DC

The 2013 *Sustainable DC Plan* is a 20-year plan for sustainable growth through the year 2032. The plan includes goals and targets in 11 areas: Jobs & The Economy, Health & Wellness, Equity & Diversity, Climate & Environment, Built Environment, Energy, Food, Nature, Transportation, Waste, and Water. Among the Transportation goals is an expansion of safe and secure biking and pedestrian infrastructure, with the target of increasing walking and biking rates to 25% of commute trips.

2.4.4. Reconstruction and Rehabilitation of the Pedestrian Bridge and Connecting Trail at Arizona Avenue

The purpose of the District -led *Reconstruction and Rehabilitation of the Pedestrian Bridge and Connecting Trail at Arizona Avenue* is to rehabilitate/reconstruct a 110 feet long pedestrian bridge over Arizona Avenue and to construct improvements to a portion of the existing Palisades Trolley Trail. Key concerns of community leaders were to replace the existing pedestrian bridge, minimize trail grade changes, minimize adjoining property impacts, improve the trail to an all-weather surface, and provide a natural-looking trail. The existing pedestrian bridge is 3'-4" below the AASHTO/DDOT Standard Minimum Vertical Clearance and is in fair structural condition.

The project is currently in the 30% design phase. The trail portion of the Arizona Avenue project scope will advance the design and construction of the northern end of the Palisades Trolley Trail, while the area south of the Palisades Recreation Center to Georgetown University is under the purview of the *Palisades Trolley Trail and Foundry Trestle Feasibility Study*. Figure 3 shows the location of the Arizona Avenue bridge and the limits of the bridge project, including the trail portion of the scope.

Figure 3 | Arizona Avenue Bridge Location

2.4.5. Rock Creek Far West Livability Study

The District-led *Rock Creek Far West (RCFW) Livability Study* sought to improve transportation safety in the study area, which included all of the District's Ward 3 west of Massachusetts Avenue, including most of the Palisades Trolley Trail study area except the area south of Georgetown University.

The *RCFW Livability Study* found that study area neighborhoods are challenged by transportation safety problems and quality of life issues caused by aggressive driving, challenging intersection geometry, outdated infrastructure, and multimodal conflicts. The study, performed from January to September 2019, identified opportunities for safer travel for residents of and visitors to the study area, and improvements to the transportation network, regardless of how a person travels.

According to the study, the study area generally has low pedestrian friendliness scores due to the lack of sidewalk availability and low-density development. The area also has relatively few bicycle facilities compared to other areas in the District.

In particular, comments received from the online Wikimap, and at public workshops identified a desire for comfortable connections for people walking and biking between the neighborhoods in the study area and the Capital Crescent Trail, along with comfortable facilities for all users along or parallel to MacArthur Boulevard.

2.4.6. DC Water Potomac River Tunnel

The *Potomac River Tunnel* is the next major phase of the DC Clean Rivers Project, proposed by DC Water. The project consists of a large-diameter deep sewer tunnel, diversion facilities, drop shafts and support structures to capture flows from existing combined sewer overflows (CSOs) along the Potomac River and convey them to the Blue Plains Advanced Wastewater Treatment Plan for treatment. The purpose of the

project is to reduce CSOs that worsen the water quality of the Potomac River and the Chesapeake Bay as mandated by the 2005 Federal Consent Decree as amended in January 2016. The tunnel corridor study area lies to the east of the Palisades Trolley Trail study area, with an overlap in the area east of the Foundry Branch Valley Park and south of Georgetown University, where three CSO outfalls are located.

3.0 Stakeholder and Public Involvement

Below is a summary of the stakeholder and public involvement activities undertaken over the duration of the Study. Detailed summaries of public outreach are available in **Appendix 5**.

3.1. Stakeholder Involvement

Throughout the Study, two formal inter-agency meetings were held between the consulting team and stakeholders. The consulting team includes: Kittelson & Associates, Jacobs Engineering Group, AMT, EHT Traceries, and Commun-ET. The stakeholders include: the District, DC Office of Planning, National Park Service (NPS), WMATA, Georgetown University, Georgetown Business Improvement District (Georgetown BID), PEPCO, State Historic Preservation Office (SHPO), and DC Water.

The first inter-agency meeting occurred on December 19, 2018, at the District Department of Transportation, Washington D.C. 26 representatives from the agencies attended the meeting. The meeting highlights included introductions, project overview, scope and schedule, stakeholder coordination, next steps, and an open discussion.

The second inter-agency meeting occurred on July 15, 2019, at the District's offices. Based on comments from the first stakeholder meeting; additional agencies were invited to the second meeting – National Planning Commission (NCPC), Commission of Fine Arts (CFA), Federal Highway Administration (FHWA), and Department of Energy & Environment (DOEE). A total of 37 representatives from the invited stakeholder agencies attended the meeting. The meeting highlights included introductions, project overview, work completed to date, the Foundry Branch Trolley Trestle Bridge inspection and assessment, review of trail and bridge concept designs, and next steps. Discussion during this meeting focused on two topics, the Foundry Branch Trolley Trestle Bridge and Trail and Bridge Concept Design.

After the 2nd inter-agency meeting, the project team received comments on the proposed bridge and trail concept designs from NPS, DC Water, WMATA, and SHPO. These comments were addressed, and the concept designs were revised accordingly.

A summary of key issues identified by the stakeholders is shown in Table 1.

Table 1 | Stakeholder Key Issues

Stakeholder	Key Issues
DOEE	DOEE shared plans to construct Stormwater BMPS in the trolley corridor near the Palisades Rec Center.
DC Water	DC Water shared design criteria for construction near the 78" watermain and provided high-level review of concept designs.
Georgetown Business Improvement District	Georgetown BID is looking for ways to bring more visitors to Georgetown without adding vehicles to the street network and this project would contribute to that initiative.
Georgetown University	Georgetown University expressed concerns with trail alignments that impact University property, bridge over Fowler Rd (which is the primary vehicle entrance to the University), and/or terminate at Prospect Street (which is heavily utilized by cars, buses, trucks, and pedestrians).
National Park Service	National Park Service supports options that preserved the Foundry Branch Trolley Trestle Bridge and supports trail alignments on NPS property that meet that goal. NPS is also supportive of the connection to the CCT at Arizona Avenue.
SHPO	SHPO is interested in the preservation the Foundry Branch Trolley Trestle Bridge and supports the adaptive re-use of the bridge as a multi-use trail. SHPO preferred a bridge rehabilitation option that replaces the approach trestles with new structures that match the existing while the existing truss is repaired.
WMATA	WMATA has no plans or ability to use the bridge for transit and they are looking to manage the liability of the Foundry Branch Trolley Trestle Bridge as a safety hazard.

3.2. Public Involvement

3.2.1. Project Website

A project website was created to provide information about the project and public meetings to the public. The site is a page on the District's main website. The text of the site states the purpose of the project and shows a detailed map of the study area. There are links to notices for the public meetings, as well as attachments to the public meeting presentations, results of the on-line survey, and a summary report from the first public meeting. Finally, the website contains contact information for the project manager at the District.

3.2.2. Public Meetings

Throughout this study, two public meetings were held to obtain feedback from community members. Outreach and notifications for both public meetings were sent out through the project website, social media, area neighborhood council (ANC) updates, civic associations, and community listserves. Project fact sheets were also provided with notification of the public meetings to Wards 2 and Wards 3. A presentation was provided to ANC 3D, and information regarding the public meeting notification and project description was provided to ANC 2E. Finally, notifications were also sent to local stakeholders for distribution to the public.

Public Meeting 1

The first public meeting was held on March 7, 2019, from 6:30 PM to 8:00 PM at the Palisades Neighborhood Library in the Large Meeting Room, 2nd Floor, and included representatives from the District and the project team. The purpose of the first public meeting was to present to the public the scope and purpose of the study, show current conditions and bicycle and pedestrian access issues, show

potential connections to key destinations and trails, and gather feedback from the public. The public meeting was an open-house style format with information boards and interactive activities around the room and a 15-minute presentation from the Project Manager. There were on-going questions and answers by members of the project team, District staff, and the attendees throughout the entire meeting.

A registration table was set up at the entrance of the meeting room, with sign-in sheets for attendees. There were 66 total attendees with 3 elected officials and the majority of residents residing in Ward 3.

Public comments were recorded through four different methods:

- Public Comments captured at the Information Boards
- Public Comments Received through Title VI data
- A corridor map was presented, and attendees were invited to write their comments though sticky notes and post them along with the map
- Community Survey Data

A summary of comments made by the public are summarized below:

- Concerns about bicycle and pedestrian safety at the Foxhall Road/MacArthur Boulevard intersection.
- Concerns about high-speed bicycle traffic on the trail in a neighborhood where kids play on the trail. This is an issue on the nearby Capital Crescent Trail.
- Concerns about additional traffic, noise, lighting, and garbage on the trail if it is converted to a multi-use facility.
- Concerns about the cost of the three new bridges and the rehabilitation of the Foundry Branch Trolley Trestle Bridge.
- Desire to keep the trail natural and unpaved. There are concerns that the Reconstruction of the Pedestrian Bridge and Connecting Trail at Arizona Avenue will result in paving a large portion of the trail.
- Desire to pave the trail to make the trail a multi-use facility.
- Concerns about drainage on the trail. Drainage is already an existing issue.

Public Meeting 2

The second public meeting was held on July 23, 2019, from 6:30 PM to 8:00 PM at St. John's Episcopal Church in Georgetown and included representatives from the District and the project team. The purpose of the second public meeting was to inform and gather input from the public on the proposed project recommendations. The format of the meeting was structured into Information Stations. Upon entering the meeting room, the public visited Information Station #1 to learn about the project back and public input summary. After visiting Information Station #1, attendees had the opportunity to visit Information Stations #2-4, where key information topics were discussed in detail in 15-minute intervals. Then, attendees visited Information Station #5 highlighting the project's next steps and obtained updates on the Reconstruction of the Pedestrian Bridge and Connecting Trail at Arizona Avenue project from team members. At each station, the public provided input on the recommendations and options, and project team members were available to answer questions.

A registration table was set up at the entrance of the meeting room, with sign-in sheets for attendees. There were 78 total attendees with 6 elected officials and the majority of residents residing in Ward 3.

A summary of comments made by the public are summarized below:

- There was both support for formalizing the trail and opposition to changing it from its current state.
- Most attendees preferred a natural surface trail and were opposed to paving the trail.
- Attendees were strongly in favor of the proposed Arizona Avenue connection to the Capital Crescent Trail.
- Due to the parallel trail adjacent to the proposed Palisades Trolley Trail, some citizens feel as though the trail is redundant.
- There was limited feedback on which design options for the three new bridges are preferred.
- Most attendees favored the rehabilitation of the Foundry Trestle Bridge over demolition; Option 1: Rehabilitate and Replace Existing Bridge was the most popular.

- Many attendees had concerns about the Reconstruction of the Pedestrian Bridge and Connecting Trail at Arizona Avenue project.
- Many attendees had concerns about the costs of the proposed trail.

3.2.3. Online Survey

Public input was also obtained through an online survey. Community members were able to respond to the online survey starting at the first public meeting on March 7, 2019, through April 7, 2019. The survey was posted online at the project website. Participants at the first public meeting were able to respond to the survey during the meeting either on ipads or through physical copies of the survey. The survey collected 499 responses during this time.

Nearly half of the survey respondents say they use the trail for walking and general recreation; 20% do not use the trail at all, and less than 10% use the trail for biking. There is an approximately even proportion of respondents who use the trail daily, weekly, or monthly. With regard to how much time respondents spend on the trail, around 50% spend more than 20 minutes. The most popular access points to the trail are Galena Place, Arizona Avenue, and Chain Bridge Road. All three locations were listed by more than 20% of respondents. Finally, when asked if they would use a multi-use trail for transportation to access the Georgetown commercial district and/or Downtown DC, 65% of respondents said yes or maybe. When asked how important to you is the rehabilitation of the Foundry Branch Trolley Trestle Bridge for bicycle and pedestrian use, more than 35% of respondents think the rehabilitation of the bridge is very important. Conversely, 50% of respondents think the bridge is either somewhat important or not important.

Concerns from residents of each neighborhood based on the online community survey regarding trail use and access, Foundry Branch Trolley Trestle Bridge, and opportunity for multi-use trail are summarized below:

Palisades:

- A desire for the trail to remain in a natural state without lighting and pavement
- Drainage issues that create muddy conditions
- Conflicts between modes, especially high-speed bicycle traffic
- Parking by trail users exacerbating existing street parking pressure by commuters

Foxhall:

- Conflicts between walkers and bikers
- Loss of green space
- Parking by trail users
- Potomac Avenue homes front the green space in the trail right-of-way

Georgetown:

- Bike traffic
- Need for street parking on Prospect Street

A detailed summary of the online summary and the full survey results are available in **Appendix 5.**

3.2.4. Online Comment Map

The third method of collecting public input was through an online public comment Wikimap. The online public comment Wikimap tool was open for comments starting at the first public meeting on March 7, 2019 through April 7, 2019. During that time, 162 comments were recorded.

Comments collected through the online public comment Wikimap are summarized below.

Opportunities and Ideas

- Desired or existing trail access point
- Support for multi-use paved trail facility
- Desired connection

- Proposed bikeshare station
- Safe crossing needed for the proposed multi-use trail

Issues and Concerns

- Maintain the natural state of the trail; opposed to paving
- Lighting/increased traffic concerns
- Parking concerns
- Mode conflicts between pedestrians and bicyclists
- Drainage issues

A detailed summary of the online comment map responses is available in **Appendix 5.**

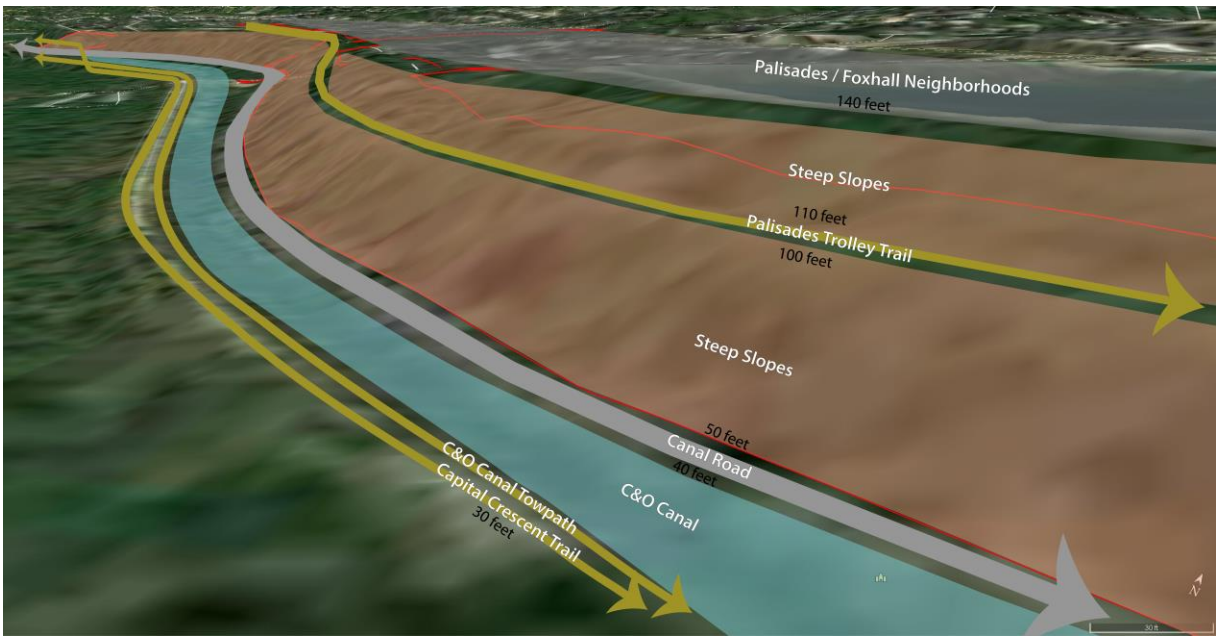
4.0 Existing Conditions

4.1. Current Trail Characteristics

4.1.1. Location and Access

The Palisades Trolley Trail currently exists as an informal trail following the Glen Echo Trolley right-of-way between Galena Place in Palisades at the northern end and Foxhall Road in Foxhall at the southern end. Since Foxhall and Palisades are both located at higher elevations relative to the C&O Canal and Potomac River and as a result, are somewhat isolated from parallel roadways and trail systems, the existing trail serves as a higher elevation connector spine through the neighborhood. The location of the trail relative to the neighborhoods and nearby transportation corridors in shown in Figure 4.

Figure 4 | Relative Elevation of Trail



Today, the trail can be accessed from eight locations, as shown in Figure 5:

- Galena Place
- Arizona Avenue pedestrian bridge
- Edmunds Place (Palisades Playground entrance)
- Chain Bridge Road
- Sherier Place
- Reservoir Road
- Q Street / Potomac Avenue
- Foxhall Road

TRAIL ACCESS POINT AT POTOMAC AVENUE (LEFT); CHAIN BRIDGE ROAD (CENTER); SHERIER PLACE (RIGHT)

East of Foxhall Road, the Foundry Branch Valley Park and Glover-Archbold Park currently act as a barrier between the current trail terminus and the Georgetown neighborhood because of steep grades. The fenced-off Foundry Branch Trestle Bridge is located approximately 400 feet east of the Foxhall Road trail terminus. Since the existing trail corridor ends at Foxhall Road, several alternative routes between Foxhall Road and the Georgetown neighborhood were examined as part of this study (see Section 6.2).

Figure 5 | Existing Trail Location, Gaps, and Access Points

4.1.2. Condition

The former Glen Echo trolley corridor west of Foxhall Road functions as a trail that developed informally over time through repeated use by the surrounding community. It traverses both grassy and wooded areas, and, in some cases, it forms a packed-dirt single-track trail. The corridor surroundings range from wooded areas on both sides to parallel roadways and adjacent homes.

EXISTING TRAIL CORRIDOR CONDITIONS

Many areas along the existing trail have steep grades, including southwest of Battery Kemble Park, south of Reservoir Road, around Clark Place, and west of Foxhall Road. The steep topography also contributes to drainage issues, with some adjacent residents reporting muddy conditions along the informal trail and basement flooding affecting their homes.


STEEP GRADES AND DRAINAGE ISSUES ALONG THE EXISTING TRAIL CORRIDOR

Continuous travel between Galena Place and Foxhall Road is impeded by gaps in the trail at any of the three locations where historic trolley bridges were removed in the 1980s for the construction of DC Water's Crosstown Water Main:

- Maddox Branch
- Drainage outfall/ravine adjacent to Reservoir Road
- Clark Place

No signs of the prior bridges exist today at any of the three locations where trolley bridges were removed and the sites leading up to and crossing these features are relatively clear. Where the bridges have been removed, trail users have formed uneven single-track trails on steep slopes to connect across the gaps. These trails are accessible to only the most intrepid pedestrians and in some cases, extend onto private property.

