

Preliminary Concept Design Report:

# CHERRYWOOD LANE COMPLETE AND GREEN STREET PROJECT

City of Greenbelt  
Prince George's County  
December 2015



## ACKNOWLEDGMENTS

This preliminary concept report was prepared under the guidance of the City of Greenbelt's Department of Planning and Community Development.

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# PROJECT OVERVIEW

## Project Scope

This *Preliminary Concept Design Report: Cherrywood Lane Complete and Green Street Project* has been prepared by the Low Impact Development Center, Inc., under the guidance of the Department of Planning and Community Development. It serves to provide a clear path for transforming a too-wide street into one that better serves multiple modes of transportation, minimizes paved surfaces, and optimizes stormwater management. This report provides guidance on complete and green street elements to be integrated within Cherrywood Lane's right-of-way and breaks down the roadway into three reconstruction phases.

The preliminary concept design and report reflect input gathered through multiple meetings with Planning and Public Works Department staff, the Advisory Planning Board, and Green ACES. Most, if not all, of these ideas are integrated into the final preliminary concept:

- Increase walkability by enhancing safety and convenience and strategically improving and expanding the sidewalk system
- Ensure pedestrian access to Greenbelt's transit system, recreational trails, and nearby neighborhoods such as Franklin Park at Greenbelt Station
- Provide access to transit stop facilities for the full range of users
- Physically protect the bike lane, wherever possible, with the use of bioretention, flexible posts, or other methods to separate bikes from cars
- Reduce impervious area and incorporate green stormwater infrastructure features such as bioretention, bioswales, and tree plantings within the right-of-way

## Project Location

Cherrywood Lane is a 1.5 mile long city-owned collector roadway in the heart of Greenbelt, MD. The roadway is a key part of Greenbelt's bike network and acts as an important commuter route to the Metro and MARC stations. West of Cherrywood Lane lies the Indian Creek Stream Valley – one of the last natural floodplains and the sole remaining unchannelized section of the stream valley within the I-495 Capital Beltway. Cherrywood Lane is bound by Maryland State Route 202 (MD-202)/Edmonston Road to the north and Maryland State Route 193 (MD-193)/Greenbelt Road to the south.

## Project Purpose

This project's purpose is to grant safe access for all users of Cherrywood Lane and better pedestrian and bicycle access to surrounding neighborhoods, commercial centers, and the Greenbelt Metro Station. It will provide on-street stormwater facilities that capture, slow down, and treat stormwater before it enters the storm drain system, eventually discharging into Indian Creek.

The following pages provide: 1) a description of the complete and green street elements utilized and 2) concept designs for various segments of the roadway. The intent is to provide the City with planning-level concepts for the reconstruction of the roadway in three separate phases. Retrofit cost estimates and stormwater treatment estimates are included for the first reconstruction phase (Phase One).

### Conceptual Site Plan Phases

The Department of Planning and Community Development envisions that Cherrywood Lane will be retrofitted in three separate phases:

**Phase One** is a roughly 4,200 linear foot segment that extends from the CVS Pharmacy parking lot entrance at Beltway Plaza to 350 feet south of the center of the roundabout at the intersection with Greenbelt Metro Access Drive.

**Phase Two** begins 350 feet south of the center of the roundabout to where Cherrywood Lane ends at Edmonston Road (MD 201). This segment is approximately 3,400 linear feet in length.

**Phase Three** is an approximately 500 linear foot segment from Greenbelt Road (MD 193) to the CVS Pharmacy parking lot entrance at Beltway Plaza.

Stormwater treatment calculations and a preliminary opinion of cost for roadway and best management practice construction are provided for Phase One (see Appendix 1).



The 1.5 mile Cherrywood Lane will be retrofitted in three phases.



# COMPLETE STREET DESIGN ELEMENTS

## Design Criteria Overview

Cherrywood Lane is a collector roadway that provides connectivity between local developed areas, neighborhoods, and arterial roadways within the City of Greenbelt. The right-of-way varies from approximately 80 to 100 feet.

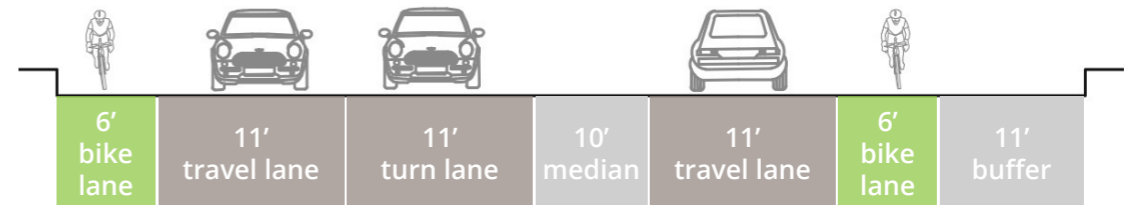
The majority of the 1.5 mile roadway is two travel lanes with wide shoulders and a large, paved median marked with yellow striping. There is minimal on-street parking on the eastern side of Cherrywood Lane, located primarily by Franklin Park at Greenbelt Station Apartments. Southbound left turn storage lanes allow for left turn movement onto Breezewood Drive, Springhill Drive, and Ivy Lane and into Franklin Park at Greenbelt Station Apartments and Springhill Lake Recreation Center. A roundabout exists at the intersection with Greenbelt Metro Access Drive. Cherrywood Lane transitions into a 4-lane road for about a quarter mile on both ends of the roadway as it approaches Edmonston Road (MD 201) to the north and Greenbelt Road (MD 193) to the south.

The design elements identified in this report are intended to fit within the existing right-of-way. Any alternative modifications that might require an expansion of the right-of-way are noted.

## Roadway Design Criteria

### Functional Classification

Cherrywood Lane is designated and recommended to remain a collector road in the 2013 *Greenbelt Metro Area and MD 193 Corridor Sector Plan and Sectional Map Amendment (SMA)*. The sector plan and SMA also proposes to keep Cherrywood Lane as a two-lane road, with one lane in each direction. This report does not propose any changes to the functional classification.



Existing Cherrywood Lane roadway section north of the intersection with Breezewood Drive.

## Traffic and Circulation

The *Greenbelt Metro Area and MD 193 Corridor Sector Plan and SMA* includes recent traffic and circulation observations and forecasts how Cherrywood Lane will perform in year 2040 traffic conditions. Excessive speeding along Cherrywood Lane was observed during off-peak hours in 2012. Prince George’s County’s regional transportation demand forecasting model found that Cherrywood Lane is and will continue to operate at an acceptable level of service, provided that the entire Capital Beltway (I-95/495) Greenbelt Metro interchange is constructed.

This *Preliminary Concept Design Report* recommends adding green infrastructure elements along the length of the roadway as traffic calming devices. Phase Two recommendations include maintaining the four-lane storage capacity between the Federal Courthouse entrance and Edmonston Road intersection and the two-lane striping between the Federal Courthouse entrance and Greenbelt Metro Access Drive. This is supported by the *Greenbelt Metro Area and MD 193 Corridor Sector Plan and SMA* and the City of Greenbelt’s 2014 *Pedestrian and Bicyclist Master Plan*.

This report also recommends that the impact of a full interchange at the existing Capital Beltway (I-95/495) Greenbelt Metro interchange be reviewed prior to finalizing a concept design for Phases Two and Three of the Cherrywood Lane complete and green street retrofit project.

### Lane Widths

Existing lane widths average between 10 and 12 feet. The concept designs included in this *Preliminary Concept Design Report* are depicted with 11 foot lane widths.

### Streetscape Standards

The *Greenbelt Metro Area and MD 193 Corridor Sector Plan and SMA* recommends that Cherrywood Lane be reconstructed as a green street with landscaped medians, wide bike lanes, turn lanes where needed, and sidewalks on both sides of the street. Inclusion of such features will also ensure conformance with the principles for complete streets design identified in the 2009 *Approved Countywide Master Plan of Transportation*.

## Pedestrian Design Criteria

### Sidewalks

Cherrywood Lane lacks sidewalks on the western side between the crosswalk nearest Beltway Plaza Mall and the roundabout. Continuous sidewalks are also missing on both sides of the roadway near Edmonston Road (Route 201). The *Greenbelt Metro Area and MD 193 Corridor Sector Plan and SMA* and the *Pedestrian and Bicyclist Master Plan* recommend correcting these issues.

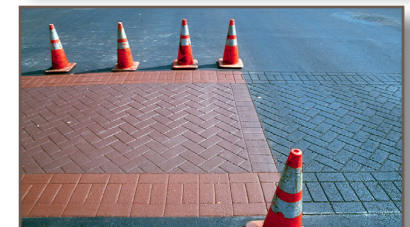


Disconnected/missing sidewalk between Edmonston Road and Breezewood Drive.

The *Pedestrian and Bicyclist Master Plan* identifies the American Association of State Highway and Transportation Officials' (AASHTO) seven characteristics of a well-designed sidewalk. These include ADA accessibility; adequate width for passing; safety/sense of security; continuity; landscaping; social space for interaction; and strengthening of neighborhood identity. This *Preliminary Concept Design Report* supports those recommendations. The final width and placement of the sidewalk will be determined in future stages of design. The cost to install a continuous 5 foot sidewalk on the west side for Phase One are provided in the cost estimates in Appendix B. An optional cost is also included for removing the 4 foot sidewalk on the eastern side and replacing it with a 5 foot sidewalk. The City may have to acquire more right-of-way to expand the sidewalk on the eastern side, if desired.

