SILVER SPRING

DOWNTOWN AND ADJACENT COMMUNITIES PLAN

STREETSCAPE STANDARDS

IN COLLABORATION WITH

Silver Spring Regional Services Center/Silver Spring Urban District
Montgomery County Department of Transportation
Montgomery County Department of Environmental Protection
Montgomery County Department of Permitting Services
Maryland Department of Transportation State Highway Administration

Montgomery Planning

DECEMBER 2025

SILVER SPRING
DOWNTOWN AND ADJACENT COMMUNITIES PLAN

STREETSCAPE STANDARDS

DECEMBER 2025

Prepared by Montgomery Planning (M-NCPPC) in collaboration with:
Silver Spring Regional Services Center/Silver Spring Urban District
Montgomery County Department of Transportation
Montgomery County Department of Environmental Protection
Montgomery County Department of Permitting Services
Maryland Department of Transportation State Highway Administration

Table of Contents

Figures

Maps

Details

Tables

Pedestrians enjoying Fenton Street at Veterans Plaza

Acknowledgments

The Streetscape Standards were developed through extensive coordination and collaboration between many talented individuals dedicated to the future of downtown Silver Spring:

Silver Spring Regional Services Center / Silver Spring Urban District

Carson Henry (Urban District)
Jeffrey Keane (Urban District)
Jacob Newman (Regional Services Center)

Montgomery County Department of Transportation

Eric Beane
John Birton
Andrew Bossi
Andrew Fisher
Matt Johnson
Brett Linkletter
Donald Noble
Brenda Pardo
Rebecca Park
Jack Pond
Dan Sanayi
Daniel Sheridan
Deepak Somarajan
Rebecca Torma

Montgomery County Department of Environmental Protection

Donna Evans
Xiaobing (Julia) Liu
Laura Miller

Montgomery County Department of Permitting Services

Mark C. Etheridge
Sam Farhadi
Michael Knapp
Chris Myers
Atiq Panjshiri

Maryland Department of Transportation State Highway Administration

Nimish Desai (Dewberry - consultant)
Joseph Moges
Kwesi Woodroffe

Montgomery Planning

Jason Sartori, Planning Director
Robert Kronenberg, Deputy Director - Planning
Elza Hisel-McCoy, West County Planning Chief
Larissa Klevan, Master Plan Supervisor, West County Planning
Atara Margolies, Planner III
Tina Schneider, Planner III, Environment and Climate
Tyler Milam, Urban Designer
Stephanie Dickel, West County Regulatory Supervisor
Eli Glazier, Transportation Planner III
Katie Mencarini, East County Regulatory Supervisor
Jenna Gilbert, Intern

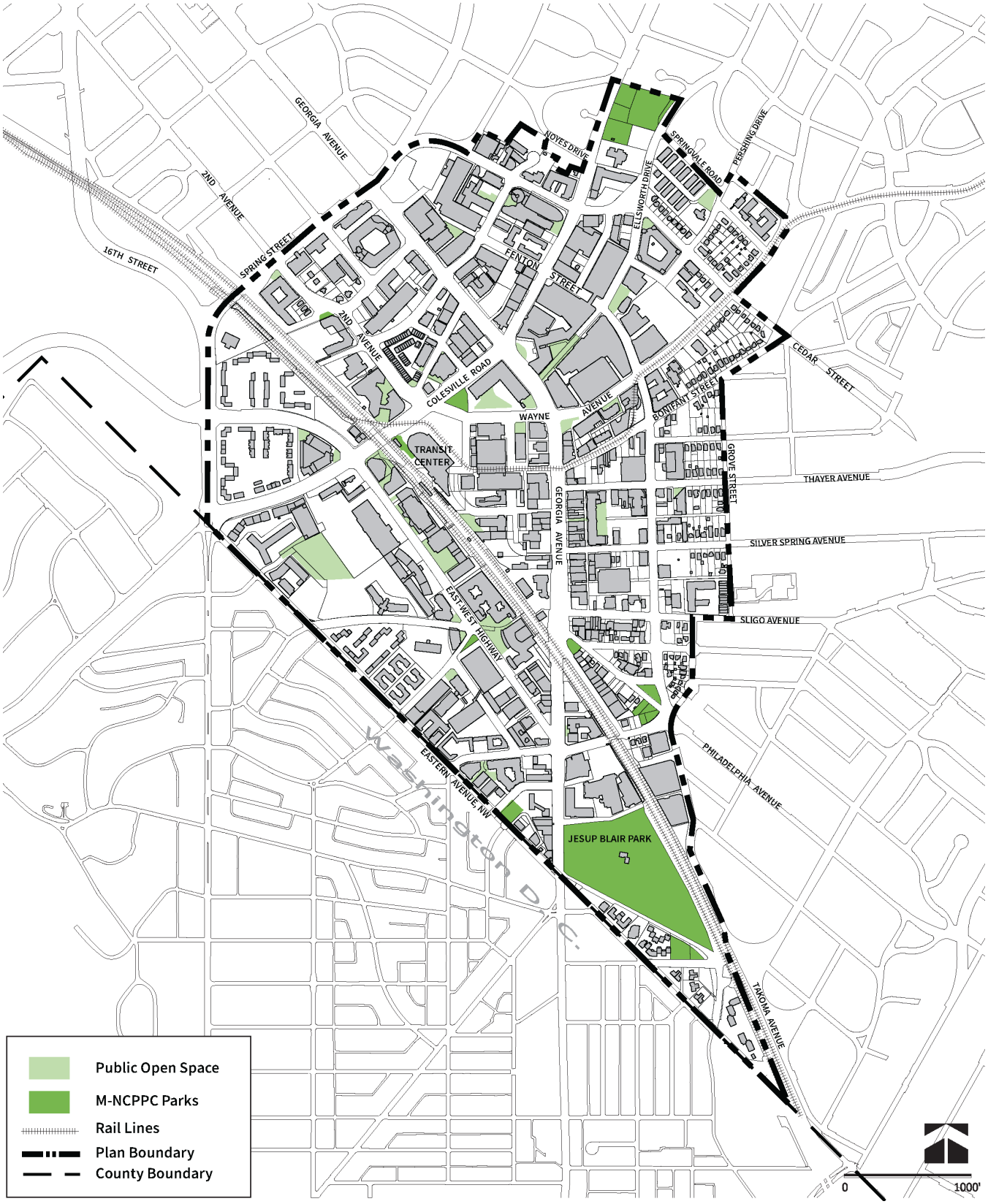
1 Introduction

Streetscape design is a vital component of a successful urban area. A strong pedestrian network includes a comfortable, accessible, and temperate streetscape. **'Streetscape' includes the improvements within a right-of-way (ROW) that allow people to safely and comfortably travel along a street. These include street trees and landscaping, sidewalks and paving, street lighting and other street furniture.** The streetscape is the connective tissue between all of the elements in downtown of Silver Spring, including mixed-use development, a robust transit network, and a diverse retail scene. These Streetscape Standards apply to the streets within the *Silver Spring Downtown and Adjacent Communities Sector Plan* (Map 1).

These Standards are the product of a years-long collaboration between Montgomery Planning and the following partner agencies/groups that implement or maintain the streetscape in Silver Spring:

- Silver Spring Urban District/Regional Services Center
- Montgomery County Department of Transportation
- Montgomery County Department of Environmental Protection
- Montgomery County Department of Permitting Services
- Maryland Department of Transportation State Highway Administration

An interagency working group met from fall 2023 through spring 2024 to discuss the major issues included in the Standards and to ensure that the work was coordinated across relevant agencies. In addition, smaller "subject matter expert" groups were convened that included relevant staff from each agency. These groups met to develop specific Standards for the topics in Chapter 3 of this document. These Standards would not be possible without the collaboration and contribution of the individuals listed in the Acknowledgments.



Map 1: Silver Spring Downtown and Adjacent Communities Plan Area

1.1 Purpose and Goals

The purpose of the Silver Spring Streetscape Standards (the Standards) is to help the future streetscape in Silver Spring be more accessible, easier to maintain, and more environmentally responsible with regard to the impacts of climate change. This update aligns the Standards with the recently approved 2022 *Silver Spring Downtown and Adjacent Communities Plan* (SSDAC Plan) and the associated Design Guidelines.

1.1.1 Goals

Enhanced Accessibility

Downtown Silver Spring should be a place where people of all ages and abilities can navigate the streets and sidewalks safely and without obstruction. The Standards focus on paving materials that will be safe to navigate whether one is walking or rolling. This document also references other ongoing county, state, and federal efforts that are working to make streetscape more accessible in our communities.

Ease of Maintenance

The Silver Spring Urban District and partner agencies are responsible for routine maintenance of sidewalks, street trees, and plantings in the right-of-way (ROW) throughout the downtown. An urban area is a challenging place to maintain healthy trees and plants, and there is always a long list of sidewalk locations that require repairs. The Standards identify planting methods, tree and plant species, and paving materials that comply with the overall objectives of the Master Plan and are reasonably easy to install and maintain.

Cool Streets

Like many urban areas, downtown Silver Spring is hotter than its surrounding neighborhoods. The heat map on page 5 (Map 2) shows that in the summer (data from August 2018) the downtown, shaded orange and yellow, is hotter than the neighborhoods surrounding it, which are mostly green and cooler. Large areas of impervious surfaces like concrete and asphalt, a dense concentration of buildings, and a lack of tree canopy and green cover contribute to urban heat. The revised standards for paving materials, soil volume, and tree planting strategies will all help to reduce urban heat in the downtown.

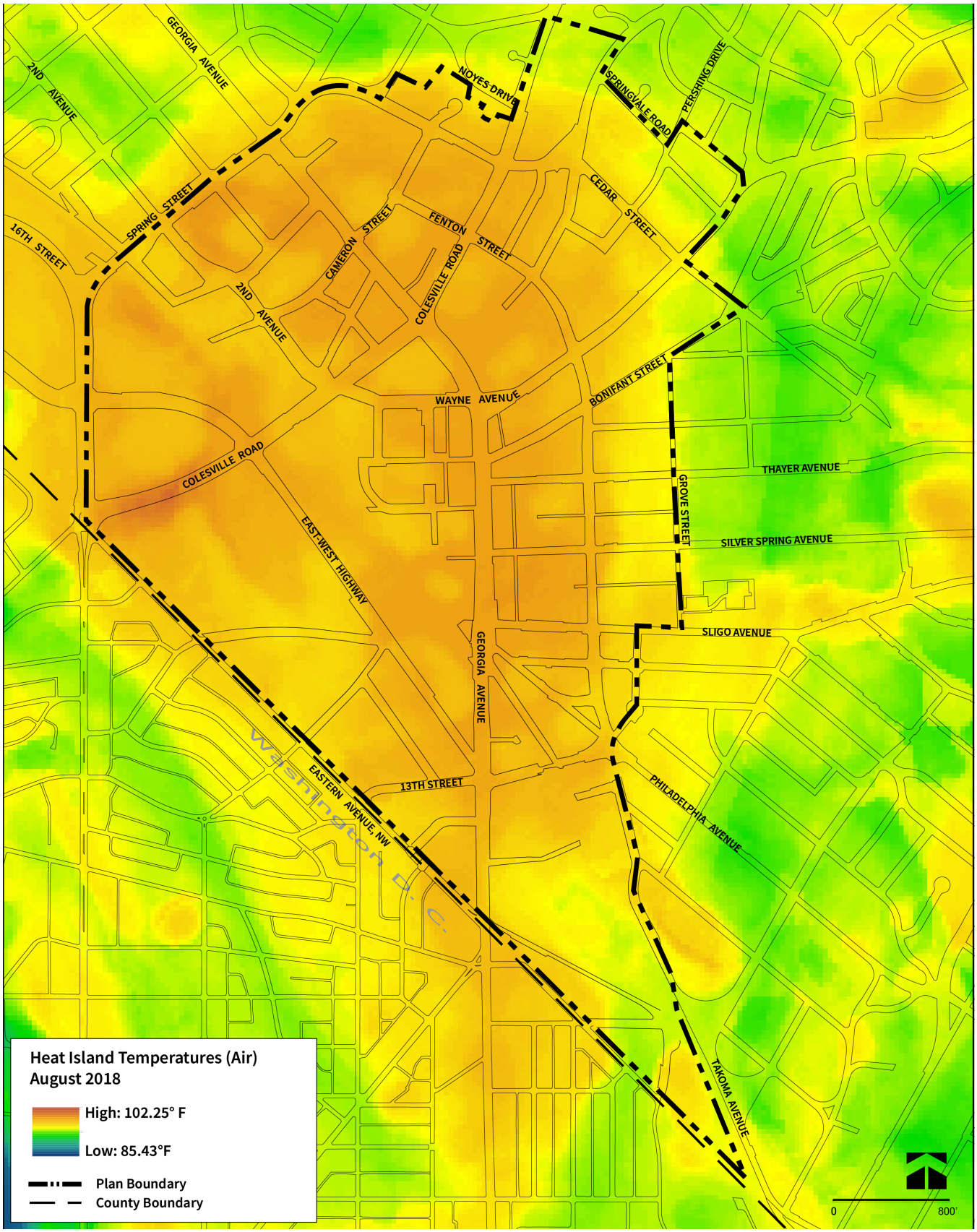
1.2 How to Use These Streetscape Standards

These Standards are a supporting document to both the SSDAC Plan and the accompanying Design Guidelines. The Standards are intended to be used by applicants, developers, and agencies within Maryland and Montgomery County that implement streetscape improvements in downtown Silver Spring.

These Standards are to be used for the design of streetscape improvements that are associated with development, as well as for capital improvement projects and regular streetscape maintenance. The Standards address typical conditions. For development projects, adherence to the Standards will be part of the regulatory review process. For other improvement projects (such as capital improvement projects or regular maintenance), the Standards should be followed as closely as practicable.

There are several locations in this document where guidance is given for maintenance that does not apply to streetscape improvements that are part of a new development project. This is indicated clearly where applicable.

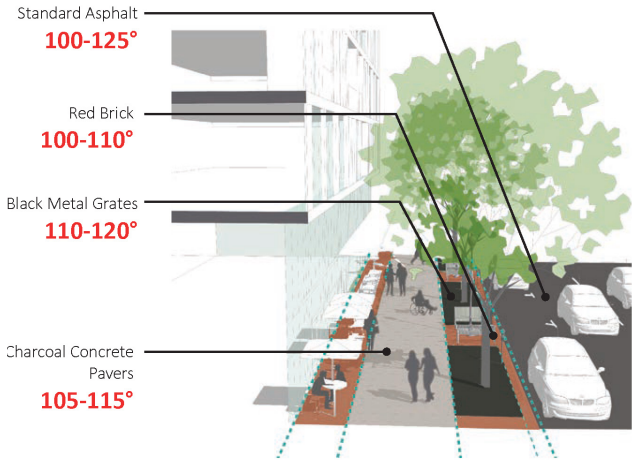
Fenton Village streetscape



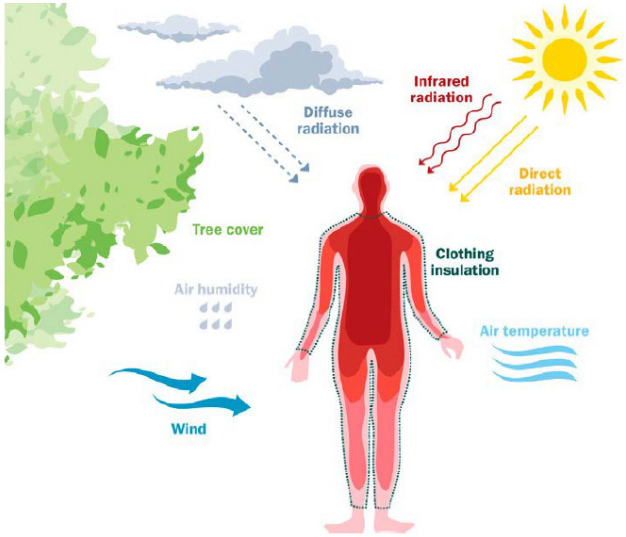
Map 2: Heat Map of SSDAC Plan Area

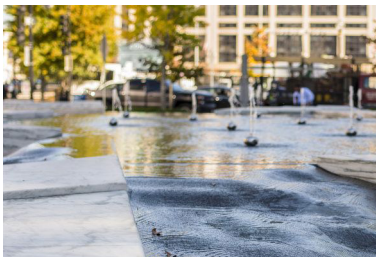
About Cool Streets

During the writing of the SSDAC Plan, Planning staff sought to understand more about why urban areas like Silver Spring are hotter than their surrounding neighborhoods. Planning staff and a consultant team led by Rhodeside and Harwell explored this via a grant from the Metropolitan Washington Council of Governments and produced the *Cool Streets Guidelines*.



Three different assessments were used to determine the temperatures of three different thermal zones: atmospheric, surface, and Universal Thermal Climate Index (UTCI or 'feels like' temperature). The findings indicated that downtown temperatures far exceed the human comfort level by as much as 46 degrees. The causes are from dark, impervious surfaces; the concentration and orientation of buildings; and lack of tree shade and green cover (lawns, green roofs, stratified vegetation).





Cooling the urban landscape requires multiple strategies on public and private land. This includes planting native, canopy trees that will thrive in the area, as well as increasing soil volume through larger street panels or structured cells that will provide those trees with the capacity to survive. Additional strategies for streets include using surface materials with increased solar reflectivity, introducing permeable paving that allows underground temperatures to cool the surface, and encouraging stormwater management facilities with native plantings to increase cooling capacity and carbon sequestration.

2 Streetscape Elements

2.1 Complete Streets Design Guide and Streetscape

In 2021, Montgomery Planning and Montgomery County Department of Transportation (MCDOT) published the Complete Streets Design Guide (CSDG). The guide provides policy and design guidance on the planning, design, and operation of county roadways and is used when designing new or renovating existing streets in an area undergoing redevelopment.

The Master Plan of Highways and Transitways (MPOHT) assigns functional classifications, as defined in the CSDG to all major roads in Montgomery County by road function and adjacent land use, from Downtown Boulevards to Neighborhood Connectors to Country Roads. Smaller neighborhood streets and neighborhood yield streets are classified via Chapter 49 of the Montgomery County Code (Road Code). Map 3 shows the MPOHT major road classifications in the SSDAC Plan area.

The CSDG also divides all ROWs into "Active Zones" and "Street Zones." The Active Zone is the area between the curb and the face of a building or structure, as shown in Figure 1. The Street Zone is the area between the curbs. These Standards are focused on the Active Zone and the elements that are located within that zone.

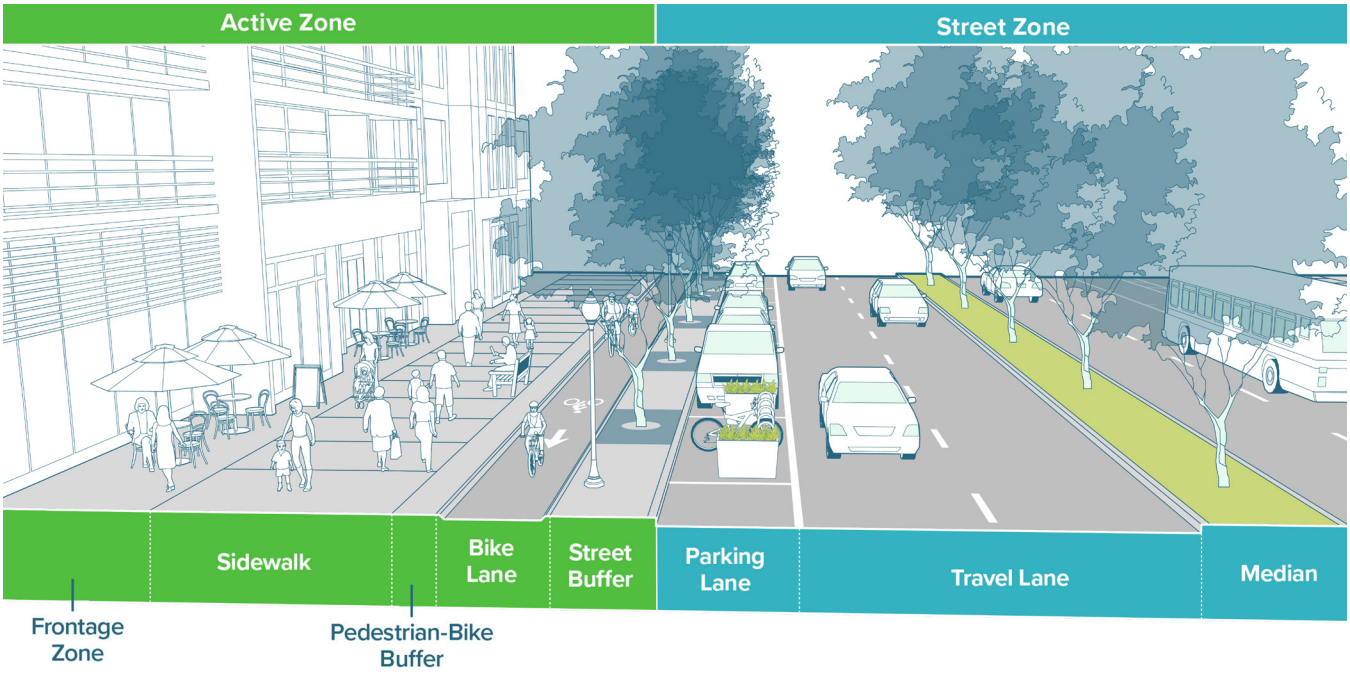
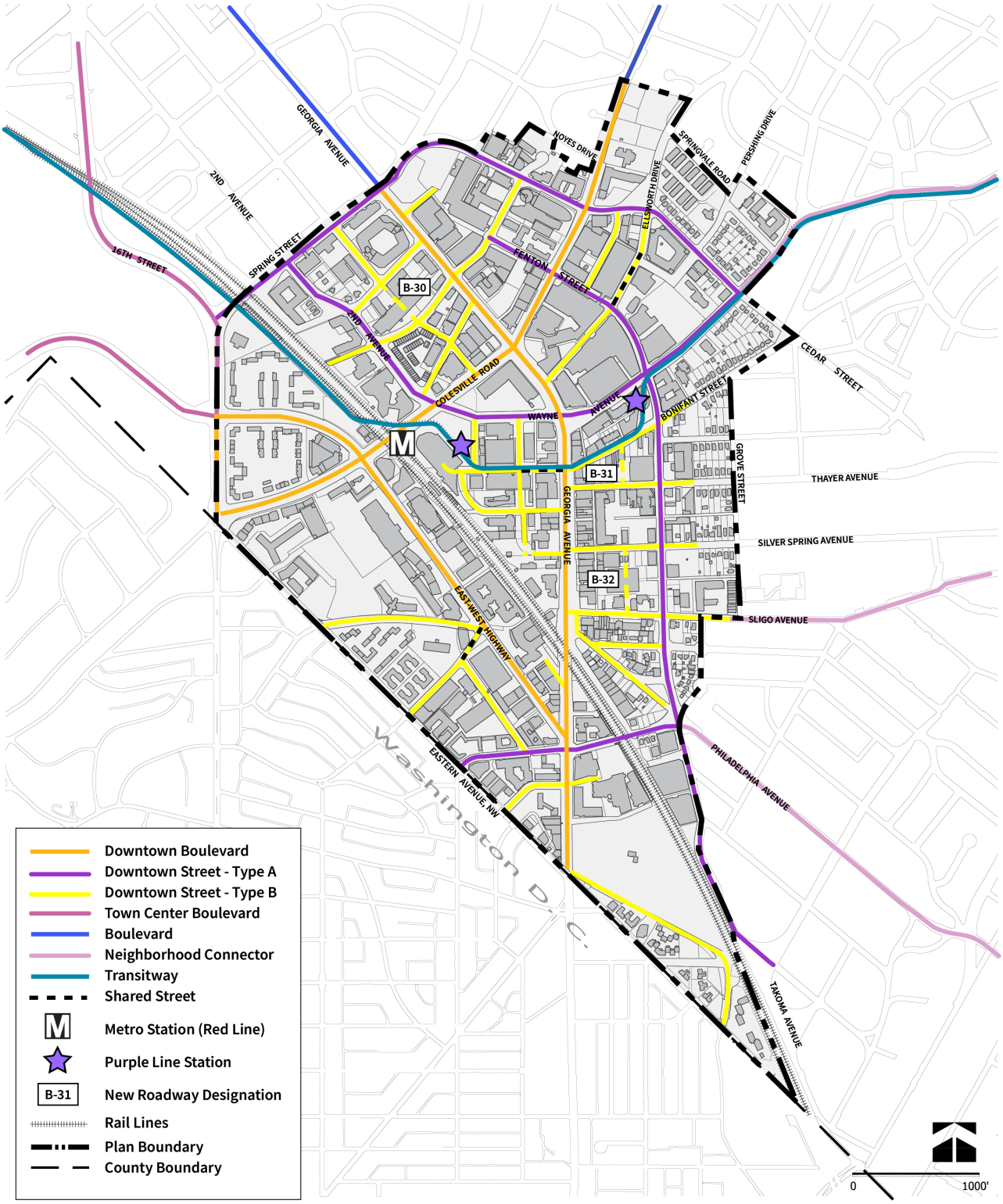


Figure 1: Active Zone and Street Zone (Complete Streets Design Guide)



Map 3: Downtown Silver Spring Master Plan of Highways and Transitways Classifications

2.1.1 Streetscape Elements and Definitions

The CSDG identifies several elements located within the Active Zone (refer to Figure 1). The Standards focus on the following elements (all definitions from CSDG):

Sidewalk[1]: The Sidewalk is the primary area where pedestrians travel. This element is intended to be free of obstructions and easy to navigate.