INFORMAL TRAILS AND TRAIL GAPS WHERE HISTORIC TROLLEY BRIDGES WERE REMOVED

Foundry Branch Trolley Trestle Bridge

The existing trail terminates at Foxhall Road. The survey area east of Foxhall Road includes Glover-Archbold Park/Foundry Branch Valley Park, the southern entrance to Georgetown University from Fowler Drive at Canal Road, and other National Park Service (NPS) properties. The historic park includes the only remaining trolley bridge in the District from the Glen Echo trolley line, the Foundry Branch Trolley Trestle Bridge, which is a contributing resource to the park. The area under the bridge has been closed to passage since 2016. The fencing has obstructed access to NPS trails in the southern part of Glover-Archbold Park.

The Foundry Branch Trestle Inspection Report provides documentation of the condition of the bridge at the time of the 3D laser scan and visual inspection completed in Spring 2019. It also includes details of the bridge geometry and observed section sizes. The following bullets summarize the findings of the inspection:

- The approach trestles are in very poor condition. There is significant deterioration of the primary structural support members with complete section loss at some locations. Secondary members, that provide for alternate load paths, are also in an advanced state of deterioration with many having corroded through and are hanging loose from the bridge.
- Bridge footings are experiencing deterioration in the form of concrete spalls and many have full width horizontal cracks. Due to the lack of regular maintenance, erosion of the slopes at either side of the bridge has led to the undercutting of some of the footings. On the west side, the footings at the bottom of the slope are entirely buried with debris and not visible.
- The suspended truss span is generally in better condition with minor rusting of the chord and web members. A large part of the original paint system is still intact. There is some corrosion of the gusset connection plates and horizontal members where water has not been able to drain.

Certain parts of the structure were not able to be inspected due to the significant overgrowth of vegetation that covers parts of the bridge. Physical access onto the remaining trolley rail ties that cover the top of the bridge was also not feasible due to safety concerns. See **Appendix 2: Foundry Branch Trolley Trestle Bridge Feasibility Report** for detailed information about the current condition of the bridge.

CURRENT CONDITIONS OF THE FOUNDRY BRANCH TROLLEY TRESTLE BRIDGE

4.1.3. Trail Crossings

Figure 6 shows two types of trail crossings that exist along the corridor: 1) grade-separated crossings (bridges) and 2) at-grade street crossings. One bridge crossing is in use today, while four are missing or require rehabilitation:

- Foundry Branch Trestle Bridge – existing; requires rehabilitation
- Clark Place – requires a new bridge
- Reservoir Road – requires a new bridge across steep grades south of Reservoir Road
- Maddox Branch – requires a new bridge
- Arizona Avenue – existing; the District is reconstructing

At Clark Place, Reservoir Road, and Maddox Branch, trolley bridges were removed in the 1980s for the construction of DC Water's Crosstown Water Main.

Figure 6 | Trail Crossings

Three street crossings of the trail are in use today. None of the crossings have marked crosswalks, wayfinding, or other pedestrian and bicycle crossing facilities:

FOXHALL ROAD AT MACARTHUR BOULEVARD

- Foxhall Road at MacArthur Boulevard – This intersection is located slightly north of the current eastern terminus of the trail at Foxhall Road. It is a high-volume, complex intersection with skewed approaches that requires trail users to detour north from the current eastern terminus of the trail in order to cross Foxhall Road and access Foundry Branch Park/Glover Archbold Park. The Rock Creek Far West Livability Study recommended the intersection be further studied as part of a multi-intersection corridor section from the intersection of MacArthur Boulevard/Reservoir Road to the west, to the intersection of Foxhall Road/Reservoir Road and ending at Foxhall Road/MacArthur Boulevard to the east.
- Reservoir Road – The existing trail approaches Reservoir Road where the road curves away from Canal Road. There is no sidewalk on the western approach. Due to steep grades on the south side of Reservoir Road, eastbound trail users must cross Reservoir Road, travel eastbound on Reservoir Road, which has a sidewalk on the south side and access the continuation of the existing trail approximately 200 feet to the east.

- Chain Bridge Road – The existing trail crosses Chain Bridge Road at an angle. Chain Bridge Road is a low-volume residential road. On the north side of the crossing, a “DO NOT DRIVE ON TRAIL” sign is posted.

4.1.4. Ownership

West of Foxhall Road, the existing trail runs along the trolley right-of-way owned by the District of Columbia and along federally owned (NPS) land approaching and next to the Georgetown Reservoir. East of Foxhall Road, NPS owns most of the land; WMATA owns a narrow swath of land from west of the Foundry Branch Trestle Bridge to the east side of the Georgetown University Access Driveway/Fowler Road. Georgetown University owns a portion of the land to the east of its access driveway; they have an easement on WMATA’s property for the driveway itself. The remaining property in the study area is owned by NPS and is surrounded by federally owned land to the west and by Georgetown University-owned land to the east. District of Columbia also owns several narrow parcels north of Canal Road on either side of the Georgetown access driveway.

Figure 7 | Land Ownership Along Trail Corridor

4.1.5. Trail Use

The existing trail is primarily used by residents of the Palisades and Foxhall neighborhoods. Typical activities along the trail include walking/hiking, dog walking, running, mountain biking, and bird

watching. Some adjacent residents have gates that open directly onto the trail, providing easy access to the facility.

4.2. Street Network

The project study area runs along the proposed trail corridor along the north side of the Chesapeake and Ohio (C&O) Canal. The trail corridor is located between two principal arterials that are approximately parallel to each other: MacArthur Boulevard to the north of the trail corridor and Canal Road to the south of the trail corridor. Canal Road transitions to a freeway functional classification north of the intersection with Arizona Avenue.

The rest of the street network in the project study area is made up of local roads, except for Foxhall Road (minor arterial) north of the intersection with MacArthur Boulevard, Reservoir Road (collector), and Arizona Avenue (principal arterial).

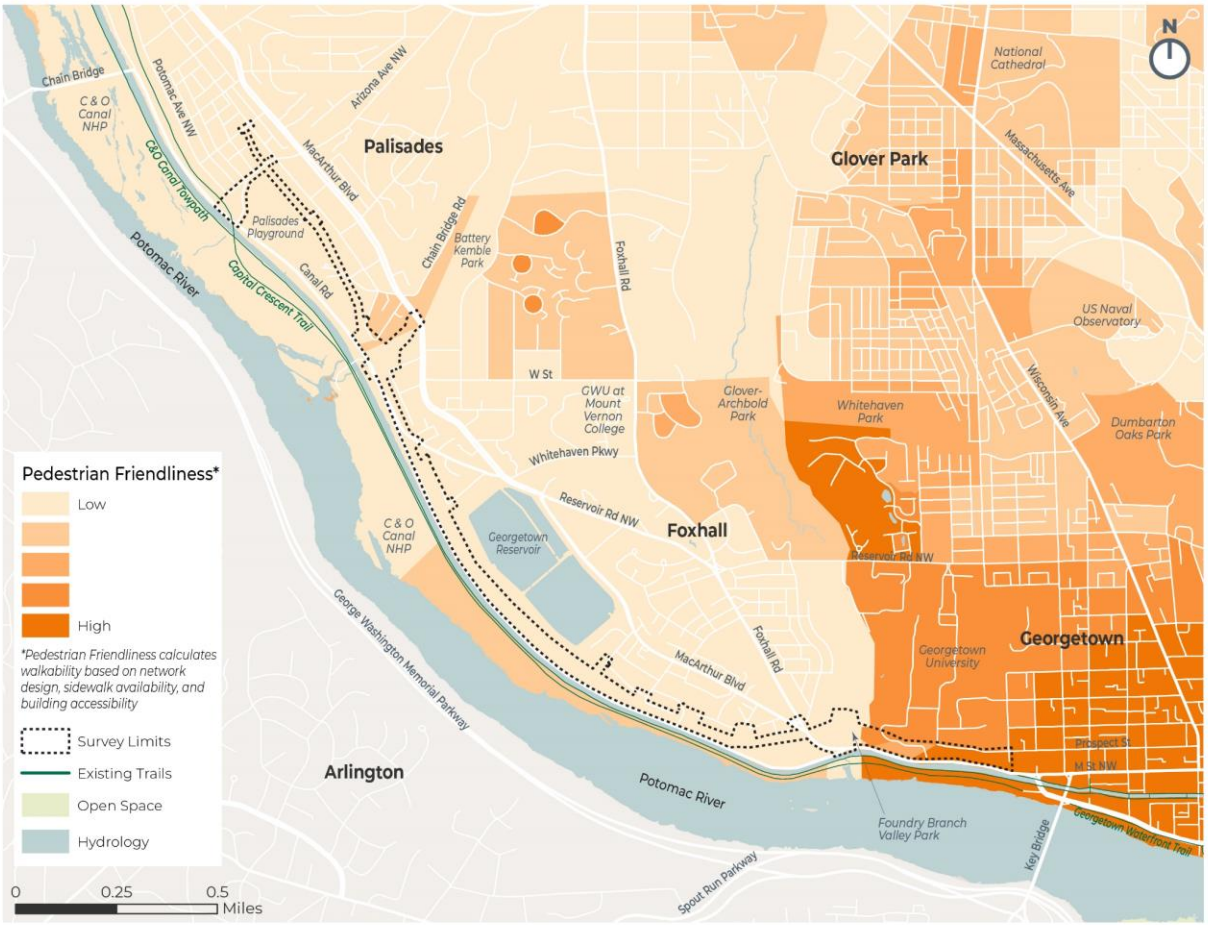
4.3. Bicycle & Pedestrian Facilities

Palisades has less complete sidewalk coverage compared to other areas of the District. There are no pedestrian facilities along Canal Road, Chain Bridge Road, parts of Arizona Avenue, and some residential streets. This lack of sidewalks creates a disconnected pedestrian network that makes it difficult to access all areas of the neighborhoods on foot. In some areas, steep slopes create an additional accessibility issue that cannot be resolved by improved sidewalks. Though there are sidewalks along both sides of MacArthur Boulevard, crossing opportunities are limited or are challenging due to lack of pedestrian signals. The pedestrian friendliness index in Figure 8 shows a stark contrast between walkability in the Georgetown area and the Palisades and Foxhall areas.

Two existing trails run parallel to the proposed Palisades Trolley Trail. The C&O Canal Towpath is an unpaved trail on the south side of the C&O Canal and is owned by the NPS. The Capital Crescent Trail is a rail-trail built along the former Georgetown Branch of the B&O Railroad. It parallels the C&O Canal Towpath on the south side of the canal from Georgetown to the Palisades Playground, where it crosses to the north side of the canal, across Canal Road on the Arizona Avenue Bridge. Despite running parallel to the PTT, these lower elevation trails are significantly separated from the PTT due to differences in topography. The typical elevation difference between the lower trails along the C&O Canal and the PTT is 50', and in some areas, the difference is as high as 90'. The Capital Crescent Trail is owned by Montgomery County in Maryland and by the NPS within the District of Columbia. The Georgetown Waterfront Trail is located to the east of the study area between 34th Street and 31st Street.

The only formal access point to the Capital Crescent Trail in the Palisades area is located at the north end of the neighborhood at Potomac Avenue and Norton Street, which is one mile from the heart of the Palisades neighborhood. The next access point is 1.7 miles away at the Abner Cloud House in Foxhall. This access point is only accessible from Canal Road, a narrow, high-speed roadway with no shoulders, sidewalks, or bicycle facilities. Further, this access is disconnected from the Foxhall neighborhood due to steep topography.

Figure 8 | Pedestrian Friendliness Index



THE PEDESTRIAN FRIENDLINESS INDEX CHARACTERIZES THE WALKABILITY OF NEIGHBORHOODS BASED ON STREET NETWORK CONNECTIVITY, SIDEWALK AVAILABILITY, AND BUILDING ACCESSIBILITY. THE INDEX ASSIGN CENSUS BLOCKS A SCORE INDICATING HOW "WALKABLE" THEY ARE RELATIVE TO OTHER NEIGHBORHOODS IN THE DISTRICT.

There is an informal access point to the Capital Crescent Trail at the all-way stop controlled intersection of Potomac Avenue Arizona Avenue. A simple crosswalk (parallel lines with no ladder striping) is striped from the corner of Potomac Avenue and Arizona Avenue . This leads toa steep and narrow hiking trail that connects to the Capital Crescent Trail and includes steps in some areas. . The community has voiced a desire for a more formal trail connection in this area adjacent to Arizona Avenue.

INFORMAL TRAIL ACCESS TO THE CAPITAL CRESCENT TRAIL AT POTOMAC AVENUE

For pedestrians and bicyclists, access to the C&O Canal Towpath is limited because of its location on the south side of the canal. The closest access point is at the Abner Cloud House where the Capital Crescent Trail access point is also located. The next access point is 0.95 miles to the north from Chain Bridge, which connects arterial roadways to the Clara Barton Parkway. Both trails have access points in the Georgetown area at the Capital Crescent Trail trailhead west of the Francis Scott Key Bridge; the C&O Canal Towpath access from this trailhead requires climbing a narrow set of stairs. The C&O Canal Towpath can also be accessed from a pedestrian bridge to Cady's Alley south of M Street.

Other than the Capital Crescent Trail, there are only two dedicated bicycle facilities near the study area. Both are 5-foot bike lanes running north-south on the one-way couplet of 34th Street and on 33rd Street

Three Capital Bikeshare stations are within a quarter-mile of the study area: two in the Georgetown neighborhood and one along MacArthur Boulevard north of the Georgetown Reservoir. A Level of Traffic Stress (LTS) analysis, which measures roadway design and operating characteristics to assess comfort for people biking, shows that Arizona Avenue, Canal Road, MacArthur Boulevard, Reservoir Road, and Foxhall Road act as high-stress barriers (LTS 3 and 4) to bicycle travel. These barriers may discourage bicycle trips to or from the Palisades area or may cause bicyclists to use circuitous routes along low-stress residential streets, thus reducing the convenience of bicycle travel.

Figure 9 | Existing Bicycle Network

4.4. Safety

According to data from 2014 to 2019, clusters of crashes involving motor vehicles and people walking and/or biking exist at the following locations:

- Arizona Avenue north of MacArthur Boulevard
- Canal Road near the entrance to the Abner Cloud House parking lot and a mid-block crosswalk
- The commercial area along MacArthur Boulevard near the U Street intersection
- The approaches to the skewed intersection of Reservoir Road and MacArthur Boulevard
- The skewed intersection of MacArthur Boulevard and Foxhall Road

Among major arterials that run parallel to the study corridor, crashes involving people walking or biking were most common on MacArthur Boulevard. Several crashes involving people walking or biking also occurred on arterials and collectors that intersect the study area, including Arizona Avenue, Reservoir Road, and the Foxhall Road approach toward MacArthur Boulevard. Along these major corridors, crashes involving people walking or biking have had much higher injury rates than crashes involving only motor vehicles, based on crash data from 2014 to 2019, as shown in Table 2. Every recorded crash involving a pedestrian resulted in injury, and 70% of crashes involving a bicyclist resulted in injury. In contrast, 21% of crashes involving only motor vehicles resulted in injury. No fatal crashes occurred near the project study area.

Table 2 | Crashes Counts and Injury Rates by Mode (2014-2019) near Project Study Area*

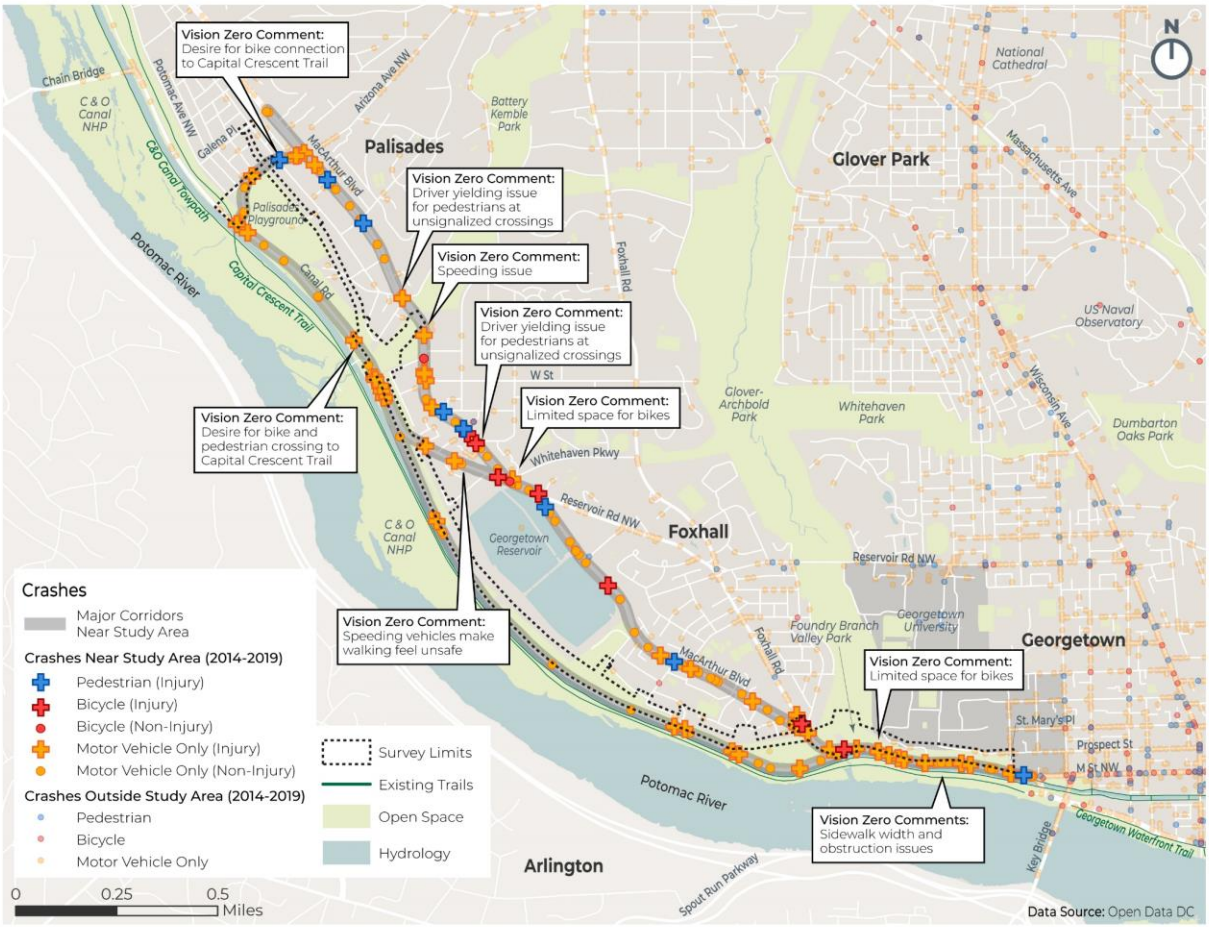
Pedestrian Crashes		Bicycle Crashes		Motor Vehicle Only Crashes	
Number	Percent Injury	Number	Percent Injury	Number	Percent Injury
8	100%	10	70%	423	21%

***Includes crashes within 50 feet of: Canal Road from Whitehurst Freeway to Foxhall Road, Foxhall Road from Canal Road to 200 feet north of MacArthur Boulevard, MacArthur Boulevard from Foxhall Road to Galena Place, Reservoir Road from Canal Road to MacArthur Boulevard, and Arizona Avenue from Canal Road to MacArthur Boulevard**

To help students safely travel to school, the District will assign Safety Technicians (i.e., crossing guards) to public schools at the school's request. School crossing guards are stationed at the intersection of MacArthur Boulevard and Dana Place near Key Elementary School and the intersection of O Street and 35th Street near the Holy Trinity School.