### Pedestrian Crossings

The current roadway configuration requires pedestrians to cross 60 to 70 feet of road width in a single crossing. Very few raised center medians or pedestrian refuge islands are available. This report recommends that best practice designs for crossings be incorporated throughout the length of Cherrywood Lane. This includes utilizing ADA compliant curb ramps, crosswalk markings, raised crosswalks, and curb bumpouts to reduce the crossing distance and limit pedestrian exposure.



Options for improving crosswalk safety include refuge islands and striped or raised crosswalks.



## Bicycle Design Criteria

### Bike Lanes

Bike lanes are present on both sides of Cherrywood Lane, with the exception of the area between Breezewood Drive and Greenbelt Road and a small segment nearest to MD 201. This *Preliminary Concept Design Report* proposes adding bike lanes on both sides of the road in these segments.

Existing bike lanes are 6 feet wide. Lanes are one-way and go in the direction of the adjacent travel lane. In several places, it is recommended that the width of the bike lanes be reduced from 6 to 5 feet to accommodate the presence of designated buffer spaces, delineator posts/bumps, and other complete and green street elements intended to separate bicycle and auto traffic. Doing so will provide cyclists with greater protection. In other areas, a shared bike lane (“sharrow”) is recommended to indicate where cyclists should bike and to remind drivers to share the street.

Where on-street parking is present, a 3 to 4 foot wide buffer should be placed between the bike lane and parking lane and marked with white diagonal cross hatching or chevron markings.



Bike lanes are present along both sides for the majority of the roadway. This report recommends adding bike lanes where they are not currently present and adding features that enhance bike safety.



Concept design recommendations include installing a series of bioswales on the western side to protect the bike lanes from the flow of traffic.

### Colored Bike Facilities

Green colored pavement in bike lanes increases cyclist visibility. It is recommended that the City evaluate whether color should be applied along the entire length of the bike lanes to increase visibility, to reinforce priority to cyclists, and to reduce conflicts. The City would need to evaluate the application process and the long-term maintenance cost. Alternately, green markings can be utilized as spot treatments in conflict areas or within intersections.

### Intersection Treatments

Design elements such as signage, medians, pavement markings, bike lane pockets, and bike boxes can increase cyclist visibility and safety. Field observations and public input obtained through the *Pedestrian and Bicyclist Master Plan* process indicates that protected left turns and conflicts with right-turning traffic at intersections are issues.

It is recommended that dashed intersection pavement markings be used to indicate the intended path of cyclists and where vehicles may cross over bike lanes.



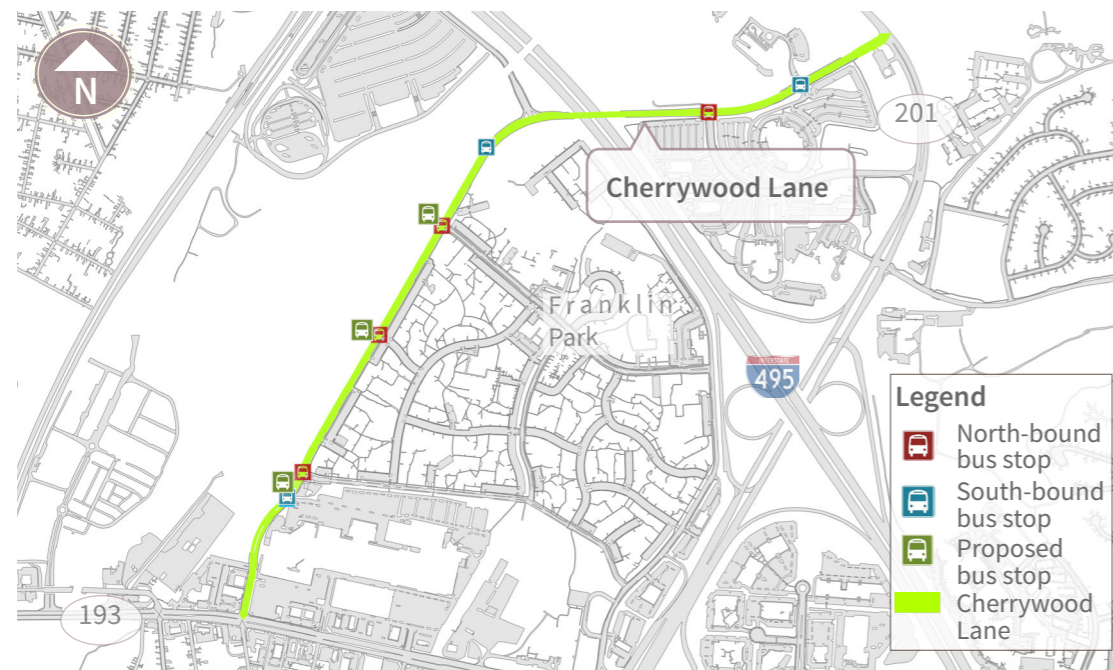
Examples of bike lanes striped (top) or covered (middle and bottom) with green retro-reflective thermoplastic to increase the safety of cyclists. Dashed areas indicate where vehicles may cross over.



## Bus Stops, Parking, and Lighting

### Bus Stop Placement

Seven bus stops are located along Cherrywood Lane: 4 on the east side and 3 on the west side. Three additional south-bound bus stop are proposed on the west side: one at the Breezewood Drive intersection; one between Breezewood Drive and Sprinhill Drive; and one near the Springhill Drive intersection. It is recommended that the existing bus stop locations be evaluated in future stages to determine whether any should be relocated on the far side of intersections to discourage mid-block crossings and to prevent people from trying to cross in front of a stopped bus where pedestrian visibility is limited.



Location of existing and proposed bus stops along Cherrywood Lane.

### Bus Stop Amenities and Shelters

There is a lack of uniform bus stop amenities and shelters along Cherrywood Lane. The *Greenbelt Metro Area and MD 193 Corridor Sector Plan and SMA* and the *Pedestrian and Bicyclist Master Plan* recommend that stops include uniform bus shelters to provide protection for waiting passengers from sun, wind, and rain. Shelters should be placed at the nearside of landing pads to provide adequate boarding and alighting space for persons in a wheelchair (WMATA 2009).

### Bus Stop Zones and Waiting Areas

All new bus facilities and modifications to existing bus facilities must comply with the Washington Metropolitan Area Transit Authority (WMATA) *Guidelines for the Design and Placement of Transit Stops*.

Near-side bus stop zones (located just before an intersection) should be placed at least 5 feet from the crosswalk and be a minimum of 100 feet in length. Far-side bus stop zones (located immediately after an intersection) require a minimum of 70 to 90 feet and



Existing bus shelter on Cherrywood Lane's west side near Beltway Plaza Mall.



Existing bus stop without a shelter on Cherrywood Lane's east side near the intersection with Ivy Lane.





should be located at least 50 feet from the intersection. Mid-block bus stops require 110-150 feet of roadside area and are the least-preferred by WMATA.”

The existing bus stops along Cherrywood Lane are all near-side, far-side, or mid-block stops. One new far-side bus stop is proposed for south-bound traffic after the intersection of Cherrywood Lane and Springhill Drive.



### Floating Bus Stops

Floating bus stops are designed to allow bicycle traffic to run behind the passenger boarding area at a bus stop. While not assessed in this report, it is recommended that the City of Greenbelt evaluate the use of floating bus stops to determine whether it is possible to have the bike lane run behind the bus loading pad. Consideration must be given as to whether a bus pull-off area is required or if buses may stop in the roadway to load and unload passengers. A bus pull-off area will require additional right-of-way. If no bus pull-off area is needed, the floating bus stop will likely fit within the existing right-of-way.

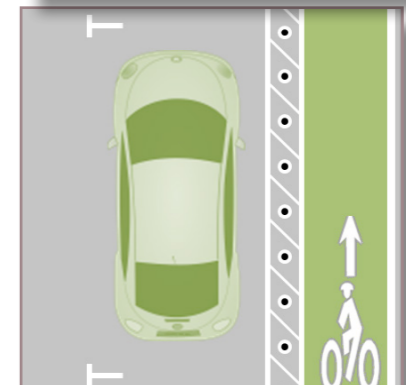
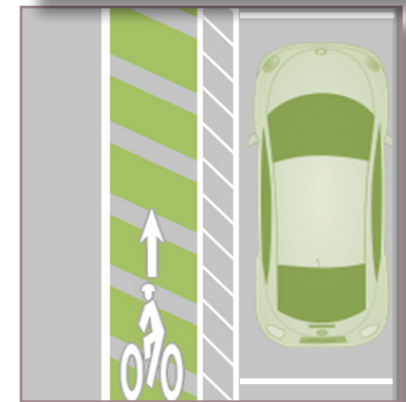


Potential floating bus stop configurations for future consideration. In each, the bike lane briefly raises up to sidewalk level to allow access to the bus boarding area.

### On-street Parking

A limited amount of on-street parking exists on the east side of Cherrywood Lane by Franklin Park at Greenbelt Station Apartments. Approximately 28 parallel parking spaces exist along two separate stretches. Input obtained from the Advisory Planning Board and Green ACES indicates that on-street parking may not be necessary. This *Preliminary Concept Design Report* recommends that the Department of Planning and Community Development conduct a parking needs assessment for Cherrywood Lane.