Street Buffer: The Street Buffer is the space that separates the Street Zone from the Bikeway (if provided) or the Sidewalk. It will often include things like street trees, landscaping, utility poles, benches, and parking meters. Refer to the illustrative street sections on pages 20-21 of the SSDAC Design Guidelines.

Pedestrian-Bike Buffer: When there are separated bike lanes, the Pedestrian-Bike Buffer provides horizontal separation between the Bikeway and the Sidewalk. This is not required on all streets, but where a Pedestrian-Bike Buffer is a minimum of 6' wide, it should be treated like a Street Buffer with regard to the street tree planting methods discussed in these Standards.

Frontage Zone: Frontage Zones are located between the Sidewalk and the face of building. They promote the interaction of adjacent land uses (such as buildings) with the Sidewalk. They are not required on all streets. Where required, they may be located in the public ROW, on private property, or a combination of the two. When Frontage Zones are located in the public ROW, these Standards apply.

Additional Notes on Streetscape Elements

While bicycle facilities often fall in the Active Zone, as shown in Figure 1, these Standards do not address bicycle lane design. For bicycle lane design guidance, refer to Chapter 5 in the CSDG.

On all Downtown Boulevards and Downtown Streets in the SSDAC Plan area, the Buffer that is adjacent to the Sidewalk (whether Street Buffer or Pedestrian-Bike Buffer) is where street trees are a priority, and that is where Section 3.2 of the Standards apply. If a street has both types of buffers and both have a width that is 6' minimum, then Section 3.2 applies to both buffers.

1 At the writing of the SSDAC *Design Guidelines,* this zone was called Sidewalk, and we have left it that way here so that the documents align. However, the CSDG was updated in 2023 and it was changed to Clear Zone to indicate its intended behavior. Clear Zones include sidewalks or sidepaths (shared paths for bicycling and walking).

On Fenton Street there is often a Frontage Zone to allow outdoor café seating.

On Second Avenue the Street Buffer is clearly delineated from the Sidewalk.

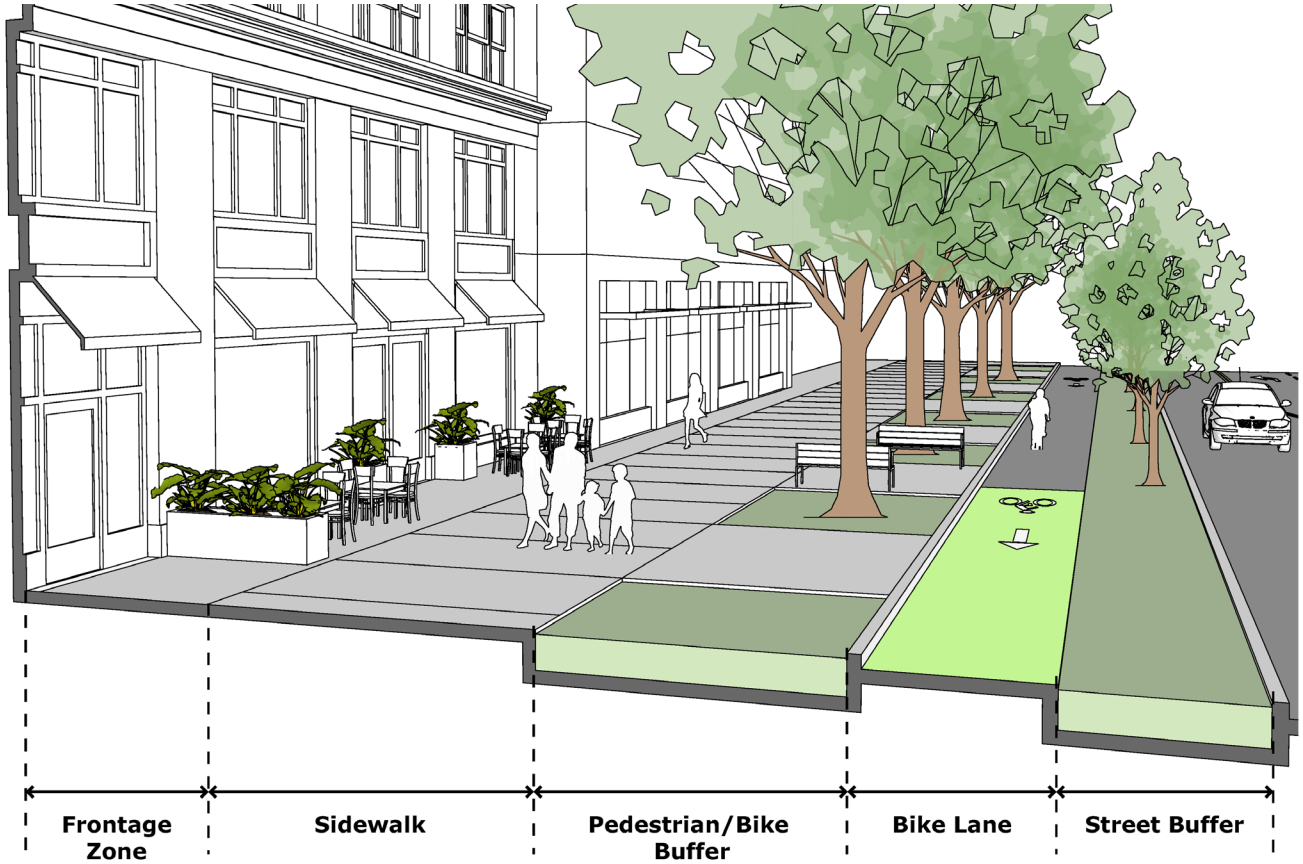


Figure 2: Streetscape Elements Diagram

3 Streetscape Standards

3.1 Sidewalks and Paving

A safe and accessible pedestrian network is a key element to a successful urban area. Sidewalks should be comfortable, easy to navigate, sufficiently wide, and free of obstructions. The sidewalk and paving standards outlined in this section strive to meet the goals regarding accessibility, ease of maintenance, and reducing the effects of urban heat as described above.

3.1.1. Accessibility

In 2023, the United States Access Board, a federal agency that promotes equality for people with disabilities, published the Public Right-of-Way Accessibility Guidelines (PROWAG). These guidelines address access to sidewalks and streets, crosswalks, on-street parking, and other components of the public right-of-way. To align with the federal government, MCDOT has completed the Accessible Design Guide which provides guidance for developing accessible streets, sidewalks, crosswalks and public spaces within the County.

A major principle of PROWAG is that sidewalks, shared use paths, and other pedestrian circulation paths must contain a "pedestrian access route" that is clear of obstructions and traversable by individuals with disabilities. This means it must be wide enough for two pedestrians to pass one another easily and it must not have such a steep slope that it is unusable by someone with a manual wheelchair. In this document, the Sidewalk is the pedestrian access route. PROWAG also states that the surfaces in the pedestrian access route "shall be firm, stable and slip resistant," and that vertical changes in level should be limited to no more than 0.25" in height (R302.6).[2]

2 The *Silver Spring Downtown and Adjacent Communities Plan Design Guidelines* addressed some of these concepts in Section 2.1.6 Accessibility: Street and Site Design.

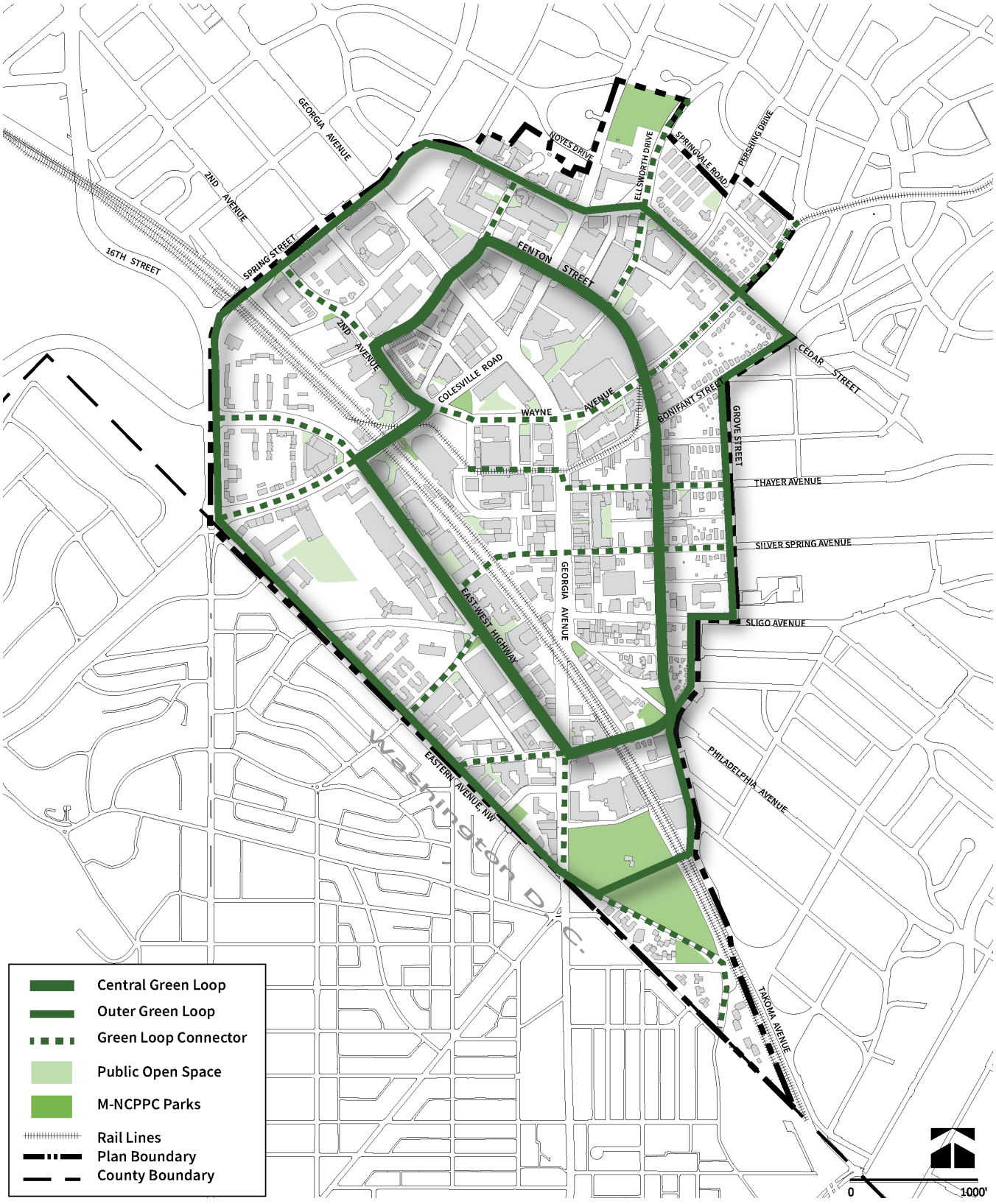
3.1.2. Paving Materials

The 2019 *Silver Spring Streetscape Standards* identified several types of pavers, including brick pavers, as the standard materials for the sidewalks in downtown Silver Spring to create a distinct and unique streetscape. However, pavers are no longer preferred as a sidewalk material, as they can be slippery when wet and can shift over time, causing gaps and tripping hazards. Brick pavers absorb and release heat, contributing to trapped heat in the downtown. They also require skilled installation and frequent repair, and are more costly to maintain than other paving materials. In addition, the recently adopted *Pedestrian Master Plan* recommends that brick pavers not be used for the pedestrian access route (typically a portion of the sidewalk).

For this update to the Standards, the desire for a unique sidewalk design for Silver Spring was balanced against the goals of enhanced accessibility, ease of maintenance, and cool streets. The materials recommended help to meet all of these goals, while still providing an aesthetically pleasing solution.

Green Loop

The Green Loop is a central "loop" of existing streets that are primary pedestrian routes in downtown Silver Spring (Map 4). The SSDAC Plan envisions this loop as a green, comfortable, and cooler portion of the larger pedestrian network. The Standards identify a permeable paver for the Street Buffer on segments of the Green Loop as described below.



Map 4: The Green Loop

Sidewalk Paving Standard

The paving standards below apply to the Sidewalk, Street Buffer, Pedestrian-Bike Buffer and Frontage Zone on all Downtown Boulevards and Downtown Streets (Type A and B) in the SSDAC Plan area. Street section compositions and widths of individual streetscape elements for each street type can be found in the SSDAC Plan and the Design Guidelines. Below are the material descriptions and where they should be installed. For paving patterns, joint patterns, and typical construction details, see plans and details on the following pages. For all paving material specifications, see Chapter 4.

The material choices below will delineate the Frontage Zone and the Street Buffer or Pedestrian-Bike buffer from the Sidewalk. This helps to establish the clear and unobstructed pedestrian access route, and it defines the Frontage Zone for retail owners who keep furniture or other movable items outside their businesses.

Paving Materials: Sidewalk, Street Buffer/Pedestrian-Bike Buffer and Frontage Zone

Poured-in-Place Concrete

Where: Sidewalk on all streets within the SSDAC Plan area

Key Characteristics:

- Slip-resistant surface
- Minimum Solar Reflectance Index (SRI) value of 0.35

Precast Concrete Paver

Where: Street Buffer and Frontage Zone on Downtown Boulevards and Downtown Streets that are not part of the Central Green Loop (Map 4). On Central Green Loop streets, this paver is used in the Frontage Zone only.

Key Characteristics:

- Product: Unilock Holland Premier in Heritage Brown or equal
- Slip-resistant surface
- Minimum SRI value of 0.38
- Dimensions: 3 7/8" x 7 7/8" x 2 3/4" (100 x 200 x 70mm)
- The selected color will provide sufficient visual contrast with poured-in-place concrete to allow those with visual disabilities to clearly see the Sidewalk. Applies to permeable precast paver below as well.

Permeable Precast Concrete Paver

Where: Street Buffer on Central Green Loop Downtown Boulevards and Downtown Streets (Map 4)

Key Characteristics:

- Product: Unilock Eco-Priora in Heritage Brown or equal
- Slip-resistant surface
- Minimum SRI value of 0.38
- Dimensions: 4 3/4" x 9 1/2" x 3 1/8" (120 x 240 x 80mm)
- Permeable paving system will allow surface runoff to percolate through the pavers rather than travel over them. (Note: Current county regulations do not allow stormwater management credit for the use of permeable surfaces such as pavers.)

The existing brick sidewalks in Silver Spring need constant maintenance, with missing bricks causing unsafe conditions for pedestrians (left). On Georgia Avenue, a recent streetscape project allowed the Urban District to install a poured-in-place concrete sidewalk to indicate a clear path for pedestrians (right).

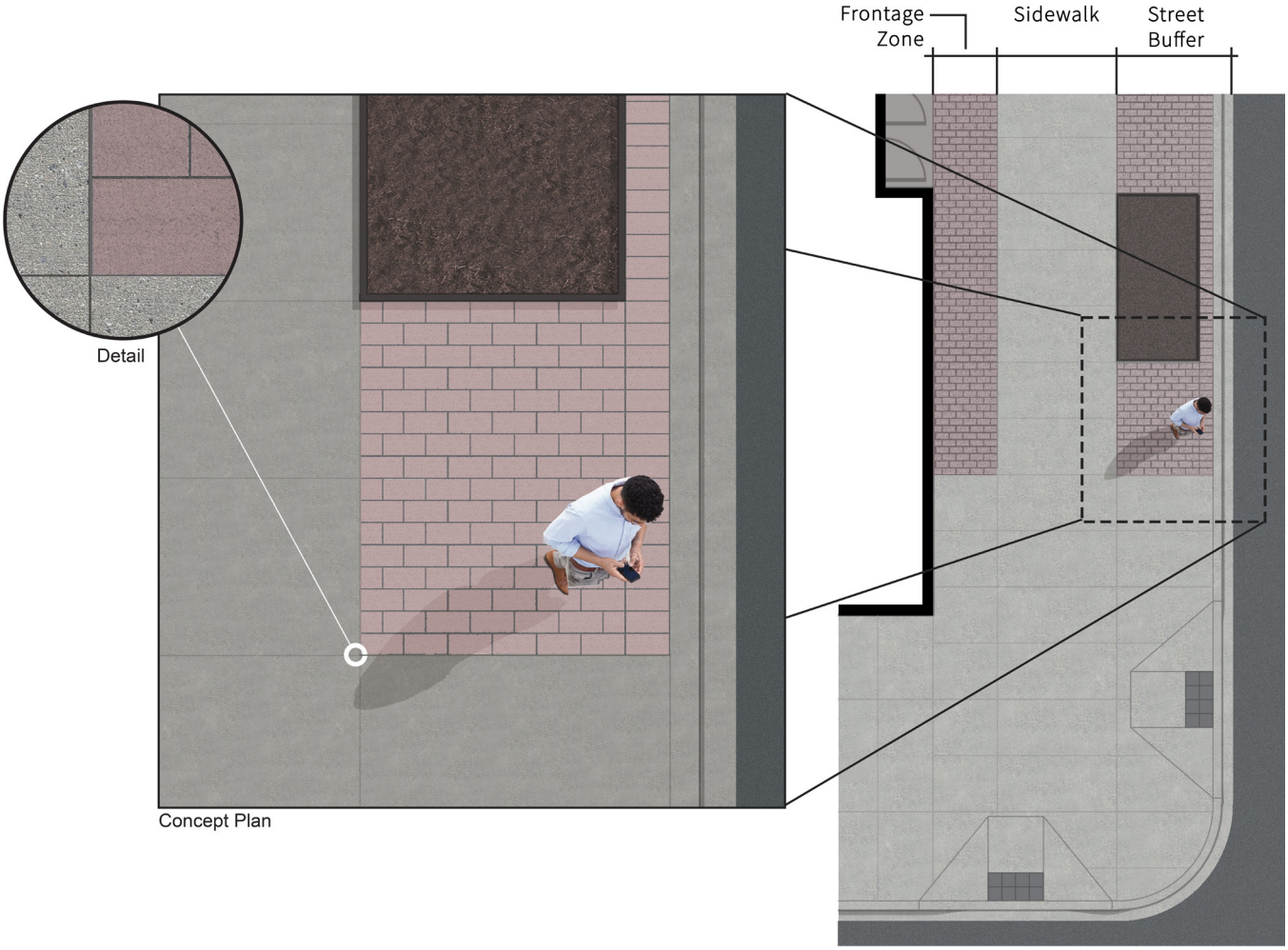


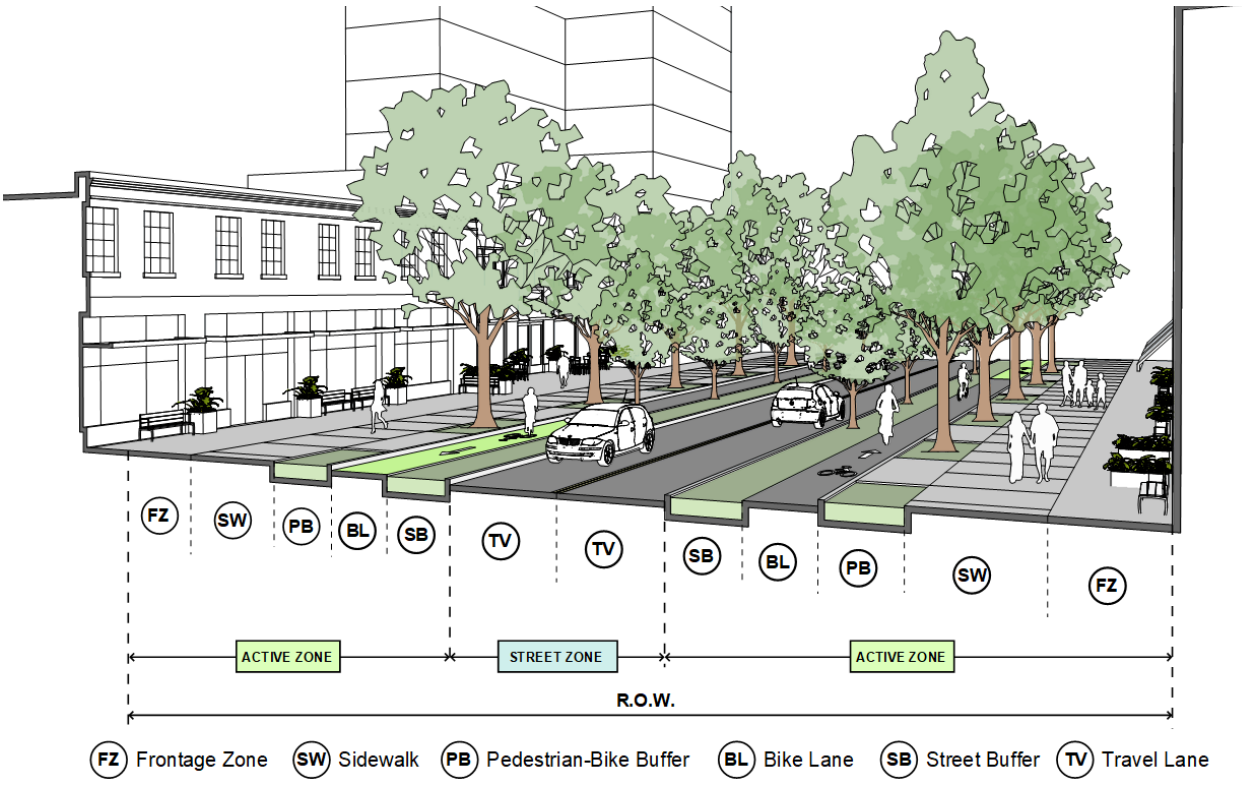
Figure 3: Paving Concept Plan and Detail

The image on the left shows how the Heritage Brown paver will have sufficient visual contrast with the poured-in-place concrete sidewalk. The overall design concept is shown in the plan on the right.