Figure 10 summarizes pedestrian, bicycle, and motor vehicle crash locations by severity (injury and non-injury) and Vision Zero comments from the public on roadways parallel to and intersecting the trail corridor. Vision Zero comments for the study area were collected from a web-based application from 2015-2016 as part of the Mayor Bowser's response to the US Department of Transportation's Mayor's Challenge for Safer People and Safer Streets.

Figure 10 | Crashes (2014-2019) and Vision Zero Summary



4.5. Environmental Resources

A desktop review and field reconnaissance were completed to identify existing resources within the study area including potential wetlands, waterways, forest cover, historic and cultural resources, and other data that appears relevant to the study.

4.5.1. Topography, Geology, and Soils

The study area has steep slopes surrounding the existing PTT, in particular: around Arizona Avenue and the connection to the CCT, Nebraska Avenue to Clark Place, and Foxhall Road to St. Mary's Place. Steep slopes also exist adjacent to the study area, separating the study area from Canal Road and the C&O Canal recreation areas.

A desktop review of existing soils was completed using data from Open Data DC and USDA; no soil samples were taken as part of the Study. Soils found in the study area, based on the desktop review, are listed below. Soil series include Glenelg, very deep, well drained soils; Manor, coarse loamy soils; Neshaminy, deep and very deep, well drained soils formed in materials weathered from diabase and other dark colored basic rocks; and Udorthents, disturbed soils where the upper soil material has been removed, filled or graded. All the soil types are characterized by USDA as well drained with high to moderately high permeability. However, due to steep topography and soil compaction, these normally well drained soils could contribute to the drainage issues present in the study area, and soil samples are needed to verify soil conditions.

- Glenelg loam
- Glenelg variant-urban land complex
- Glenelg-urban land complex
- Manor loam
- Manor-urban land complex
- Neshaminy-urban land complex
- Udorthents
- Udorthents, Loamy
- Urban land-Manor complex

The study area is outside of the storm surge risk area and flood risk zone. Southern portions of the Capital Crescent Trail and C&O Canal Towpath are within or bordered by the storm surge risk area and the 1% annual flood risk zone. Canal Road regularly experiences flooding; during some of these events, the road is closed to vehicular traffic.

Sources: Open Data DC, USDA Official Soil Descriptions (OSDs)

4.5.2. Water Quality and Wetlands

Much of the study area is wooded with no wetlands. However, south of the study area, emergent wetlands and forest/shrub wetlands are present within the C&O Canal National Historical Park. The study area intersects with two inland waters at Maddox Branch and Glover Archbold Park. Three inland waters are located adjacent to the study area, the Georgetown Reservoir, a forty-acre open-air reservoir owned by DC Water, the C&O Canal, and the Potomac River. The Georgetown Reservoir is located adjacent to the study area in C&O Canal Park.

Sources: Open Data DC, USGS National Map

4.5.3. Hazardous Waste Sites

Based on the review of the available data, two underground storage tanks are located adjacent to the study area but do not intersect with the existing trail.

A review of the Environmental Protection Agency (EPA) website of brownfields and land revitalization activities website showed no sites in the study area.

Sources: Open Data DC, EPA Brownfields Website

4.5.4. Threatened and Endangered Species

The study area intersects with the current range of the Northern Long-Eared Bat (Myotis septentrionalis), a threatened species found across most of the eastern and north-central United States. Because there are no critical habitats for this species within the study area, it is not expected that there will be negative impacts to the species.

A review of the National Oceanic and Atmospheric Administration (NOAA) Fisheries Section 7 Mapper of the Greater Atlantic Region showed no resources in the study area.

Sources: U.S. Fish & Wildlife Service Environmental Conservation Online System (ECOS), NOAA Section 7 Mapper

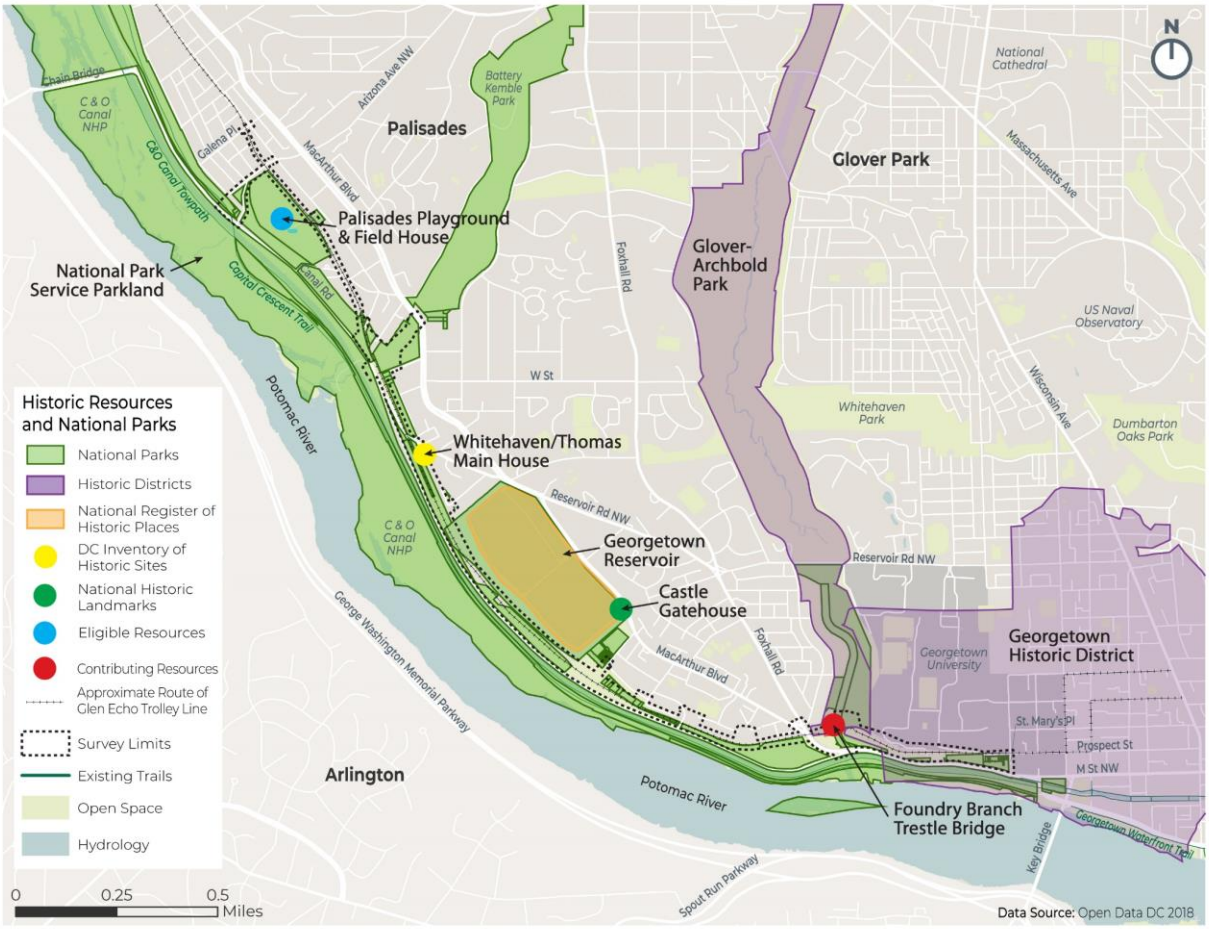
4.5.5. Parkland

There are multiple National Park Service (NPS) parks within the project area. A portion of the Chesapeake & Ohio (C&O) Canal National Park runs directly adjacent to the study area along the eastern shore of the Potomac River. C&O Canal Park amenities in this area include Fletcher's Cover Boat House, the Capital Crescent Trail (CCT), and C&O Canal Towpath. The study area intersects three other NPS Parks: Battery Kemble Park, Glover-Archbold Park, and the Palisades Recreation Center at Sherier Place and Edmunds Place.

4.5.6. Historic and Cultural Resources

There are currently five eligible or listed historic resources within the project area: Palisades Playground and Field House, Whitehaven/Thomas Main House, Georgetown Reservoir (including the Castle Gatehouse), Glover-Archbold Park, and the Georgetown Historic District. A map of the historic resources and parkland is shown on Figure 11.

Figure 11 | Historic Resources and National Parks



Palisades Playground & Fieldhouse

The Palisades Recreation Center was designed and constructed from 1935-1936 by the National Capital Park and Planning Commission. The Center is in Square 1415 on a high bluff northeast of the Potomac River and occupies a thirteen-acre site. It contains a recreation center, a play area, tennis and basketball courts, a baseball diamond, and a soccer field.

Whitehaven-Thomas Main House

The Thomas Main House, also known as the Whitehaven Plantation, was constructed circa 1805 by Thomas Main. The house is located on a single parcel between Reservoir Road and the streetcar line. The house was listed on the DC Inventory of Historic Sites in 1964.

Georgetown Reservoir

The Georgetown Reservoir, managed by the US Army Corps of Engineers, is part of the Washington Aqueduct that treats water from the Potomac River. It was listed in the National Register of Historic Places in 1973. The Castle Gatehouse was individually listed in the National Register of Historic Places in 1975. The Reservoir consists of four main structures that were built between 1862-1901: the influent Gatehouse, the Castle Gatehouse, the Pipe (Meig's) Vault, and the West Shaft gatehouse. The Reservoir covers approximately 65 acres.

Glover-Archbold Park

Glover-Archbold Park is administered by the National Park Service, whose Rock Creek Park staff manage the park. The 222-acre park is approximately 2.5 miles long and 0.5 miles wide. The park includes the Foundry Branch Trestle Bridge, the Foundry Branch creek, and transverse connector trails. Today the park is an urban forest that consists of a community garden and trail system.

Georgetown Historic District

The Georgetown Historic District was established in 1751 when the Maryland Assembly authorized a town on the Potomac River. Historic preservation efforts that began in the 1920s have preserved many of the district's residential and commercial buildings. The Georgetown Historic District was created in 1950, and in 1967 the district was designated a National Historic Landmark, listed in the National Register of Historic Places, and added to the D.C. Inventory of Historic Sites.

See **Appendix 4** for the full Historic Resources report.

4.5.7. Socioeconomic Resources and Community Destinations

The areas within a half-mile of the study area include the following socioeconomic resources and destinations shown in Figure 12:

- Six schools (Holy Trinity School, Georgetown Visitation Preparatory School, Duke Ellington School of the Arts, The Lab School, Our Lady of Victory School, and Key Elementary School)
- Two public recreational facilities (Hardy Recreation Center and Palisades Recreation Center)
- Two farmer's markets (Georgetown University Farmer's Market, Palisades Farmer's Market)
- One library (Palisades Library)
- One non-profit educational facility (Living Classrooms)
- Commercial corridors with containing pharmacies, banks, restaurants, and other everyday destinations (along MacArthur Boulevard from Arizona Avenue to Dana Place, MacArthur Boulevard from V Street to Reservoir Road, and M Street)
- The downtown Georgetown commercial corridor and Business Improvement District (BID) with an estimated 13,000+ jobs
- Georgetown University with 1,670 full and part-time faculty and over 5,000 students

Figure 12 | Socioeconomic Resources and Community Destinations

4.5.8. Noise

The ability to perceive changes to noise levels varies greatly among the individuals. The extent to which the individuals are affected by noise is controlled by several factors including: the duration and frequency of sound, the distance between the sound source and the receptor, the intervening natural and man-made barriers or structures; and the ambient environment. It is anticipated that PTT would generate only short-term construction related noise associated with grading and laying the trail surface, constructing the storm management facilities etc. No appreciable impact on the noise is expected due to the operation of the trail. The majority of the sensitive noise receptors like the residences are currently surrounded by other noise generating resources which would nearly eliminate any noise produced by the trail users.

4.5.9. Visual Resources

Due to the steep topography of the study area, views of the Potomac River are available at multiple locations from the existing PTT. Areas of the trail with the best views are located adjacent to the Georgetown Reservoir and the Foxhall neighborhood around Clark Place. Due to dense vegetation located along the west side of the existing trails, these views may be obstructed in some areas.

4.5.10. Utilities

DC Water's Crosstown Water Main is a 78" water pipe that runs under the entire length of the PTT in District of Columbia right-of-way from north of Galena Place to the south of Clark Place. Record drawings indicate that the water main has a minimum of 3 feet of land cover. Various appurtenances associated with the water main (e.g., air release chambers, blow off chambers) are located along the right-of-way. DC Water requires access to the right-of-way and appurtenances for maintenance and repairs.

DC Water also maintains a group of pipes (24” sanitary, 30” water, and 36” water pipes) that cross underneath MacArthur Boulevard between the Foundry Branch Trolley Trestle Bridge and Foxhall Road. These cast iron pipes are buried less than five feet below ground and are currently covered by a short bridge structure in the section between the Foundry Branch Trolley Trestle Bridge and Foxhall Road. The structural integrity and condition of this bridge structure was not evaluated as a part of this study.

PEPCO overhead wires and electric poles are located along the length of the former trolley right-of-way from north of Galena Place to Foxhall Road. PEPCO requires access to the corridor to cut back vegetation and provide other maintenance activities. Communication lines also run along the poles on this corridor.

5.0 Project Opportunities and Constraints

5.1. Project Opportunities

5.1.1. Safety: Vision Zero, Pro-active, Pre-emptive

Providing dedicated, separated facilities for biking and walking is a pre-emptive safety measure. Real and perceived safety concerns prevent most people from biking for transportation. Due to limited access points to the Capital Crescent Trail and the C&O Canal Towpath and the high-speed nature of Canal Road, MacArthur Boulevard is currently the most accessible corridor connecting the Palisades and Foxhall neighborhoods. . However, MacArthur Boulevard is a multilane road with street parking and no dedicated bike facilities; bicyclists must be confident riding in traffic despite the constant risk of being "doored" by parked vehicles. The perception of safety risks would prevent "interested but concerned" riders from biking on MacArthur Boulevard. Though there are sidewalks along both sides of MacArthur Boulevard, multiple lanes and a wide median create long crossing distances for pedestrians. North of Arizona Avenue, there are long distances between marked pedestrian crossing opportunities. The perceived safety risks of these conditions are borne out in crash data showing:

- Multiple crash clusters along MacArthur Boulevard
- Higher injury rates for bicycle and pedestrian crashes along MacArthur Boulevard, Canal Road, and connecting segments between these parallel roadways including Arizona Avenue and Reservoir Road.

While a relatively small number of pedestrian and bicycle crashes have been recorded on these major corridors compared to auto-only crashes, pedestrian and bicycle crashes are often underreported.

Furthermore, the data does not take into account near misses. A single near miss incident can dissuade someone from walking and biking if they have another transportation option.

The District's Vision Zero initiative aims to reach zero traffic related fatalities and serious injuries by 2024. Meeting both Vision Zero safety goals and MoveDC mode split goals will require simultaneously increasing the number of walking and biking trips while reducing the safety risks of these modes. The Palisades Trolley Trail would give people traveling between Palisades, Foxhall, and Georgetown a safe, separated, and direct multimodal connection that minimizes mixing with vehicular traffic and provides an alternative to MacArthur Boulevard and Canal Road.

5.1.2. Demand

The Palisades Trolley Trail would serve an estimated 800 to 1,100 walking and biking trips per day (AADTT, annual average daily trail trips), which equates to approximately 400 to 500 people utilizing the trail daily (roundtrip). The demand estimate is based on a national model built by the Rails-to-Trails Conservancy. Local inputs for the Palisades area came from the EPA Smart Location Database, which measures neighborhood characteristics including housing density, diversity of land use, employment, and demographics. For pedestrian trips, weather data is included in the Rails-to-Trails Conservancy model to further inform the estimates. The demand estimates have a margin of error, as they are mostly grounded in demographic data and do not account for the existing transportation network; however, they are within a reasonable order of magnitude when compared to trail volumes on other regional trails. As shown in Table 3, volumes recorded on nearby trails vary in what modes are captured, time periods, and data collection year, but generally show volumes ranging from several hundred to several thousand users per day.

Table 3 | User Volumes on Nearby Trails

Trail	Location	User Volume	Mode	Time Period	Year(s)
Capital Crescent Trail[1]	Washington, DC	419	Biking	6 AM – 10 AM	2014
		585		3 PM – 7 PM	
		1,753		8 Hours*	2015
Capital Crescent Trail[2]	Montgomery County, MD	1,137	Biking	Daily	2017
		961	Walking	Daily	2016
Metropolitan Branch Trail[3]	Washington, DC	1,050	Walking + Biking	Daily	2019
Anacostia Riverwalk Trail[2]	Washington, DC (River Terrace)	323	Walking + Biking	Daily	2019
Mount Vernon Trail[4]	Arlington County, VA	4,470	Walking + Biking	Daily	2011
	Alexandria, VA	2,106	Walking + Biking	Daily	2016

* The 8-hour total for CCT 2015 volumes in Washington, DC is reported, because separate AM and PM peak period volumes to be entered incorrectly in the dataset.
[1] Source: Metropolitan Washington Council of Governments (MWCOG) (Counts from a specific day)
[2] Source: MWCOG (Annual daily average of 2 count locations)
[3] Source: DDOT (Daily average from July-November 2019)
[4] Source: VDOT Northern Virginia District Bike and Pedestrian Counts

Based on the number of expected users, expected user mix, and proposed width of the PPT, the Shared Use Path Level of Service (SUPLOS) for biking on the proposed trail is estimated to be LOS B (Table 4). Other regional trails shown in Table 4 currently operate at LOS grades ranging from B to F.[1]

[1] Level of Service (LOS) estimates are based on the FHWA Shared-Use Path Level of Service Calculator (2006) FHWA's Shared-Use Path Level of Service Calculator: A Users Guide (2006) Report for LOS model assumptions.

Table 4 | Shared Use Path LOS (SUPLOS) Estimates for PPT and Existing Regional Trails

Trail	Location	LOS Grade
Palisades Trolley Trail	Washington, DC	B
Capital Crescent Trail	Montgomery County, MD	E
Metropolitan Branch Trail	Washington, DC	E
Anacostia Riverwalk Trail	Washington, DC	B
Mount Vernon Trail	Arlington County, VA	B
Mount Vernon Trail	Alexandria, VA	F

It is expected that some people currently using the Capital Crescent Trail would switch to using the Palisades Trolley Trail, but many trips on the Palisades Trolley Trail would be from new users benefitting from of increased access to and from the Palisades and Foxhall neighborhoods.

5.1.3. Regional and Local Connections

Local Connectivity

The proposed Palisades Trolley Trail and connections to and from the trail could increase walking and biking access to community resources including community facilities, schools, farmer's markets, and commercial areas. It is expected that the PTT will be a lower speed facility compared to the nearby Capital Crescent Trail, providing mostly local trips for residents of all ages in the Palisades and Foxhall neighborhoods.