The concept designs were prepared with the assumption that some or all on-street parking will be retained. It is recommended that a 3-4 foot buffer be placed between parked cars and the bike lane to prevent dooring (i.e., an opened door hitting or being hit by passing traffic) where on-street parking exists. The buffer should be marked with 2 solid white lines with interior diagonal cross hatching or chevron markings (NATCO 2013). Alternatively, the street can be redesigned to allow bicycle traffic to run behind the on-street parking area.



The current bike lanes fall within the door zone (top). Proposed (middle) vs. optional (bottom) modifications.

### Pedestrian-Scale Lighting

Street lights in the City of Greenbelt are owned and maintained by Pepco. Existing street lights along Cherrywood Lane were designed primarily with automobile safety and comfort in mind. Utility pole-mounted street lights are set at a pole height of between 20-30 feet and are spaced at an average of every 150 feet along Cherrywood Lane. It is recommended that pedestrian-scale light fixtures be used to in-fill between street light poles every 50 feet to provide uniform illumination and security for pedestrians and cyclists. Pedestrian-scale lighting elements also serve to improve aesthetics and can act as a unifying element of other streetscape items.

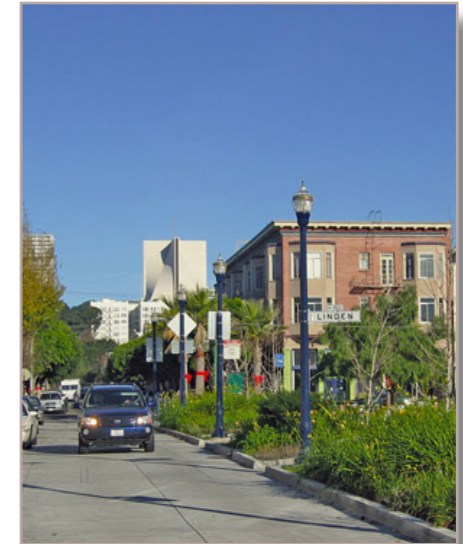
Pedestrian-scale lighting is characterized by medium height light poles (i.e. 12- to 15-foot-tall posts) fitted with downcast or low- to full-cutoff fixtures to prevent glare. As per the *Pedestrian and Bicyclist Master Plan*, high pressure sodium vapor or metal halide lamps should be used to produce a better color definition and “white light” to areas



LED pedestrian-scale lighting in Holland, MI has helped to create a vibrant downtown community.

with higher pedestrian volumes. Lighting levels should comply with local ordinances and light fixtures should be made to withstand vandalism.

The Department of Planning and Community Development should coordinate light fixture selection and placement with Pepco. It is suggested that standalone solar fixtures and LED and solar-powered lighting options be explored during final design.



Pedestrian-scale lighting on Hayes St. in San Francisco, CA.



## GREEN STREET DESIGN ELEMENTS

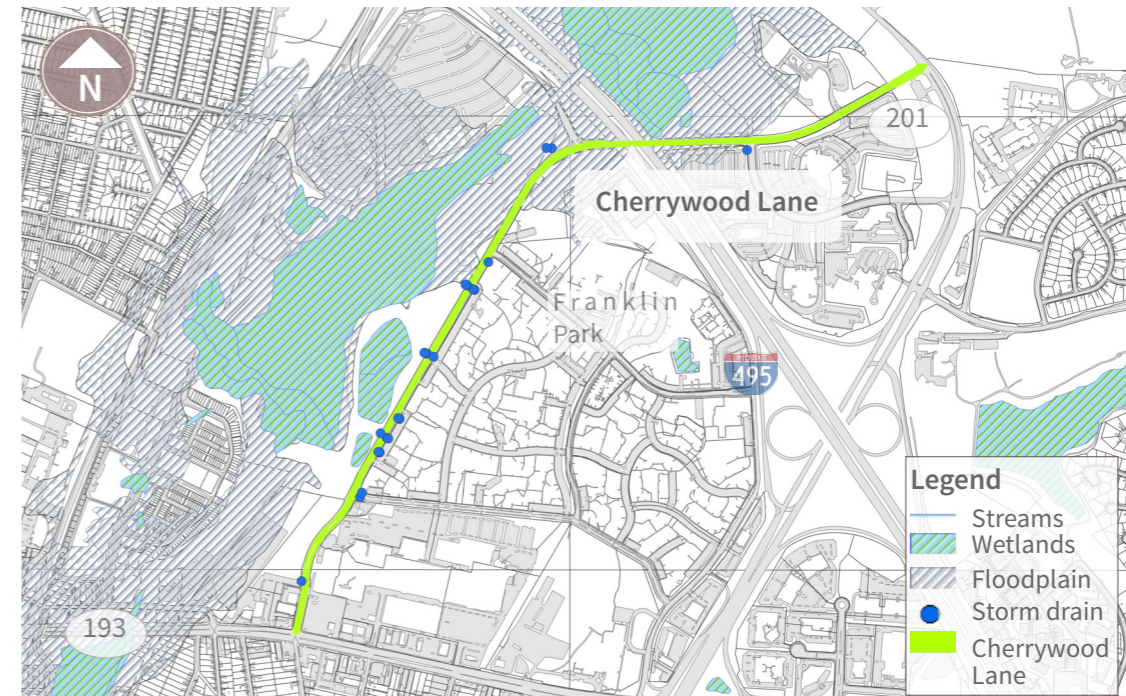
### Design Criteria Overview

Cherrywood Lane lies within the Indian Creek subwatershed, which is a heavily populated and industrialized subwatershed within the Anacostia watershed. West of Cherrywood Lane is the Indian Creek Stream Valley – the sole remaining unchannelized section and one of the last natural floodplains inside the beltway.

Portions of the surrounding area have long been designated by the City of Greenbelt and Prince George’s County as important environmental areas. The majority of development along Cherrywood Lane occurred before modern requirements for stormwater management. Little consideration was given for the problems that stream bank erosion, sedimentation, and an abundance of impervious surfaces would bring.

The combination of development without innovative, modern stormwater management features and a high percentage of impervious surfaces has resulted in poor water quality conditions. The existing road and right-of-way encompass a 14.17-acre drainage area, of which 91% or 12.94 acres is impervious.

The roadway drains as sheet flow and shallow concentrated flow to curb inlets on both the east and west sides. Drainage is good and ponding is minimal; however, direct discharge to Indian Creek creates flooding conditions around the stream. There is some evidence of impairment to the stormwater outfalls that lie on Maryland State owned land. The stormwater running off of Cherrywood Lane currently does not receive treatment before it reaches Indian Creek. Green stormwater infrastructure design elements incorporated within the green and complete street design aim to control at least 1 inch of runoff.



Environmental Features

One inch of rainfall in the Greenbelt area is considered as the 90th percentile storm, meaning that 90 percent of all storms that occur within a year are, on average, 1 inch or less. Green stormwater infrastructure can help to improve the water quality by capturing the first inch or more of rainwater within the right-of-way, thus reducing the volume of water entering the storm drain and flowing into Indian Creek during a storm event. This first inch is often referred to as the “first flush” of rainwater because it carries with it a higher concentration of pollutants. Green stormwater infrastructure elements serve to decrease pollutant loads by allowing the runoff to slow down and be treated before either being absorbed into the ground or air, or slowly being released into the storm drain system.





Example of a stormwater curb extension along side a residential street.

## Green Stormwater Infrastructure

### Stormwater Curb Extensions

Stormwater curb extensions are landscaped bump-outs that are designed as bioretention areas to slow down, collect, and clean stormwater runoff. The top of the planting media is set lower than the street’s gutter to allow stormwater to flow into it via one or more inlets. The plants take up some of the stormwater through their root system, while the rest is temporarily stored within the curb extension’s media until it either evapotranspires into the air, infiltrates the ground, or slowly makes its way back to the storm drain.

Stormwater curb extensions can be utilized on the east side of Cherrywood Lane in several locations. These areas should be designed to be 8 feet wide, which is the same width as a street parking lane. Alternatively, if protected bike lanes are utilized

on the east side, these water treatment areas can be narrowed to a minimum of 5 feet and set away from the curb as “floating” stormwater curb extensions to allow bicycle traffic to run behind them. Stormwater curb extensions can also be elongated for some or most of a block by adding a bioswale in front of the bioretention area.

Stormwater curb extensions cannot be used where bus pull-off areas or on-street parking areas exist. The feasibility and final location of the stormwater curb extensions will be evaluated during the final design process based on engineer review of utilities, on-street parking conditions, street width, and vehicle turning radii and volumes.

### Bioswales

Bioretention swales, or bioswales, are modified swales that use bioretention media beneath the swale to improve water quality, reduce the runoff volume, and modulate the peak runoff rate. Bioswales are designed to collect sheet flow of runoff from small lengths of drainage to help absorb water and then convey the excess runoff from storms.



Top image: bioswale with a grassed strip along the edge. Bottom image: a narrower bioswale with inlets directing water from both the sidewalk (left side) and street (right side) into the treatment area.