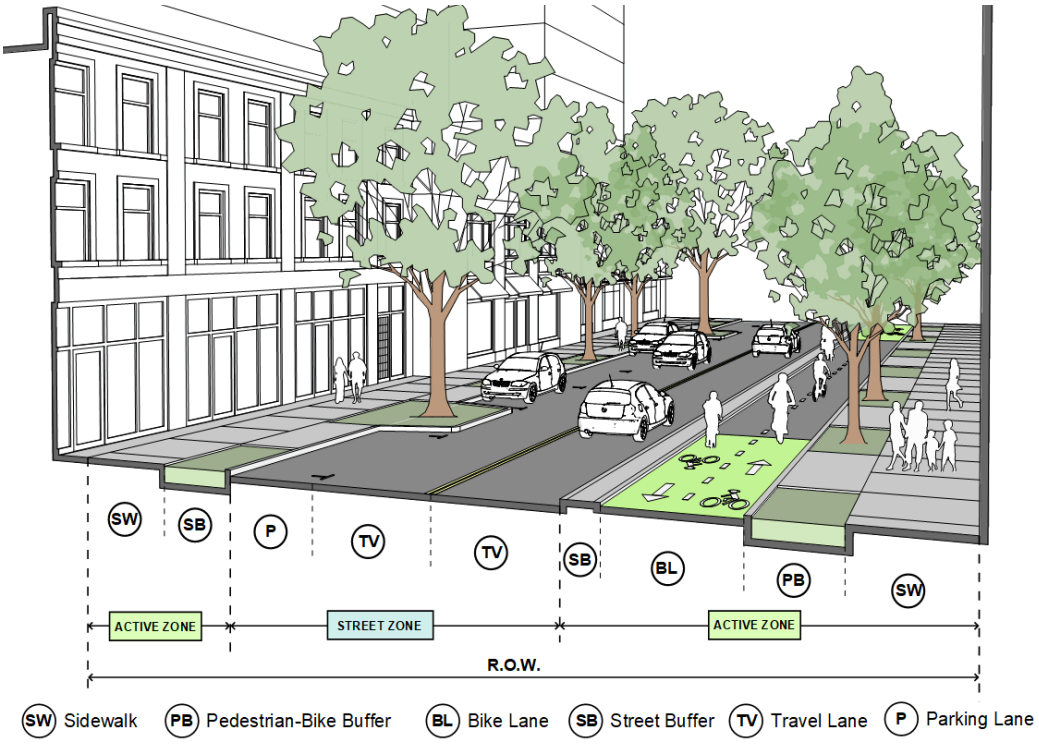
Pedestrian-Bike Buffer and Street Buffers

Pedestrian-Bike Buffers and Street Buffers will vary in width and location, depending on bicycle lane configuration, as described in the Design Guidelines (Section 2.1.2). Ideally, Buffers should be a minimum of 6' wide to accommodate canopy street trees. Buffers that are less than 5' wide can accept smaller trees and other plantings (refer to herbaceous planting guidelines in Section 3.2.6). Buffers that are a minimum of 5' should follow the tree planting and paving standards as described herein. If a continuous linear planted buffer is desired, it should follow Section 3.2.5 and have minimal paving.

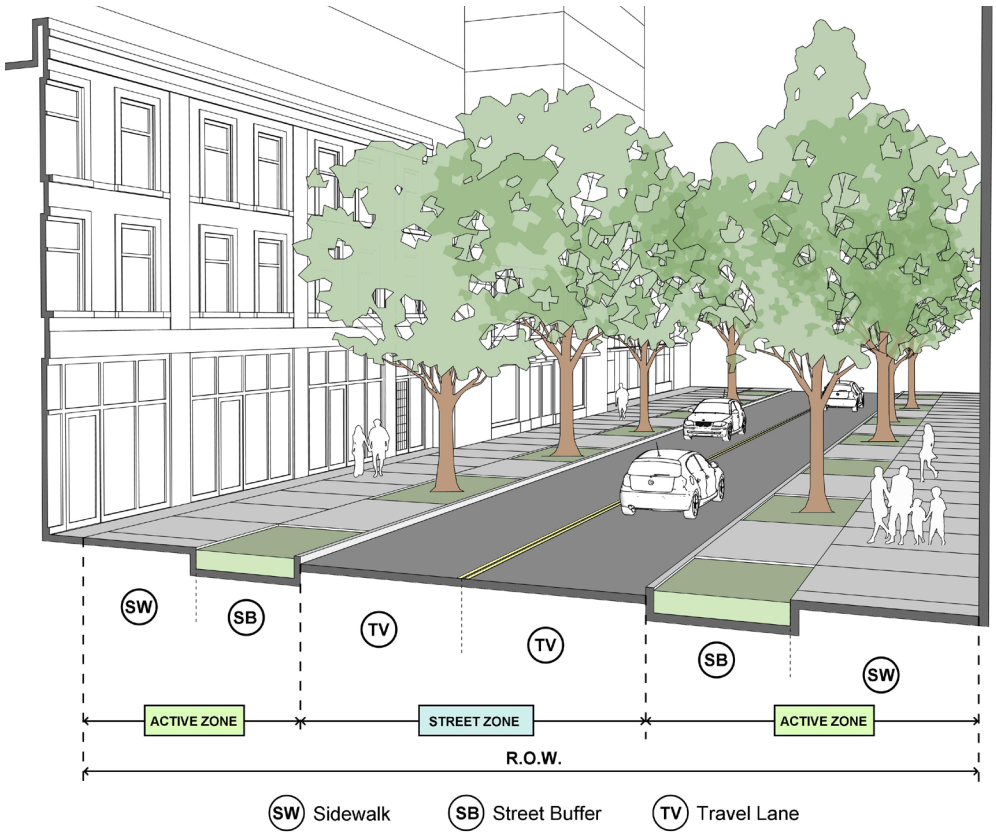
The street sections on these pages from the Design Guidelines illustrate how the Buffer configuration may differ based on street type and design. In the Downtown Street - Type A section, both the Street and Pedestrian-Bike Buffers are wide enough for street trees and would follow the standards for planting. However, the sections on p.16 show Downtown Streets - Type B with more constrained ROWs. In the top image only the Pedestrian-Bike Buffer is wide enough to accommodate street trees. The Street Buffer is constrained and is effectively a wide raised curb. In the bottom image the Street is so narrow that a separate bicycle facility is not possible. Therefore, there is only a Street Buffer and it would follow the standards for planting in this document.



Illustrative section of a Downtown Street - Type A (generous ROW)



Illustrative section of a Downtown Street - Type B (possible interim condition)



Illustrative section of a Downtown Street - Type B (constrained ROW)

3.1.3. Paving Plans and Details

Typical plans and details are below. Each site will have its own challenges; this Standard provides the typical condition and trusts that design teams will make needed adjustments in non-typical conditions. For development projects: if substitutions or other material adjustments are necessary, this will be handled on a case-by case basis via coordination with Montgomery Planning and other reviewing agencies.

Refer to MCDOT Design Standards and MDOT SHA Standards for curb and ramp design.

Typical Streetscape Paving Plans

Poured-in-place concrete is used for the Sidewalk (S) while precast pavers are used in the Frontage Zone (FZ) and the Street Buffer (SB). The numbers in the magenta circles reference the details on pages 21-22.

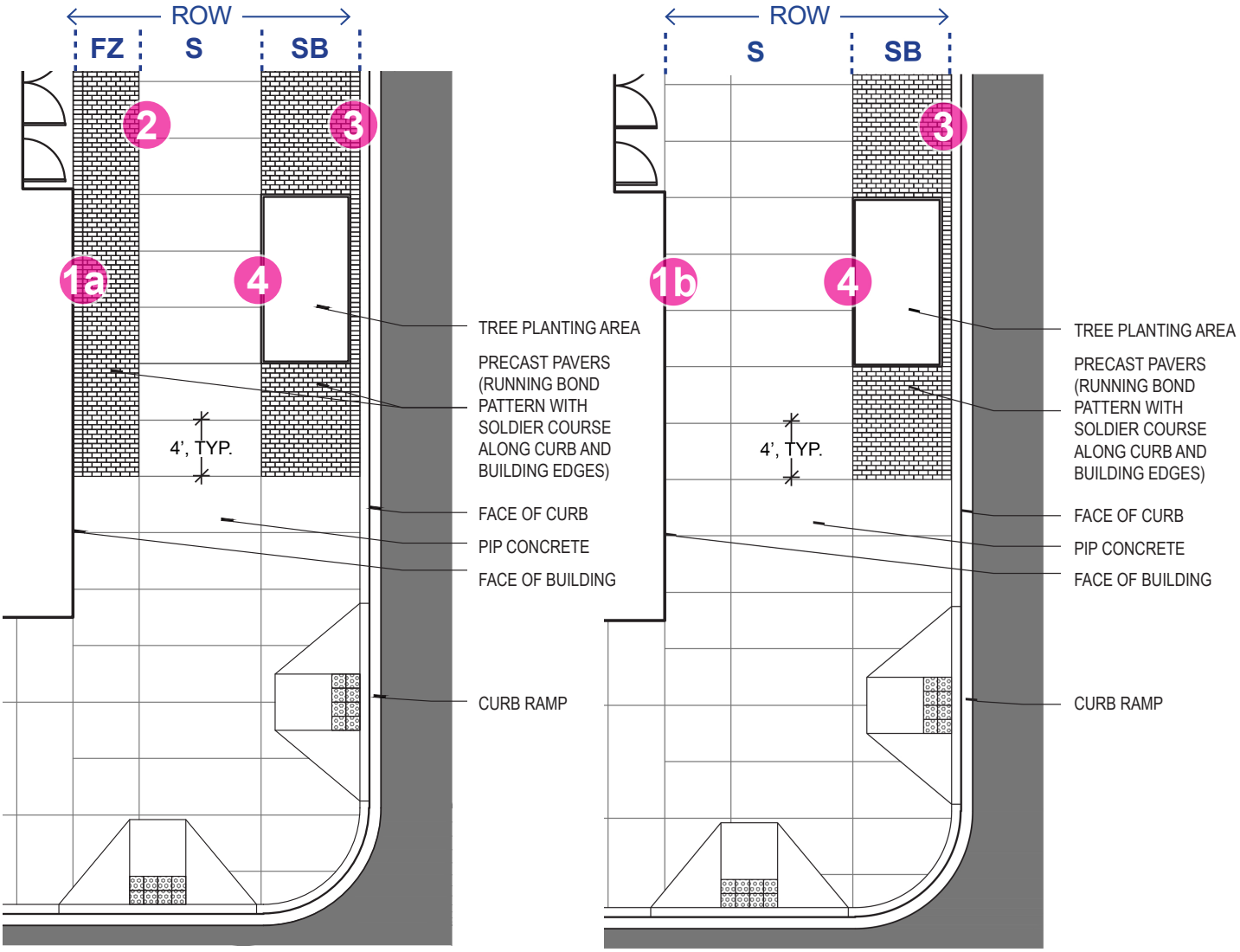


Figure 4: Typical streetscape paving plans for streets with and without Frontage Zones (FZ)

Paving at Building Entrances

On streets with Frontage Zones, building entrances may be located at the ROW edge or the edge of the Frontage Zone and door swings may encroach on the Frontage Zone. Frontage Zones may be located fully inside the ROW or may extend past the ROW, it depends on the required Frontage Zone width for each street type (see Design Guidelines Section 2.1.2)

However, on streets without Frontage Zones, it is preferred that building entrances be set back from the edge of the Sidewalk. If a Sidewalk is wide and its width comfortably exceeds the required width specified in the Design Guidelines, then a building entrance may abut the edge of the Sidewalk if necessary.

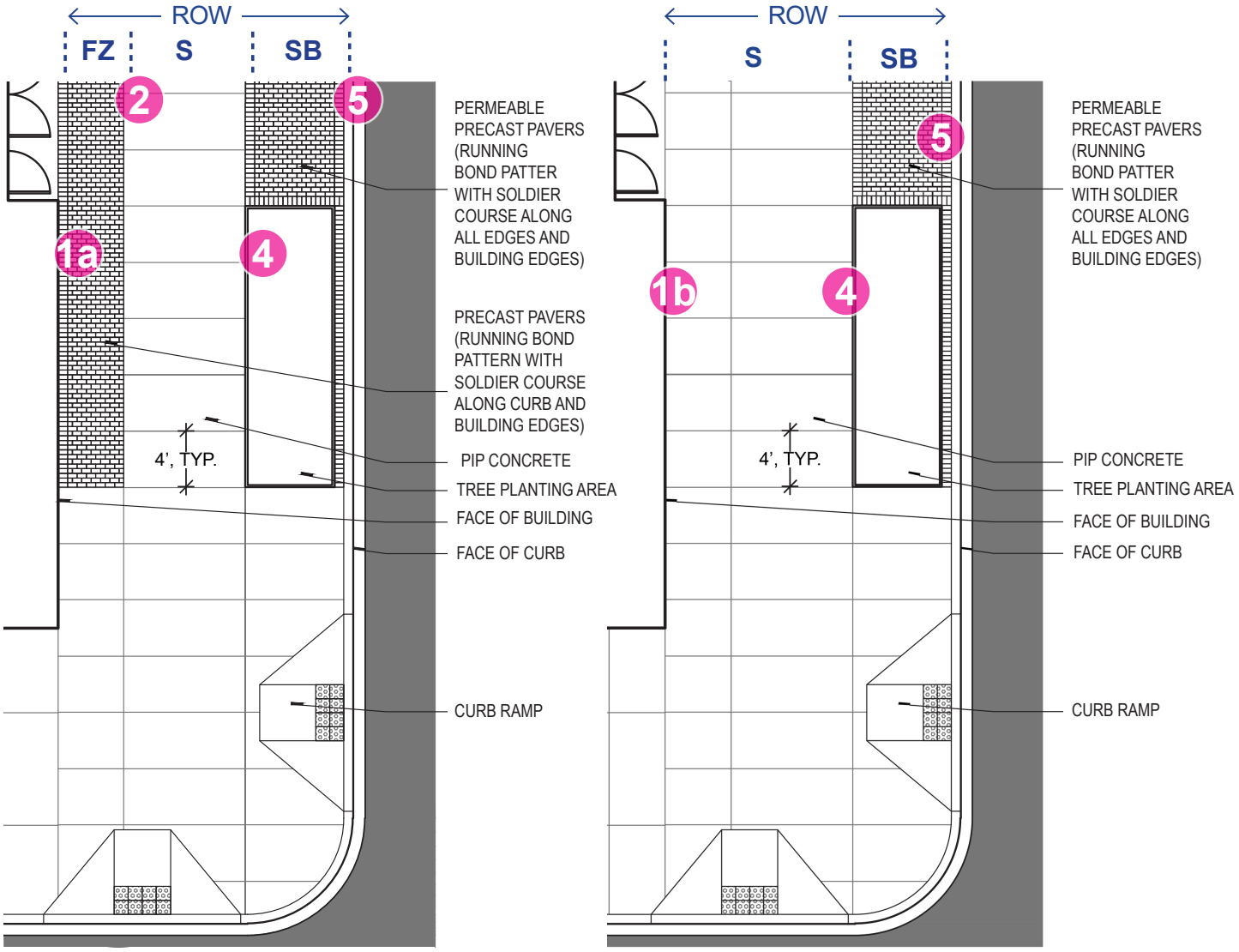
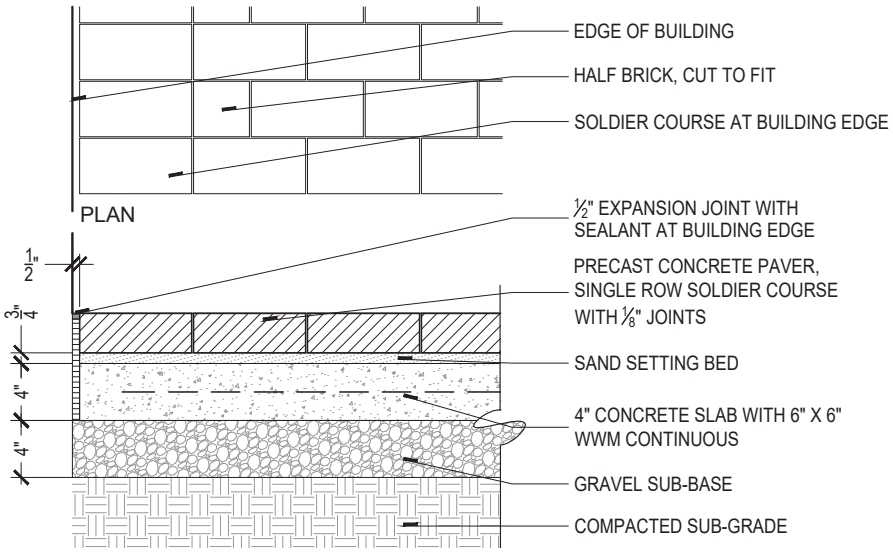


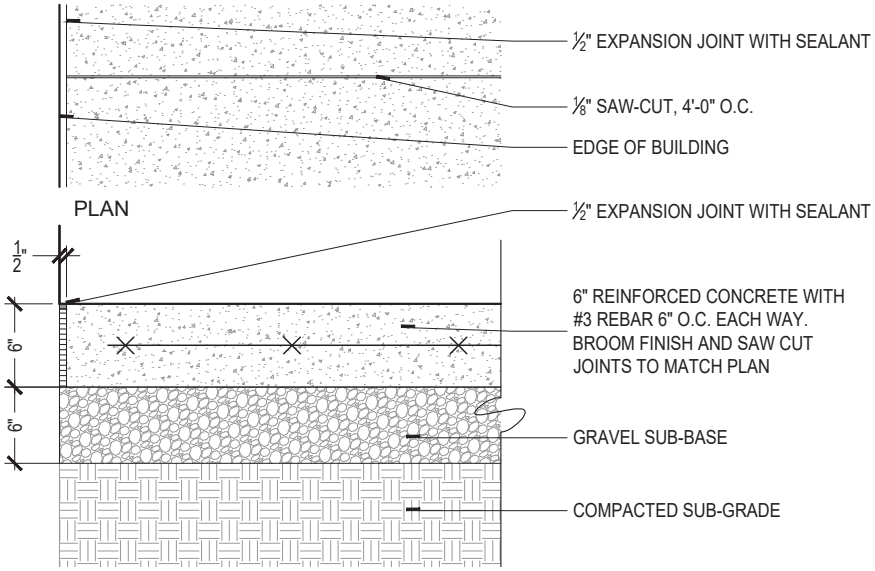
Figure 5: Typical streetscape paving plans along Central Green Loop with and without Frontage Zones (FZ)

Typical Streetscape Paving Details

The details on these pages represent the typical conditions, including streets on the Central Green Loop. On Central Green Loop streets permeable concrete pavers are used in the Street Buffer (Detail 5).

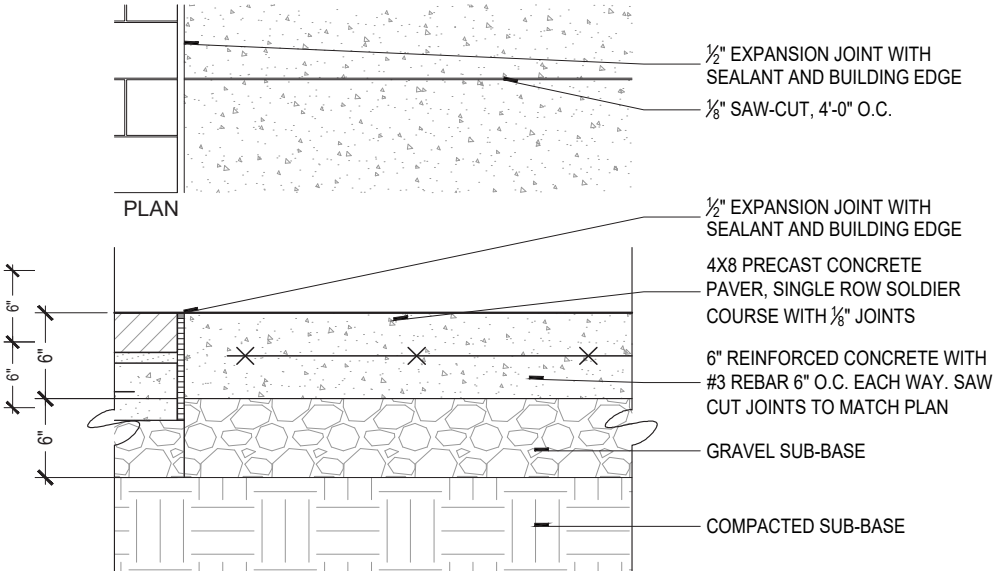


1a Detail 1a: Precast concrete paver in Frontage Zone

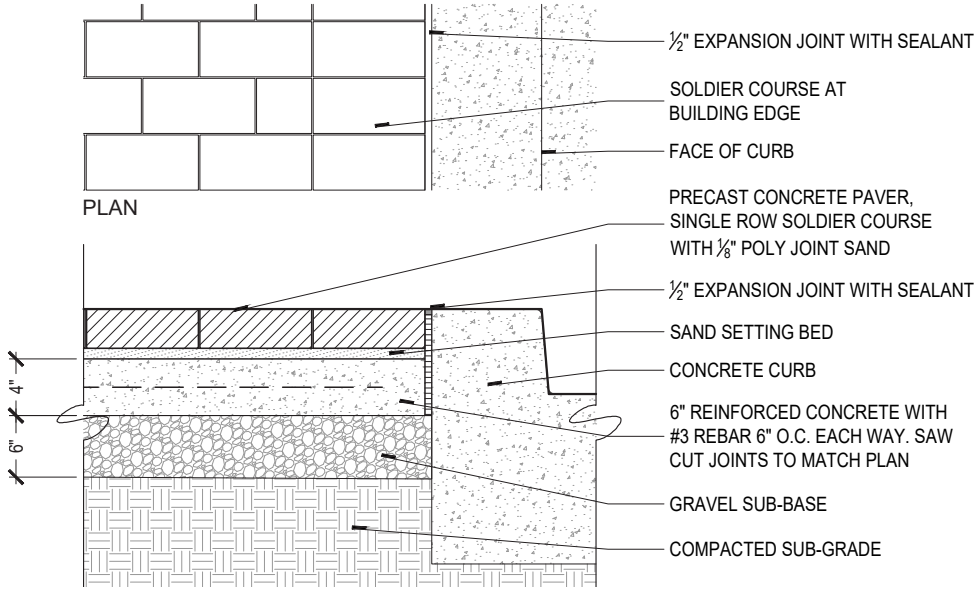


1b Detail 1b: Poured-in-place concrete sidewalk at building face (no Frontage Zone)

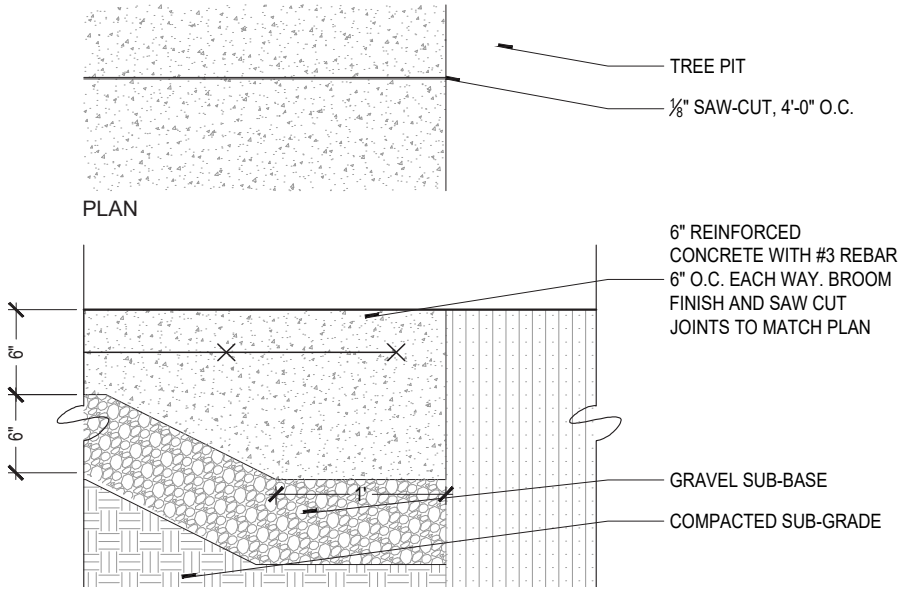
Note: As indicated here, the concrete should have sawcut joints. These joints are easier to navigate for those in mobility devices with wheels, such as wheelchairs or scooters.