Destinations adjacent to or within 500 feet of the proposed trail include the M Street commercial area, Georgetown Day School, the River School, and the Palisades Playground. Destinations within a half mile of the trail corridor but which could require more substantial connective facilities and wayfinding include:

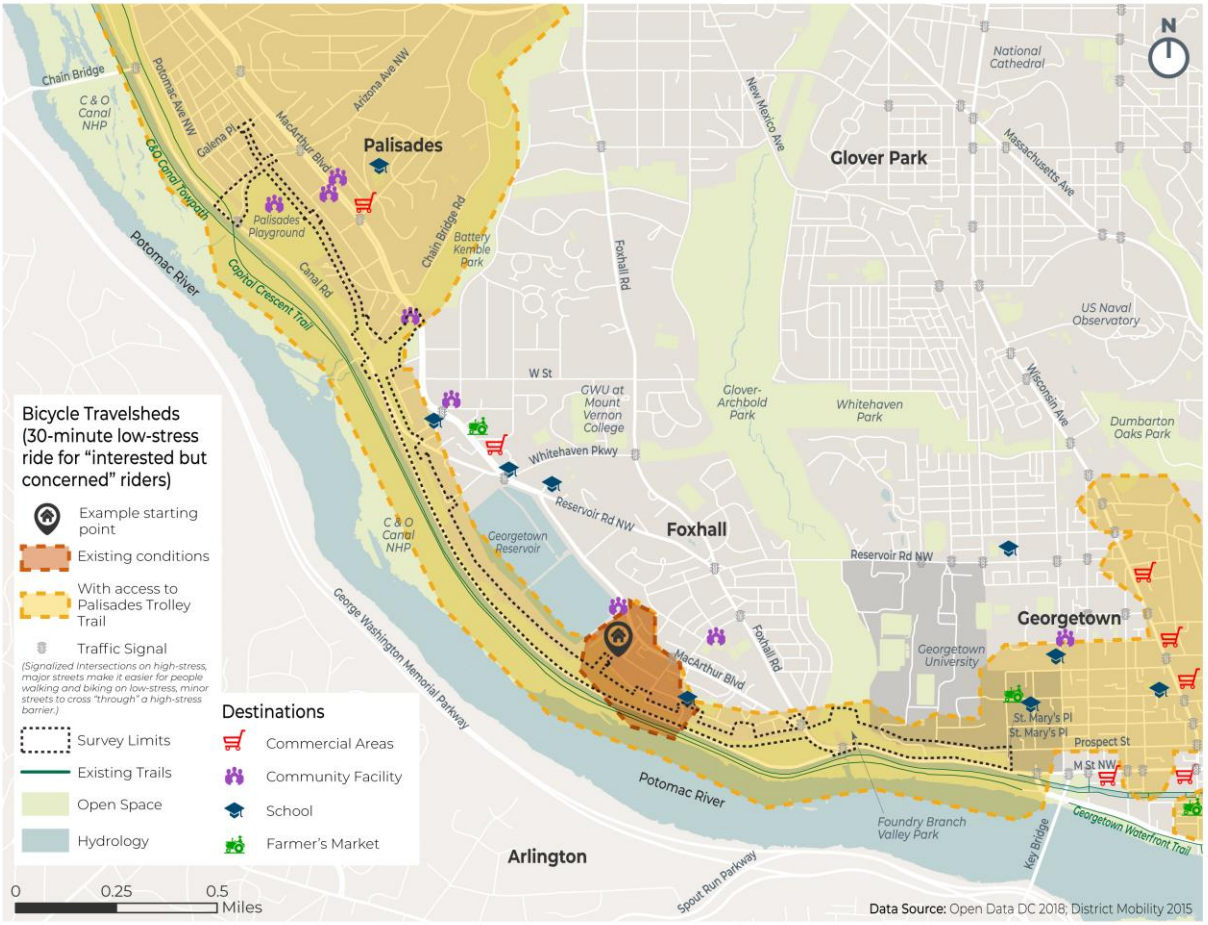
- Six schools (Holy Trinity School, Georgetown Visitation Preparatory School, Duke Ellington School of the Arts, The Lab School, Our Lady of Victory School, and Key Elementary School)

- One public recreational facility (Hardy Recreation Center)
- Two farmer's markets (Georgetown University Farmer's Market, Palisades Farmer's Market)
- One library (Palisades Library)
- One non-profit educational facility (Living Classrooms)
- Commercial corridors with containing pharmacies, banks, restaurants, and other everyday destinations (along MacArthur Boulevard from Arizona Avenue to Dana Pl, MacArthur Boulevard from V Street to Reservoir Road, and M St)

Access to these and additional destinations depends on a person's starting point, acceptable distance or travel time, and level of stress tolerance while biking. Figure 13**Error! Reference source not found.** shows that for a hypothetical "interested but concerned" rider starting in Foxhall south of MacArthur Boulevard, the existing low-stress "bikeshed," or accessible area traveling along low-stress streets, is blocked by high-stress roadways (MacArthur Boulevard and Canal Road) and geographic barriers (Georgetown Reservoir). With a connection to the proposed Palisades Trolley Trail at Q Street/Potomac Avenue, this "bikeshed" would expand to include Palisades and parts of Georgetown within a 30-minute ride. Included within a block of this "bikeshed" are 5 community facilities, 6 schools, 2 farmer's markets, and several commercial corridors. Fewer than 1,000 residents live in the example existing "bikeshed," while the expanded "bikeshed" would allow an additional 20,000 residents to connect to these community facilities, commercial areas, and jobs, based on 2017 Census data.[2]

[2] U.S. Census Bureau American Community Survey (ACS) 2012-2017 Five-Year Estimates (Block Groups)

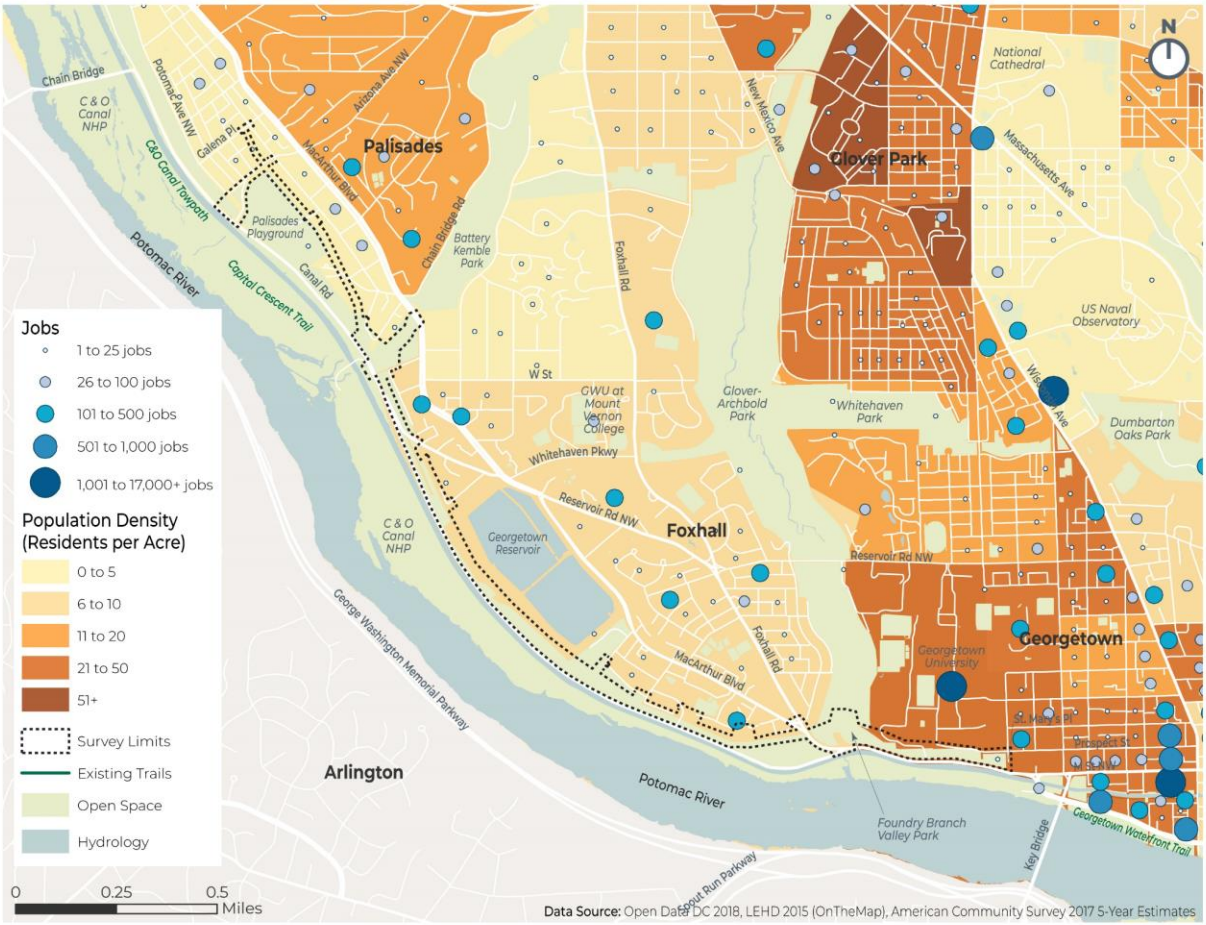
Figure 13 | Accessibility Expansion for 30-Minute Bike Ride on Low Stress Streets Before/After PTT



Georgetown

The PTT would provide a dedicated, traffic-separated facility for walking and biking to the Georgetown neighborhood, which contains over 25,000 jobs at Georgetown University and surrounding businesses, as shown in Figure 14 . Today, it is difficult for Palisades and Foxhall residents to access these jobs by walking or biking due to infrastructure deficiencies. The CCT ends west of Whitehurst Freeway on the south side of the C&O Canal, and the C&O Towpath requires crossing the Potomac River on a narrow pedestrian bridge and climbing stairs to the 34th Street/M Street intersection. M Street is a high stress roadway for biking. By expanding the low-stress network between the Palisades, Foxhall, and Georgetown neighborhoods, the PTT would provide direct access to Georgetown University via Fowler Road at Canal Road and direct access to the Georgetown neighborhood commercial district via either Prospect Street or M Street. Based on the most recent available Census workplace and resident location data from 2017, several hundred residents of Palisades and Foxhall work in the Georgetown neighborhood and could potentially benefit from this direct connection, both to employment and to retail, restaurants, entertainment, and other destinations.

Figure 14 | Job Counts and Residential Density



Capital Crescent Trail

The proposed Palisades Trolley Trail would include a multi-use connection to the Capital Crescent Trail (CCT) from Arizona Avenue, a connection currently only accessible via a narrow, steep walking path. There is another connection to the CCT at Norton Street, but it requires a significant detour for most areas of the Palisades. The proposed Arizona Avenue trail segment would provide a low-stress, ADA-accessible connection from the heart of the Palisades neighborhood to the CCT, a major regional 7-mile trail that runs from downtown Georgetown to Bethesda, Maryland. Since the CCT operates as a higher volume, higher speed facility, this new connection would be attractive to commuters and more advanced bicyclists, while the PTT would operate as a slower speed facility for local access.

The PTT would also provide a connection to the CCT via the existing Foundry Branch Tunnel, which can be accessed via the existing 10' sidewalk on Canal Road south of the Foxhall Road/MacArthur Boulevard intersection. A direct trail connection to the Tunnel from the PTT was investigated east of the Foundry Branch Trolley Trestle Bridge; however, due to the steep grades in this area requiring multiple switchbacks and a slower trail design speed, it was deemed infeasible.

5.1.4. Historic Preservation

The Foundry Trolley Trestle Bridge is the last remaining trolley bridge along the Glen Echo streetcar line and a contributing resource to the Glover-Archbold Park's status has a historic district. The PTT provides an opportunity to preserve the bridge through rehabilitation and adaptive reuse as a multi-use trail. Other efforts to change ownership of the bridge have been unsuccessful, and it is likely that unless ownership of the bridge is transferred to another entity, the bridge will be demolished, and the resource lost.

5.1.5. Stormwater Management/Erosion Mitigation

Drainage issues along the trails are reported to affect existing trail users and nearby residents. The Palisades Trolley Trail provides the following potential opportunities to mitigate erosion and improve drainage:

- Gentler slopes along the trail would reduce water velocity and reduce erosion along the trail and in adjacent areas.
- Sloped areas and canals located along either side of the trail would assist in collecting and conveying water away from the trail. Check dams could be placed along ditches to slow water flow which would also help in reducing area erosion.
- Innovative Stormwater Management – In areas with enough ROW, innovative stormwater management could be used to collect and treat water. Bioswales and rain gardens could provide water treatment and improve aesthetics along the trail. Materials like porous pavement could be used along the trail to increase stormwater infiltration and decrease stormwater runoff.
- Sod and Mats & Blankets – Planted sod along the sides of the trails and mats & blankets placed along the trail slopes would assist in filtering runoff and reducing path and area erosion.

5.2. Project Constraints

5.2.1. Land Ownership

West of Foxhall Road, most of the existing PTT lies on land owned by the District. However, approximately 550 and 800 linear feet of the existing alignment traverses land owned by the Army Corps of Engineers and NPS, respectively. For sections of trail on District land, the available right-of-way typically ranges from 20 feet to 30 feet near private residences to 30 feet or more adjacent to land owned by NPS, WMATA, or the Army Corps of Engineers. Due to the presence of other constraints discussed below, construction easements, as well as permanent right-of-way impacts, are likely required to accommodate a widened trail and clear zone.

East of Foxhall Road, there is less available District-owned right-of-way. The previous alignment of the Palisades Trolley Line, which operated using the Foundry Branch Trestle Bridge and a bridge over the current Georgetown University access driveway, ran across what is now NPS, WMATA, and Georgetown University property. The land directly west of the Foundry Branch Trolley Trestle Bridge is owned by NPS and WMATA, and land east of the bridge is owned by WMATA. The former bridge over the Georgetown University access road was located fully in what is now WMATA property. Any extension of the PTT east of Foxhall Road will require impacts to land owned by one or more of these entities.

5.2.2. Utility Impacts

The PTT currently features manholes, utility covers, and PEPCO utility poles directly adjacent to the unpaved surface of the trail, with the trail alignment often meandering around these utilities. A widened trail will likely need to incorporate these utilities into either the clear zone, or in certain instances, the traveled-way. Where ground-level utilities lie in the trail's traveled-way, they will need to be brought flush with the trail's surface.

UTILITIES ALONG EXISTING TRAIL CORRIDOR

There are also utility impacts to constructing new bridges at Clark Place, Reservoir Road, and Maddox Branch along the PTT. As it has been noted previously, the bridges at these three locations were demolished 30+ years ago for the installation of the 78" diameter Crosstown Water Main that is owned by DC Water. As part of that construction, a 21" sanitary sewer line was also relocated onto the trolley trail alignment on the north side of Maddox Branch. This Water Main is the most significant potential impediment for the construction of these three proposed bridges. An underground utility of that size and critical nature is not easily relocated and to do so from conception to construction could take upwards of a decade. Therefore, relocation is not considered a feasible option. Feasible options to construct the bridges have been developed as part of this study, however further coordination and partnering with the utility owner will be required to take this project from a feasible concept to a constructible project. In addition to the Water Main, there are overhead utilities at each location that would be impacted or potentially impacted by the construction of these three bridges. These are

predominately overhead powerlines, however in the vicinity of the Reservoir Rd. Bridge, there are overhead communication lines along Reservoir Road that would be impacted and would require a relocation. Further coordination with these utilities would be required to determine feasibility of relocation.

The group of cast iron pipes operated by DC Water crossing between the Foundry Branch Trolley Trestle Bridge and Foxhall Road lie less than five feet below ground. Given the sensitivity of these pipes (originally installed in the 1860's) additional coordination with DC Water is needed to ensure a potential trail could be constructed on top of the pipes The trolley line was carried over these pipes on a small bridge structure between the Foundry Branch Trolley Trestle Bridge and Foxhall Road; however, this bridge is unlikely to be reusable for the construction of the trail due to its current condition and alignment. A structural evaluation of this bridge structure was not conducted as a part of this study.

5.2.3. Constructability of Foundry Branch Trolley Trestle Bridge Rehabilitation

Access to the site beneath the Foundry Branch Trolley Trestle bridge would be from Canal Road, westbound lane only. There would need to be traffic control for vehicles to safely enter and leave the site which would need to account for the safe accommodation of pedestrians and bicyclists using the existing sidewalk along Canal Road (24 DCMR § 3315). A construction work area would be established beneath and adjacent to the bridge and a lay down area in the space between Canal Road and the bridge (Figure 15). A permit from NPS would be needed for access and construction rights from WMATA to access their property (and bridge).

Access to the west abutment from Foxhall Road or 44th Street would need to be designed carefully not to conflict with the existing intersection with Macarthur Boulevard and residences on 44th Street and

avoid the existing cast iron water pipes adjacent to Foxhall Road. Access to the east abutment would be from Georgetown University and across WMATA property (Figure 15).

There are multiple utilities in the vicinity of the Foundry Branch bridge which would need to be either relocated or protected in place as described below.

- The 9-foot diameter Crosstown Water Main runs parallel and adjacent to the south of the bridge. Constructed in 1981 it connects with the 78" water main that runs the length of the trolley trail. The rock tunnel runs at a depth of approximately 125-feet below the ground at the center of the bridge. The tunnel should not be impacted by construction, but further coordination would be needed with DC Water.
- Multiple other wet utilities located beneath the bridge would also need to be protected in place during construction:
    - A 9-foot diameter storm drain runs north-south beneath the bridge into which is connected a 42-inch diameter east to west aligned storm drain with a manhole approximately 50-feet north of the bridge at the base of a depression in the ground.
    - A 27-inch diameter sanitary sewer runs approximately 15-feet west of and parallel to the 9-foot diameter storm drain.
    - South of the bridge in the area of land between Canal Road and the bridge are multiple manholes serving 30-inch and 36-inch water mains.
- There are overhead Pepco power lines supported on poles at either end of the bridge and an unknown line that hangs on the north side of the bridge. These would both need to be relocated.

Figure 15 | Access to the Foundry Trolley Trestle Bridge

5.2.4. Constructability of New Bridges

The sites for all 3 proposed bridge locations are highly constrained with only an approximately 30-foot-wide DC public right of way width for the trail. In addition to the narrow width, the sites at all 3 locations have access challenges and multiple underground and overhead utilities that present potential conflicts. In addition, it should be noted that temporary access and construction easements may be required at all 3 locations and there may be the need to clear vegetation and trees adjacent to the trail in order to avoid conflicts with bridge erection. Despite the constraints and potential conflicts that exist at each proposed bridge location, there are multiple feasible options at each location to construct the bridges. All options will require additional study and stakeholder coordination, with some requiring the

relocation of utilities that would conflict with the equipment required to construct the bridges. Constructability at each location is discussed in more detail in the technical memorandum for the 3 new bridges which is included as **Appendix 3** of this feasibility report.

5.2.5. Trail Crossings at High-Stress Roadways

The PTT has at-grade crossings at Reservoir Road and Foxhall Road at MacArthur Boulevard, which are categorized as high level of traffic stress roadways (LTS 3 and 4 roadways). At Reservoir Road, the curvature of the roadway and overgrown landscaping at the northwest corner creates dangerous sightlines for the trail crossing. At Foxhall Road, there is no direct crossing between the current trail terminus east of Foxhall Road and the logical path to the Foundry Branch Trestle Bridge. This would require trail users to detour up to the Foxhall Road/MacArthur Boulevard intersection and make multiple crossing movements at a complex high-volume intersection. This intersection was cited often by the public as dangerous and in need of redesign to increase safety. Both trail crossings will require special treatments and changes to intersection geometry to slow traffic and create safe, visible crossings for trail users.