Bioswales differ from bioretention cells in that they are designed to be conveyance treatment devices and not storage devices. This *Preliminary Concept Design Report* recommends installing a series of bioswales on Cherrywood Lane’s west side to provide stormwater runoff treatment and to create a buffer between the bike lane and travel lane. “Floating” bioswales may replace floating stormwater curb extensions on the roadway’s eastern side. The final combination of stormwater treatment elements will be determined in a later stage.

Bioswale widths vary from approximately 6 to 8 feet. Only the 2-foot-wide flat bottom provides treatment. The remainder should be landscaped to match existing landscape. Special attention should be paid to reduce potential maintenance costs.

### Impervious Surface Removal

Impervious surface removal refers to the replacement of impervious areas — such as asphalt and concrete — with vegetation or other permeable surfaces. Replacing hard, impermeable areas with healthy vegetated groundcover, bioretention areas, permeable pavement, or tree planting areas improves urban hydrology and water quality. It also adds green spaces back into the urban streetscape.

The removal of impervious area along both sides of Cherrywood Lane and in the paved median will greatly reduce the amount of stormwater runoff that must be treated. This in turn reduces the size and cost of stormwater treatment. The new non-impervious areas also provide pedestrian refuge when crossing the busy street. The reconstructed road’s boulevard feel will provide a traffic calming effect, deterring motorists from speeding down the road which is currently an issue.

### Tree Plantings and Landscaping

Planting street trees and landscaping in the public right-of-way enhances the physical, ecological, and social aspects of Cherrywood Lane. Because street trees are an important organizing element of the streetscape environment, appropriate tree species selection, location, and design are essential. Proper tree selection and planting will ensure the healthy growth and longevity of trees, enhance streetscape

character, and maximize the City of Greenbelt’s investment.

The following guidelines shall be utilized to identify suitable plantings and materials that are attractive, minimize maintenance, avoid obstruction of visibility, discourage graffiti, and conserve water. Trees and landscaping in the median should blend in with existing vegetation or provide a nice contrast. Plant material should be drought tolerant and disease resistant, with preference given to native species. Care should be taken to select trees and shrubs that have room for adequate root growth, keep the visibility triangle free from obstruction, and do not interfere with pedestrian passage or with existing overhead or underground utilities, where applicable.

Flowering trees should be spaced approximately 30 feet apart and shade trees 50 feet apart when preparing the landscaping plan for final design. No trees should be placed closer than 15 feet from street lights or utility poles (DPW&T 2008).

When selecting groundcover, turf grass should be avoided in the median to ensure that no mowing is necessary. Consider adding variation in seasonal appearance and combining evergreen with deciduous material. Stormwater infiltration should be promoted by utilizing a proper soil medium (loamy soil).



Cherry trees within the existing planted median (top) near Breezewood Drive provide spectacular spring colors (middle). Existing trees can also be found along the eastern sidewalk (bottom).

## CHERRYWOOD LANE ILLUSTRATED CONCEPTS

The following pages consist of illustrated concept plans for the retrofit of Cherrywood Lane in three separate reconstruction phases. Phase One extends from the CVS Pharmacy parking lot entrance at Beltway Plaza to 350 feet south of the center of the roundabout at the intersection with Greenbelt Metro Access Drive. Phase Two begins south of the Greenbelt Metro Access Drive roundabout to where Cherrywood Lane terminates at the intersection with Edmonston Road (MD 201). Phase Three extends from the intersection with Greenbelt Road (MD 193) to the crosswalk near Beltway Plaza Mall.

Phase One is targeted for reconstruction first. Because of the long-term nature of this project, cost estimates are provided for Phase One only, for the purpose of securing final design and reconstruction funding. Stormwater treatment estimates are also provided for Phase One.





## Cherrywood Lane Illustrated Concepts: Phase One

Phase One of the Cherrywood Lane complete and green street retrofit spans 4,200 feet, or 8/10 of a mile. Phase One begins at the CVS Pharmacy entrance drive at Beltway Plaza and ends 350 feet south of the Greenbelt Metro Access Drive roundabout's center. Beltway Plaza Mall, Franklin Park at Greenbelt Station, Springhill Lake Recreation Center, and Springhill Lake Elementary School lie to the east. A state preservation parcel containing Indian Creek lies to the west. The new Greenbelt Station development also lies further to the west, near the southernmost portion of Phase One.

Bike lanes are absent on Cherrywood Lane until just north of Breezewood Drive. Sidewalks are lacking on the western side of the roadway. In terms of stormwater management, the roadway captures rainwater and snow melt from a drainage area of approximately 6.79 acres, of which 6.23 acres are impervious. This stormwater drains as sheet flow and shallow concentrated flow to curb inlets on both the east and west sides of Cherrywood Lane.

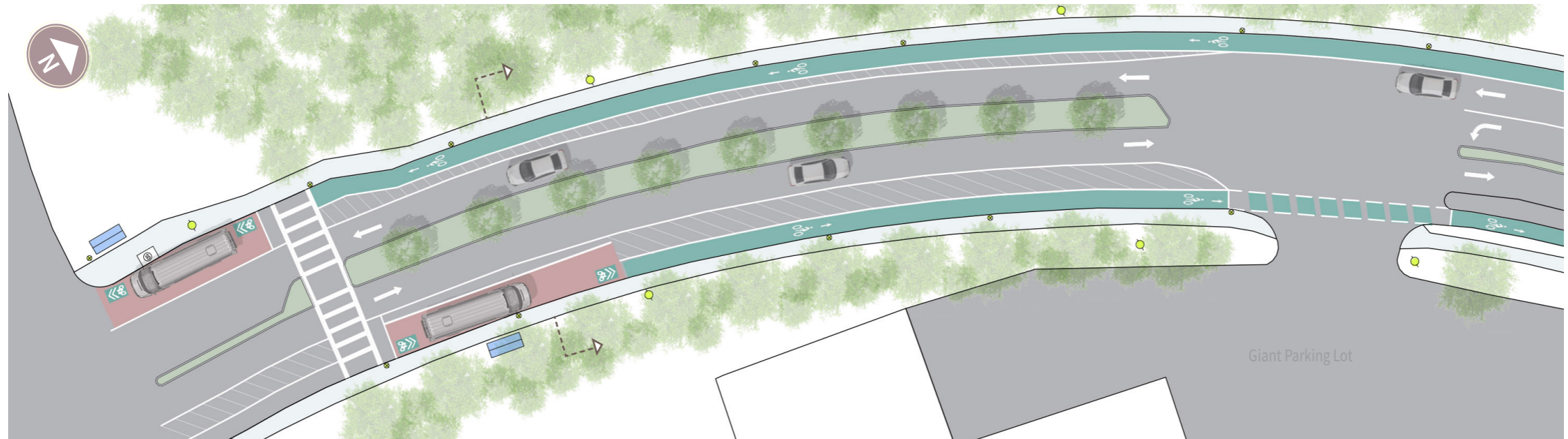
The proposed Phase One concepts are illustrated in roadway segments A, B, C, and D. Each segment represents predominant sections of the roadway. Each representative segment illustrates how sidewalks, bike lanes, and green stormwater infrastructure elements are incorporated into the existing right-of-way.

As conceptualized, 1.3 acres of existing impervious area would be removed. The proposed green stormwater infrastructure elements would treat 19,815 cubic feet, or 148,226 gallons, of stormwater. This preliminary estimate translates to roughly 114% of the volume required to treat the 1 inch storm event. More or less stormwater can be treated by increasing or decreasing the size of the green stormwater infrastructure elements. The final calculation would be determined at full design.

The total estimated cost to design and build Phase One as a complete and green street is \$2,765,514. This estimate includes 17% design and engineering costs and a 30% contingency. Optional improvements to mill and overlay the existing pavement and to widen the sidewalk on the eastern side would increase this estimate to \$3,073,890.



## Roadway Segment A



### Existing Features

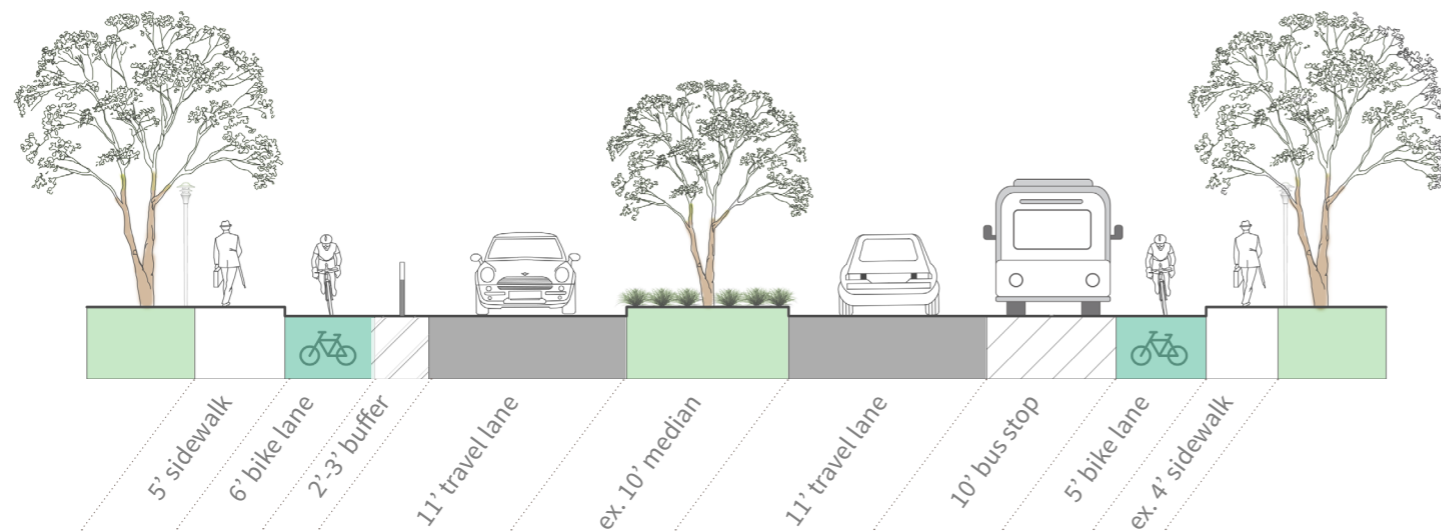
|                      |           |
|----------------------|-----------|
| telephone/light pole | canopy    |
| storm drain          | crosswalk |
| fire hydrant         | bus stop  |