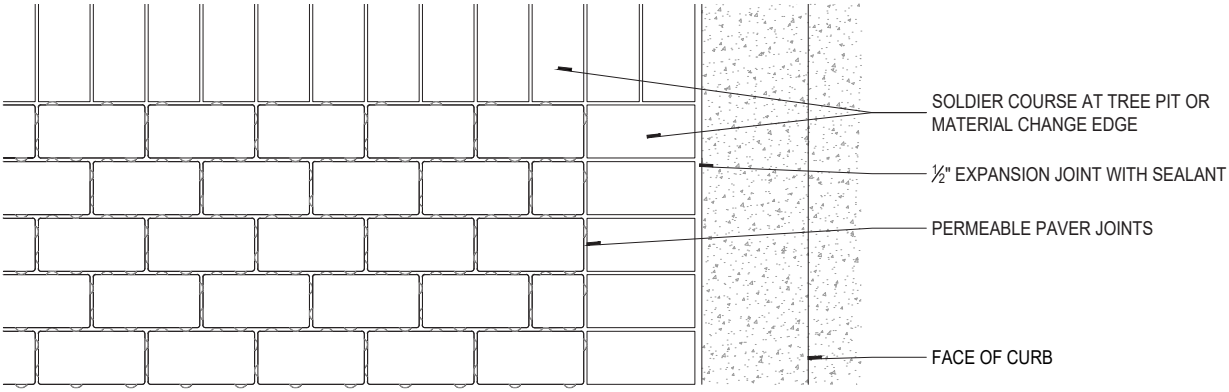
2 Detail 2: Poured-in-place concrete sidewalk at concrete paver edge



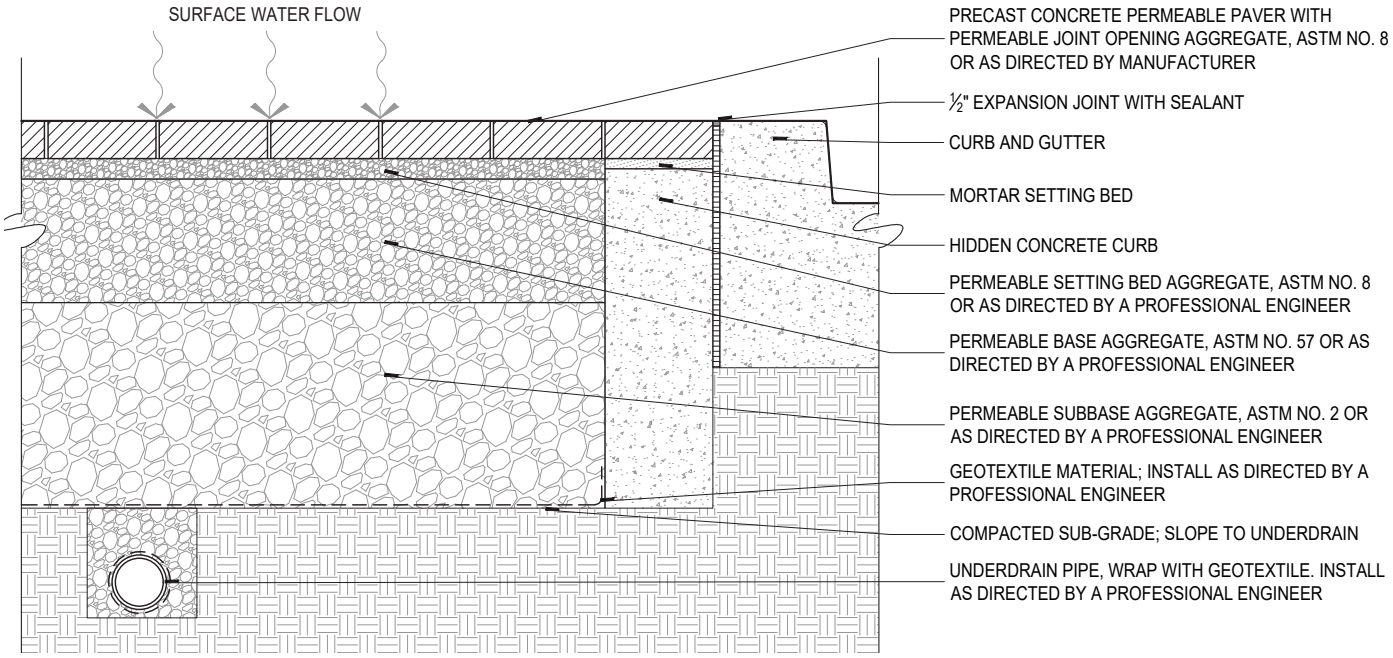
3 Detail 3: Precast concrete paver in Street Buffer



4 Detail 4: Poured-in-place concrete sidewalk at tree pit edge



PLAN



5 Detail 5: Precast concrete permeable paver in Street Buffer (Central Green Loop)

3.2 Street Trees

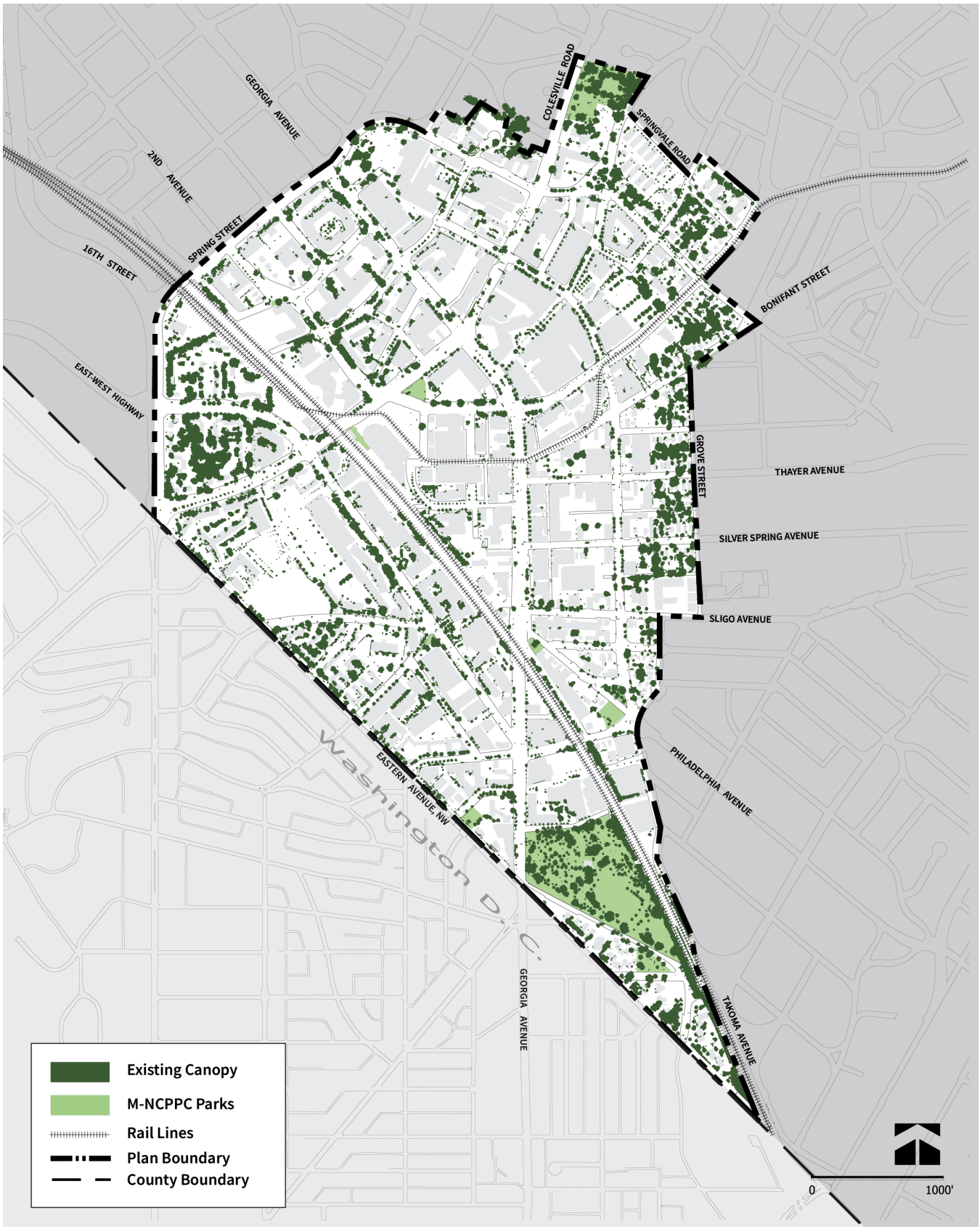
Street trees are an essential part of any urban streetscape, providing environmental, economic, and social benefits. Trees cool streets, contribute to biodiversity, sustain the food web, improve air and water quality, sequester carbon, reduce impervious cover, buffer pedestrians from traffic, and provide character, beauty, and charm to a downtown. As in many urban areas, street trees in downtown Silver Spring experience a lot of stress, which can cause ill health, stunted growth, and mortality.

Existing mature trees on Fenton Street between Wayne Street and Colesville Road.

3.2.1 Existing Tree Canopy Challenges

Today, downtown Silver Spring has a tree canopy cover of just under 9 percent (Map 5), compared with the SSDAC Plan goal of 45 percent. This includes trees located in parks and on private property. Consequently, numerous streets are unshaded, and contribute to urban heat island effect. While many street trees are healthy, others are prematurely ill or dying, and others are leaning as they reach for the sun on partially shaded streets.

Increasing street tree canopy in the downtown is a Sector Plan recommendation. Priority planting zones are along the Green Loop routes, particularly the Central Green Loop (Map 4), areas without existing tree canopy cover, and locations where failing trees need to be replaced. The standards and strategies that follow provide those designing and working within downtown Silver Spring with best practices to achieve maximum tree and vegetation growth, longevity, and survival.



Map 5: Existing Tree Canopy (2024)

3.2.2 Soil Volume and Tree Size

The most significant problem that urban trees face is the scarcity of soil suitable for root growth.[3] A growing tree sends roots as far as the width of its canopy, so sufficient, uncompacted soil for the roots to spread is crucial. The greater the soil volume, the higher probability the tree has to reach maximum growth and tree canopy spread. Trees in typical tree pit cannot expand into the surrounding soil, and when the roots hit the walls of the box, the tree becomes stunted, stressed, vulnerable to disease, and unable to reach its full growth. Soil compaction from pedestrians, pets, maintenance, and construction equally affect tree health and survival.

Providing adequate soil volume is crucial for long-term health and maximizing tree growth. Table 1 provides the ideal soil volumes for trees based on tree size. In Section 3.2.4, several different planting methods are outlined that can provide the necessary soil volumes for tree longevity and survival (Figure 6).

New Development

Large canopy trees, along with the requisite soil volumes, are required for all new development projects where streetscape is being improved or replaced through frontage improvements. When replanting occurs after a tree has died, the Planning department and the Urban District should be notified but there is no need to amend a Certified Site Plan.

Tree Replacement

When replanting trees that have died, the Silver Spring Urban District should strive to plant the largest tree canopy tree possible given site constraints and soil conditions/volume. Refer to Table 1 and to the planting lists by district in Section 3.2.5.

Table 1: Ideal Soil Volume per Tree Size

Ideal Tree Size	Soil Volume	Best Planting Location
Large canopy tree (over 50' tall)	1,000-1,200 cubic feet of uncompacted soil	Streets with linear tree panels, structured cells, or where large soil volumes can be provided.
Medium tree (35-50' tall)	800 cubic feet or greater of uncompacted soil	Streets where planting beds cannot achieve more than 800 cubic feet of soil.
Small tree (under 35' tall)	650 cubic feet or greater of uncompacted soil	Planting beds with less than 650 cubic feet of soil. Also appropriate for sites with power lines overhead.

3 Lindsey, P. and N. Bassuk. "Redesigning the urban forest from the ground below: A new approach to specifying adequate soil volumes for street trees." Arboricultural Journal 16 (1992): 25-39.

Soil volumes can be achieved through the tree planting methods described in Section 3.2.4. Minimum adequate soil volumes can be achieved through a tree pit alone, or via a covered soil approach, such as amended or structural soil that provides a greater area for root expansion and a better chance for tree survival.

Larger, preferred soil volumes for canopy trees can be achieved through a continuous planting strip or a covered soil approach, such as a structured cell or an amended/structural soil panel.

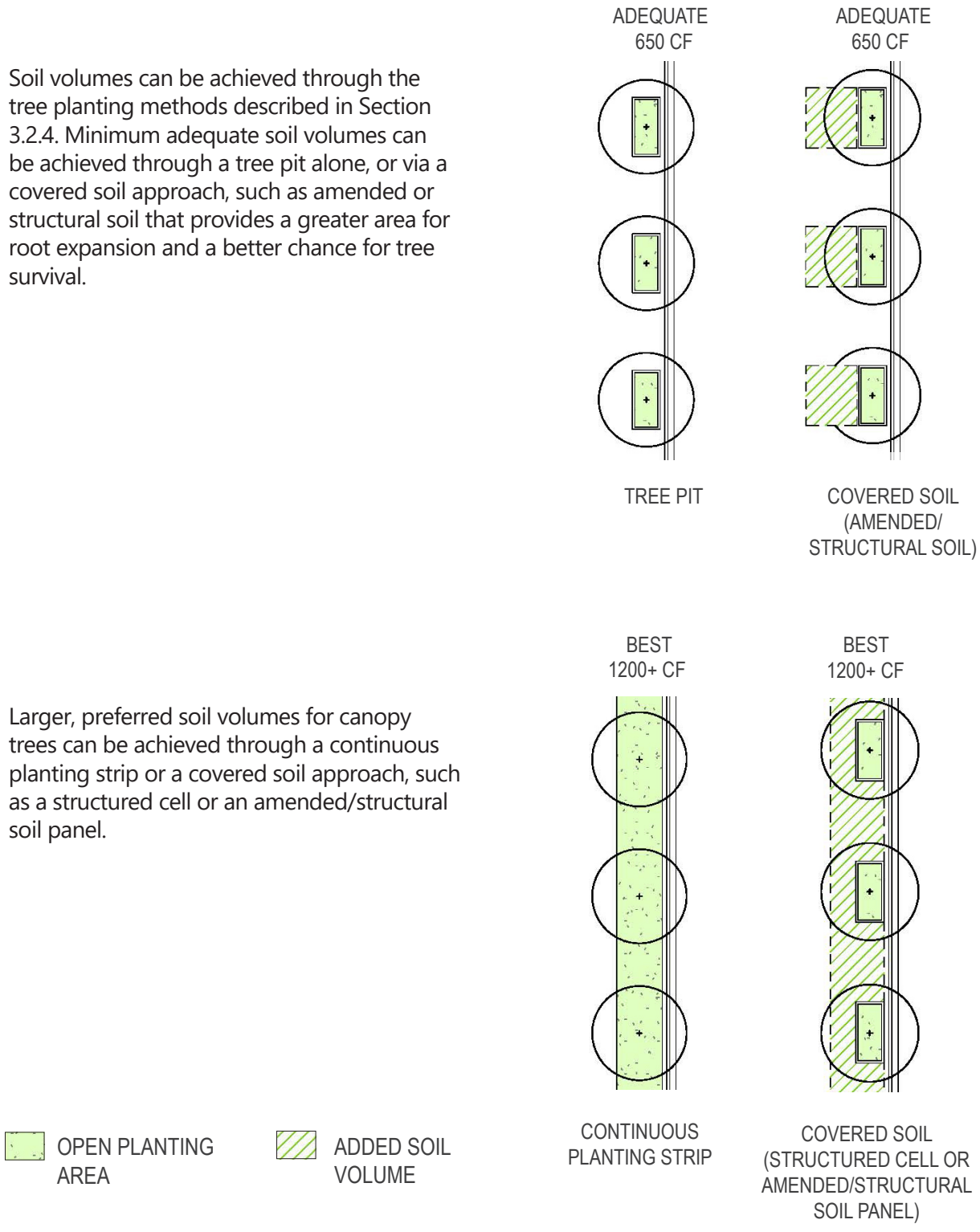


Figure 6: Achieving Soil Volumes

3.2.3. Tree Layout and Spacing

In urban areas, street trees typically appear in one of two configurations at the surface level: as individual trees with paving between them, or as a linear planted bed with more than one tree. Both of these conditions exist in downtown Silver Spring today, and the Standards support continued use of these typologies.

Typically the open planting area for a street tree will be a minimum of 5' in width. Length can vary due to available depth for soil, total soil volume, and other design considerations. Planting methods for trees can be found in Section 3.2.4. For new development projects, locate existing underground utilities and coordinate with relevant agencies prior to deciding on tree placement and planting approach.

Tree Spacing

- Tree spacing (for projects where more than one tree is being planted or replaced at a time) should follow these standards. Refer to Section 3.2.5 for species lists and sizes of trees:
    - Small trees: 30'–35' on center
    - Medium trees: 35'–40' on center
    - Large trees: 40'–45' on center

Along Dixon Street trees are planted in what appears to be individual tree wells. This planting layout can be achieved through covered soil methods as described in Section 3.2.4.

Continuous Planted Beds

Continuous planted beds are linear strips along the street that create a buffer between the road and the sidewalk. Opportunities for these tend to be limited in a downtown but should be considered when feasible as they allow for root expansion, and increased tree health and survival. New development projects on Downtown Streets that are replacing whole sections of streetscape should strive for continuous planters when possible. When exploring continuous planted beds, consider the level of pedestrian foot traffic, the amount of on-street parking, and whether or not there is a high risk for soil compaction. In addition, PROWAG includes requirements for on-street accessible parking spaces. Locating these spaces adjacent to continuous planters will not allow for an accessible path between the space and the sidewalk, so this should be taken into consideration. For more information refer to Chapter 19 in the MCDOT Accessible Design Guide.

Design Standards for Continuous Planted Beds

- For streets with on-street parking immediately adjacent to the planted bed, provide a suspended walkway (minimum 3' feet wide) to access the sidewalk.
- Avoid overplanting of herbaceous species per Section 3.2.6.
- If linear soil planting beds are not feasible, consider structured cells or amended/structural soil to achieve the recommended soil volume. See Section 3.2.4.

Continuous planted beds can be found throughout downtown Silver Spring including along Wayne Avenue (top) and East-West Highway (bottom).

3.2.4. Tree Planting Methods

Regardless of the selected tree bed, projects designing and building new streetscape as frontage improvements must provide canopy trees with appropriate soil volumes to increase the tree's ability to maintain good health and reach maturity. This section includes the planting methods for downtown Silver Spring, in order of priority.

With sufficient soil volume and sunlight, street trees can thrive, like these trees in the landscaped median on Georgia Avenue (top), However, lack of adequate soil volume, and unprotected, compacted soil can cause a tree to struggle (bottom).

Structured Cell System

Structured cells are the preferred street tree planting option in all areas in Silver Spring. They should be used on all Downtown Boulevards and Downtown Streets.

Structured cells maximize tree health by providing trees with soil access below the sidewalk adjacent to the planting area. They are manufactured modules or chambers made of plastic or recycled materials in a stacked arrangement and filled with soil. The structured cell expands under the adjacent sidewalk to optimize root expansion in a constrained urban environment. The rigid underground structure supports sidewalk infrastructure without causing soil compaction.

Structured cells are more expensive than other planting options. However, they are a priority in the urban landscape to ensure long-term tree survival and reduced maintenance and tree replacement.

Structured cells can be used to achieve either of the tree layouts described: individual trees separated by pavers, or a linear planted bed. The cells are designed to support paving materials above the soil, so they are ideal for a planted bed with paving between the trees.

These Standards identify structured cells as a priority for tree planting. However, if the applicant installs a stormwater bioretention system, plant an understory tree in the device rather than a street tree. This should not replace canopy trees within the streetscape. The purpose of this recommendation is due to periodic maintenance required within the bioretention systems which would result in canopy tree loss.

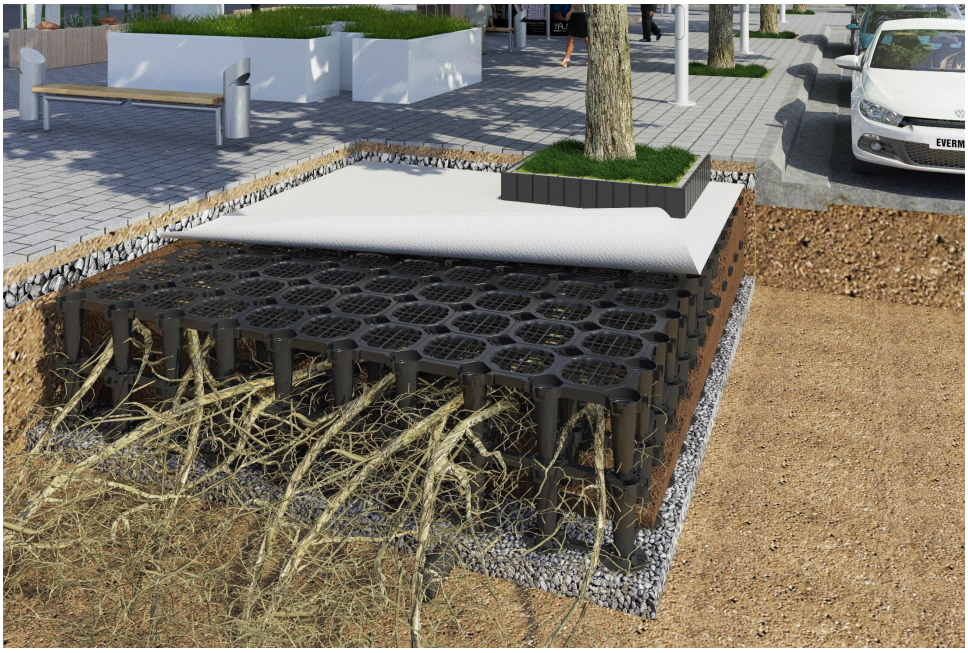


Image of how an underground structured cell works. In this illustrative image the sidewalk is cut away to show the black rigid cell structure below. (www.citygreen.com)

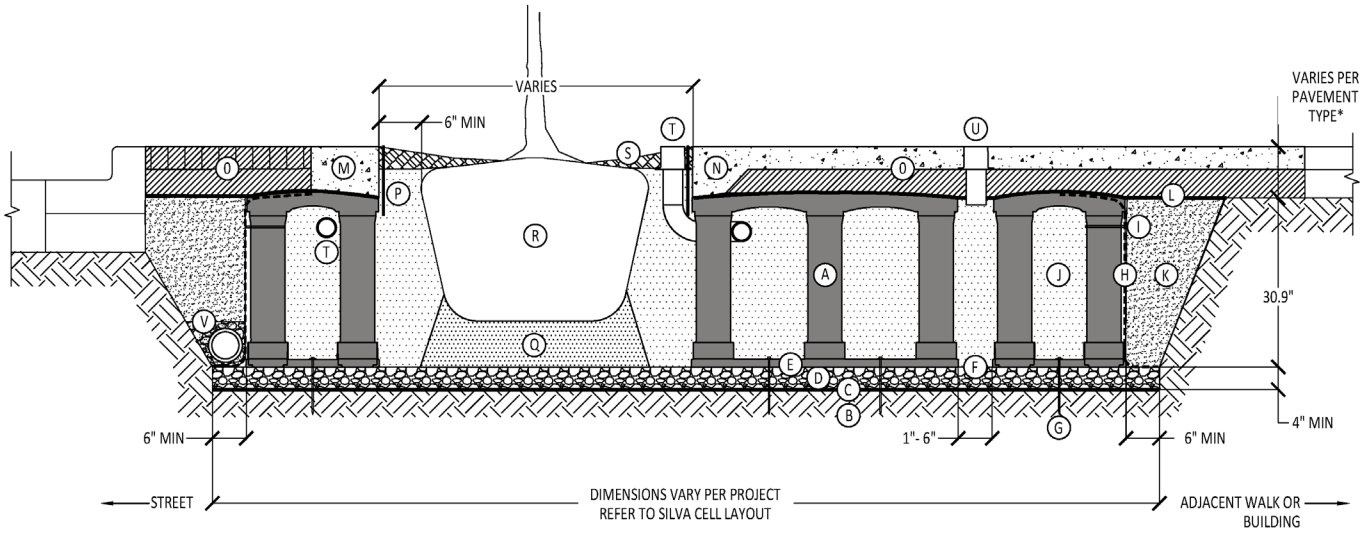


Figure 7: Structural Cell Partial Section

Partial section of a street tree planted with a structural cell system made by Silva Cell. Section detail is intended to be illustrative. Dark gray shaded area represents the structured cell. Projects should follow relevant manufacturer details.