5.2.6. Complex Conditions East of Foxhall Road

The potential trail area between Foxhall Road and St. Mary's Place is characterized by steep, heavily wooded areas that create challenges to developing an ADA accessible trail with a maximum 5% grade. Glover-Archbold Park has a valley in the middle with 35-40' grade changes on either side; this valley is currently traversed by the Foundry Branch Trolley Trestle Bridge, which is in disrepair and closed to all traffic. South of relatively flat WMATA property east of the bridge, there is a 40-50' hill down to Canal Road. NPS owned property west of Prospect Street climbs 50' before reaching a potential trail terminus at Prospect Street and St. Mary's Place. Any trail development through these areas would require

significant grading with extensive retaining walls and considerable loss to the existing mature trees and vegetation. As no soil information has been collected at this time, there are unknowns related to grading and the constructability of the retaining walls within this area.

Georgetown University is concerned about locating the trail on their property through this area, which includes a portion of Prospect Street that is a private roadway owned by the University. This area also serves as the southern entrance to Georgetown University's campus via an access driveway, Fowler Road, that is used for truck deliveries, bus access to the McDonough Bus Turnaround, and an underground parking lot. Most of Fowler Road is also privately owned, except for a portion in the survey area that is on an easement on WMATA property.

5.2.7. Roadway Context in Georgetown at Trail Terminus

There are two potential locations for the eastern terminus of the PTT in downtown Georgetown: Canal Road/M Street at Whitehurst Freeway and Prospect Street at St. Mary's Place. Both locations are characterized by high-stress roadways with a current level of traffic stress (LTS) of 4 and 3, respectively, and no dedicated bicycle facilities.

M Street is the less desirable trail terminus location of the two with AADT of over 30,000 vehicles. At the Canal Road/M Street at Whitehurst Freeway intersection, M Street has five lanes of traffic and the Whitehurst Freeway has six. The only crosswalk at the intersection is located across M Street and incudes the crossing of a right-turn slip lane.

Prospect Street is the preferred trail terminus location with just over 4,000 AADT. It is a two-lane, two-way road with parallel parking on both sides of the street. Connections can also be made to 37th Street and N Street; the latter is a low stress street that can be used as a connector to downtown Georgetown.

However, this area is directly adjacent to the Georgetown University campus and sees significant foot and vehicular traffic on narrow streets that would be impacted by large numbers of bicyclists.

5.2.8. Community Perspective on the Proposed Trail

There is support for the PTT among Foxhall and Palisades community members who want to see an ADA accessible multimodal connection through the neighborhoods. This group is in favor of either paving the trail or using a crushed stone surface to maintain slower speeds for bicyclists along the trail. They see the trail as an opportunity to create a sustainable non-vehicular transportation connection. Benefits of the trail cited by this group include, staying active, aging in place, and providing an accessible trail for the elderly and disabled who cannot use the trail in its current state.

There is also a significant community contingent who are vigorously opposed to the proposed trail. There is a strong community desire to keep the trail in its natural grassy state and not be paved. This is related to concerns about additional stormwater runoff from impervious surfaces and wanting to maintain the existing plant and animal habitats. The issue of trail surface has been raised at multiple meetings for both the PTT and Reconstruction of the Pedestrian Bridge and Connecting Trail at Arizona Avenue projects, and multiple homes along the trail display “Save Don’t Pave” stickers to mark their opposition to formal paving of the trail. The trail surface is also related to another major concern: high-speed bicycle traffic on the trail. The nearby CCT is often cited as too dangerous for children, the elderly, and recreational bicyclists due to the prevalence of high-speed bicyclists. Many community members feel that creating a paved and connected trail would destroy the low-speed peaceful nature of the existing trail. Additionally, residents with homes abutting the trail are concerned about how a formalized trail would impact their properties from increases in noise, trash, light pollution, crime, and non-resident parking on local streets. Finally, the high cost associated with the multiple bridges required to connect the trail is seen as prohibitive relative to the benefits brought by the trail, particularly since

the CCT and C&O Canal Towpath run parallel to the PTT and are seen as viable alternatives for those seeking a connection into downtown.

5.2.9. Cost

The cost associated with construction and maintenance of the potential Palisades Trolley Trail is a significant constraint. Capital costs to cover multiple new bridges in constrained right-of-way areas will be high, as will be the costs to rehabilitate the Foundry Branch Trestle Bridge both to stabilize the bridge and restore its historic integrity. Costs for the trail east of Foxhall Road will also be high due to the significant amount of earthwork and retaining walls required to traverse the steep topography east of Foxhall Road and around the potential Arizona Avenue Connection to the CCT. Once constructed, the trail will likely have higher maintenance costs compared to other trails due to the isolated nature of the trail and potential trail surfaces; the District does not currently maintain decomposed granite trail facilities.

5.2.10. Environmental Resources

The Study included a desktop environmental review of existing environmental resources. The matrix in Table 5 summarizes the impacts of the potential PTT to those resources. Impacts are categorized as follows:

- No Likely Impact
- Potential Impact
- Known Impact

The matrix is a preliminary assessment only. Further analysis of the impacts to the environmental resources (e.g. historic resources, parkland, utilities, etc.) will be required in subsequent phases of the project to verify the findings and provide additional detail. Alignment alternatives east of Foxhall Road would have varying levels of potential impacts to these resources.

Table 5 | Preliminary Assessment of Impacts to Environmental Resources

Environmental Resource	Impact	Notes
Topography, Geology, and Soils	Potential Impact	Significant regrading required
Water Quality and Wetlands	No Likely Impact	No known impacts to the water quality and wetlands
Hazardous Waste Sites	No Likely Impact	Existing hazardous waste sites are not within the study area
Threatened and Endangered Species	No Likely Impact	No known impact to threatened and endangered species
Parkland	Known Impact	Impacts to multiple NPS properties
Historic & Cultural Resources	Known Impact	Foundry Branch Trestle Bridge; see Appendix 4: Historic Resources Report
Socioeconomic Resources	Known Impact (positive)	Positive impacts related to new bicycle and pedestrian access to community resources
Noise	No Likely Impact	No appreciable increase in the noise levels due to the trail users; see Section 4.5.8 for additional information
Visual Resources	Known Impact (positive)	Enhanced views of Potomac River from trail
Utilities	Known Impact	DC Crosstown Water Main, PEPCO power lines

5.2.11. Environmental Permitting + Coordination

All required agency consultation and environmental permitting associated with existing resources would be completed during future phases of the project. The District has been coordinating with the agencies and other stakeholders for this project; preliminary feedback towards the project was solicited during

the District 's interagency meetings. Further agency consultation would continue, if the project moves to the NEPA phase. Potential environmental agency consultation that may be required for the project are listed below.

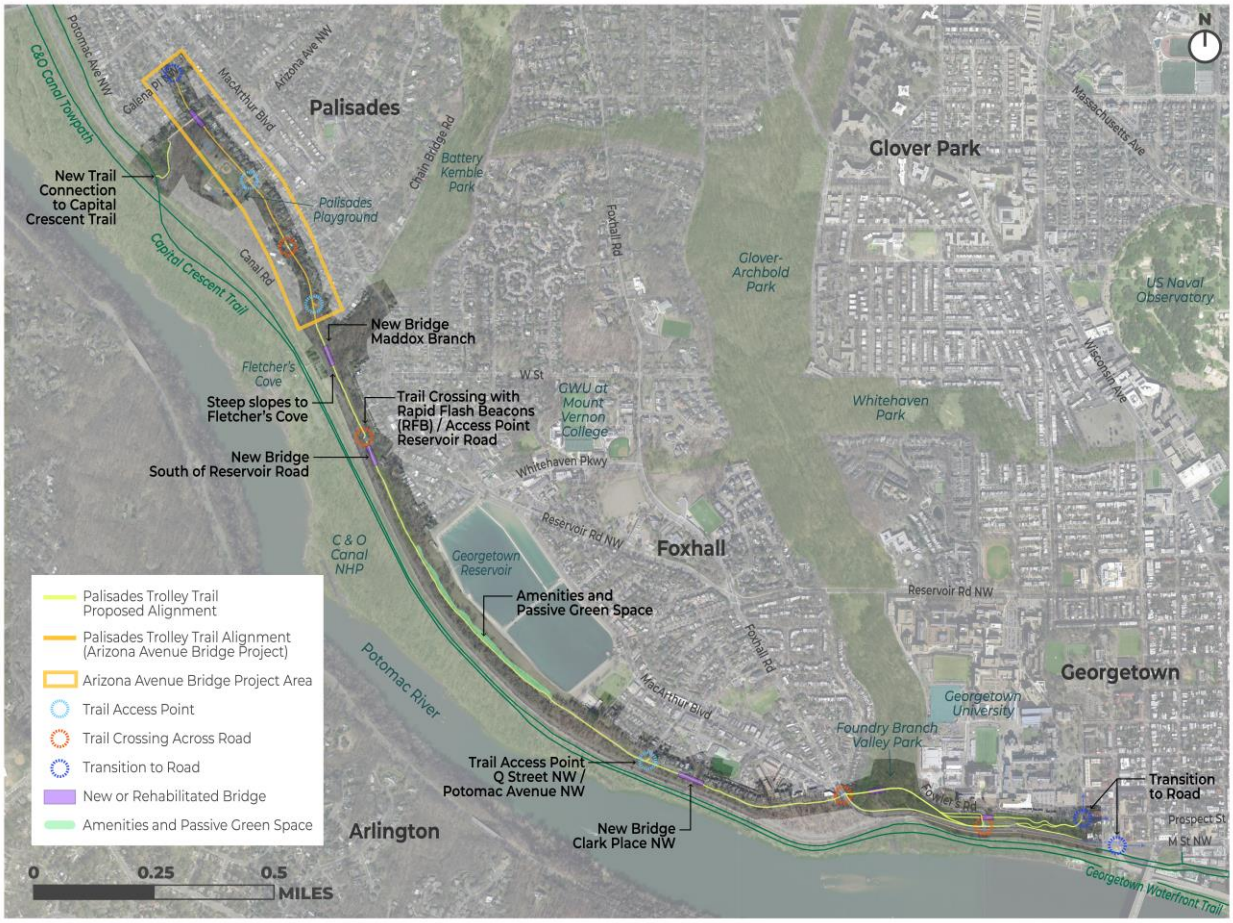
- Section 7 (Endangered Species Act) consultation with the US Fish and Wildlife Service
- Section 106 consultation of the National Historic Preservation Act, including coordination with the State Historic Preservation Office (SHPO), National Park Service (NPS) and other parties for Palisades Playground and Field House, Whitehaven/Thomas Main House, Georgetown Reservoir (including the Castle Gatehouse), Glover-Archbold Park, the Georgetown Historic District and the Foundry Branch Trestle Bridge historic resources, including potential archaeological resources
- Phase 1A Investigation to determine existence of and, if applicable, potential adverse effects to archaeological resources
- Section 4(f) of the USDOT Act (preservation of parklands and historic resources)
- Section 6(f) of the Land and Water Conservation Act related to parklands
- US Army Corps of Engineers for stormwater and water quality
- Right-of-way coordination with NPS, WMATA, Georgetown University, and Army Corps of Engineers for required easements, land transfers, etc.
- Utility coordination with DC Water and PEPCO
- Coordination with District Department of Energy and Environment (DOEE)

6.0 Concept Design

This section provides an overview of the proposed concept design for the Palisades Trolley Trail and associated bridges. Detailed design information is available in **Appendix 1** for the trail, **Appendix 2** for the Foundry Branch Trolley Trestle Bridge, and **Appendix 3** for new bridges west of Foxhall Road.

6.1. Trail Overview

Figure 16 | General Trail Alignment



6.1.1. General Alignment + Characteristics

The proposed PTT follows the same general alignment of the existing informal trail east of Foxhall Road on District owned right-of-way as shown in Figure 16. Wherever possible, the trail is located on the flattest portions of the right-of-way to minimize grading required to construct the trail. Gentle curves are incorporated into the alignment to maintain slower bicycle speeds. Potential trail surface materials include stabilized decomposed granite, asphalt, and porous asphalt.

The typical trail section is 11' wide with 2' shoulders on either side. Where the trail right-of-way is more constrained, particularly in areas adjacent to existing homes, there is minimal landscaping and the trail footprint is limited to a 15' wide section. Where there is sufficient right-of-way, stormwater management best management practices (BMPs) are located adjacent to the trail to manage stormwater runoff. The widest portion of the trail around the Georgetown Reservoir includes areas for passive recreation and space for an informal walking trail adjacent to the formalized trail as shown in Figure 17. This area also includes west-facing lookout areas that provide views of the Potomac River.

Figure 17 | Proposed Trail East of Clark Place (Left) and West of Georgetown Reservoir (Right)

Detailed sections for different trail conditions are provided in **Appendix 1**.

6.1.2. Access Points

Access points and at-grade trail crossings East of Foxhall Road are proposed at the following locations:

- Galena Place at Sherier Place (western trail terminus)
- Arizona Avenue at Sherier Place
- Palisades Recreation Center at Edmunds Place
- Chain Bridge Road (at-grade road crossing)
- Sherier Place north of Nebraska Avenue
- Reservoir Road (at-grade road crossing)
- Potomac Avenue at Q Street
- Foxhall Road south of MacArthur Boulevard

Access points along the trail provide opportunities to incorporate trail amenities such as trail signage and informational kiosks, seating, bike storage, shelter structures, and additional landscaping. Additional motor vehicle parking for trail access is not proposed. Should motor vehicle parking for trail use become an issue at trail access locations, restrictions to limit parking for trail use could be evaluated.

At-grade trail crossings include safety improvements such as Rectangular Rapid Response Flashing Beacons (RRFBs), raised crosswalks, painted crosswalks, and adjustments to crossing geometry to maximize improve vehicular sightlines with the trail. Plans of proposed improvements at Reservoir Road and Foxhall Road are shown in Figure 18 and Figure 19.

Figure 18 | Reservoir Road Trail Crossing Concept

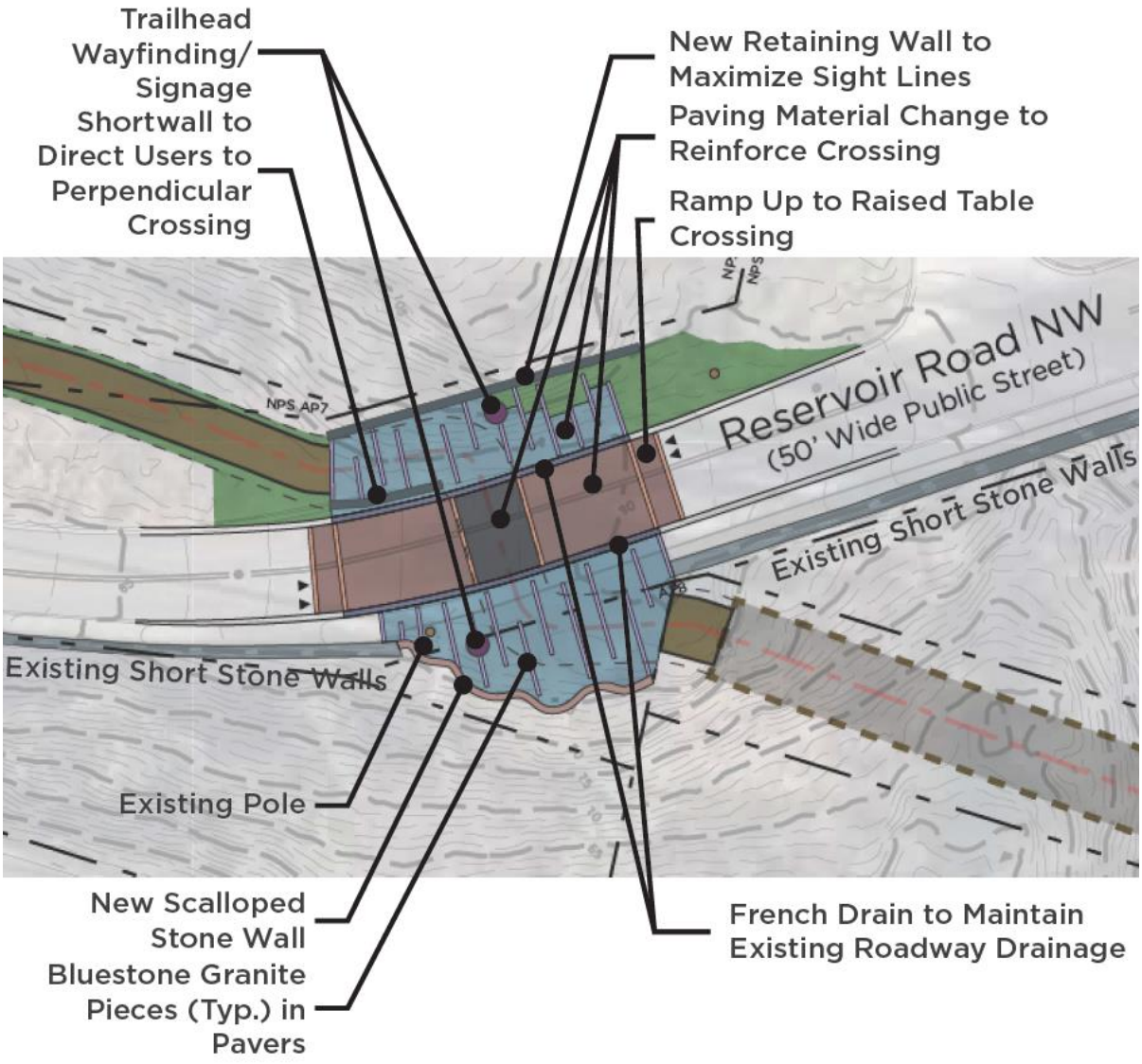
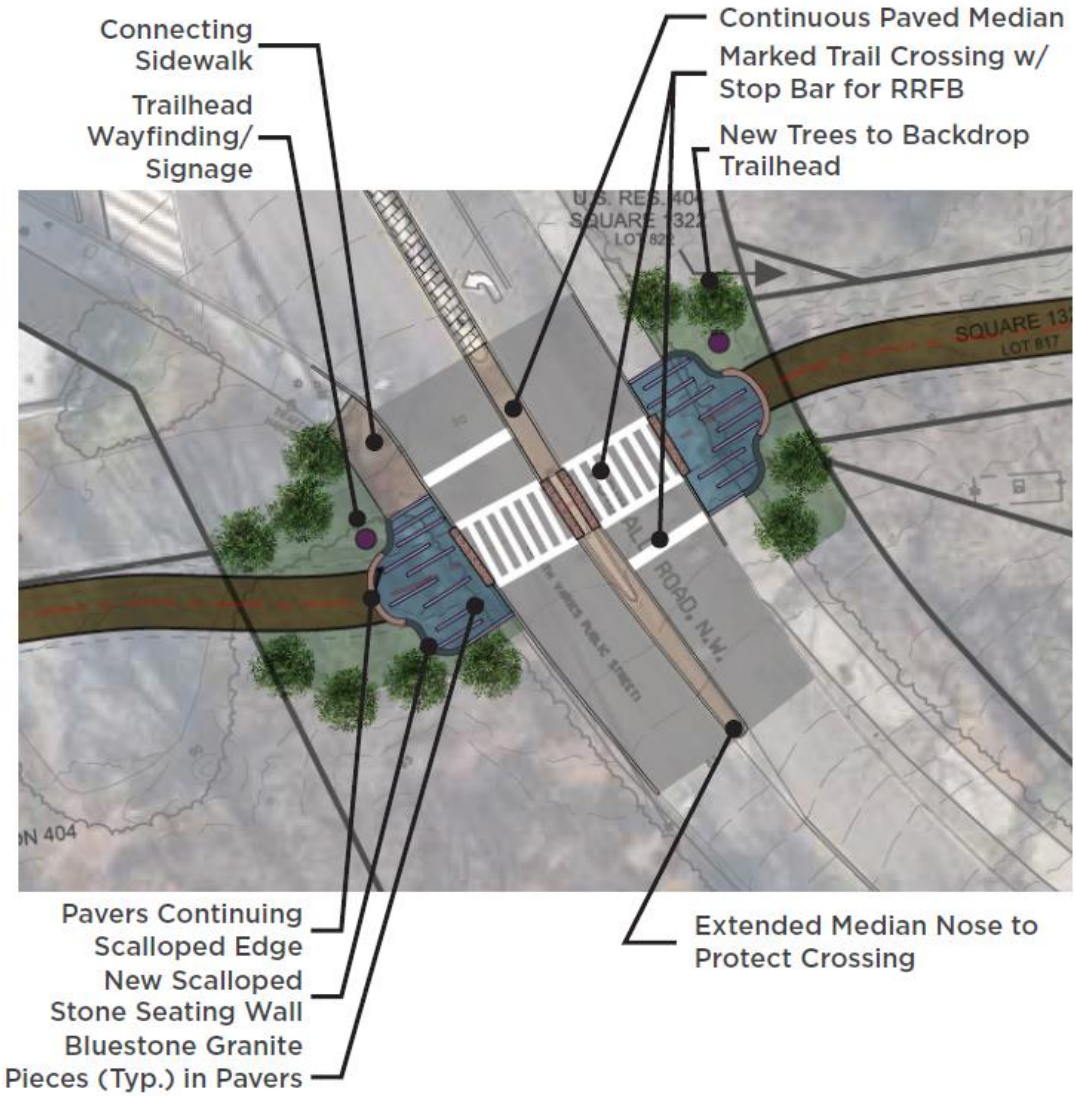