### Proposed Features

|              |           |                  |
|--------------|-----------|------------------|
| bioswale     | bus stop  | street tree      |
| bicycle lane | bus zone  | pedestrian light |
| sharrow      | crosswalk | plastic bollard  |

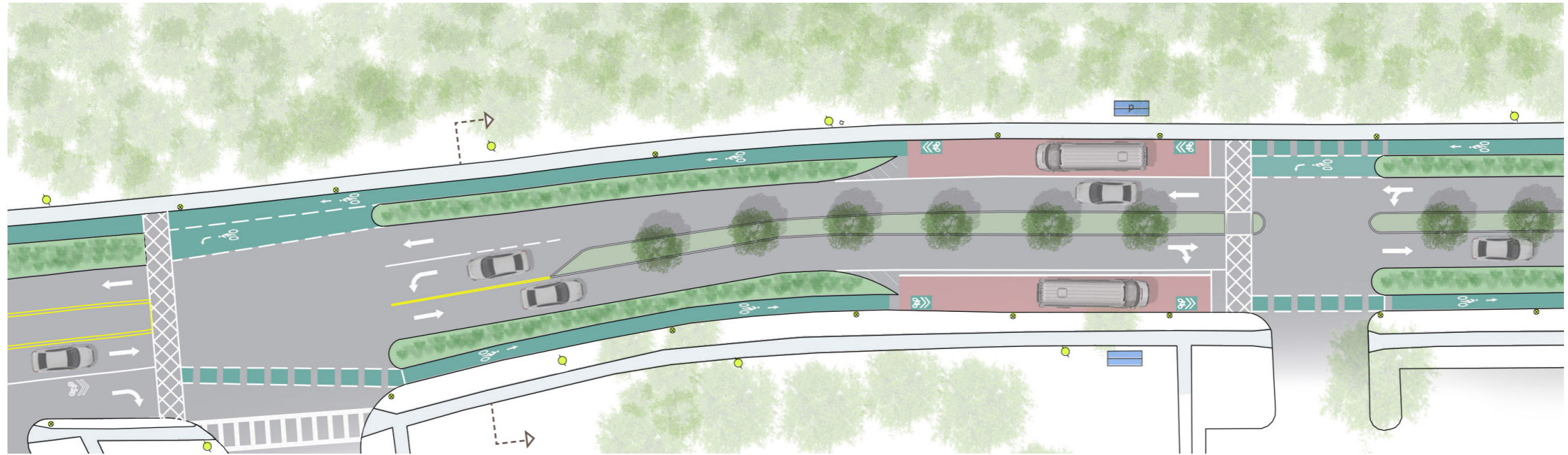
## A Across from Beltway Plaza Mall

Phase One begins near Beltway Plaza Mall at the CVS Pharmacy parking entrance. The concept envisions re-striping the existing four-lane road into a two-lane road with a single travel lane in each direction. Doing so provides space for a 6 foot protected bike lane on both sides, except in the location of the bus stops. In the bus stop area, the bike lane narrows to 5 feet and becomes a sharrow (this may need to be reconsidered after discussions with WMATA). A 5-foot-long sidewalk is added to the west side. Opportunities to install green stormwater infrastructure elements within this roadway segment are limited. The road already benefits from the presence of a planted median buffer, and the City may consider replacing portions of the striped protected buffer with a planted buffer. Pedestrian-scale lighting is added to address safety concerns and to incorporate a unifying feature throughout the entire length of the roadway.





Roadway Segment B



Existing Features

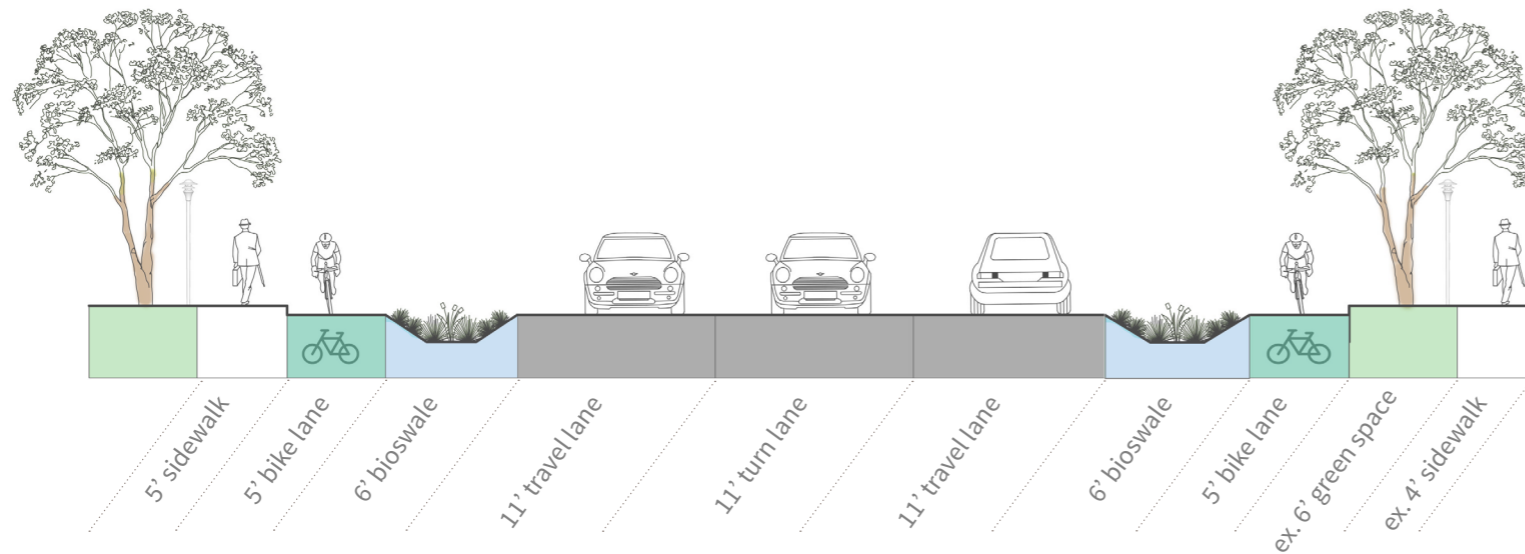
- telephone/light pole
- ☎ storm drain
- fire hydrant
- canopy
- ▨ crosswalk
- ▭ bus stop

Proposed Features

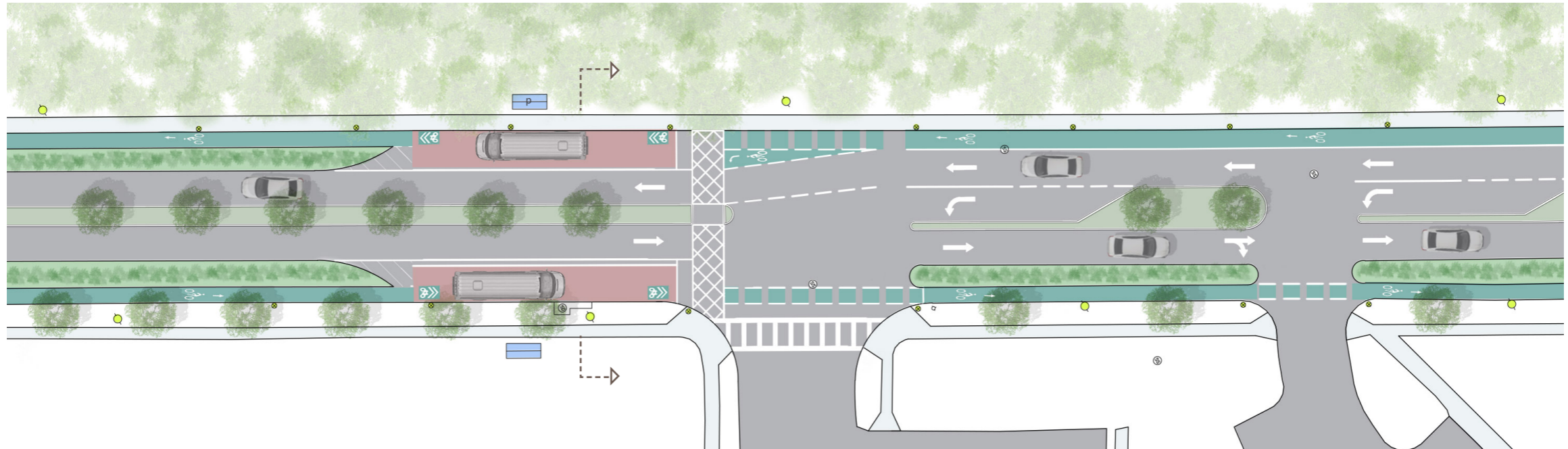
- bioswale
- bicycle lane
- ➡ sharrow
- ▭ bus stop
- bus zone
- ▨ crosswalk
- street tree
- pedestrian light
- plastic bollard