Amended/Structural Soil

Amended or structural soil is a supportive material used under sidewalks containing nutrients and aggregates strong enough to sustain the above sidewalks without soil compaction. This material is used as a method to increase tree health and survival by allowing root expansion while providing additional nutrients beyond the planting zone.

To achieve both goals of maximizing tree health and maintaining the integrity of the sidewalk, these Standards identify two types of amended/structural soils commonly used today: Cornell University's Structural Soils (CU Structural Soils) mix and Sand-Based Structural Soil. Sand-Based Structural Soil has a slightly higher percentage of organic matter to improve tree health. While structural cells are the priority as discussed previously, both types of amended/structural soils are good secondary options for achieving long-term tree survival in urban areas.

CU Structural Soil consists of a mixture of crushed gravel and soil. The soil should be loam to a clay loam containing at least 20% clay to maximize water- and nutrient-holding capacity. The proportion of soil to stone is approximately 80% stone to 20% soil by dry weight, with a small amount of hydrogel aiding in the uniform blending of the two materials.

Sand-Based Structural Soil should consist of a blend of approximately 60% coarse sand by volume, 15% base loam by volume, and 25% organic amendment by volume. The components should be blended to create a uniform mixture. Percentages will be adjusted as necessary to achieve proper grain size.

Full specifications for both types of structural soils are included in Chapter 4.

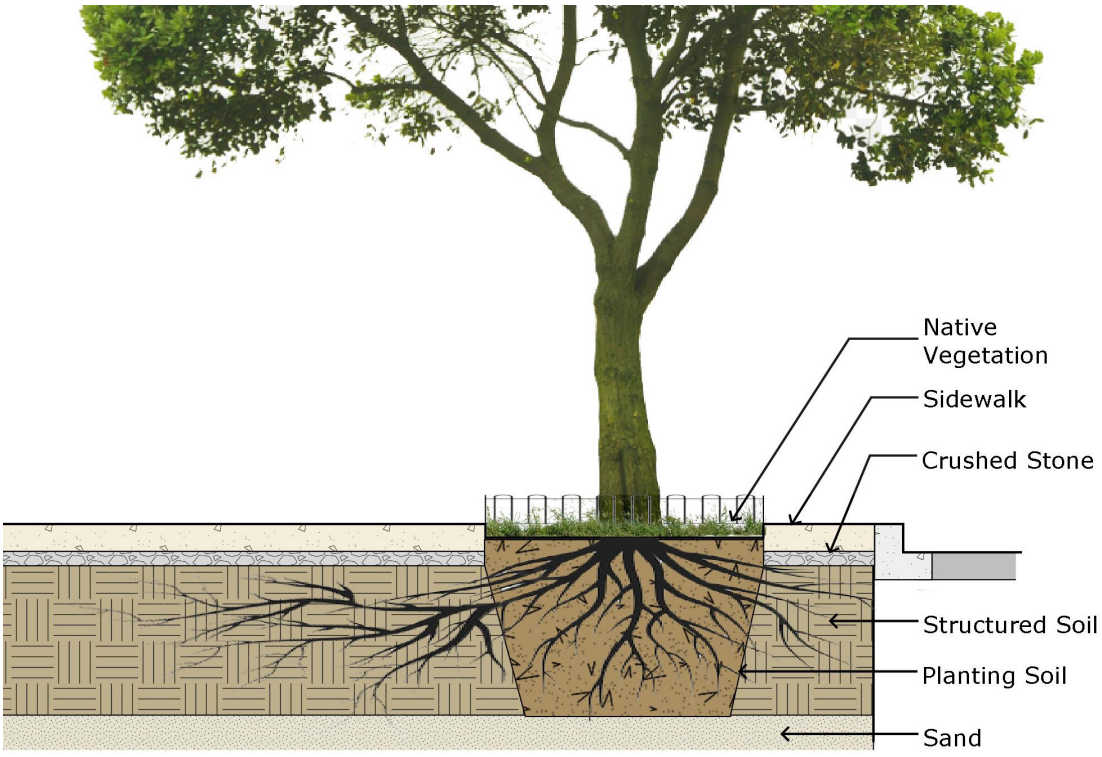


Figure 8: Structural Soil Diagram

Tree Pits

Tree pits are underground individual boxes that house a single tree. They have walled sides or structural systems that prevent the expansion of tree roots. If the well is not large enough, this causes root stunting and binding and deprives the tree of adequate soil, nutrients, and water. In most cases, tree pits are undersized for the species of tree in the pit, which results in a shortened life span or ill health. For these reasons, it is important to strive for the ideal soil volumes provided in Table 1 in Section 3.2.2. Achieving adequate soil volume for proper tree health is generally harder to accommodate with tree wells.

Tree Pit Standards

- New development projects should prioritize structured cells and amended/structural soil over tree pits.
- Where tree pits are used, provide a soil volumes in Table 1 in Section 3.2.2.
- Use a covered soil (mulch) approach for tree planting to achieve greater soil volumes.
- Never overplant a tree pit with herbaceous species, as they compete for soil nutrients and water.

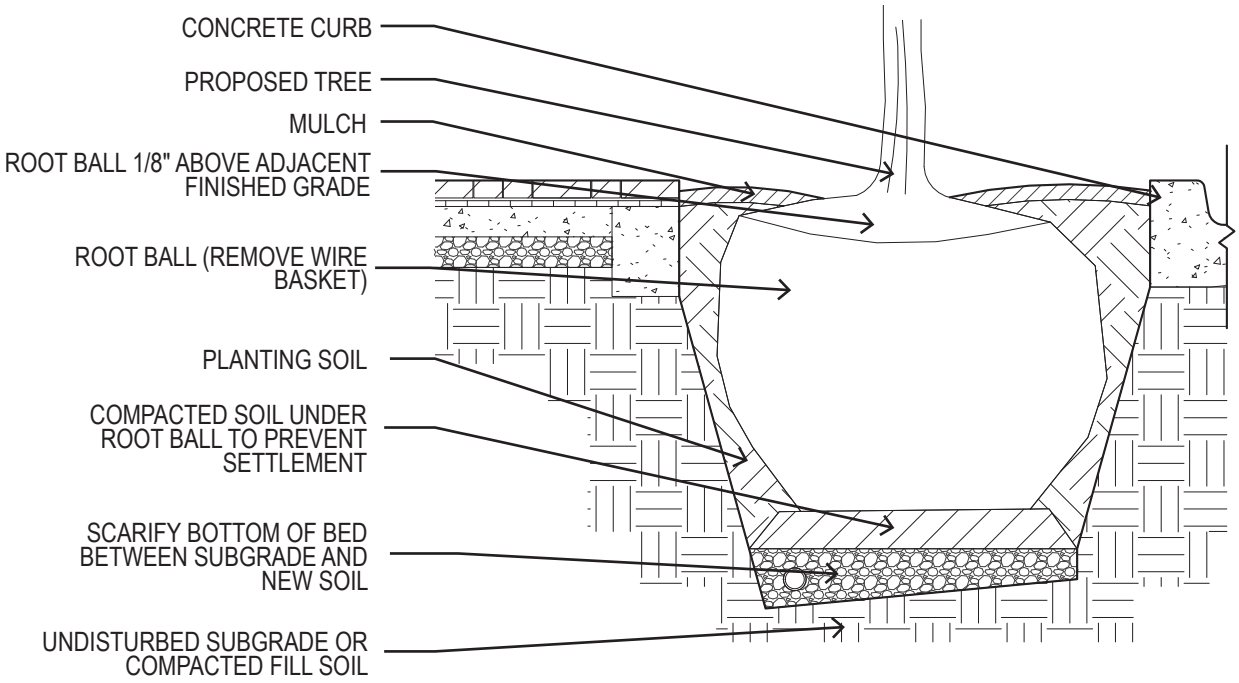


Figure 9: Typical Tree Pit Section

Mulching

Mulching provides many benefits to trees. It moderates soil temperatures, helps to retain soil moisture, reduces compaction, aerates the soil, and provides nutrients.

- Mulch should be applied at a depth of 2–4 inches. Avoid excessive mulching of trees and do not mulch against the tree trunk (Figure 8).
- Use mulch made of organic materials such as wood chips, bark nuggets, and composted leaves.

Replanting Trees

When existing trees fail and need to be replaced, it is often impossible to know the soil volume underneath the street surface, making tree selection difficult. Different tree species require different soil volumes based on their maximum tree size at maturity. In these cases, it is often useful to note the species and health of the existing trees already growing on the same street. If the trees are canopy or understory trees, plant trees of similar stature at maturity.

If an existing tree dies:

- Take note of the cause, as it may inform replanting.
- Evaluate whether or not the existing soil volume could be increased. If the soil volume is insufficient for a canopy tree, replace with a medium-size tree of similar canopy spread.
- Refer to planting lists per district in Section 3.2.5.

If multiple attempts to replant a tree location fail, refer to Section 3.2.6.

Properly mulching a tree includes creating a "donut" of mulch around the tree with room for the tree to breathe in the center (left -www.porta3.mk). Mounding the mulch up around the trunk is not beneficial to the tree (right).

3.2.5. Tree Species and Selection

Challenges to Street Trees

In urban areas, tree species need to be particularly resilient and able to thrive under harsh conditions. Not all tree species are suitable, and environmental conditions can vary from one side of the street to the other. These Standards offer a revised planting list tailored to the conditions of each individual street to provide greater resiliency and increase tree survival.

Multiple factors contribute to tree stress and ill health, such as extreme temperatures, diseases, below ground root mutilation (from utility work and construction), road and sidewalk repair, soil compaction from pets and pedestrians, and insufficient water, soil, and nutrients. Regular maintenance and/or installation of public utility lines located within the ROW often impact tree roots, growth and canopy and can sometimes cause the loss of urban street trees.

When trees are not given enough soil volume for the roots to expand, the roots often reach up to the surface for oxygen and nutrients.

Tree Species Selection Approach

Presently, most streets have one or two dominant tree species. While this creates uniformity and symmetry, having the same tree species along the entire length of a street corridor could result in complete tree loss should that species become victim to pests and diseases or climate impacts.

To address these concerns without disrupting existing healthy trees, as trees die, they will be replaced either in-kind, or with the species recommended for that particular street and location identified in the tables below. The result will be that many blocks will eventually have a diverse mix of appropriate species while simultaneously increasing long-term tree survival and resiliency against unforeseen species mortality.

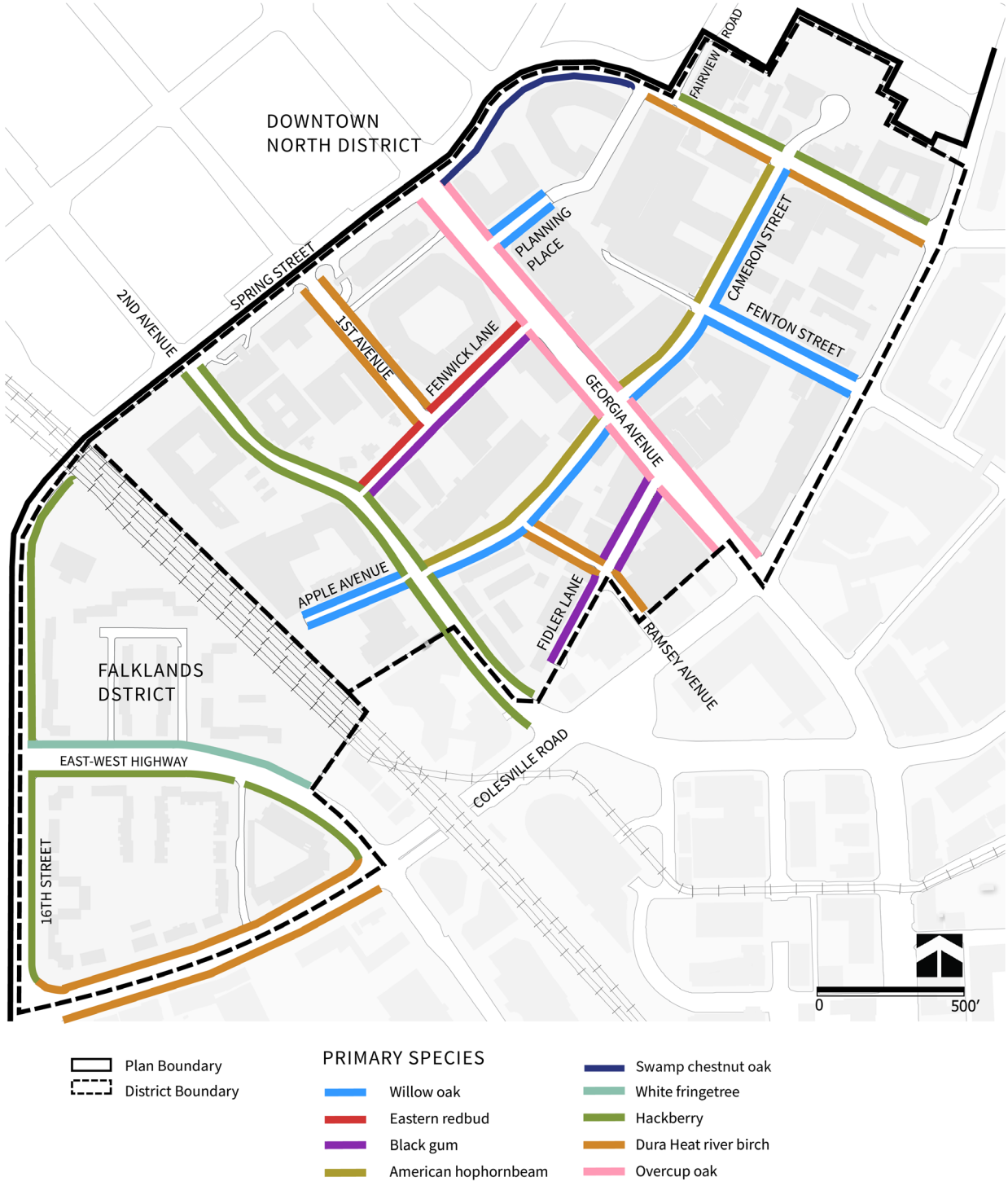
The species maps and tables on the following pages identify the priority plantings for each street's unique existing conditions per SSDAC Plan districts (refer to Map 6 for district boundaries). Existing species that are thriving in their current locations are retained, and additional species that would provide diversity are recommended. For each street, there is a primary preferred species, and then a second and third choice for replanting, or if the primary species are unavailable. **All new development projects should start with the primary species.** However, if the primary species is a smaller understory tree (due to existing conditions) and the new development increases the street tree soil volume, a larger canopy tree should be selected from the master tree list (Appendix A). The trees listed for each district were selected based on the existing tree canopy, height, width, shape, location, space constraints, adaptability, and habitat value.

Note: The Adjacent Communities District has a very well-established tree canopy and predominantly includes zones that do not require Optional Method of Development; therefore these Standards do not make street-by-street recommendations for that District.

Map 6: Silver Spring Downtown and Adjacent Communities Plan Districts

Downtown North and Falklands Districts

The map and table below identify the primary species for each street. The table also identifies secondary and tertiary choices for species should the primary species fail or be unavailable from nursery stock.



Map 7: Downtown North and Falklands Districts: Species Location

Table 2: Downtown North and Falklands Districts Tree Species Prioritization

Apple Avenue (limited planting areas)

	Latin Name	Common Name	Native	Height	Spread	Species Supported[4]	Shape
Primary Choice	*Quercus phellos*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal
Secondary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honey locust	X	30'–70'	30'–70'	Low	Spreading

Cameron Street: North Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal
Secondary Choice	*Betula nigra 'Dura Heat'® (sing*le stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Third Choice	*Nyssa sylvatica*	Black gum, Black tupelo	X	30 - 50'	20 - 30'	Very Low	Pyramidal

Cameron Street: South Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus phellos*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal
Secondary Choice	*Acer rubrum*	Red maple	X	40'–60'	40'–60'	High	Round
Third Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval

Colesville Road: From 16th Street to East-West Highway (pruning care is needed)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Cladrastis kentukea*	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading
Third Choice	*Ulmus Americana* 'New Harmony'	New harmony American elm	X	60'–70'	60'–70'	Medium	Vase

4 Species Supported: The number of caterpillar species (butterflies, skippers, and moths) that a tree supports indicating a trees ability to host protein sources for wildlife thereby supporting biodiversity. Sources: The Living Landscape: Designing for beauty and biodiversity in a garden. Rick Darke and Doug Tallamy. 2022. Casey Trees Urban Tree Selection Guide: A Designer's List of Appropriate Trees for the Urban Mid-Atlantic. 2015.

Downtown North and Falklands District Tree Species Prioritization (continued)

East-West Highway: North Side from 16th Street to Colesville Road (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Chionanthus virginicus*	White fringetree	X	25'–30'	25–30'	Very Low	Vase
Secondary Choice	*Crataegus phaenopyrum*	Washington hawthorn	X	25'–30'	20–25′	Medium	Pyramidal
Third Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25′	Low	Pyramidal

East-West Highway: South Side from 16th Street to Colesville

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40 - 60′	40 - 60′	Low	Vase/Oval
Secondary Choice	*Quercus imbricaria*	Shingle oak	X	50 - 60′	50 - 60′	High	Pyramidal/ Spreading
Third Choice	*Tilia tomentosa*	Silver linden	X	50 - 70′	35 - 45′	Medium	Oval/ Pyramidal

Fenwick Lane: North Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Cercis canadensis*	Eastern redbud	X	25'–30'	25–35′	Very Low	Round
Secondary Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading
Third Choice	*Carpinus caroliniana 'palisade'*	Palisade American hornbeam	X	20 - 30′	20 - 30′	Low	Round

Fenwick Lane: South Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Nyssa sylvatica*	Black gum, Black tupelo	X	30 - 50′	20 - 30′	Very Low	Pyramidal
Secondary Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Third Choice	*Ostrya virginiana*	American hophornbeam	X	25 - 40′	15 - 25′	Low	Pyramidal

Fenton Street: From Cameron Street to Colesville Road

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus phellos*	Willow oak	X	40′–60′	30′–40′	High	Oval/ Pyramidal
Secondary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honey locust	X	30′–70′	30′–70′	Low	Spreading
Third Choice	*Platanus x acerifolia*	London planetree		70′–100′	65′–80′	Unknown	Spreading

Fidler Lane

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	Nyssa sylvatica	Black gum, Black tupelo	X	30 - 50′	20 - 30′	Very Low	Pyramidal
Secondary Choice	Betula nigra 'Dura Heat' (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Third Choice	Prunus avium	Sweet cherry		15'–30'	15'–30'	High	Columnar

Georgia Avenue: From Spring Street to Colesville Road

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus lyrata*	Overcup oak	X	40–60'	40'–50'	High	Round
Secondary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Third Choice	*Celtis occidentalis*	Hackberry	X	40′–60′	40′–60′	Low	Vase/Oval

Planning Place

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus phellos (low branches)*	Willow oak	X	40′–60′	30′–40′	High	Oval/ Pyramidal
Secondary Choice	*Robinia pseudoacacia*	Black locust	X	30'–50'	20'–35'	Low	Irregular
Third Choice	Nyssa sylvatica	Black gum, black tupelo	X	30'–50'	20–30'	Very Low	Pyramidal

Downtown North and Falklands District Tree Species Prioritization (continued)

Ramsey Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Cladrastis kentukea*	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading
Third Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading

Spring Street: From Colesville Road to Fairview Road, North Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Secondary Choice	*Quercus phellos*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal
Third Choice	*Ulmus americana* 'Jefferson'	Jefferson American elm	X	60'–90'	30'–50'	Medium	Vase

Spring Street: From Colesville Road to Fairview Road, South Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Robinia pseudoacacia*	Black locust	X	30'–50'	20'–35'	Low	Irregular
Third Choice	*Nyssa sylvatica*	Black gum, black tupelo	X	30'–50'	20–30'	Very Low	Pyramidal

Spring Street: From Fairview to Georgia Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Secondary Choice	*Quercus palustris (plant off streets-parks)*	Pin oak	X	65–70'	25–40'	High	Pyramidal
Third Choice	*Quercus lyrata*	Overcup oak	X	40–60'	40'–50'	High	Round

Downtown North and Falklands District Tree Species Prioritization (continued)

1st Avenue: From Spring Street to Fenwick Lane

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Cladrastis kentukea*	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading
Third Choice	*Nyssa sylvatica*	Black gum, black tupelo	X	30 - 50'	20 - 30'	Very Low	Pyramidal

2nd Avenue: From Spring Street to Colesville Road

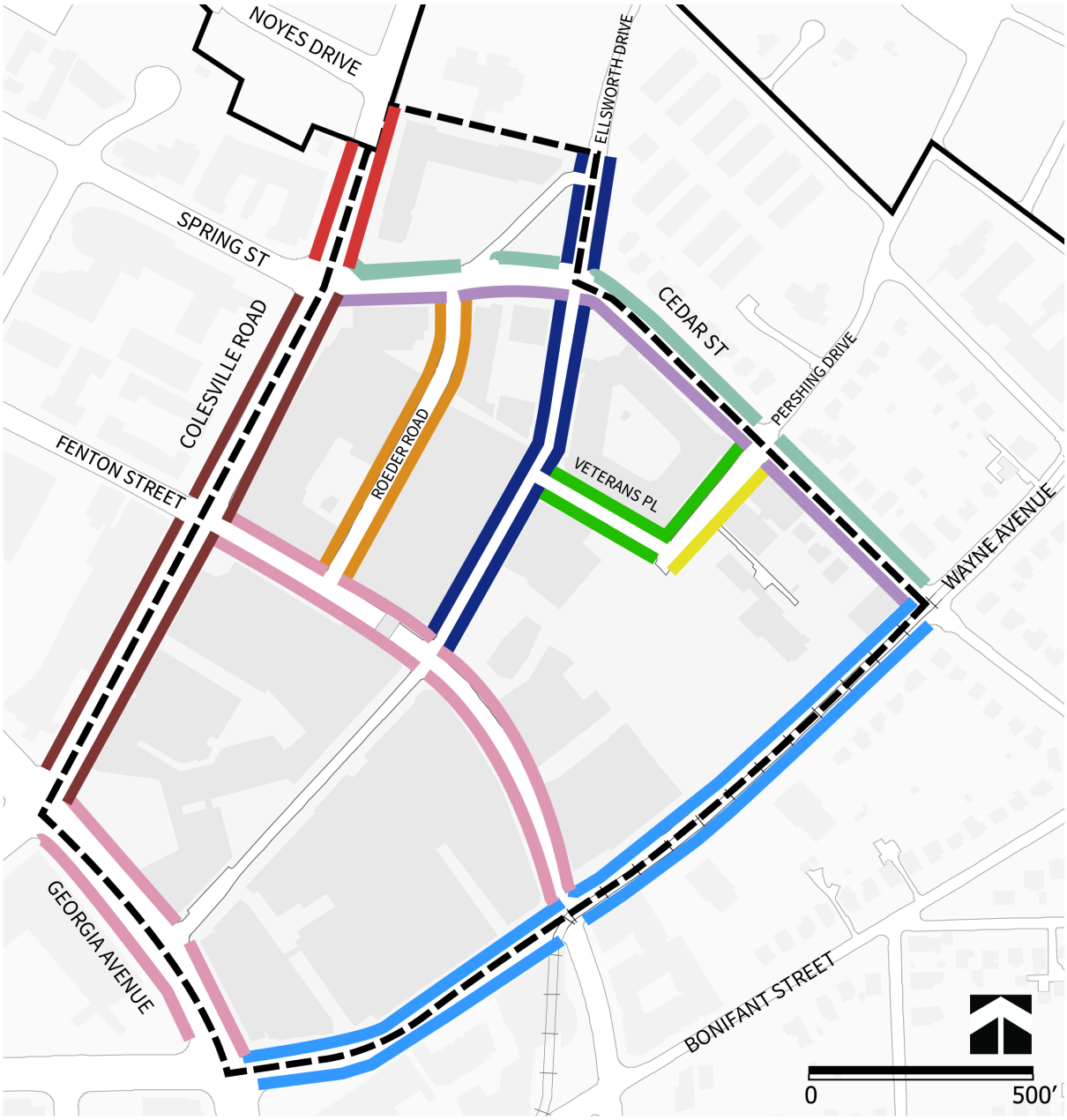
	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Secondary Choice	*Robinia pseudoacacia*	Black locust	X	30'–50'	20' - 35'	Medium	Irregular
Third Choice	*Quercus phellos* (low branches)	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal

16th Street: From Spring Street to Colesville Road

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Secondary Choice	*Quercus lyrata*	Overcup oak	X	40–60'	40'–50'	High	Round
Third Choice	*Quercus imbricaria*	Shingle oak	X	50'–60'	50'–60'	High	Pyramidal/ Spreading

Ellsworth District

The map and table below identify the primary species for each street. The table also identifies secondary and tertiary choices for species should the primary species fail or be unavailable from nursery stock.