Figure 19 | Foxhall Road Trail Crossing Plan



6.1.3. New Bridge Crossings

Figure 20 | Typical Bridge Section

New multi-use trail bridges are proposed at the three locations along the trail where the former trolley bridges were demolished: Maddox Branch, Reservoir Road, and Clark Place. The preferred concept design at each location is a single span Prefabricated Steel H Truss bridge with a concrete deck and an uncoated weathering steel finish, as depicted in the typical section in Figure 20 and the rendering in Figure 21. A concept design for a Prefabricated Steel Bow String and a Steel Girder bridge is also presented in the technical memorandum. The alignment and layout for each of the locations is described in detail in the bridge technical memorandum (**Appendix 3**) and for the most part the alignment follows the existing trail with only minor deviations to avoid foundation conflicts with the 78" Water Main. For all locations, the deck width on the bridge for the trail is 12 feet as agreed with the District through bi-weekly coordination meetings. A pedestrian railing is proposed on both sides to meet ADA and other requirements for pedestrian and bicyclist safety. Micropiles are the assumed foundation type for all bridges and locations. Where the 78" diameter Water Main is present at an abutment location, the abutment is proposed to straddle the Water Main or be shifted to one side to avoid conflict. Where the abutment or portion of the abutment is proposed to be above the Water Main, a minimum clearance of 18 inches is proposed and that spaces is proposed to be filled with expanded polystyrene (EPS). At the approaches to the bridges, additional fill up to 5 feet deep is proposed. This fill is proposed to be a lightweight material, such as low-density cementitious fill (LDCF) to minimize additional loading to the Water Main.

Figure 21 | Rendering of Proposed Trail Bridge at Maddox Branch

6.1.4. Foundry Branch Trolley Trestle Bridge Rehabilitation Options

Most of the trail alignment options include rehabilitation of the Foundry Branch Trolley Trestle Bridge for use as a bicycle and pedestrian bridge. Rehabilitation options were developed based upon a 12 feet wide trail to match the three proposed new bridges further along the trail. The feasibility study evaluates four options for adaptive re-use of the bridge as a pedestrian / bike crossing. Consistent across each option is that the truss span is currently in reasonable condition and able to be reused by first lifting from the supporting trestles and then rehabilitated either on site or transported to an offsite facility. It would then be lifted back on to the new or rehabilitated approach trestles as described below. New shallow footings will be needed for all of the options. The four options evaluated include:

- Option 1 - Rehabilitate the approach trestles steelwork

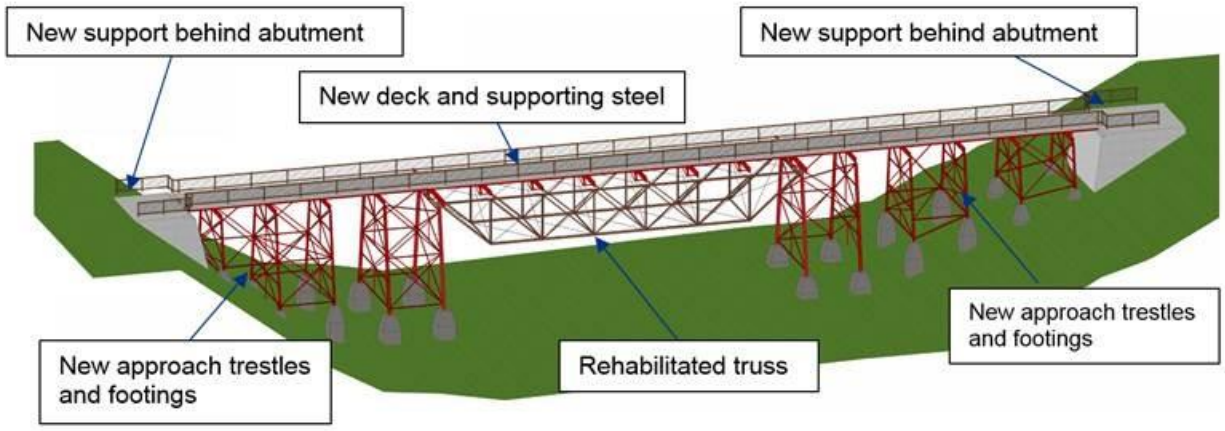
- Option 2 - Replace the approach trestles with new structures to match existing
- Option 3 - Replace the approach trestles with new longer spans
- Option 4 - Retain the approach trestles as facades supported by new structure

The feasibility study evaluates each option against the following criteria:

- Risks resulting from the deteriorated condition of the steelwork during design and construction;
- Construction duration;
- Historic review during the design and construction phases;
- Life cycle risks;
- Aesthetics; and
- A qualitative evaluation of comparative cost.

As new footings are needed for all the options evaluated, all existing steelwork will need to be dismantled. Therefore, should it be decided to proceed with the design of the reuse of the bridge, it is recommended that Option 2 (Figure 22) is selected with new approach trestles of similar geometry to the existing constructed on new footings. This would eliminate the risk of trying to rehabilitate the existing deteriorated steelwork after it has been dismantled, but also provide a structure that is aesthetically closest to the existing historic structure. Options 3 is considered undesirable as it would result in a structure that is aesthetically very different to the existing. This option would also be less costly and result in a shorter overall design and construction duration than rehabilitation of the existing approach trestles required for Options 1 and 4.

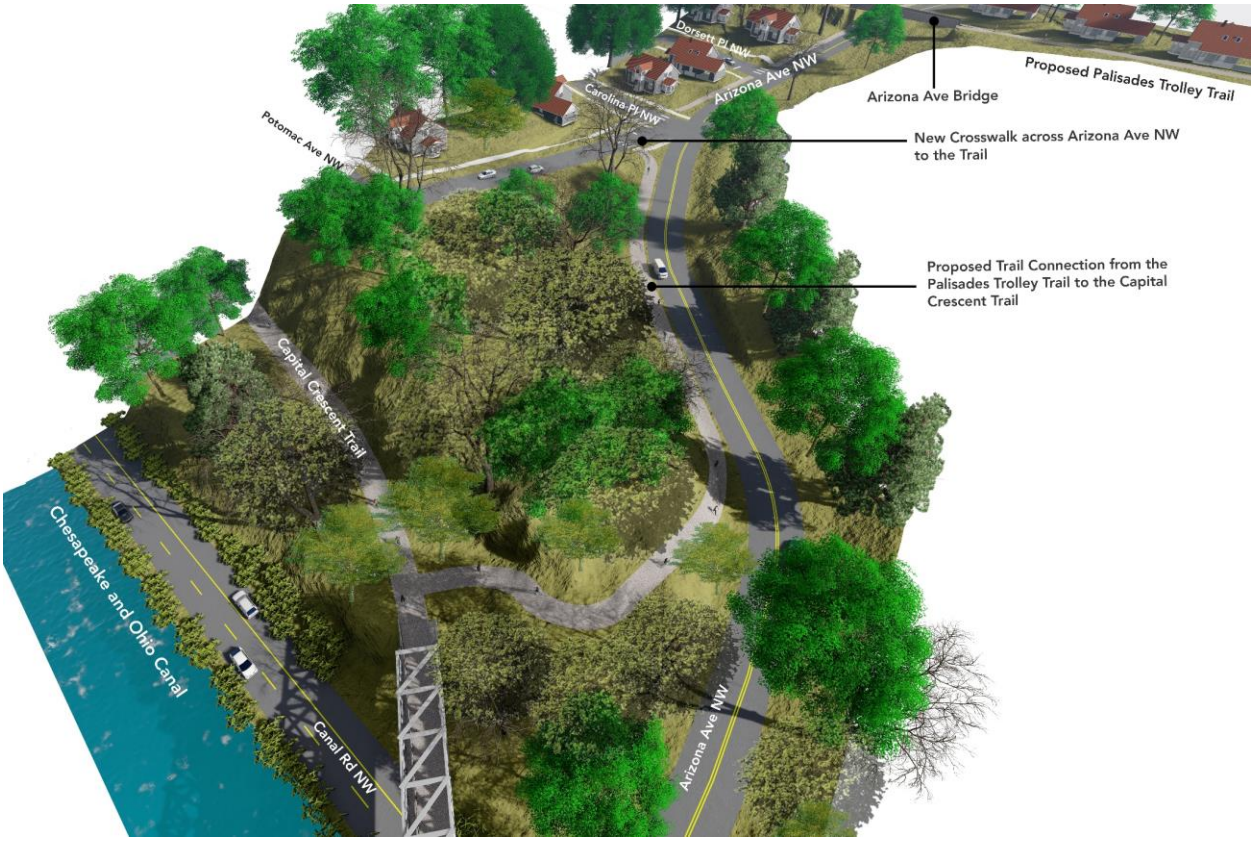
Figure 22 | Foundry Trestle Bridge Rehabilitation Option 2



6.1.5. Arizona Avenue Connection to Capital Crescent Trail

A new multi-use trail connection to the CCT is proposed from the PTT and Palisades neighborhood at Arizona Avenue and Sherier Place to the CCT bridge over Canal Road and the C&O Canal north of Arizona Avenue (Figure 23). From the base of the Arizona Avenue Bridge access ramp at Sherier Place, the proposed trail follows new sidewalks on the north side of Arizona Avenue to Carolina Place. A new crosswalk across Arizona Avenue connects to a new multi-use trail on NPS property that parallels Arizona Avenue and gradually traverses the grade to connects to the CCT at its current grade approximately 15’ above Arizona Avenue. Grading and retaining walls on NPS property will be required to maintain an ADA accessible trail through this area with a maximum 5% grade.

Figure 23 | Rendering of Proposed Arizona Avenue Connection to CCT



6.2. Alignment Options East of Foxhall Road

Due to steep topography and complex property ownership east of the current trail terminus at Foxhall Road, there are five potential trail alignments to connect the PTT to the Georgetown neighborhood. All the options use a rehabilitated Foundry Branch Trestle Bridge as part of the trail alignment except for Option 2. The eastern trail terminus for alignment Options 1-3 is at Canal Road/M Street and Whitehurst

Freeway; Options 4-5 have a trail terminus at Prospect Street and St. Mary's Place. Canal Road/M Street is a very high stress road environment with over 30,000 AADT, multiple travel lanes, no dedicated bicycle facilities, and one crosswalk across M Street. Prospect Street has significantly lower volumes with just over 4,000 AADT, two lanes of traffic, and a slower neighborhood/residential environment. Diagrams of the two trail terminus locations are shown in Figure 24 and Figure 25.

Figure 24 | Proposed Eastern Trail Terminus for Options 1-3 (Canal Road/M Street and Whitehurst Freeway)

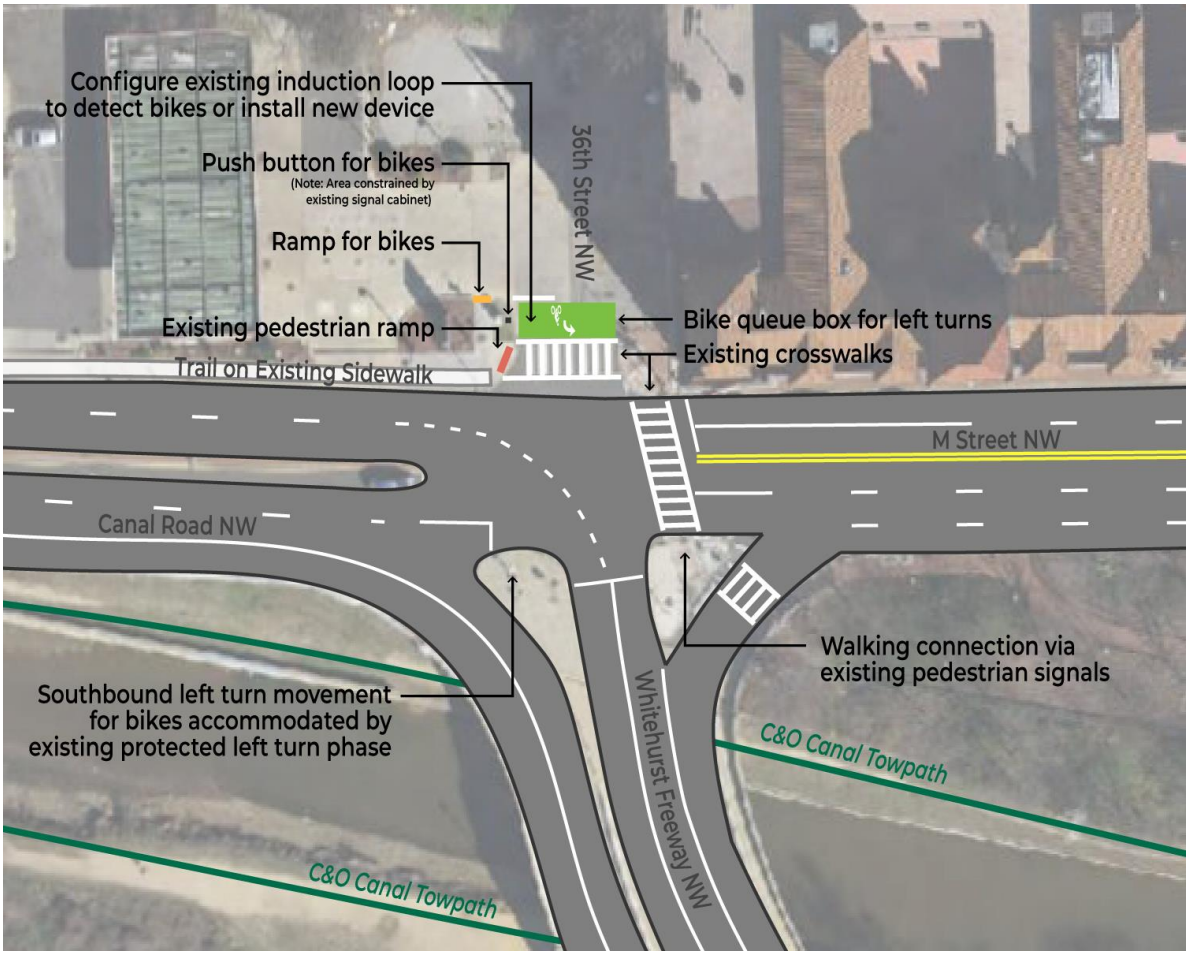
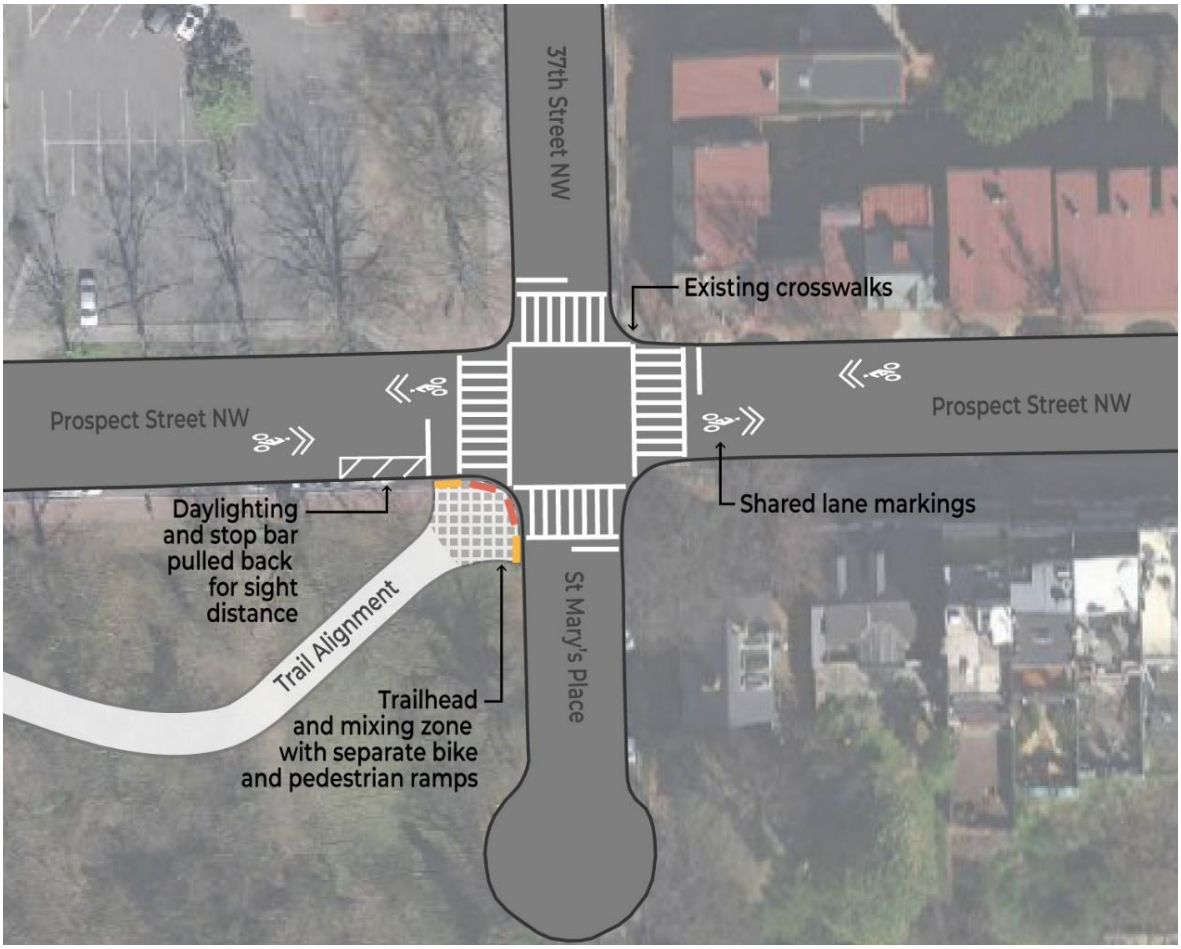