B Breezewood Drive

Approaching Breezewood Drive, additional room within the right-of-way allows for the installation of stormwater treatment areas on both sides and a planted median in the center. The stormwater treatment areas buffer the designated bike lane from the travel lane. Here, the bike lane narrows to 5 feet. A left turn area is provided for south-bound cyclists needing to cross Cherrywood Lane to go onto Breezewood Drive or to get into the apartment parking area. A bus stop is added to the west side. Marked crosswalks are added to increase crosswalk visibility and indicate that vehicles should yield to pedestrians. Crossing distances are reduced by the addition of the planted median and stormwater treatment areas. Pedestrian lighting introduced in segment A continues here to help define the area and allow pedestrians and cyclists to feel more secure during early morning and dusk hours.



### Roadway Segment C



#### Existing Features

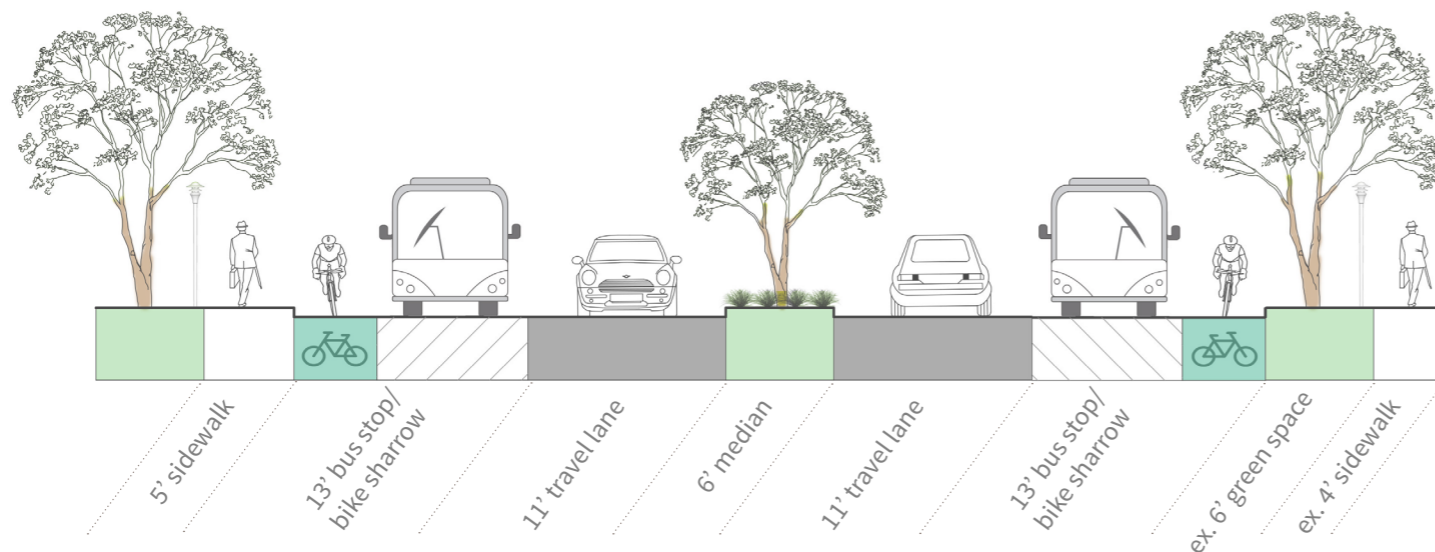
- telephone/light pole
- storm drain
- fire hydrant
- canopy
- crosswalk
- bus stop

#### Proposed Features

- bioswale
- bicycle lane
- sharrow
- bus stop
- bus zone
- crosswalk
- street tree
- pedestrian light
- plastic bollard

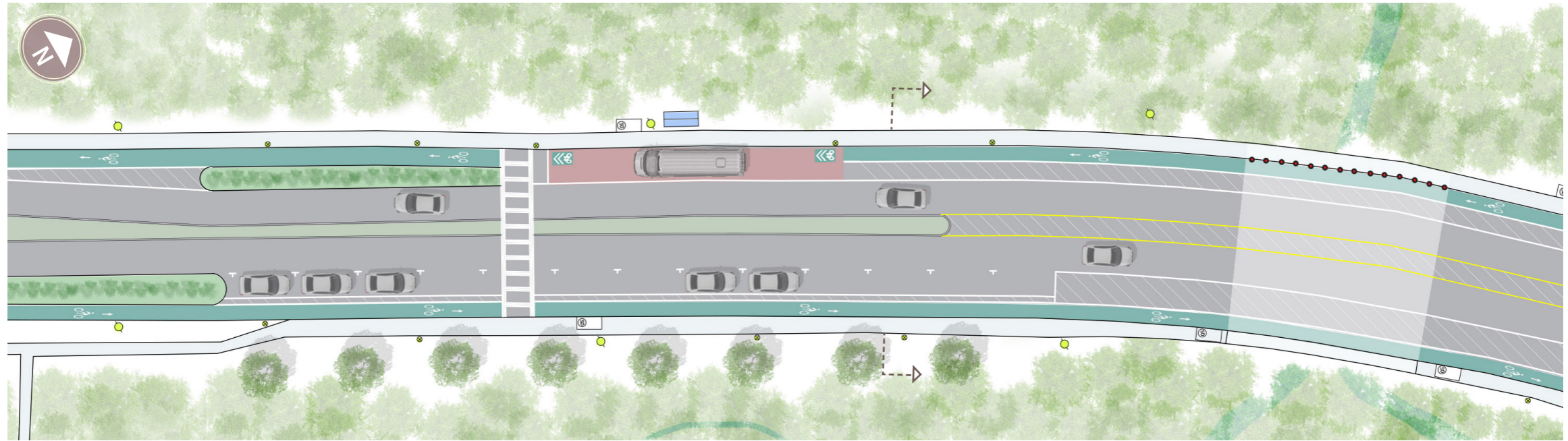
### C Springhill Drive

A continuous rhythm of complete and green street elements along Cherrywood Lane provide a unified identity along the corridor. In the area represented by segment C, a narrow planted median is installed. A new bus stop is placed on the west side of the roadway, and pedestrian crosswalks are added at the intersection with Springhill Drive. A median refuge area provides a safe spot for pedestrians crossing the street. Street trees are planted within the median and along the eastern side of the street to provide shade for pedestrians and cyclists. The specific locations of street trees and pedestrian-scale lighting will be determined at final design, as will the locations of other complete and green street elements. The bus stop location may need to be reconsidered after discussions with WMATA.





## Roadway Segment D

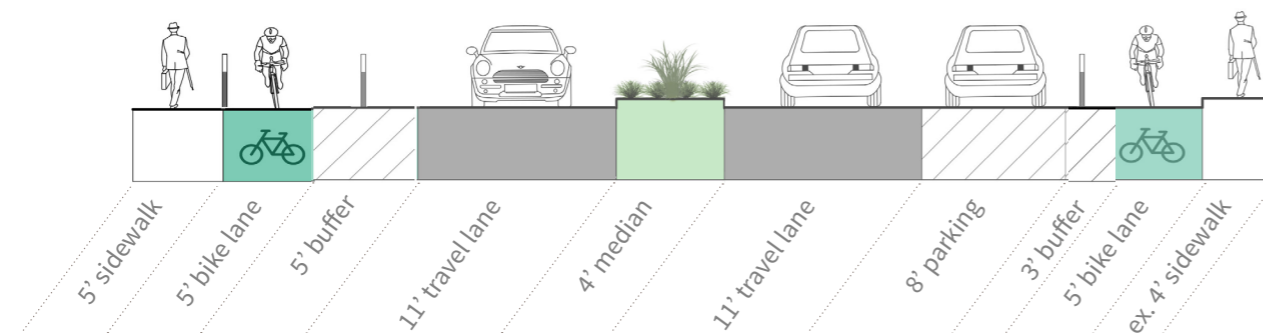


### Existing Features

- telephone/light pole
- canopy
- storm drain
- crosswalk
- fire hydrant
- bus stop

### Proposed Features

- bioswale
- bus stop
- bicycle lane
- bus zone
- sharrow
- crosswalk
- street tree
- pedestrian light
- plastic bollard



## D Indian Creek Tributary Bridge

As the roadway reaches the small bridge across the Indian Creek tributary, the bike lanes are maintained but many of the green street features are removed. The planted median reduces to 4 feet to allow room for protected bike lanes on both sides. A designated area for on-street parking is added on the east side to accommodate overflow parking for events at the Springhill Lake Recreation Center. Alternatively, this parking area could be converted to a stormwater treatment area if the Department of Planning and Community Development’s parking needs assessment determines that additional parking is not needed. Presently, no sidewalk exists along the west side of the bridge. Reflective bollards or delineator posts are added to define the pedestrian walkway and the bike lane.