PRIMARY SPECIES

- Plan Boundary
- District Boundary
- Swamp chestnut oak
- Thornless honey locust
- Willow oak
- Pin oak
- Sugarbery
- Sycamore
- Silver linden
- American hornbeam
- Washington hawthorn
- Streetwise Persian ironwood

Map 8: Ellsworth District: Species Location

Table 3: Ellsworth District Tree Species Prioritization

Colesville Road: From Georgia Avenue to Noyes Drive

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Secondary Choice	Tilia tomentosa	Silver linden	X	50' - 70′	35' - 45′	Medium	Oval/ Pyramidal
Third Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval

Colesville Road: From Georgia Avenue to Spring to Noyes Drive (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading
Secondary Choice	*Carpinus caroliniana*	Palisade American hornbeam	X	20'–30'	20–30'	Low	Round
Third Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25′	Low	Pyramidal

Ellsworth Drive: Northeast of Fenton Street

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honeylocust	X	30′–70′	30′–70′	Low	Spreading
Secondary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Third Choice	*Quercus lyrata*	Overcup oak	X	40–60'	40'–50'	High	Round

Fenton Street: From Colesville Road to Wayne Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus palustris*	Pin oak	X	65′–70′	25′–40′	High	Pyramidal
Secondary Choice	*Tilia americana*	American linden, basswood	X	60′–90′	30′–55′	Medium	Oval
Third Choice	*Platanus x acerifolia*	London planetree	X	70′–100′	65′–80′	Unknown	Spreading

Ellsworth District Tree Species Prioritization (continued)

Georgia Avenue: From Colesville Road to Wayne Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus palustris*	Pin oak	X	65'–70'	25'–40'	High	Pyramidal
Secondary Choice	*Ulmus americana 'Jefferson'*	Jefferson American elm	X	60'–80'	30'–50'	Medium	Vase
Third Choice	*Tilia americana*	American linden, basswood	X	60'–90'	30'–55'	Medium	Oval

Roeder Road

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Carpinus caroliniana*	American hornbeam	X	20'–30'	20'–30'	Low	Round
Secondary Choice	*Chionanathus retusus*	Chinese fringetree		25'–30'	25'–30'	Very Low	Round/ Spreading
Third Choice	*Robinia pseudoacacia*	Black locust	X	30'–50'	20' - 35'	Low	Irregular

Spring Street/Cedar Street: From Colesville Road to Wayne Avenue, North Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Parrotia persica 'Streetwise'*	Streetwise Persian ironwood		20'–30'	10'–20'	Unknown	Columnar
Secondary Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading
Third Choice	*Betula nigra 'dura heat' (single stem)*	Dura Heat® river birch	X	30 - 40'	30 - 40'	Very Low	Pyramidal

Spring Street/Cedar Street: From Colesville Road to Wayne Avenue, South Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Tilia tomentosa*	Silver linden	X	50'–70'	35'–45'	Medium	Oval/ Pyramidal
Secondary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honeylocust	X	30'–70'	30'–70'	Low	Spreading
Third Choice	*Quercus imbricaria*	Shingle oak	X	50'–60'	50'–60'	High	Pyramidal/ Spreading

Veterans Place and Pershing Drive (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Crataegus phaenopyrum*	Washington hawthorn	X	25'–30'	20–25′	Medium	Pyramidal
Secondary Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading
Third Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30′–40′	30′–40′	Very Low	Pyramidal

Veterans Place and Pershing Drive (locations without powerlines)

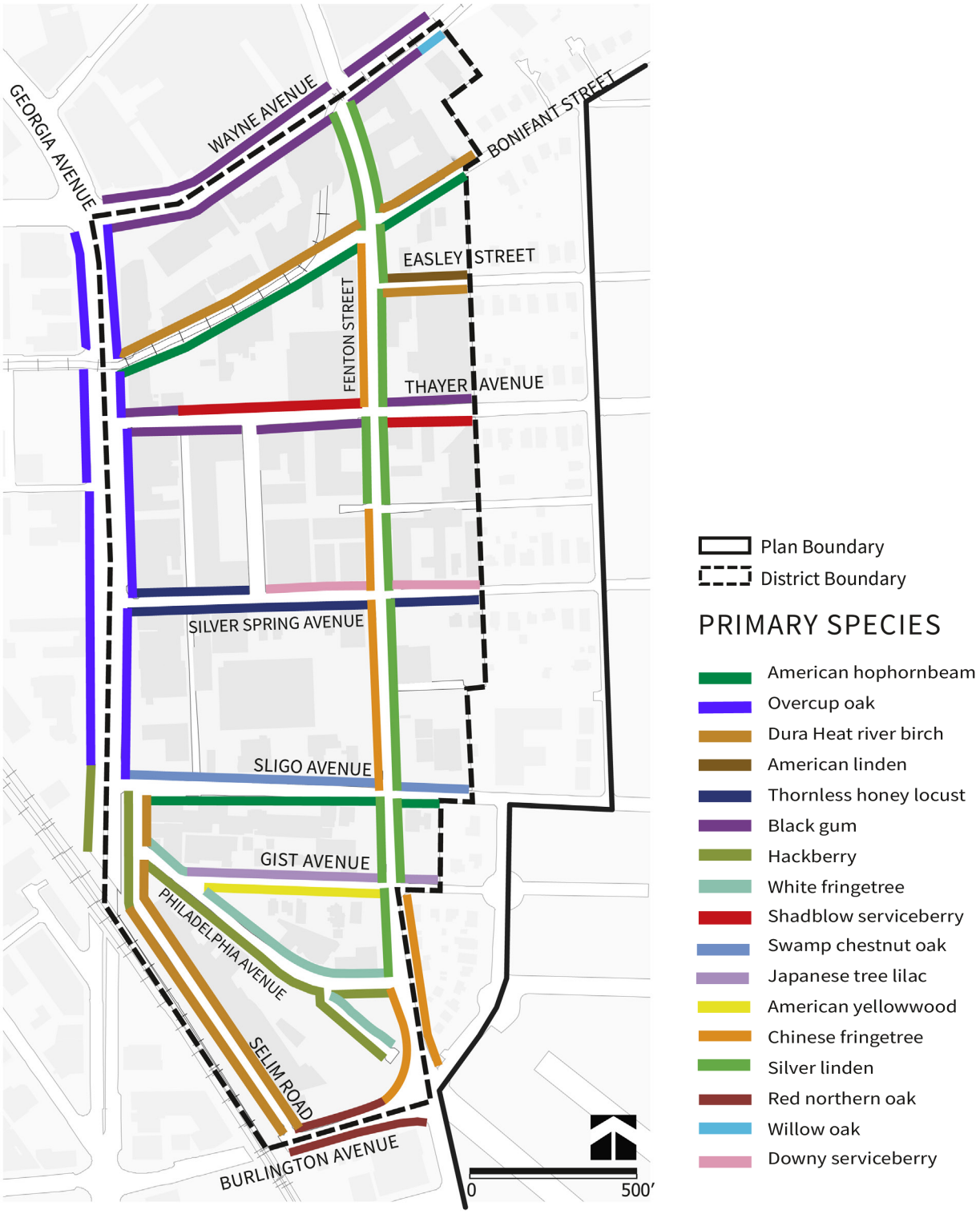
	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Platanus occidentalis*	Sycamore	X	75′–100′	75′–100′	Low	Round/ Spreading
Secondary Choice	*Quercus imbricaria*	Shingle oak	X	50′–60′	50′–60′	High	Pyramidal/ Spreading
Third Choice	*Tilia americana*	American linden, basswood	X	60′–90′	30′–55′	Medium	Oval

Wayne Avenue: From Georgia Avenue to Cedar Street

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus phellos*	Willow oak	X	40′–60′	30′–40′	High	Oval/ Pyramidal
Secondary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honey locust	X	30′–70′	30′–70′	Low	Spreading
Third Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round

Fenton Village District

The map and table below identify the primary species for each street. The table also identifies secondary and tertiary choices for species should the primary species fail or be unavailable from nursery stock.



Map 9: Fenton Village District: Species Location

Table 4: Fenton Village District Tree Species Prioritization

Bonifant Street: From Georgia Avenue to Cedar Street (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	Cladrastis kentukea	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading
Third Choice	*Tilia tomentosa*	Silver linden		50 - 70'	35 - 45'	Medium	Oval/ Pyramidal

Bonifant Street: From Georgia Avenue to Cedar Street (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal
Secondary Choice	*Cladrastis kentukea*	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading
Third Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal

Burlington Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus rubra*	Northern red oak	X	60'–75'	60 -75'	High	Round
Secondary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Third Choice	*Quercus rubra*	Northern red oak	X	60'–75'	60 -75'	High	Round

Easley Street: South Side (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Low	Pyramidal
Secondary Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading
Third Choice	*Prunus x incamp* 'Okame'	Okame cherry		15'–25'	20'	Unknown	Oval/ Round

Fenton Village District Tree Species Prioritization (continued)

Easley Street: North Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Tilia Americana*	American linden, basswood	X	60'–90'	30'–55'	Medium	Oval
Secondary Choice	*Quercus imbricaria*	Shingle oak	X	50'–60'	50'–60'	High	Pyramidal/ Spreading
Third Choice	*Gymnocladus dioicus* 'Stately Manor'	Fruitless Kentucky coffee tree	X	50'–70'	30'–50'	Low	Spreading

Fenton Street: From Wayne Avenue to Burlington Avenue (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Chionanathus retusus*	Chinese fringetree		25'–30'	25'–30'	Very Low	Round/ Spreading
Secondary Choice	*Cornus kousa*	Kousa dogwood		20'–30'	20'–30'	0	Round
Third Choice	*Ostrya virginiana*	American hophornbeam		25'–40'	15'–25'	Low	Pyramidal

Fenton Street: From Burlington Avenue to Wayne Avenue (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Tilia tomentosa*	Silver linden		50'–70'	35'–45'	Medium	Oval/ Pyramidal
Secondary Choice	*Quercus phellos*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal
Third Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honey locust	X	30'–70'	30'–70'	Low	Spreading

Gist Avenue: North Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Syringa reticulata*	Japanese tree lilac		20'–30'	15'–25'	0	Oval
Secondary Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal
Third Choice	*Parrotia persica* 'Streetwise'	Streetwise Persian ironwood		20'–30'	10-20'	Unknown	Columnar

Fenton Village District Tree Species Prioritization (continued)

Gist Avenue: South Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	Cladrastis kentukea	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading
Secondary Choice	Tilia Americana	American linden, basswood	X	60'–90'	30'–55'	Medium	Oval
Third Choice	Tilia tomentosa	Silver linden		50'–70'	35'–45'	Medium	Oval/ Pyramidal

Georgia Avenue: From Wayne Avenue to Sligo Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus lyrata*	Overcup oak	X	40–60'	40'–50'	High	Round
Secondary Choice	*Tilia americana*	American linden, basswood	X	60'–90'	30'–55'	Medium	Oval
Third Choice	*Tilia tomentosa*	Silver linden		50'–70'	35'–45'	Medium	Oval/ Pyramidal

Georgia Avenue: From Sligo Avenue to Selim Road

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Secondary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honey locust	X	30'–70'	30'–70'	Low	Spreading
Third Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round

Philadelphia Avenue: North/East Side (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Chionanthus virginicus*	White fringetree	X	25'–30'	25'–30'	Very Low	Vase
Secondary Choice	*Crataegus viridis*	Winter king hawthorn	X	20'–30'	20 - 35'	Medium	Pyramidal
Third Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal

Fenton Village District Tree Species Prioritization (continued)

Philadelphia Avenue: South/West Side

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Second Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Third Choice	*Ulmus americana* 'Jefferson'	Jefferson American elm	X	60'–90'	30'–50'	Medium	Vase

Selim Road: From Sligo Avenue to Burlington Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Nyssa sylvatica*	Black gum, black tupelo	X	30'–50'	20'–30'	Very Low	Pyramidal
Third Choice	*Crataegus viridis*	Winter king hawthorn	X	20'–30'	20 - 35'	Medium	Pyramidal

Silver Spring Avenue (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Amelanchier arborea*	Downy serviceberry	X	15'–25'	15'–25'	Medium	Vase
Secondary Choice	*Syringa reticulata*	Japanese tree lilac		20'–30'	15'–25'	0	Oval
Third Choice	*Ostrya virginiana*	American hophornbeam		25'–40'	15'–25'	Low	Pyramidal

Silver Spring Avenue (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Gleditsia triacanthos var. inermis 'Shademaster'*	Thornless honey locust	X	30'–70'	30'–70'	Low	Spreading
Secondary Choice	*Quercus coccinea*	Scarlet oak	X	60'–90'	40'–50'	High	Round
Third Choice	*Quercus michauxii*	Swamp chestnut oak	X	50'–60'	30'–60'	High	Round

Fenton Village District Tree Species Prioritization (continued)

Sligo Avenue (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal
Secondary Choice	*Prunus serrulata 'Kwanzan'*	Kwanzan cherry		15'–25'	20'–25'	Unknown	Oval/ Round
Third Choice	*Chionanthus virginicus*	White fringetree	X	25'–30'	25–30'	Very Low	Vase

Sligo Avenue (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Secondary Choice	*Quercus imbricaria*	Shingle oak	X	50 - 60'	50 - 60'	High	Pyramidal/ Spreading
Third Choice	*Quercus phellos (low branches)*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal

Thayer Avenue (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Amelanchier canadensis*	Shadblow serviceberry	X	5'–20'	15'–20'	Medium	Vase
Secondary Choice	*Amelanchier x grandiflora*	Apple serviceberry	X	15'–25'	15'–20'	Medium	Vase
Third Choice	*Crataegus viridis*	Winter king hawthorn	X	20'–30'	20–35'	Medium	Pyramidal

Thayer Avenue (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Nyssa sylvatica*	Black gum, black tupelo	X	30'–50'	20–30'	Very Low	Pyramidal
Secondary Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Third Choice	*Cladrastis kentukea*	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading

Fenton Village District Tree Species Prioritization (continued)

Wayne Avenue: From Georgia Avenue to Cedar Street (locations without powerlines)

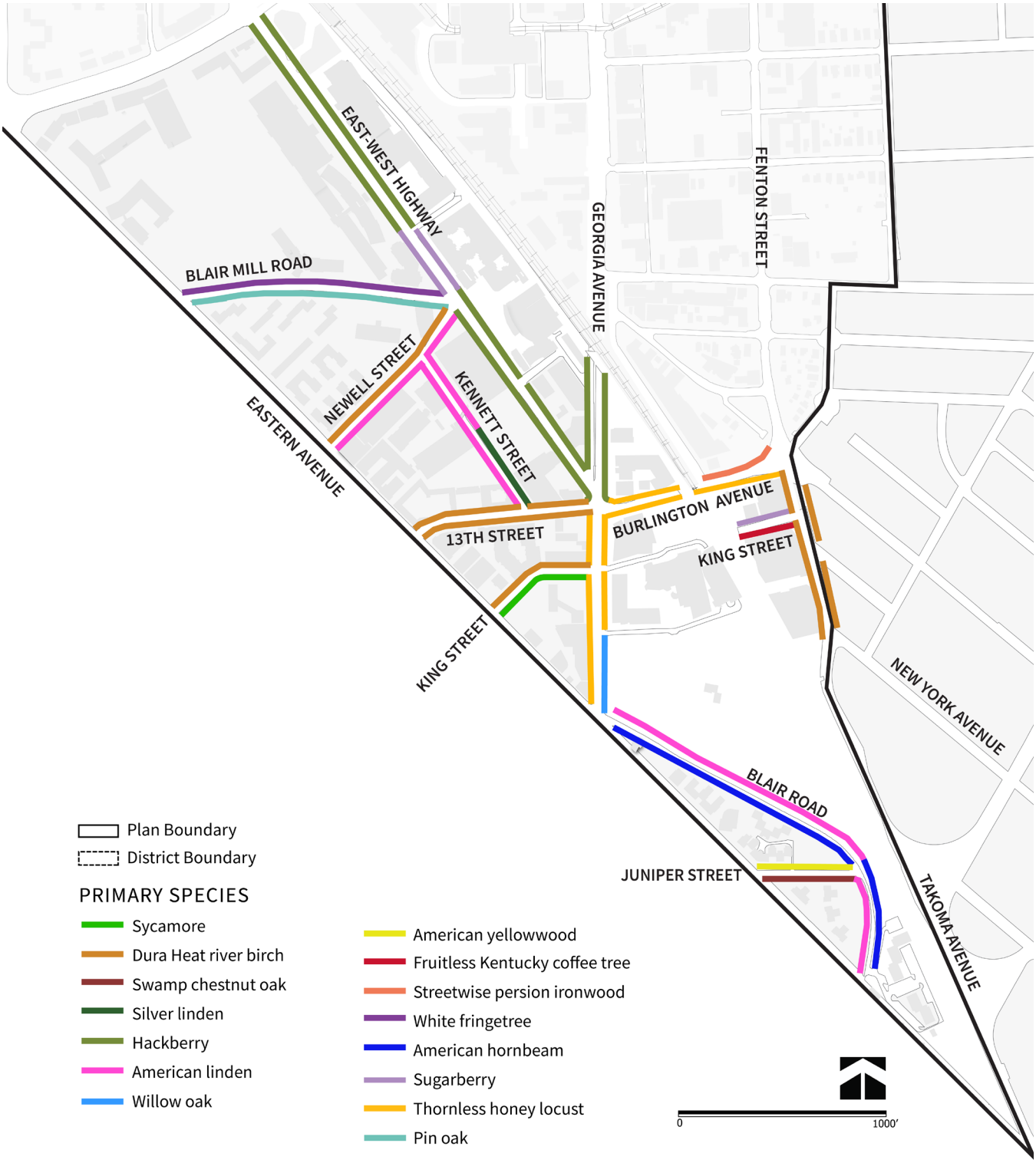
	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus phellos*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal
Secondary Choice	*Gleditsia triacanthos var. inermis 'Shademaster'*	Thornless honey locust	X	30'–70'	30'–70'	Low	Spreading
Third Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round

Wayne Avenue: From Georgia Avenue to Cedar Street (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Nyssa sylvatica*	Black gum, black tupelo	X	30 - 50'	20 - 30'	Very Low	Pyramidal
Secondary Choice	*Gleditsia triacanthos var. inermis 'Shademaster'*	Thornless honey locust	X	30 - 70'	30 - 70'	Low	Spreading
Third Choice	*Ostrya virginiana*	American hophornbeam	X	25 - 40'	15 - 25'	Low	Pyramidal

South Silver Spring District

The map and table below identify the primary species for each street. The table also identifies secondary and tertiary choices for species should the primary species fail or be unavailable from nursery stock.