Figure 25 | Proposed Eastern Trail Terminus for Options 4-5 (Prospect Street/37th Street)

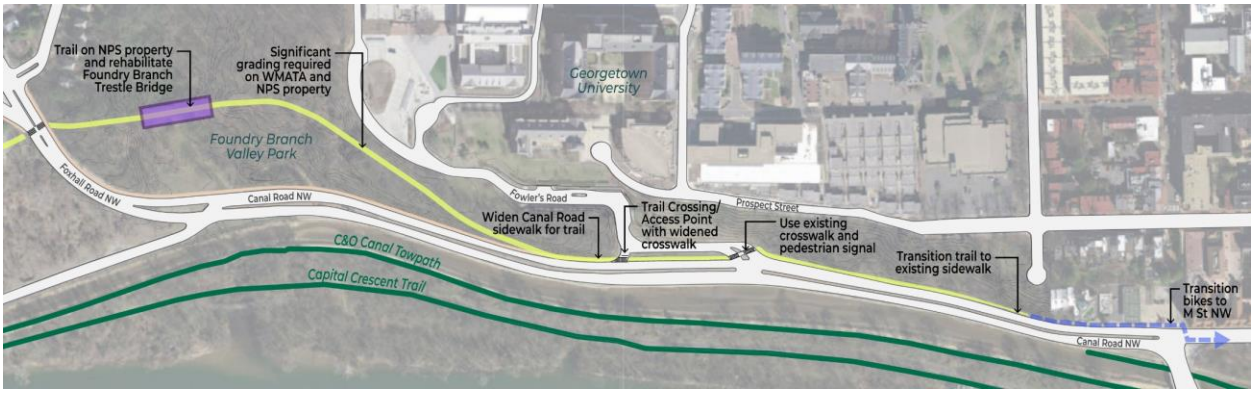


6.2.1. Option 1: Foundry Branch Trolley Trestle Bridge to Canal Road

The potential alignment uses a new at-grade road crossing at Foxhall Road to a trail on NPS property that connects to the rehabilitated Foundry Branch Trolley Trestle Bridge. The trail traverses steep

topography east of the Bridge on WMATA and NPS property to connect to the existing sidewalk on Canal Road just west of Fowler Road at the southern entrance to Georgetown University. The trail then parallels the north side of Canal Road on a widened sidewalk on NPS property until a pinch point with a stone wall and residential properties. This portion of the trail utilizes two existing crossings of the Fowler Road. After the pinch point, the trail effectively ends, transitioning to the narrow existing sidewalk to the eastern trail terminus at the intersection with Whitehurst Freeway and M Street (Figure 26).

Figure 26 | Trail Alignment Option 1: Foundry Branch Trolley Trestle Bridge to Canal Road

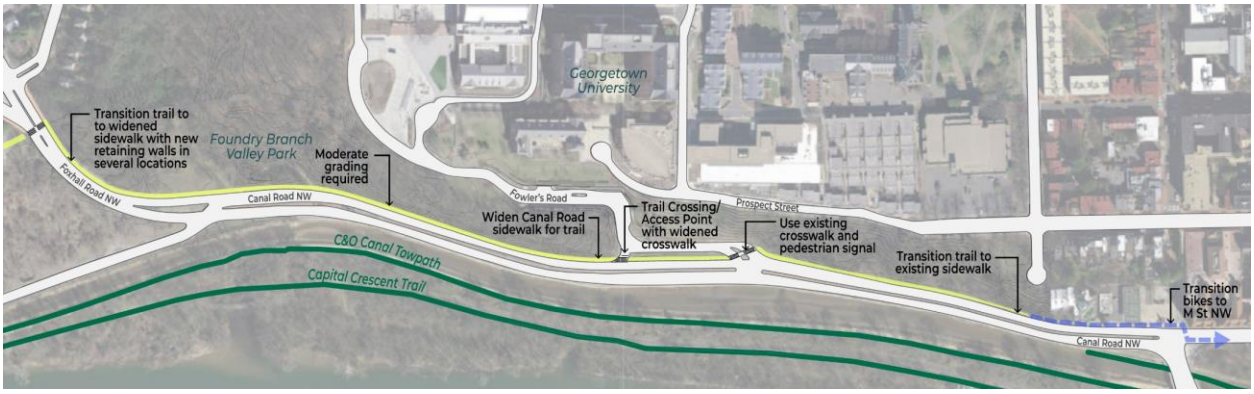


6.2.2. Option 2: Canal Road

The potential alignment uses a new at-grade road crossing at Foxhall Road to the existing sidewalk on Canal Road. The trail then parallels the north side of Canal Road on a widened sidewalk on NPS property until a pinch point with a stone wall and residential properties. This portion of the trail utilizes two existing crossings of Fowler Road at the southern entrance to Georgetown University; it also provides a direct connection to the existing trail to the Foundry Branch Tunnel which goes under Canal Road and the C&O Canal and intersects with the C&O Canal Towpath and CCT. After the pinch point, the trail

effectively ends, transitioning to the narrow existing sidewalk to the eastern trail terminus at the intersection with Whitehurst Freeway and M Street (Figure 27).

Figure 27 | Trail Alignment Option 2: Canal Road

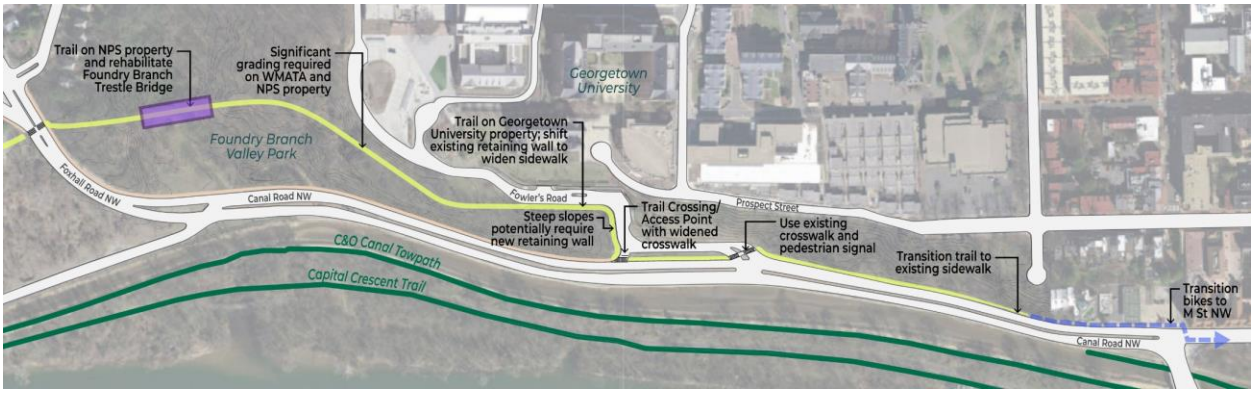


6.2.3. Option 3: Foundry Branch Trolley Trestle Bridge to Fowler Road to Canal Road

The potential alignment uses a new at-grade road crossing at Foxhall Road to a trail on NPS property that connects to the rehabilitated Foundry Branch Trolley Trestle Bridge. The trail follows relatively flat land on WMATA property to the existing sidewalk on the south side of Fowler Road at the southern entrance to Georgetown University. The existing narrow sidewalk is widened along Fowler Road on Georgetown University and WMATA property by relocating the adjacent retaining wall connects to Canal Road at the terminus of the Driveway. The trail then parallels the north side of Canal Road on a widened sidewalk on NPS property until a pinch point with a stone wall and residential properties. This portion of the trail utilizes two existing crossings of Fowler Road. After the pinch point, the trail

effectively ends, transitioning to the narrow existing sidewalk to the eastern trail terminus at the intersection with Whitehurst Freeway and M Street (Figure 28).

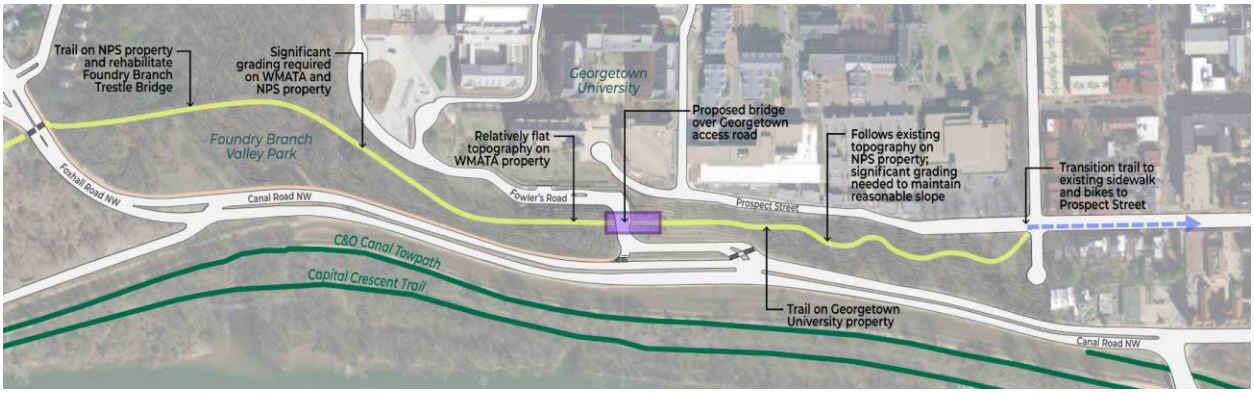
Figure 28 | Trail Alignment Option 3: Foundry Branch Trolley Trestle Bridge to Fowler Road to Canal Road



6.2.4. Option 4: Foundry Branch Trolley Trestle Bridge to New Bridge to Prospect Street

The potential alignment uses a new at-grade road crossing at Foxhall Road to a trail on NPS property that connects to the rehabilitated Foundry Branch Trolley Trestle Bridge. The trail follows relatively flat land on WMATA property to a new bridge over Fowler Road at the southern entrance to Georgetown University. The eastern landing of the bridge is on Georgetown University property and then traverses steep topography on GU and NPS property to reach the eastern trail terminus at Prospect Street and St. Mary's Place (Figure 29).

Figure 29 | Trail Alignment Option 4: Foundry Branch Trolley Trestle Bridge to New Bridge to Prospect Street



The new bridge over Fowler Road on Georgetown University's property provides an opportunity to create an iconic gateway into the University via a modern bridge. Clearance for all University vehicles, including buses and trucks would be maintained. An artistic rendering of the new bridge is shown in Figure 30.

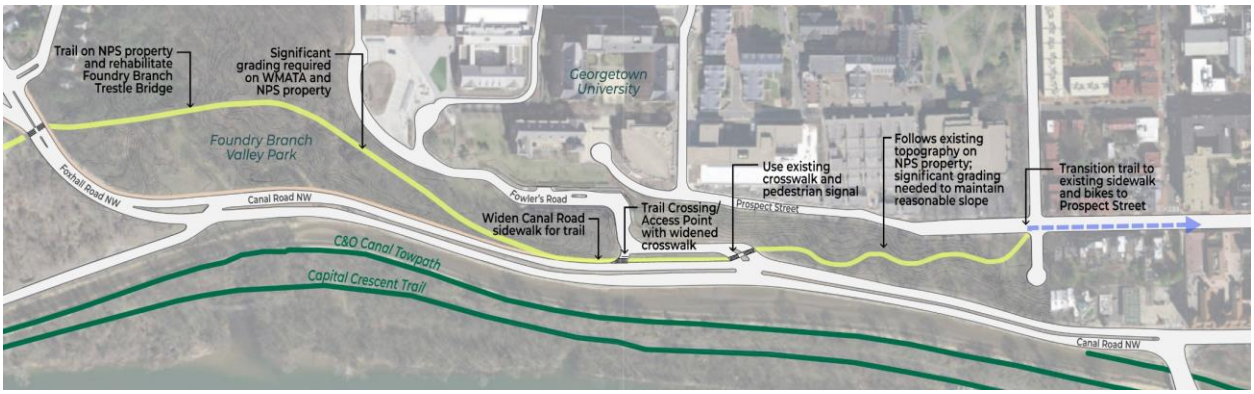
Figure 30 | Rendering of New Bridge Over Fowler Road

6.2.5. Option 5: Foundry Branch Trolley Trestle Bridge to Canal Road to Prospect Street

The potential alignment uses a new at-grade road crossing at Foxhall Road to a trail on NPS property that connects to the rehabilitated Foundry Branch Trolley Trestle Bridge. The trail traverses steep topography east of the Bridge on WMATA and NPS property to connect to the existing sidewalk on Canal

Road just west of Fowler Road at the southern entrance to Georgetown University. The trail then parallels the north side of Canal Road on a widened sidewalk and utilizes two existing crossings of Fowler Road. After the second crossing, the trail traverses steep topography on NPS property to reach the eastern trail terminus at Prospect Street and St. Mary's Place (Figure 31).

Figure 31 | Trail Alignment Option 5: Foundry Branch Trolley Trestle Bridge to Canal Road to Prospect Street



A summary matrix of the potential risks, impacts, and benefits of each of the five trail alignments is shown in Table 6. In general, the trail alignment options that end at Prospect Street, Options 4 and 5, are the most desirable because they terminate in a lower stress road environment with significantly lower vehicular volumes. This will facilitate the transition of bicyclists between the trail and the road network and provide a more comfortable connection into downtown Georgetown. These options both have very high costs, would require a property agreement with Georgetown University and an additional bridge structure (Option 4) and significant grading and earthwork on NPS property to reach Prospect Street (Options 4 and 5). Options 1-3 are less desirable due to the trail termination point on M Street with 30,000 AADT and no bicycle facilities.

Table 6 | East of Foxhall Road Trail Alignment Alternatives Comparison

Alignment Rating — Undesirable → Desirable

Alignment Option	Cost	Right-of-Way Impacts	Comfort of Connection	Network Connectivity	Potential Permitting/ Constructability Issues
Option 1 Foundry Trestle Bridge to Canal Road *(Lower Georgetown)*	**High**	**Moderate** » Substantial grading and retaining walls needed to maintain a maximum 5% grade » Requires property agreements with WMATA and NPS	**Very Low** » Trail on existing 8'wide sidewalk for ~360'feet » **Trail Transition:** bike queue area on 36th Street ROW with potential for push button signal for bike crossing » High ADV on M Street with no room for dedicated bicycle facilities	**Low-Moderate** » Good pedestrian connections to lower Georgetown via M Street and C&O Canal Towpath/CCT via Foundry Branch Tunnel » Poor on-road bicycle connection to lower Georgetown via high-stress M Street	**Moderate** » Section 106 for Foundry Trestle Bridge » 4(f) impacts to NPS property in Glover Archbold Park and along Canal Road
Option 2 Canal Road *(Lower Georgetown)*	**Moderate**	**Low** » Substantial grading and retaining walls needed to widen Canal Road sidewalk to accommodate the trail » Requires property agreements with NPS	**Very Low** » Trail on existing 8'wide sidewalk for ~360'feet » **Trail Transition:** bike queue area on 36th Street ROW with potential for push button signal for bike crossing » High ADV on M Street with no room for dedicated bicycle facilities	**Moderate** » Good pedestrian connections to lower Georgetown via M Street and C&O Canal Towpath/CCT via Foundry Branch Tunnel » Good trail bicycle connection to C&O Canal Towpath/CCT via Foundry Branch Tunnel » Poor on-road bicycle connection to lower Georgetown via high-stress M Street	**Moderate** » 4(f) impacts to NPS property along Canal Road
Option 3 Foundry Trestle Bridge to Fowler Road to Canal Road *(Lower Georgetown)*	**High**	**Very High** » Relocation of retaining wall and substantial earth work needed to Fowler Road sidewalk to accommodate the trail » Existing abutment may need to be removed » Requires property agreements with WMATA, Georgetown, and NPS	**Very Low** » Trail on existing 8'wide sidewalk for ~360'feet » **Trail Transition:** bike queue area on 36th Street ROW with potential for push button signal for bike crossing » High motor vehicle traffic and pedestrian volumes » High ADV on M Street with no room for dedicated bicycle facilities	**Low-Moderate** » Good pedestrian connections to Georgetown via M Street and C&O Canal Towpath/ CCT via Foundry Branch Tunnel » Poor on-road bicycle connection to Georgetown via high-stress M Street	**Very High** » Section 106 for Foundry Trestle Bridge » 4(f) impacts to NPS property in Glover Archbold Park east and west of Fowler Road » WMATA agreement to widen Georgetown's easement on Fowler Road
Option 4 Foundry Trestle Bridge to New Bridge to Prospect Street *(Upper Georgetown)*	**Very High**	**Very High** » New bridge over Fowler Road » Substantial grading and retaining walls needed to traverse steep topography up to Prospect Street » Requires property agreements with WMATA, Georgetown, and NPS	**High** » Fully separated connection to Georgetown street network » **Trail Transition:** trailhead and mixing zone with separate bike/ ped ramps at Prospect Street » Lower ADV on Prospect Street than Canal Street; still high stress volumes	**Moderate-High** » Good pedestrian connections to upper Georgetown via Prospect Street and C&O Canal Towpath/CCT via Foundry Branch Tunnel » Fair on-road bicycle connection to upper Georgetown via direct route on lower-stress Prospect Street » Good on-road bicycle connection to upper Georgetown via indirect route on low-stress N Street	**Very High** » Section 106 for Foundry Trestle Bridge » 4(f) impacts to NPS property in Glover Archbold Park and » Signficant grading/retaining walls on hill west of Prospect Street
Option 5 Foundry Trestle Bridge to Canal Road to Prospect Street *(Upper Georgetown)*	**Very High**	**Very High** » Substantial grading and retaining walls needed to maintain a maximum 5% grade to Canal Road » Substantial grading and retaining walls needed to maintain a maximum 5% grade to Prospect Street » Requires property agreements with WMATA and NPS	**High** » Fully separated connection to Georgetown street network » **Trail Transition:** trailhead and mixing zone with separate bike/ ped ramps at Prospect Street » Lower ADV on Prospect Street than Canal Street; still high stress volumes	**Moderate-High** » Good pedestrian connections to upper Georgetown via Prospect Street and C&O Canal Towpath/CCT via Foundry Branch Tunnel » Fair on-road bicycle connection to uppper Georgetown via direct route on lower-stress Prospect Street » Good on-road bicycle connection to upper Georgetown via indirect route on low-stress N Street	**Very High** » Section 106 for Foundry Trestle Bridge » 4(f) impacts to NPS property in Glover Archbold Park and » Signficant grading/retaining walls on hill west of Prospect Street » Slopes greater than 5% on hill west of Prospect Street

7.0 Implementation

7.1. Cost Estimates

Table 7 provides planning-level order of magnitude cost estimates for the following three trail sections:

1. Trail Alignment West of Foxhall Road
2. Trail Alignment Options East of Foxhall Road
3. Arizona Avenue Connection to Capital Crescent Trail

The planning-level order of magnitude cost estimates are intended to offer guidance on potential ranges of costs and provide the District with baseline information for budgeting and programming. The timeframe for implementation is subject to the availability of funding to undertake each section.