## Phase One Treatment Options

### Pedestrian Crossings



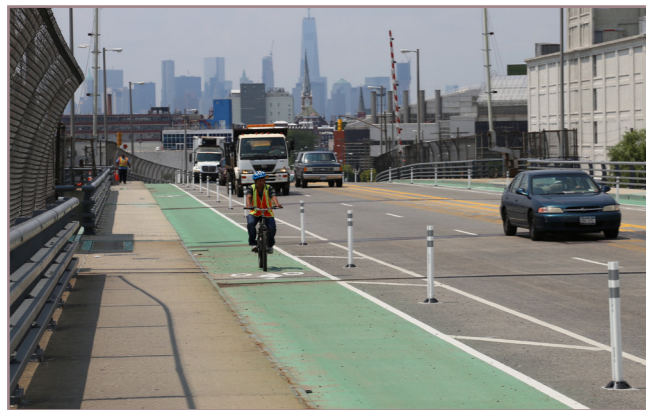
### Bike Lane Treatments





### Phase One Treatment Options (continued)

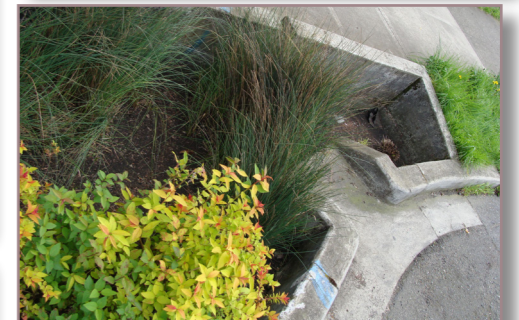
#### Bridge Segment



#### Pedestrian-scale Lighting



#### Green Stormwater Infrastructure





## Cherrywood Lane Illustrated Concepts: Phase Two

Phase Two of the Cherrywood Lane complete and green street retrofit begins about 300 feet south of the roundabout at Greenbelt Metro Access Drive and ends at Edmonston Road (Route 201). Phase Two is approximately 3,500 feet long, or just under 7/10 of a mile and encompasses a drainage area of approximately 6.35 acres and includes 5.83 acres of impervious area.

Several segments of Phase Two provide challenges to implementing complete and green street elements. Some concerns have been voiced regarding the flow of bike traffic through the roundabout; however, no physical changes to the roundabout are being proposed. The incorporation of green stormwater infrastructure elements are also limited around the roundabout and the bridge that crosses I-95. Much of this segment falls within the limits of the 100-year floodplain.

In spite of these challenges, Phase Two provides many opportunities to enhance bike and pedestrian safety. Bike lanes and sidewalks are present for the majority of Phase Two, with the exception of the approximately 400-foot-long segment as it nears Edmonston Road. This report recommends extending the sidewalks in this area and ensuring bike lanes are appropriately protected and marked.

Phase Two also provides opportunities to reduce the amount of impervious area by about 1 acre and replace it with a landscaped median and other green stormwater infrastructure features. Opportunity also exists to retrofit an existing grass swale on the west side of the roadway into a bioswale. The proposed Phase Two concepts are illustrated in roadway segments E, F, and G.



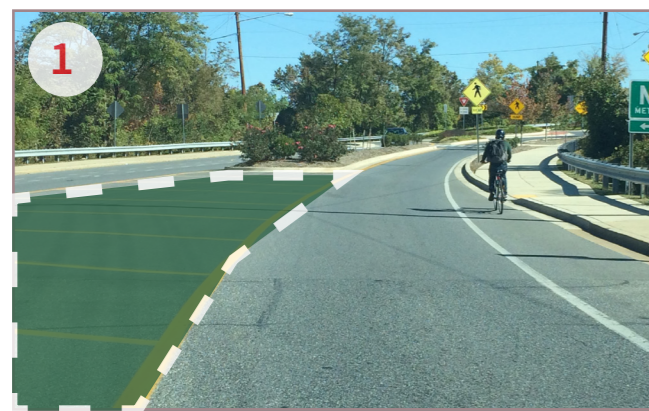


### Roadway Segment E



### E South of the Roundabout

Phase Two begins about 350 feet south of the center of the Greenbelt Metro Drive roundabout. This concept proposes expanding the existing planted median to reduce the amount of impervious area and further enhance the roadway's aesthetics (1). This portion of the roadway includes sidewalks on either side of the roadway and a raised pedestrian crossing. Pedestrian-scale lighting is recommended to ensure pedestrian and cyclist safety. It is recommended that a sign be incorporated near the roundabout's entrance to alert all road users that cyclists are permitted.





### Roadway Segment F



### F Near Capital Office Park

The opportunity arises to integrate additional complete and green street elements in Phase Two as Cherrywood Lane nears Capital Office Park. The two existing bike lanes are painted green, and a bioswale or planted buffer is added to physically protect the bike lane on Cherrywood Lane's north/west side while also providing improved stormwater management (2), and the median's pavement is replaced with a raised planted median (3). A grassed swale on Cherrywood's south/east side may provide opportunity to be retrofitted into a bioswale, depending on site condition (4). Colored bike facilities, intersection treatments, pedestrian-scale lighting, and tree plantings will also be incorporated within the right-of-way.

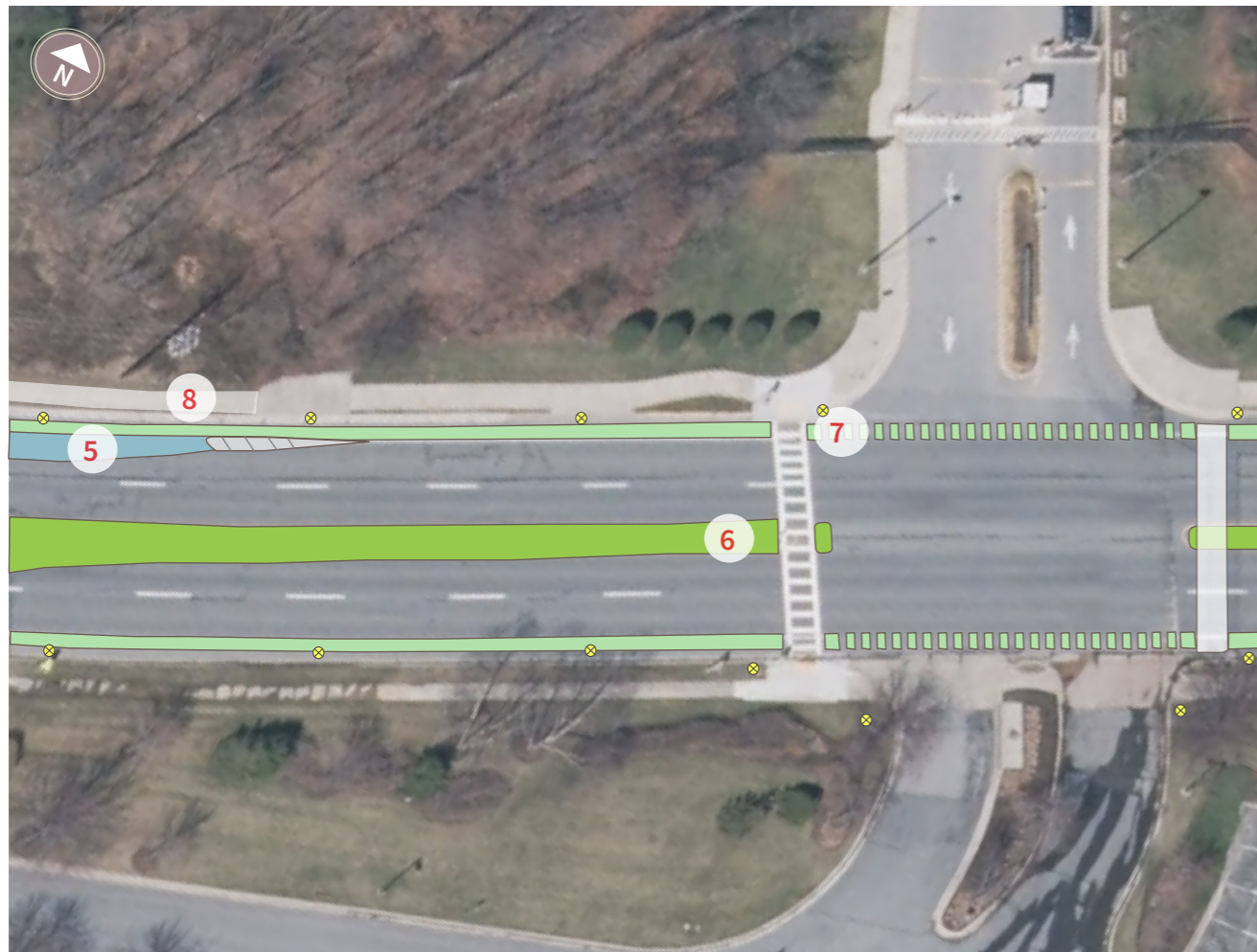


pedestrian-scale lighting, and tree plantings will also be incorporated within the right-of-way.