Map 10: South Silver Spring District: Species Location

Table 5: South Silver Spring District Tree Species Prioritization

Blair Road: West Side (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Tilia americana*	American linden, basswood	X	60'–80'	30'–55'	Medium	Oval
Secondary Choice	*Platanus occidentalis*	Sycamore	X	75'–100'	75'–100'	Low	Round/ Spreading
Third Choice	*Quercus coccinea*	Scarlet oak	X	60'–90'	40'–50'	High	Round

Blair Road: East Side (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Carpinus caroliniana*	American hornbeam	X	20'–30'	20–30'	Low	Round
Secondary Choice	*Amelanchier canadensis*	Shadblow serviceberry	X	5'–20'	15'–20'	Medium	Vase
Third Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Low	Pyramidal

Blair Mill Road (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Chionanthus virginicus*	White fringetree	X	25'–30'	25'–30'	Very Low	Vase
Secondary Choice	*Amelanchier laevis*	Allegheny serviceberry	X	15'–25'	15'–25'	Medium	Vase
Third Choice	*Crataegus viridis*	Winter king hawthorn	X	20'–30'	20–35'	Medium	Pyramidal

Blair Mill Road (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus palustris*	Pin oak	X	65'–70'	25'–40'	High	Pyramidal
Secondary Choice	*Liquidambar styraciflua 'Rotundiloba' (fruitless)*	Low fruiting Sweetgum	X	60'–75'	40'–50'	Very Low	Oval
Third Choice	*Gymnocladus dioicus 'Stately Manor'*	Fruitless Kentucky coffeetree	X	50'–70'	30'–50'	Very Low	Spreading

South Silver Spring District Tree Species Prioritization (continued)

Burlington Aveue (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Parrotia persica 'Streetwise'*	Streetwise Persian ironwood		20'–30'	10'–20'	Unknown	Columnar
Secondary Choice	*Betula nigra 'dura heat' (single stem)*	Dura Heat® river birch	X	30 - 40'	30 - 40'	Very Low	Pyramidal
Third Choice	*Chionanathus retusus*	Chinese fringetree		25'–30'	25–30'	Very Low	Round/ Spreading

Burlington Avenue (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Gleditsia triacanthos var. inermis 'Shademaster'*	Thornless honeylocust	X	30 - 70'	30 - 70'	Low	Spreading
Secondary Choice	*Betula nigra 'dura heat' (single stem)*	Dura Heat® river birch	X	30 - 40'	30 - 40'	Very Low	Pyramidal
Third Choice	*Carya ovata*	Shagbark hickory	X	60 - 80'	35 - 50'	Medium	Oval

East-West Highway: Most Locations (see exception below)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Secondary Choice	*Ulmus Americana 'Jefferson'*	Jefferson American elm		60'–90'	30'–50'	Medium	Vase
Third Choice	*Tilia tomentosa*	Silver linden		50'–70'	35'–45'	Medium	Oval/ Pyramidal

East-West Highway: from Blair Mill Road to Alley between 1201 and 1215 East-West Hwy

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading
Secondary Choice	*Ostrya virginiana*	American hophornbeam		25'–40'	15'–25'	Low	Pyramidal
Third Choice	*Crataegus viridis*	Winter king hawthorn	X	20'–30'	20 - 35'	Medium	Pyramidal

South Silver Spring District Tree Species Prioritization (continued)

Fenton Street: From New York Avenue to Burlington Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Chionanthus virginicus*	White fringetree	X	25'–30'	25'–30'	Very Low	Vase
Third Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal

Georgia Avenue: From Metrorail Overpass to Burlington Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Secondary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honey locust	X	30'–70'	30'–70'	Low	Spreading
Third Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round

Georgia Avenue: Burlington Avenue to Blair Road (see park frontage exception below)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Gleditsia triacanthos var. inermis* 'Shademaster'	Thornless honeylocust	X	30'–70'	30'–70'	Low	Spreading
Secondary Choice	Gymnocladus dioicus 'Stately Manor'	Fruitless Kentucky coffeetree	X	50'–70'	30'–50'	Very Low	Spreading
Third Choice	*Liquidambar styraciflua 'Rotundiloba' (fruitless)*	Low fruiting Sweetgum	X	60'–75'	40'–50'	Very Low	Oval

Georgia Avenue: East Side, from Jesup Blair Road to Blair Road (frontage at park entrance)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus phellos* (low branches)	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal
Secondary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Third Choice	*Carya ovata*	Shagbark hickory	X	60'–90'	35'–50'	Medium	Oval

South Silver Spring District Tree Species Prioritization (continued)

Juniper Street: North Side (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Cladrastis kentukea*	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading
Secondary Choice	*Ostrya virginiana*	American hophornbeam		25'–40'	15'–25'	Low	Pyramidal
Third Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal

Juniper Street: South Side (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Secondary Choice	*Quercus coccinea*	Scarlet oak	X	60'–90'	40'–50'	High	Round
Third Choice	*Quercus imbricaria*	Shingle oak	X	50'–60'	50'–60'	High	Pyramidal/ Spreading

Kennett Street (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Tilia tomentosa*	Silver linden	X	50'–70'	35–45'	Medium	Oval/ Pyramidal
Secondary Choice	*Gymnocladus dioicus 'Stately Manor'*	Fruitless Kentucky coffeetree	X	50'–70'	30'–50'	Very Low	Spreading
Third Choice	*Gleditsia triacanthos var. inermis 'Shademaster'*	Thornless honeylocust	X	30'–70'	30'–70'	Low	Spreading

Kennett Street (locations without powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Tilia Americana*	American linden, basswood	X	60' - 80'	30' - 55'	Medium	Oval
Secondary Choice	*Celtis occidentalis*	Hackberry	X	40 - 60'	40 - 60'	Low	Vase/Oval
Third Choice	*Cladrastis kentukea*	American yellowwood	X	30 - 50'	40 - 55'	Unknown	Round/ Spreading

South Silver Spring District Tree Species Prioritization (continued)

King Street: From Georgia Avenue to Eastern Avenue (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	Betula nigra 'Dura Heat' (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Liquidambar styraciflua 'Cherokee'*	Cherokee sweetgum	X	40'–50'	25–30'	Very Low	Oval/ round

King Street: From Georgia Avenue to Eastern Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Platanus occidentalis*	Sycamore	X	75'–100'	75'–100'	Low	Round/ Spreading
Secondary Choice	*Quercus palustris*	Pin oak	X	65'–70'	25'–40'	High	Pyramidal
Third Choice	*Quercus rubra*	Northern red oak	X	60'–75'	60 -75'	High	Round

King Street: From Fenton Street to Metrorail tracks (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis laevigata*	Sugarberry	X	40-60'	40' -55'	Medium	Round/ Spreading
Secondary Choice	*Crataegus phaenopyrum*	Washington hawthorn	X	25'–30'	20–25'	Medium	Pyramidal
Third Choice	*Chionanthus virginicus*	White fringetree	X	25'–30'	25–30'	Very Low	Vase

King Street: From Fenton Street to Metrorail tracks

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Gymnocladus dioicus 'Stately Manor'*	Fruitless Kentucky coffeetree	X	50'–70'	30'–50'	Very Low	Spreading
Secondary Choice	*Nyssa sylvatica*	Black gum, black tupelo	X	30 - 50'	20 - 30'	Low	Pyramidal

South Silver Spring District Tree Species Prioritization (continued)

Newell Street: North Side (locations under powerlines)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Carpinus caroliniana 'palisade'*	Palisade American hornbeam	X	20'–30'	20'–30'	Low	Round
Third Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal

Newell Street (locations without powerlines)

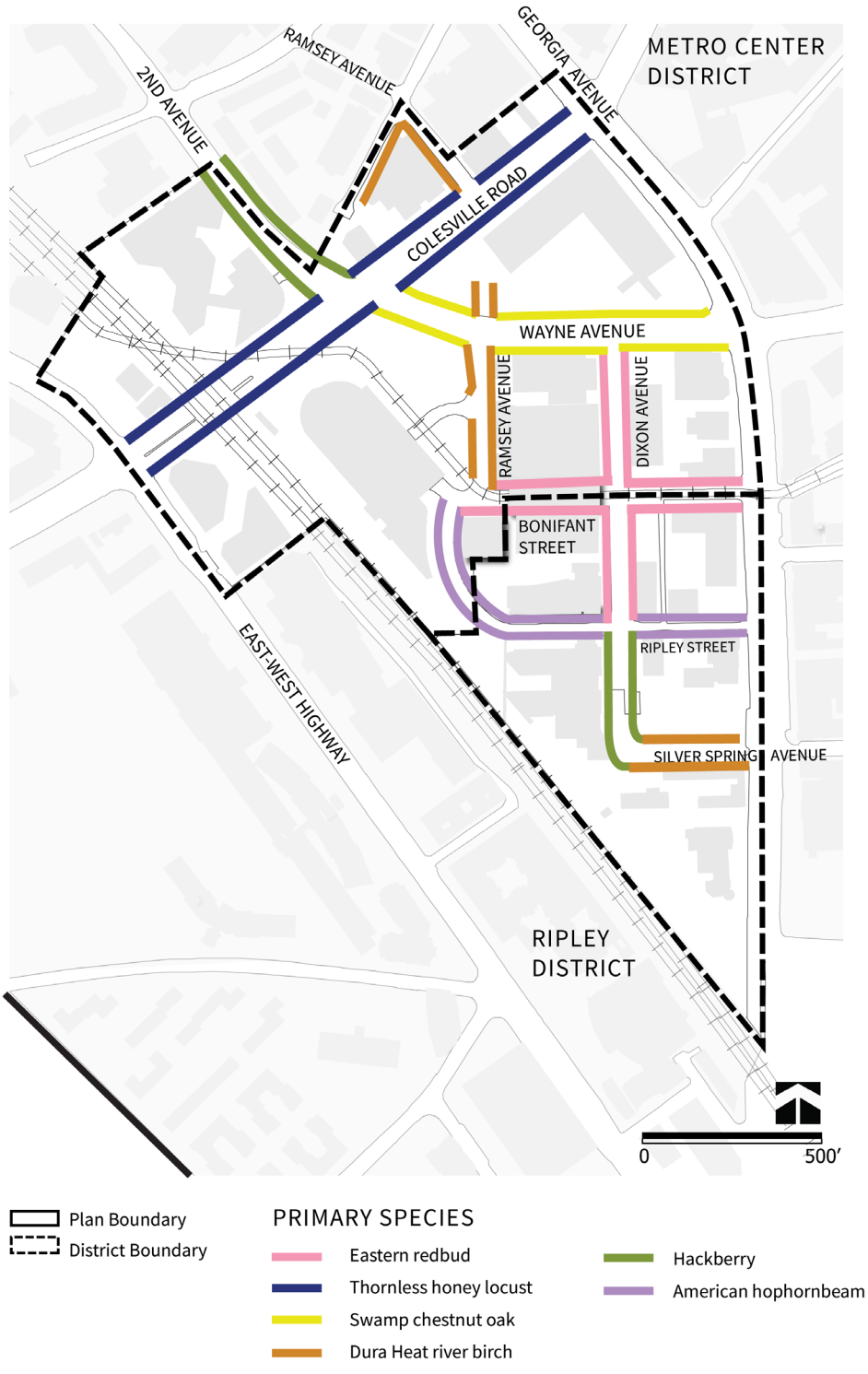
	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Tilia Americana*	American linden, basswood	**X**	60 - 80'	30' - 55'	Medium	Oval
Secondary Choice	*Liquidambar styraciflua 'Rotundiloba'*	Low fruiting Sweetgum		60' - 75'	40' - 50'	Low	Oval
Third Choice	*Gleditsia triacanthos var. inermis 'Shademaster'*	Thornless honey locust	X	30' - 70	30 - 70'	Low	Spreading

13th Street: From Eastern Avenue to Georgia Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra* 'Dura Heat'® (single stem)	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Liquidambar styraciflua 'Cherokee'*	Cherokee sweetgum	X	40'–50'	25'–30'	Very Low	Oval/ Round
Third Choice	*Cladrastis kentukea*	American yellowwood	X	30'–50'	40'–55'	Unknown	Round/ Spreading

Metro Center and Ripley Districts

The map and table below identify the primary species for each street. The table also identifies secondary and tertiary choices for species should the primary species fail or be unavailable from nursery stock.



Map 11: Metro Center/Ripley Districts: Species Location

Table 6: Metro Center and Ripley Districts Tree Species Prioritization

Bonifant Street: From Georgia Avenue to the Transit Center

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Cercis canadensis*	Eastern redbud	X	25'–30'	25'–35'	Very Low	Round
Secondary Choice	*Carpinus caroliniana 'palisade'*	Palisade American hornbeam	X	20'–30'	20'–30'	Low	Round
Third Choice	*Ostrya virginiana*	American hophornbeam		25'–40'	15'–25'	Low	Pyramidal

Colesville Road: From East-West Highway to Georgia Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Gleditsia triacanthos var. inermis 'Shademaster'*	Thornless honey locust	X	30'–70'	30'–70'	Low	Spreading
Secondary Choice	*Gymnocladus dioicus 'Stately Manor'*	Fruitless Kentucky coffee tree	X	50'–70'	30'–50'	Very Low	Spreading
Third Choice	*Quercus phellos (low branches)*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal

Dixon Avenue: From Wayne Avenue to Ripley Street

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Cercis canadensis*	Eastern redbud	X	25'–30'	25–35'	Very Low	Round
Secondary Choice	*Chionanathus retusus*	Chinese fringetree		25'–30'	25–30'	Very Low	Round/ Spreading
Third Choice	*Viburnum prunifolium*	Blackhaw viburnum	X	10'–15'	10'–15'	Medium	Vase

Dixon Avenue: Extension South of Ripley Street

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval
Secondary Choice	*Liquidambar styraciflua 'Rotundiloba'*	Low fruiting Sweetgum		60'–75'	40'–50'	Low	Oval
Third Choice	*Quercus imbricaria*	Shingle oak	X	50'–60'	50'–60'	High	Pyramidal/ Spreading

Metro Center and Ripley Districts Tree Species Prioritization (continued)

Ramsey Avenue: From Bonifant Street to Colesville Road

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Prunus x incamp 'Okame'*	Okame cherry		15'–25'	20'	Unknown	Oval/ Round
Third Choice	*Ostrya virginiana*	American hophornbeam		25'–40'	15'–25'	Low	Pyramidal

Ripley Street (few planting areas)

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Ostrya virginiana*	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal
Secondary Choice	*Parrotia persica 'Streetwise'*	Streetwise Persian ironwood		20'–30'	10-20'	Unknown	Columnar

Silver Spring Avenue: West of Georgia Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Betula nigra 'Dura Heat' (single stem)*	Dura Heat® river birch	X	30'–40'	30'–40'	Very Low	Pyramidal
Secondary Choice	*Robinia pseudoacacia*	Black locust	X	30'–50'	20' - 35'	Low	Irregular
Third Choice	*Ostrya virginiana*	American hophornbeam		25'–40'	15'–25'	Low	Pyramidal

Wayne Avenue: From Colesville Road to Georgia Avenue

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Quercus michauxii*	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round
Secondary Choice	*Quercus phellos*	Willow oak	X	40'–60'	30'–40'	High	Oval/ Pyramidal
Third Choice	*Platanus occidentalis*	Sycamore	X	75'–100'	75'–100'	Low	Round/ Spreading

Table 6: Metro Center and Ripley Districts Tree Species Prioritization (continued)

2nd Avenue: From Colesville Road to Spring Street

	Latin Name	Common Name	Native	Height	Spread	Species Supported	Shape
Primary Choice	*Celtis occidentalis*	Hackberry	X	40′–60′	40′–60′	Low	Vase/Oval
Secondary Choice	*Robinia pseudoacacia*	Black locust	X	30′–50′	20' - 35'	Low	Irregular
Third Choice	*Quercus phellos (low branches)*	Willow oak	X	40′–60′	30′–40′	High	Oval/ Pyramidal

3.2.6. Additional Standards for Existing Trees

This section does not apply to tree planting associated with development projects. Rather, it is intended to provide guidance on plantings other than trees to the Urban District, county agencies and other entities who implement streetscape improvements in downtown Silver Spring.

Planting of Herbaceous Perennials and Bulbs in Tree Beds

In some instances, trees cannot survive urban conditions. It may be due to soil contamination, lack of sufficient soil volumes, or other unknown factors. When tree plantings have failed, or in street medians that cannot support trees, planting understory shrubs and perennials is acceptable.

In other instances, there may be a desire to beautify the urban landscape to support local businesses. Herbaceous perennials can be planted in tree beds without impacting the health of the tree if selected and planted correctly. Overplanting can cause the new plants to compete with the tree for moisture, soil, nutrients and oxygen. Low perennial plantings can beautify the urban landscape while providing ecological value such as increased biodiversity, pollinator potential, even soil aeration (if the root mass is small and does not dominate the tree bed). Plantings can also deter pedestrians from stepping into the beds and protect the tree from soil compaction, stress, and possible mortality.

Note: Tree health is the top priority. If trees are not healthy and strong, do not plant perennials, annuals, or bulbs, as they compete for resources that the tree needs to thrive.

Planting Protocols:

- Choose from the menu of species in Table 7.
- Do not overplant.
- When planting in beds with existing trees, locate plants along the sidewalk edge and corners of the tree planting bed as shown in Figure 10. Do not fill the entire bed with plants.
- Plant in clusters of three or five of the same species to provide aesthetic continuity.
- Use only hand trowels to avoid tree root disturbance. If a tree root is encountered during planting, stop digging and choose another location. Holes must not be wider or deeper than 3.5" beyond existing plant root mass to protect the existing tree roots.
- Do not add more than 1 inch of soil to the top of the existing soil surface. Never mulch trees or plants in volcano form, and always mulch using donut mulching principles (refer to Figure 7 on p. 31).
- Avoid invasive species such as fescue, miscanthus, bamboo, ivy, any vines, shrubs, or other species not within the planting list provided.

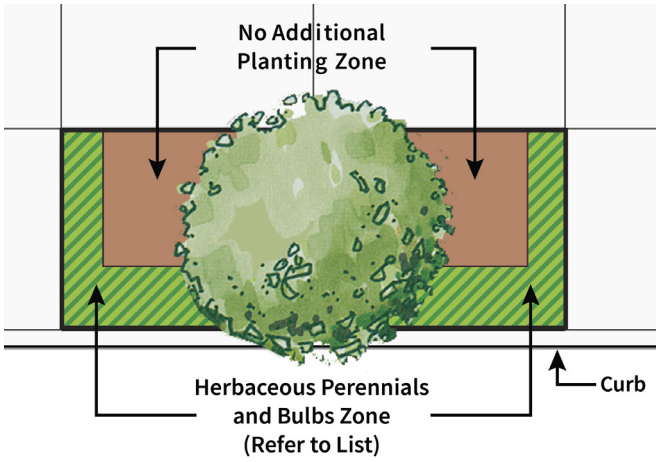


Figure 10: Tree Pit Planting Diagram

Table 7: Herbaceous Perennial Species

Herbaceous Ferns	
Scientific Name	**Common Name**
Polystichum acrostichoides	Christmas fern
Dennstaedtia punctilobula	Hayscented fern

Ornamental Grasses	
Scientific Name	**Common Name**
Panicum virgatum 'Cheyenne Sky'	Switchgrass 'Cheyenne Sky'
Schizachyrium scoparium	Little Bluestem

Sedges	
Scientific Name	**Common Name**
Carex amphibola	Creek sedge
Carex appalachica	Appalachian sedge
Carex flaccosperma	Blue wood sedge
Carex pensylvanica	Pennsylvania sedge

Sun/Shade Perennials	
Scientific Name	**Common Name**
Heuchera richardonii	Alumroot
Eurybia divaricata	White wood aster
Phlox divaricata	Wild sweet William
Asclepias syriaca	Common milkweed
Aster novae angliae ' Purple Dome'	New England aster
Chamaecrista fasciculata	Partridge pea
Coreopsis verticillata 'Moonbeam'	Threadleaf coreopsis
Dianthus 'Neon Star'	Garden pinks
Gaillardia x grandiflora	Blanket flower
Helenium autumnale	Sneezweed
Heliopsis helianthoides	Oxeye sunflower
Leucanthemum x superbum 'Becky'	Shasta daisy

Sun/Shade Perennials (continued)	
Scientific Name	**Common Name**
Liatris spicata	Blazing star
Lupinus x hybrida	Lupine
Penstemon digitalis	Beardtounge
Phlox subulata	Moss phlox
Rudbeckia hirta	Black-eyed Susan
Salvia officinalis 'Berggarten'	Common sage
Symphyotrichum oblongifolium	October skies' aster
Amsonia tabernaemontana	Blue star
Anemone canadensis	Windflower
Echinacea purpurea 'Magnus'	Purple coneflower
Filipendula rubra	Queen of the prarie
Helianthus decapetalus	Thinleaved sunflower
Lespedeza capitata	Bush clover
Lilium superbum	Turkscap lily
Mimulus ringens	Allegheny monkey flower
Monarda didyma	Bee balm
Oenothera biennis	Common evening primrose
Phlox maculata	Spotted phlox
Phlox paniculata	Garden phlox
Rudbeckia fulgida var fulgida	Black-eyed Susan

Ground Cover Perennials	
Scientific Name	**Common Name**
Ruellia humilis	Wild petunia
Sesleria autuumnalis	Autumn moore grass
Gaillardia sp.	Blanket flower
Sedum sp.	Creeping types
Sedum spectabile 'Autumn Joy'	Autumn joy stonecrop
Thymus sepiphylluur or pseudolanugipsus	Thyme
Thymus serpyllum	Creeping thyme
Nepeta sp.	Catmint
Allium millennium	Ornamental onion
Antennaria plantaginifolia	Pussytoes
Cerastium tomemtosum	Snow in summer
Tiarella cordifolia	Foam flower

Example of a tree pit that is over-planted.

Example of a street tree pit properly planted with annuals (photo by Kate Ford, New York City).

Bulbs

Bulbs are often planted for seasonal blooms and beautification. However, bulbs can require continued soil disturbance if they are removed annually, so native perennials are preferred. If bulbs are desired, choose native species from Table 8. Plant in the same configuration as shown for perennial plantings in Figure 9.

Table 8: Bulb Species

Bulb Species	
Scientific Name	**Common Name**
Crocus sativus	Crocus
Chionodoxia	Chionodoxia
Narcissus pseudonarcissus	Daffodil
Eranthis hyemalis	Winter aconite
Galanthus nivalis	Snow drops
Hyacinthoides hispanica	Spanish bluebells (best in shade)
Convallaria magilis	Lily of-the-valley
Muscari armeniacum	Grape-hyacinth
Tulipia	Tulips

3.2.7. Guards and Grates

All new tree beds in downtown Silver Spring are required to have some protection installed, whether tree guard or grate. In an urban area, open tree beds can encounter a range of issues, from compaction due to pedestrians and dogs walking in the pits, to trash accumulation in high-traffic areas. **Tree guards are preferred throughout the downtown.** Tree grates should only be used in limited areas where there is particularly high pedestrian traffic (perhaps on blocks immediately surrounding the Transit Center) or where the sidewalk is narrower than 6' and therefore there is increased risk of pedestrians trampling open tree pits.

Tree guards or fencing around the perimeter of a tree pit provide a physical barrier between a tree, pedestrians, and pets.

Tree Guard Standards

- Tree guards shall be made of steel, or another similarly durable material.
- Tree pit guards shall be between 12"–18" in height from the sidewalk.
- Although tree pit guards may differ in pattern or style somewhat throughout the downtown, strive for consistency as much as possible, particularly on a given block.
- Tree guard should not include components that have pointed ends that could easily cause injury.
- The New York City Department of Parks and Recreation has several design ideas for tree pit guards that would also work well in Silver Spring. Refer to designs A, B, and D on this website: https://www.nycgovparks.org/trees/tree-care/tree-guards,

The image at the top is from Kennett Street. While the tree guard is an acceptable height and style, it does not wrap fully around the tree pit. The approach of the middle and bottom images will be more effective in reducing the risk of soil compaction.

Tree Grates

A tree grate is a metallic grating installed around a tree at the same level as the pavement that allows the soil underneath to remain uncompacted.

- Select a slip-resistant grate, as they can be slippery when wet and create hazardous conditions.
- Ensure grates are ADA compliant and will not allow canes, heels, or other devices to be stuck in the grate openings.
- Grates must be easy to expand or modify as the tree grows.
- Grates should be cast iron, cast aluminum, steel frame, or other durable, strong, sustainable material.

Georgia Avenue at Montgomery College: Street trees along the roadway have open planted areas while the trees in the wide sidewalk have planting areas covered with grates as pedestrians are likely to walk on them.

3.3 Stormwater Management Facilities

For sites within the public right-of-way, such as street and sidewalk renovation, all stormwater treatments must be in the public ROW. At times, new development projects dedicate new streets (based on master plan recommendations). In these situations, developers are required to provide treatment facilities for the additional stormwater runoff in the new street. Treatments may include pervious surfaces, bioretention cells, and stormwater planter boxes, or other approved treatment facilities.

Since a primary goal of this plan is to cool streets and provide tree canopy cover, the stormwater facilities must not replace the required street canopy street tree plantings. They should be separate from the street tree planting areas due to periodic maintenance requirements of the facilities that may result in tree removal.

The Department of Permitting Services (DPS) reviews and approves all stormwater management facilities, and the Department of Environmental Protection (DEP) maintains all facilities within the public ROW. At present, developers are not encouraged by Montgomery County to provide stormwater management facilities within the ROW; however, if and when a developer wants to provide additional stormwater treatments, they should work with DPS for approval.