Order of magnitude cost estimates for the three sections were compiled using unit costs following the District's standards and bid item costs. Estimates include the following allowances:

- 4 percent for landscaping
- 35 percent of impervious costs for stormwater management, pipes, and structures
- 10 percent for erosion and sediment control during construction
- Utility relocations are a lump sum cost based upon number of power/light pole relocation.
- 5 percent for maintenance of traffic during construction
- 10 percent for construction mobilization
- 40 percent design contingency, to reflect the conceptual nature of the design

The trail cost estimates include a planning-level order of magnitude cost estimates for the three proposed bridges west of Foxhall Road and the Foundry Branch Trestle Bridge in accordance with a Class 5 estimate as defined by the Association for the Advancement of Cost Engineering (AACE). The bridge

estimates presented below have a range of accuracy, as defined by AACE and estimator judgment, of -20% to +50% based on level of project definition and other factors such as project timing. The assumed superstrate type for the estimates is a prefabricated steel H truss with uncoated weathering steel and a concrete deck. The new bridge over Fowler Road within the East of Foxhall Road alternatives were estimated at $250 per sf.

The total cost for the trail and three new bridges west of Foxhall Road is estimated at $8.5 million. The total costs for the five trail alignment options west of Foxhall Road, some of which include the rehabilitation of the Foundry Branch Trolley Trestle Bridge range from $2.1 million to $8.75 million. The total cost for the new Arizona Avenue trail connection to the Capital Crescent Trail is estimated at $1.2 million.

Table 7 | Trail Alignment Order of Magnitude Cost Estimates

West of Foxhall road (Including Foxhall Crossing)		
Trail Order of Magnitude Cost Estimate	Bridge Order of Magnitude Cost Estimate	Total Order of Magnitude Cost Estimate
$3,075,000	$2,100,000 – Maddox Branch Bridge	**$8,475,000**
	$1,500,000 – Reservoir Road Bridge	
	$1,800,000 – Clark Place Bridge	
East of Foxhall Road		
Option 1		
Trail Order of Magnitude Cost Estimate	Bridge Order of Magnitude Cost Estimate – Foundry Branch Bridge	Total Order of Magnitude Cost Estimate
$5,460,000	$2,750,000	**$8,210,000**
Option 2		
Trail Order of Magnitude Cost Estimate	Bridge Order of Magnitude Cost Estimate	Total Order of Magnitude Cost Estimate
$2,160,000	N/A	**$2,160,000**
Option 3		
Trail Order of Magnitude Cost Estimate	Bridge Order of Magnitude Cost Estimate – Foundry Branch Bridge	Total Order of Magnitude Cost Estimate
$1,600,000	$2,750,000	**$4,350,000**

East of Foxhall Road (Cont.)		
Option 4		
Trail Order of Magnitude Cost Estimate	Bridge Order of Magnitude Cost Estimate	Total Order of Magnitude Cost Estimate
$1,400,000	$2,700,000 – Georgetown Access Bridge $2,750,000– Foundry Branch Trestle Bridge	**$6,850,000**
Option 5		
Trail Order of Magnitude Cost Estimate	Bridge Order of Magnitude Cost Estimate – Foundry Branch Bridge	Total Order of Magnitude Cost Estimate
$6,000,000	$2,750,000	**$8,750,000**
Arizona Avenue connection to CCT		
Trail Order of Magnitude Cost Estimate	Bridge Order of Magnitude Cost Estimate	Total Order of Magnitude Cost Estimate
$1,200,000	n/a	**$1,200,000**

7.2. Potential Implementation Phases

The District project development process generally consists of five phases:

1. Planning (Current Step)
2. Environmental
3. Design
4. Right-of-Way
5. Construction

Projects of the magnitude of the Palisades Trolley Trail, which are larger capital projects that need to be programmed into the budget process with detailed designs and right-of-way examination, require each of the five phases involved in the District project development process.

This document represents the conclusion of the Planning phase of the project development process. Each of the future phases will include opportunities for public comments and each phase is contingent on the identification of funding. While the length of time required to complete each phase can vary, the District tends to assume a four- to eight-year timeframe from the end of the first phase to project completion.

Complexities associated with each of the remaining project phases have the potential to slow down or derail the Palisades Trolley Trail project in its entirety. To assist in advancing the trail towards completion, the trail could be broken into four smaller projects. These projects could include:

- The Arizona Avenue Connection to the Capital Crescent Trail
- Reconstruction of Pedestrian Bridge and Connecting Trail at Arizona Avenue
- The section between the Palisades Recreation Center to Foxhall Road
- The section east of Foxhall Road

Each of these projects are discussed in more detail below.

7.2.1. Arizona Avenue Connection to CCT

The Arizona Avenue Connection to the Capital Crescent Trail was identified in the Rock Creek Far West Livability study as a standalone project that would connect future facilities for people walking and biking on Arizona Avenue with the CCT. Throughout the Rock Creek Far West Livability Study, support for the project was received via the online Wikimap and through public meetings. This project also received strong support from community members at both public meetings for the PTT. Coordination with

National Park Service (NPS), the property owner for most of the impacted area, has already begun for this project, and NPS has suggested they are willing to pursue the project further.

Based on the level of support received to date, it is expected this project could advance through ongoing coordination with NPS. Two Federal Highway Administration Programs could be considered for funding sources for this project: The Transportation Alternatives Set-Aside (TA Set-Aside) and Recreational Trails Program (RTP). NPS and the District could also partner on this project to secure funding.

7.2.2. Reconstruction of Pedestrian Bridge and Connecting Trail at Arizona Avenue

This project is several steps ahead of the rest of the PTT in the District project development process as it is currently under design. The project originated as a bridge reconstruction project for the Arizona Avenue pedestrian bridge and includes upgrades to the connecting PTT from Nebraska Avenue to Galena Place. Construction funding for this project has already been identified.

7.2.3. Nebraska Avenue to Foxhall Road

This project, immediately to the east of the Reconstruction of the Pedestrian Bridge and Connecting Trail at Arizona Avenue project, would provide local connectivity between the Palisades and Foxhall neighborhoods. The project includes three new bridges at Maddox Branch, Reservoir Road, and Clark Place, as well as upgrades to the length of the trail and two improved at-grade trail crossings at Reservoir Road and Foxhall Road.

Ongoing coordination with the community is needed for this project, due to the opposition to a formalized trail by residents abutting the trail. The contentious issue of trail surface, which was discussed extensively during community conversations for the Reconstruction of the Pedestrian Bridge

and Connecting Trail at Arizona Avenue project, will need to be determined during preliminary design. Ending the project at Foxhall Road will allow this portion of the trail to move forward independently from the complex conversations around trail alignments east of Foxhall Road (described below). This project will create a continuous trail facility between the Palisades and Foxhall neighborhoods, which will provide an independent utility for local connections between the neighborhoods.

7.2.4. East of Foxhall Road

The trail area east of Foxhall Road is the most complex of the trail projects due to the Foundry Branch Trolley Trestle Bridge and the limited District right-of-way ownership through the area. Extensive coordination is needed with NPS, Georgetown University, and WMATA to determine a preferred alignment; Georgetown University currently has serious concerns with the trail alignment affecting their property in alignment options 3 and 4, the latter of which includes a bridge across Fowler Road at the southern entrance to Georgetown University. Keeping this area as a standalone project allows the other sections to advance in the District project development process while decisions are made regarding both the Foundry Branch Trolley Trestle Bridge and the resulting Section 106 process and access through or around Georgetown University. If the District was to take on ownership of the bridge, short term improvements (e.g. shoring up the truss span on temporary piers) would need to be made to prevent probable collapse.

7.3. Performance Measures

State and city departments of transportation throughout the country increasingly use performance management to make data-driven decisions, measure program outcomes, and demonstrate progress to key constituencies. The District's Palisades Trolley Trail Feasibility Study provides an excellent opportunity to further integrate performance measures into the District's planning efforts. A useful set

of performance measures for this study will not only help ensure that the study's objectives are met, but also serve as a model for incorporating performance management into subsequent District plans.

Transportation performance management is an emerging topic, and there are no standard guidelines to follow. In general, there are three key components to consider in developing a performance management system:

1. Determining the performance measures most appropriate for a given situation. The set of performance measures depend on both on agency/plan objectives and available data (existing and expected).
2. Develop a data collection plan to support selected performance measures. Note that performance measures and data collection should be planned together to ensure that the required data-collecting effort is realistic.
3. Setting performance standards (i.e., targets) for specific measures. Depending on the application, standards are set for only some or none of the measures.

7.3.1. Potential Performance Measures for the Palisades Trolley Trail

In September 2016, the District published the *Performances Measures Toolbox* as a Guide for District staff and consultants to choose appropriate performance measures for specific project types and transportation modes. Many of these measures are often used in District planning studies, while some are used less frequently and oriented to specific types of projects. Ultimately, this toolbox provides necessary context, direction, data needs, and best practices, so the measures are consistently applied for all projects, allowing for reliable project comparisons, decision-making, and a means for measuring progress. The *Performance Measures Toolbox* incorporates goals established by other District planning efforts, including *moveDC*, *Sustainable DC 2.0*, and the *Vision Zero DC Action Plan*.

MoveDC set a 25-year vision for the transportation system in the District and formed the basis for the May 2018 update to the *DC Statewide Transportation Improvement Program* (DC STIP). The goals established by *moveDC* include:

- **Sustainability and Health:** achieve 75% of all District trips by non-auto modes
- **Citywide Accessibility and Mobility:** maximize system reliability and capacity for moving people and goods
- **Neighborhood Accessibility and Connectivity:** support neighborhood vitality and economic development
- **Safety and Security:** achieve zero fatalities and severe injuries on the District's transportation network
- **Public Space:** reinforce Washington DC's historic landscapes and quality of the neighborhoods
- **Preservation:** achieve a state of good repair for all District infrastructure
- **Funding and Financing:** invest in transportation to achieve outcomes within plan horizon

Sustainable DC 2.0 The Sustainable DC 2.0 plan includes 167 actions and 36 goals across 13 separate topics and builds off the original Sustainable DC plan released in early 2013. The *Sustainable DC 2.0* goals that relate to the Palisades Trolley Trail are listed below and organized by their topic area identified in the *Sustainable DC 2.0* plan.

Built Environment

- **Goal:** Strengthen existing neighborhoods to be vibrant and walkable while maintaining their historic character.
  Target: By 2032, provide essential services within a quarter-mile walk, and a variety of services and amenities within a half-mile walk of all residents.

Health

- **Goal:** Provide residents with resources to achieve healthy, active lifestyles, regardless of income, ability, employment, or neighborhood.
  Target: By 2032, 65% of residents get at least 150 minutes per week of physical activity.

- **Goal:** Provide high quality, safe, and sustainable places to be healthy and active.
  Target: By 2032, reduce disparities in the quality of places contributing to disparate health outcomes by 15%.

Nature

- **Goal:** Improve human access to and stewardship of nature.
  Target: By 2032, provide access to the natural environment or quality green space within a 10-minute walk of all residents.

Transportation

- **Goal:** Expand safe, connected infrastructure for pedestrians and cyclists.
  Target: By 2032, increase biking and walking to 25% of all commuter trips in all wards.

- **Goal:** Enhance affordable, convenient transportation options to reduce dependency on single occupant vehicles.
  Target: By 2032, reduce commuter trips made by car to 25%.

- **Goal:** Reduce greenhouse gas emissions and air pollution from the transportation sector.
  Target: Reduce greenhouse gas emissions from transportation by 60%.

The ***Vision Zero DC Action Plan*** guides the implementation of Vision Zero in the District, which aims to eliminate fatalities and severe injuries to travelers of the District's transportation system by the year 2024. The *Vision Zero Action Plan* identified four guiding themes, including:

1. Create Safe Streets
2. Protect Vulnerable Users
3. Prevent Dangerous Driving
4. Be Transparent and Responsive.

Table 8 provides a list of possible performance measures for the Palisades Trolley Trail Feasibility Study from the *Performances Measures Toolbox* and incorporating guidance from *moveDC*, *Sustainable DC 2.0*,

and the *Vision Zero DC Action Plan*. The table shows the identified performance listed in the form of the relevant question the performance measure is intended to address, along with the likelihood data is available to analyze the performance measures, the document source (*Performances Measures Toolbox*, *moveDC*, *Sustainable DC 2.0*, and/or *Vision Zero DC Action Plan*), along with the potential relationship between the Palisades Trolley Trail and the performance measures. The identification of the potential relationship is subjective and intended to provide a rough idea of how the constructed Palisades Trolley Trail would affect the identified performance measure.

Table 8 | Potential Performance Measures

Performance Measure	Data Availability	Performance Measure Source	Potential Relationship
Does the number of bicycle and pedestrian crashes in the Palisades Trolley Trail corridor go down?	Yes	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0 • Vision Zero DC Action Plan	Low
Does the effective low-stress bicycle network increase in size?	Yes	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0 • Vision Zero DC Action Plan	High
Do travel times along the Palisades Trolley Trail corridor go down for people walking, biking, and driving?	Maybe	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0	High (walking and biking) Low (driving)
Does the number of people biking along the Palisades Trolley Trail corridor go up?	Yes	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0	High
Does the number of people walking along the Palisades Trolley Trail corridor go up?	Yes	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0	Medium

Performance Measure	Data Availability	Performance Measure Source	Potential Relationship
Does the percent of residents within a ten-minute walk of quality green space go up?	Maybe	• Sustainable DC 2.0	High
Does the number of jobs and destinations accessed in less than 45 minutes by bicycle or walking increase?	Maybe	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0	High
Does the percent of residents within a half-mile walking distance or a two-mile biking distance of a transit stop go up?	Maybe	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0	High
Does the percent of residents within a quarter-mile network distance to sidewalk, trail, bike facility, or low-traffic stress street go up?	Maybe	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0	High
Does the ability of bicyclists to reach various origins and destinations comfortably, safely, directly, and reliably on the District's transportation system improve?	Yes	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0 • Vision Zero DC Action Plan	High
Does the ability of pedestrians to reach various origins and destinations comfortably, safely, directly, and reliably on the District's transportation system improve?	Yes	• Performance Measure Toolbox • moveDC • Sustainable DC 2.0 • Vision Zero DC Action Plan	High
Do greenhouse gas emissions along the Palisades Trolley Trail corridor decrease?	Maybe	• Sustainable DC 2.0	Low

7.4. Potential Next Steps

7.4.1. Understand Short-Term Concerns of Foundry Branch Trolley Trestle Bridge Ownership

Prior to taking over ownership of the Foundry Branch Trolley Trestle Bridge, the District needs to consider the liability associated with the bridge in its current condition; the approach trestles to the bridge are in overall very poor condition, and there is significant deterioration of the members that provide primary structural support. This unstable condition makes the bridge a potential liability to the District if its ownership is transferred from WMATA.

If ownership of the Foundry Trestle Bridge is transferred to DDOT, potential agreements and memoranda of understanding will need to be completed between the participating agencies and organizations (WMATA, NPS, and SHPO). Securing short-term agreements related to the ownership, access, design, and construction of the bridge would be required. Long-term agreements related to maintenance of the bridge will also be required. DDOT would need to consider the long-term implications for responsibility and legal liability once the possession of the bridge structure is completed; and maintain the bridge as an asset for the region. DDOT should also consider that until the bridge is rehabilitated, the area beneath the bridge should remain closed and further signage added that identifies the safety hazards beneath the bridge and the truss span should be shored up on temporary piers or lifted from the bridge to prevent possible collapse.

7.4.2. Consider Long-Term Tradeoffs and Benefits of the Trail

The Study identifies several key benefits and risks of the proposed PTT that must be considered in order to decide a path forward for the project.

Benefits

- Preservation of the historic Foundry Branch Trolley Trestle Bridge
- Provision of a separated multi-use trail facility for all ages and abilities in neighborhoods currently without dedicated bicycle facilities
- Expansion of the low stress network between Palisades, Foxhall, and neighborhoods
- Provision of a direct connection to the Capital Crescent Trail
- Achieve Vision Zero goals by reducing serious crashes
- Achieve Move DC mode split goal by increasing the percent of trips made by walking and biking
- Decrease in erosion and stormwater runoff issues on the existing trail

Risks

- Community opposition to a formalized trail in Palisades and Foxhall
- Liability associated with the Foundry Branch Trolley Trestle Bridge in its current condition
- Land ownership impacts
- Opposition from institutions/property owners
- Trail alignment options 1-3 terminate at M Street in a high-stress, high-volume vehicular environment with limited bicycle facilities.
- Potential utility impacts to DC Water Crosstown Water Main
- Constructability of new bridges and steep topography sections of the trail
- Availability of funding (Federal and/or local) for high capital and maintenance costs

7.4.3. Identify Potential Funding Sources and Environmental Review Process

Constructing the PTT is a long-term endeavor that will require the proper alignment of local and federal funding, rights-of-way and easements, and community support. All trail concepts traverse through public lands and rights-of-way owned and operated by federal and local agencies. Therefore, the environmental review process would also require DDOT to continue working closely with agencies involved with linking this trail such as the National Park Service, DC SHPO, Army Corps of Engineers, and WMATA on the potential permits and agreements. If the District decides to advance this project, one of

the next implementation steps will be to determine the likely class of action that is most appropriate in terms of the National Environmental Policy Act of 1969 (NEPA) and the District of Columbia Environmental Policy Act (DCEPA).

Since the project requires federal action (such as approvals or permits) then this project must comply with NEPA. Projects that comply with NEPA automatically comply with DCEPA, as an exemption is provided under District of Columbia Municipal Regulations (DCMR) Chapter 72, section 7202.1(b). If the District intends to use federal funding from FHWA, discussions with FHWA as the lead federal transportation agency will inform the class of action and key next steps in terms of NEPA.

For projects where NEPA applies, whether the project is a Categorical Exclusion (CE), an Environmental Assessment (EA), or an Environmental Impact Statement (EIS) action depends on the "significance" of the project's potential adverse impacts. For projects using local funding where DCEPA applies, whether the project is an exemption, or requires an Environmental Impact Screening Form (EISF) or requires an EIS also depends upon the significance of the project impacts.

8.0 Appendices

1. Trail Concept Design Package
2. Foundry Branch Trolley Trestle Bridge Feasibility Report
3. New Bridges Technical Memorandum
4. Historic Resources Report
5. Public Outreach Summaries