Roadway Segment **G**



**G** Federal Courthouse Entrance

Cherrywood Lane widens from 2 to 4 lanes prior to the entrance drive to Federal Courthouse when approaching Edmonston Road from the west. The proposed concept design roadway provides space for green stormwater infrastructure elements such as bioswales on the north/west side (5). The median is converted to a landscaped median (6) with a pedestrian refuge island on the west of the Federal Courthouse entrance. The crosswalk on the east side of the Federal Courthouse entrance is shifted slightly eastward to reduce the overall crossing distance and allow for a pedestrian refuge island on the east side as well. The bike lanes with intersection treatments



(7) increase cyclist visibility and safety. Missing sidewalk connections (8) are added. Bike sharrows may be used beyond the Federal Courthouse entrance to indicate where a bicyclist should ride.



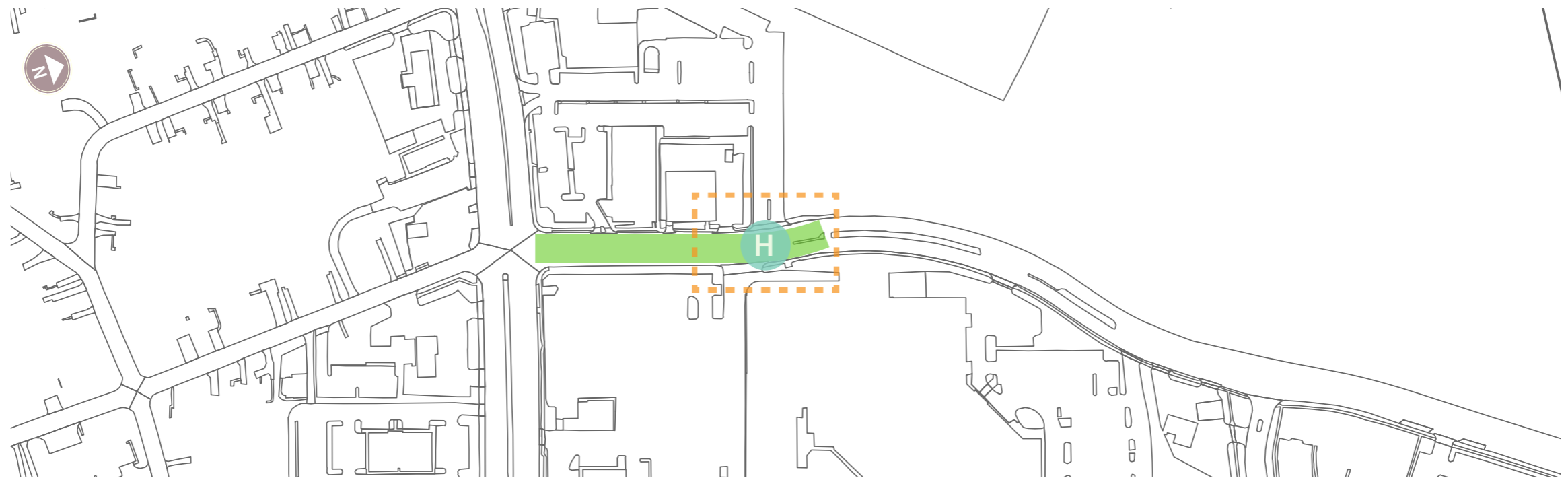


### Cherrywood Lane Illustrated Concepts: Phase Three

Phase Three of the Cherrywood Lane complete and green street retrofit is the shortest phase. Phase Three spans 500 feet from the intersection with Greenbelt Road (MD 193) to the CVS Pharmacy parking lot entrance near Beltway Plaza Mall.

An unmarked, mostly uncontrolled intersection of Cherrywood Lane and Beltway Plaza Mall parking lot access road exists in this area. The *Pedestrian and Bicyclist Master Plan* reports that large volumes of turning traffic enter Cherrywood Lane from shopping center driveways, and that the lack of control makes turning movements difficult to predict.

The existing drainage area is approximately 1.03 acres and includes 0.88 acres of impervious area. The roadway drains as sheet flow and shallow concentrated flow to curb inlets on both the east and west sides. There is extremely limited space for green infrastructure with the current lane alignment. If lanes were to be reduced, full treatment could be provided in this space.





## Roadway Segment H



## H Beltway Plaza Parking Lot Access Road

Traffic at the intersection of Cherrywood Lane and the Giant Food Store parking lot road is largely uncontrolled, making turning movement difficult to predict. Bike sharrows are recommended for this portion of the roadway to indicate where cyclists should ride and to alert motorists of the location bicyclists are likely to occupy within the travel lane (9). The existing crosswalk is maintained. The City of Greenbelt should engage the Maryland State Highway Administration when determining final recommendations in this area due to the segment's close proximity to Greenbelt Road. Alternatively, the intersection could be reconfigured as a roundabout as depicted in the *Pedestrian and Bicyclist Master Plan*. The roundabout configuration should be considered if the Giant Food store location is redeveloped. The City of Greenbelt would need to work with the Maryland State Highway Administration and private landowners to determine the final roundabout configuration, as well as how to provide a bicycle connection in this area.



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M-NCPPC. 2009. Approved Countywide Master Plan of Transportation. Series Number 829092405. November 2009.

NATCO. 2013. Urban Bikeway Design Guideline.

WMATA. 2009. Guidelines: Design and Placement of Transit Stops. December 2009.

## APPENDIX A: ESTIMATED PHASE ONE STORMWATER BENEFITS

ESD<sub>v</sub> Required (Existing Condition)

$$ESD_v = [(P_E)(R_v)(A)]/12$$

ESD = 21,557 cf

ESD<sub>v</sub> Required (Proposed Condition)

$$ESD_v = [(P_E)(R_v)(A)]/12$$

ESD = 17,326 cf

ESD<sub>v</sub> Provided (S<sub>v</sub>)

$$ESD_v = [(P_E)(R_v)(A)]/12$$

ESD = 19,815 cf

|   | Existing Site Data | Proposed Site Data | Results and Changes |
|---|--------------------|--------------------|---------------------|
| <b>Total Surface Area (sf)</b>                  | 295,600            | 295,600            | 0                   |
| <b>Impervious Area (sf)</b>                     | 271,274            | 214,587            | -56,687             |
| <b>Non-impervious Area (sf)</b>                 | 24,326             | 66,863             | 42,537              |
| <b>Percent Impervious</b>                       | 91.77%             | 72.59%             | -19.18%             |
| <b>BMP Area</b>                                 | N/A                | 14,150             | 14,150              |
| <b>Volumetric Runoff Coeff. (R<sub>v</sub>)</b> | 0.88               | 0.70               | -0.12               |
| <b>Max. Runoff Treatment Depth (in.)</b>        | N/A                | 1.0                | N/A                 |



## APPENDIX B: PHASE ONE PRELIMINARY COST ESTIMATES

### Preliminary Cost Estimate

|                                  |                       |
|----------------------------------|-----------------------|
| 1 SITE PREPARATION               | \$74,280.00           |
| 2 STORMWATER MANAGEMENT          | \$312,105.00          |
| 3 HARDSCAPE                      | \$314,910.00          |
| 4 LANDSCAPING                    | \$282,842.00          |
| 5 EARTHWORK                      | \$51,325.00           |
| 6 SIGNING AND MARKING            | \$62,840.00           |
| 7 LIGHTING                       | \$328,000.00          |
| 8 LUMP SUM ITEMS                 | \$455,000.00          |
| <b>SUBTOTAL</b>                  | <b>\$1,881,302.00</b> |
| 30% CONTINGENCY                  | \$564,391.00          |
| 17% DESIGN AND ENGINEERING COSTS | \$319,821.00          |
| <b>SUBTOTAL</b>                  | <b>\$2,765,514.00</b> |
| COST PER FOOT                    | \$658.00              |
| 9 OPTIONAL IMPROVEMENTS          | \$209,780.00          |
| 30% CONTINGENCY                  | \$62,934.00           |
| 17% DESIGN AND ENGINEERING COSTS | \$35,663.00           |
| <b>SUBTOTAL</b>                  | <b>\$308,377.00</b>   |
| COST PER FOOT                    | \$95.50               |
| <b>TOTAL</b>                     | <b>\$3,073,891.00</b> |
| <b>TOTAL COST PER FOOT</b>       | <b>\$731.00</b>       |

### Notes

- 1 SITE PREPARATION: Cost to remove pavement and to remove concrete curb and gutter
- 2 STORMWATER MANAGEMENT: Cost to excavation of and materials for the preparation of bioswales and stormwater curb extensions
- 3 HARDSCAPE: Cost to install concrete curb and gutter and ADA ramps, and, for the west side, a 5 foot wide concrete sidewalk
- 4 LANDSCAPING: Cost of sod, street trees, stormwater plantings, and regular landscape plantings
- 5 EARTHWORK: Cost of fill and spoil
- 6 SIGNAGE AND MARKING: Cost of street signs and thermoplastic pavement markings, letters, and arrows
- 7 LIGHTING: Cost of pedestrian-scale lighting features
- 8 LUMP SUM ITEMS: Cost of erosion and sediment control and mobilization
- 9 OPTIONAL IMPROVEMENTS: Cost to mill and overlay existing pavement and to remove and replace existing 4 foot wide sidewalk on east side with a 5-foot-wide sidewalk