An example of stormwater management facility that is part of the streetscape design in the NOMA neighborhood in Washington, D.C.

3.4 Street Lighting

Street lighting is vital for pedestrian and vehicular safety, particularly in downtown Silver Spring where there is a high level of pedestrian activity after dark. These Standards are not proposing changes to the lighting poles or fixtures in Silver Spring. MCDOT maintains installation manuals and street lighting specifications that should be referenced for fixture types. MCDOT and Planning have recently collaborated on revised streetlighting design requirements that establish target illuminance values by street type.

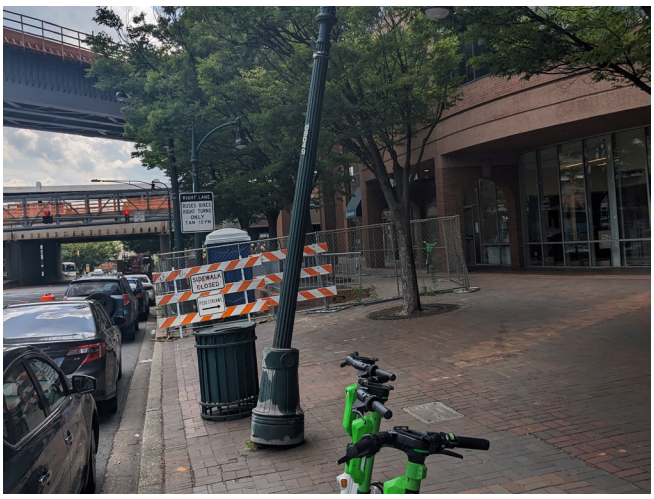
3.4.1 Light Poles and Safety

In Silver Spring, light poles are often struck by vehicles. The poles are damaged or fall over and cause damage to nearby streetscape elements, public or private property, power lines, or other items.

- The Urban District should continue to wrap reflective tape around the base of all light poles on Downtown Boulevards and Downtown Streets (Type A) as these are the streets with the highest traffic volumes. In the locations where this approach has been piloted, it has been successful in reducing collisions.
- The reflective tape should be located 4'-6' off the ground so it is in the line of sight of drivers.

3.4.2 Light Poles and Planted Areas

Street lights should typically be placed such that the concrete footers for the light poles do not interfere with tree roots. When continuous planters are used for tree planting, take care to place the lights centered between two trees to minimize impact. Avoid placing light poles immediately next to a planted tree.



Light pole damaged by vehicle collision.

Reflective tape helps drivers see light poles.

LIght pole appropriately placed between two trees on East-West Highway.

3.5 Street Furnishings

This section includes standards for benches and trash/recycling receptacles in downtown Silver Spring. For specifications, see Chapter 4.

3.5.1. Benches

Seating in the public ROW is a key element of an accessible pedestrian network.

Bench Placement and Design

- On Central Green Loop streets:
    - Provide a minimum of one pair of benches that face each other such that there is at least one pair of benches every 500 linear feet or at least one pair per linear block, whichever is the lesser.
- On all other Downtown Boulevards and Downtown Streets:
    - Provide a minimum of one bench per 500 linear feet or one linear block, whichever is the lesser.
- Benches should be located in the Street Buffer or Pedestrian-Bike Buffer, whichever is adjacent to the Sidewalk. Benches should not be placed in the Sidewalk. If there is Frontage Zone in the public ROW that is sufficiently deep for two facing benches, the benches may be located there as well. 6' benches will fit nicely into a 6' Street Buffer, as shown in Figure 11.

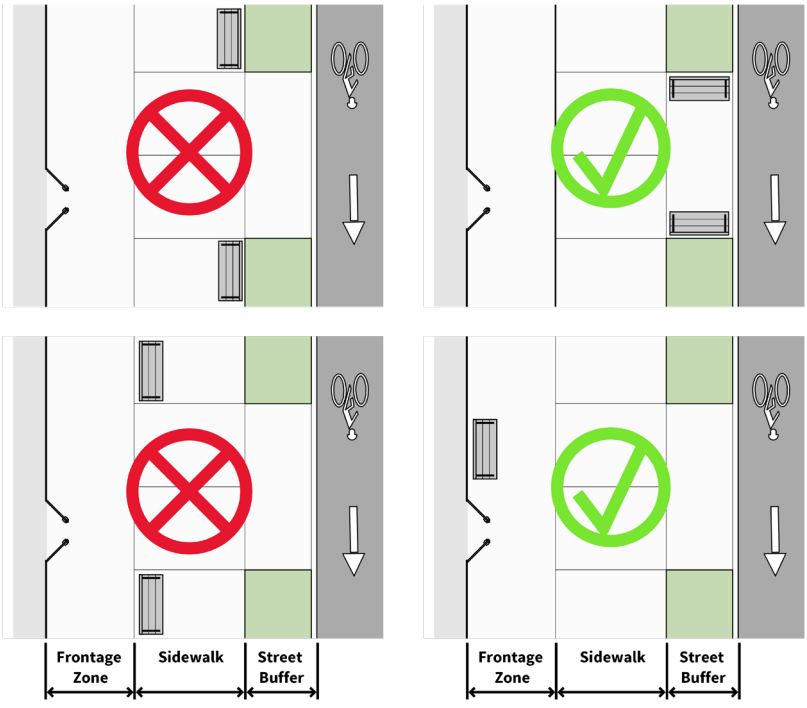


Figure 11: Bench Placement Diagram

- Benches should be made of durable materials that will not get too cold or hot in extreme weather.
- Benches should be designed to be bolted to the ground.
- All benches must meet the following standard (Federal Access Board guidance for benches):
    - Benches should have armrests and back support to assist in sitting and standing, as these features make the bench more usable and comfortable for those with disabilities.
    - Benches should have a seat height of 17"-19" above sidewalk level.
    - All outdoor benches should have a clear ground space adjacent to the structure that is a minimum of 30" x 48".
- Chapter 4 includes a bench that is specified for the Green Loop, and a bench that would be appropriate for elsewhere in downtown Silver Spring. However, other benches that meet all of the standards above are acceptable.
- Overly sculptural benches that are not easy to sit on and do not meet the above standards should not be installed as public seating in the ROW.

Benches with arms and backs that are placed in the Street Buffer represents best practice (top). Do not place benches in the Sidewalk area where pedestrians need a clear path (center), and do not select benches that are interesting to look at but impossible to sit on (bottom).

3.5.2 Trash and Recycling Receptacles

In an urban area trash cans need to be durable and easy to empty while keeping out unwanted elements such as rodents, and even large amounts of rainwater.

- Continue to provide the existing standards Victor-Stanley SD-42 (or equivalent) style trash can throughout the downtown.
- Include galvanized steel liners and to keep rodents away, and rain dome covers to reduce rainwater from entering the container.
- Trash can graphics and decals are at the Urban District's discretion.
- In high-traffic areas provide Big Belly or similar solar compactor systems. These systems are expensive and heavy to move but are well-suited for areas that generate a lot of refuse. Currently these are installed at Veterans Plaza. Other locations to consider would be:
    - Around the Metrorail station
    - Around the Purple Line station at the Silver Spring Library (when it is operational)
    - Additional locations at the Urban District's discretion.

Standard trash can (top), solar compactor near Veterans Plaza (bottom)

4 Specifications

4.1 Paving Materials and Specifications

Partial specifications are provided for paving materials to assist with project scoping. Full manufacturer specifications should be used for preparation, installation and examination for all streetscape projects.

4.1.1 POURED-IN-PLACE CONCRETE (SIDEWALK)

CONCRETE MATERIALS: Portland Cement - ASTM C150, Type 1. Use only one brand of cement throughout the project.

Aggregates - ASTM C33, fine and coarse aggregates shall be clean, sharp, and free from clay, organic matter and other deleterious substances.

Coarse aggregates shall be crushed stone with a maximum size no larger than one-fifth of the narrowest dimension between side forms, one-third depth of the slab, nor three-fourths of the minimum clear spacing between individual reinforcing bars.

Water shall be clean, drinkable and meet the PH requirements of AASHTO T-26 Method B.

REINFORCING MATERIALS: Reinforcing Bar shall conform to ASTM A615, Grade 60. Welded Wire Fabric shall conform to ASTM A285. Supports for reinforcement shall comply with CRSI recommendations. Wood, bricks or other devices will not be acceptable as supports for reinforcement.

ADMIXTURES:

Air - entraining admixtures shall conform to ASTM C260.

Water - admixtures shall conform to ASTM C494, Type A.

Set – control admixtures shall conform to ASTM C494 as follows:

Type B – Retarding

Type C – Accelerating

Type D – Water reducing and retarding

Type E – Water reducing and accelerating

Calcium chloride shall meet the requirements of AASHTO M.144, Type 1 or 2

COLOR ADMIXTURES: N/A

COMPRESSIVE STRENGTH: Minimum of 3,000 psi shall be achieved by the 28th day of a strength test. Control testing shall be in conformance with Montgomery County Standards.

SLUMP REQUIREMENTS: 2"-4" range is acceptable.

AIR CONTENT: 5% to 8%

4.1.2 PRECAST PAVER (STREET BUFFER & FRONTAGE ZONE WHERE APPLICABLE)

TYPE: Unilock concrete paver Holland Premier or approved equal. "Equal" must be submitted to staff of Urban Design Division, M-NCPPC for approval.

COLOR: Heritage Brown

SRI VALUE: 0.38

DIMENSIONS: 3 7/8" x 7 7/8" x 2 3/4" (100 x 200 x 70mm)

ABSORPTION RATE: Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.

COMPREHENSIVE STRENGTH: Shall not be less than 8,000 psi with no individual unit under 7,200 psi

FREEZE-THAW CYCLES: Conforming to ASTM C 1645 when tested for freeze-thaw requirements.

TOLERANCES: Shall conform to ASTM Designation C-936-82.

BOND: Running Bond, perpendicular to the curb.

BORDER: Soldier Course at curb and building edge, see details for additional visual.

POLYMERIC JOINT SAND

Provide Polymeric Joint Sand meeting the minimum material and physical properties as follows:

COMPRESSION STRENGTH: proven resistance to compression of 300 PSI minimum after drying for 7 days under controlled conditions (73°F (23°C) at 50% humidity). Test sand sample shape: cylinder (2" (5 cm) dia. X 4" (10 cm) high).

COLOR: Dark Grey

GRADATION: as shown in Table 4-1 below.

Table 4-1: Gradation Requirements for Joint Sand

ASTM C 144		
Sieve Size	**Natural Sand Percent Passing**	**Manufactured Sand Percent Passing**
No. 4 (4.75mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 75
No. 50 (0.300 mm)	10 to 30	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075)	0 to 1	0 to 10

SETTING BED SAND:

Provide Setting Bed Sand as follows:

1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
2. Do not use limestone screenings, stone dust, or sand material that does not conform to conform to the grading requirements of ASTM C 33.
3. Do not use mason sand or sand conforming to ASTM C 144.
4. Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.
5. Conform to the grading requirements of ASTM C 33 with modifications as shown in Table 4-2 below:

Table 4-2: Gradation Requirements for Setting Bed Sand

ASTM C 33	
Sieve Size	**Percent Passing**
3/8 in (9.5 mm)	100
No. 4 (4.75mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075)	0 to 1

CONCRETE BASE:

CONCRETE MATERIALS:

Portland Cement - ASTM C150, Type 1. Use only one brand of cement throughout the project.

Aggregates - ASTM C33, fine and coarse aggregates shall be clean, sharp, and free from clay, organic matter and other deleterious substances.

Coarse aggregates shall be crushed stone with a maximum size no larger than one-fifth of the narrowest dimension between side forms, one-third depth of the slab, nor three-fourths of the minimum clear spacing between individual reinforcing bars.

Water shall be clean, drinkable and meet the PH requirements of AASHTO T-26 Method B.

ADMIXTURES:

Air..... entraining admixtures shall conform to ASTM C260.

Water.....admixtures shall conform to ASTM C494, Type A.

Set.....control admixtures shall conform to ASTM C494 as follows:

Type B.....Retarding

Type C.....Accelerating

Type D.....Water reducing and retarding

Type E.....Water reducing and accelerating

Calcium chloride shall meet the requirements of AASHTO M.144, Type 1 or 2.

COLOR ADMIXTURES: Not applicable

COMPRESSIVE STRENGTH:

Minimum of 3,000 psi shall be achieved by the 28th day of a strength test. Control testing shall be in Conformance with Montgomery County standards.

SLUMP REQUIREMENTS:

2" - 4" range is acceptable.

AIR CONTENT:

5% to 8%

REINFORCING MATERIALS:

Reinforcing Bar shall conform to ASTM A615, Grade 60. Welded Wire Fabric shall conform to ASTM A285. Supports for reinforcement shall comply with CRSI recommendations. Wood, bricks or other devices will not be acceptable as supports for reinforcement.

GEOTEXTILE / FILTER FABRIC:

Provide Geotextile material conforming to the following performance characteristics, measured per the test methods referenced:

6. 4 oz., non-woven needle punched geotextile composed of 100% polypropylene staple fibers that are inert to biological degradation and resists naturally encountered chemicals, alkalies, and acids.
7. Grab Tensile Strength: ASTM D 4632: 115 lbs.
8. Grab Tensile Elongation: ASTM D 4632: 50%
9. Trapezoidal Tear: ASTM D 4533: 50 lbs.
10. Puncture: ASTM D 4833: 65 lbs.
11. Apparent Opening Size: ASTM D 4751: 0.212 mm, 70 U.S. Sieve
12. Permittivity: ASTM D 4491: 2.0 sec -1
13. Flow Rate: ASTM D 4491: 140 gal/min/s.f.

4.1.3 PERMEABLE PRECAST PAVER (STREET BUFFER IN CENTRAL GREEN LOOP ONLY)

TYPE: Unilock concrete paver Eco-Priora or approved equal. "Equal" must be submitted to staff of Urban Design Division, M-NCPPC for approval.

COLOR: Heritage Brown

SRI VALUE: 0.38

DIMENSIONS: 4 3/4" x 9 1/2" x 3 1/8" (120 x 240 x 80mm)

ABSORPTION RATE: Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.

COMPREHENSIVE STRENGTH: Shall not be less than 8,000 psi with no individual unit under 7,200 psi

FREEZE-THAW CYCLES: Conforming to ASTM C 1645 when tested for freeze-thaw requirements.

TOLERANCES: Shall conform to ASTM Designation C-936-82.

BOND: Running Bond, perpendicular to the curb.

BORDER: Soldier Course at hidden curb abutting streetside curb, see details for additional information.

PERMEABLE JOINT OPENING AGGREGATE

Provide Permeable Joint Opening Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 8 as shown in Table 4-3.

Table 4-3: Eco-Priora Permeable Join Opening Aggregate Gradation Requirements (granite chips)

ASTM No. 9	
Sieve Size	**Percent Passing**
3/8 in (9.5 mm)	100
No. 4 (4.75mm)	85 to 100
No. 8 (2.36 mm)	10 to 40
No. 16 (1.18 mm)	0 to 10
No. 50 (0.300 mm)	0 to 5

PERMEABLE SETTING BED AGGREGATE:

Provide Permeable Setting Bed Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 8 as presented in Table 4-4 below:

Table 4-4: Permeable Setting Bed Aggregate Gradation Requirements

ASTM No. 8	
Sieve Size	**Percent Passing**
1/2 in (12.5 mm)	100
3/8 in (9.5 mm)	85 to 100
No. 4 (4.75mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5

PERMEABLE BASE AGGREGATE:

Provide Permeable Base Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 57 as presented in Table 4-5:

Table 4-5: Permeable Base Aggregate Gradation Requirements

ASTM No. 57	
Sieve Size	**Percent Passing**
1-1/2 in (37.5 mm)	100
1 in (25 mm)	95 to 100
1/2 in (12.5 mm)	25 to 60
No. 4 (4.75 mm)	0 to 10
No. 8 (2.36 mm)	0 to 5

PERMEABLE SUBBASE AGGREGATE

Provide Permeable Subbase Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 2 as presented in Table 4-6:

Table 4-6: Permeable Subbase Aggregate Gradation Requirements

ASTM No. 2	
Sieve Size	**Percent Passing**
3 in (75 mm)	100
2-1/2 in (63 mm)	90 to 100
2 in (50 mm)	35 to 70
1-1/2 in (37.5 mm)	0 to 15
3/4 (19 mm)	0 to 5

GEOTEXTILE / FILTER FABRIC:

Provide Geotextile material conforming to the following performance characteristics, measured per the test methods referenced:

14. 4 oz., non-woven needle punched geotextile composed of 100% polypropylene staple fibers that are inert to biological degradation and resists naturally encountered chemicals, alkalies, and acids.
15. Grab Tensile Strength: ASTM D 4632: 115 lbs.
16. Grab Tensile Elongation: ASTM D 4632: 50%
17. Trapezoidal Tear: ASTM D 4533: 50 lbs.
18. Puncture: ASTM D 4833: 65 lbs.
19. Apparent Opening Size: ASTM D 4751: 0.212 mm, 70 U.S. Sieve
20. Permittivity: ASTM D 4491: 2.0 sec -1
21. Flow Rate: ASTM D 4491: 140 gal/min/s.f.

4.2 Soil Specifications

STRUCTURAL CELLS

Modular, reinforced cell system that supports healthy root growth and accommodates tree growth below sidewalks and roads. Can support vehicular loads.

MANUFACTURERS: Silva Cells, Stratacell, Terravault or equivalent. Install per manufacturer's instructions.

- https://www.deeproot.com/products/silva-cell/
- https://citygreen.com/product_info/stratacell/
- https://www.rainsmartsolutions.com/terravault_structural_soil_cell

STRUCTURAL SOILS (AMENDED SOIL PANEL)

As discussed in the Standards, there are two choices for structural soils. Both of these soils have been used in the mid-Atlantic region to some success. There are pros and cons to each and every site should be evaluated carefully to determine which structural soil is best, assuming a structural cell cannot be used.

CU-Soil™ - Cornell University Structural Soil

CU-Soil™ is a proprietary material patented by Cornell University (US Patent #5,849,069) and marketed under the registered trademark, CU-Structural Soil®. Only licensed companies are authorized to produce this material, meeting the specifications described in this text. For a list of licensed CU-Soil™ producers, call AMEREQ, INC. at 800-832-8788.

1. CLAY LOAM
   A. Soil shall be a "loam" with a minimum clay content of 20% or a "clay loam" based on the"USDA classification system" as determined by mechanical analysis (ASTM D-422) and it shall be of uniform composition, without admixture of subsoil. It shall be free of stones, lumps, plants and their roots, debris and other extraneous matter. It shall not contain toxic substances harmful to plant growth. Clay loam shall contain not less than 2% or more than 5% organic matter as determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F., plus or minus 9 degrees.
   B. Mechanical analysis for the loam or clay loam shall be as follows:
      1. Textural Class % of Total Weight
      2. Gravel less than 5%
      3. Sand 20-45%
      4. Silt 20-50%
      5. Clay 20-40%
   C. Chemical analysis: Meet, or be amended to meet the following criteria:
      1. pH between 5.5 to 6.5
      2. Percent organic matter 2% - 5% by dry weight

3. Adequate nutrient levels
4. Soluble salt less than 1.0 mmho/cm
5. Cation Exchange Capacity (CEC) greater than 10
6. Carbon/Nitrogen ratio less than 33:1

D. Loam or clay loam shall not come from USDA-classified prime farmland.

2. FERTILIZER (if needed)

A. Should nutrient analysis suggest that the loam or clay loam need additional nutrients, it shall be amended by Amereq's licensed producer.

3. SULFUR (if needed)

A. Sulfur shall be a commercial granular, 96% pure sulfur, with material and analysis appearing on the labeled container.

B. Sulfur used to lower pH shall be a ferrous sulfate formulation.

C. Application rates shall be dependent on soil test results.

4. LIME (if needed)

A. Agricultural lime containing a minimum of 85% carbonates.

B. Application rates shall be dependent on soil test results.

5. CRUSHED STONE

A. The size of the crushed stone shall be 0.75 inches to 1.5 inches allowing for up to 10% being greater than 1.5 inches, and up to 10% less than 0.75 inches.

B. Acceptable aggregate dimensions will not exceed 2.5:1.0 for any two dimensions.

C. Minimum 90% with two or more fractured faces.

D. Results of Aggregate Soundness Loss test shall not exceed 18%.

E. Losses from LA Abrasion tests shall not exceed 40%.

6. HYDROGEL

A. Hydrogel shall be a coated potassium propenoate-propenamide copolymer (Gelscape® Hydrogel Tackifier) as manufactured by Amereq, Inc. 800-832-8788.

7. WATER

A. The installing contractor shall be responsible to furnish his own supply of water (if needed) free of impurities, to the site.

8. CU-STRUCTURAL SOIL®

A. A uniformly blended urban tree mixture of crushed stone, clay loam and Gelscape® Hydrogel Tackifier, as produced by an Amereq-licensed company, mixed in the following proportion:

Material	Unit of Weight
specified crushed Stone	100 units dry weight
specified clay loam	20 – 25 units (to achieve minimum CBR of 50)
Gelscape® Hydrogel Tackifier	0.035 units dry weight
moisture	ASTM D698/AASHTO T-99 optimum moisture

PRODUCTION AND INSTALLATION GUIDELINES

1. CU-SOIL™ MIXING AND QUALITY CONTROL TESTING
   A. All CU-Structural Soil® mixing shall be performed at the licensed producer's yard using appropriate soil measuring, mixing and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. No mixing of CU-Structural Soil® at the project site shall be permitted.
2. Maintain adequate moisture content during the mixing process. Soils and mix components shall easily shred and break down without clumping. Soil clods shall easily break down into a fine crumbly texture. Soils shall not be overly wet or dry. The licensed producer shall measure and monitor the amount of soil moisture at the mixing site periodically during the mixing process.
   A. Raw materials shall be mixed off-site, only at the licensed producer's facility, on a flat asphalt or concrete paved surface to avoid soil contamination.
   B. Should the independent laboratory test results of the clay loam reveal a need to amend it, to meet specifications, the amending materials should be added to the clay loam following the rates and recommendations provided by Amereq.
3. UNDERGROUND UTILITIES AND SUBSURFACE CONDITIONS
   A. The installing contractor shall notify the engineer of any subsurface conditions which will affect the contractor's ability to install the CU-Soil™.
   B. The installing contractor shall locate and confirm the location of all underground utility lines and structures prior to the start of any excavation.
   C. The installing contractor shall repair any underground utilities or foundations damaged during the progress of this work.

SITE PREPARATION

1. Do not proceed with the installation of the CU-Structural Soil® material until all walls, curb footings and utility work in the area have been installed. For site elements dependent on CU-Structural Soil® for foundation support, postpone installation of such elements until immediately after the installation of CU-Structural Soil®.
2. Install subsurface drain lines as shown on the plan drawings prior to installation of CU-Structural Soil® material.
3. Excavate and compact the proposed subgrade to depths, slopes and widths as shown on the drawings. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not over excavate compacted subgrades of adjacent pavement or structures.
4. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings.
5. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.
6. Do not proceed with the installation of CU-Structural Soil® until all utility work in the area has been installed. All subsurface drainage systems shall be operational prior to installation of CU-Structural Soil®.
7. Protect adjacent walls, walks and utilities from damage. Use ½" plywood and/or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.
8. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.
9. Any damage to the paving or architectural work caused by the installing contractor shall be repaired, as directed by the engineer.
10. Maintain all silt and sediment control devices required by applicable regulations. Provide adequate methods to assure that trucks and other equipment do not track soil from the site onto adjacent property and the public right of way.
11. INSTALLATION OF CU-STRUCTURAL SOIL® MATERIAL
    A. Install CU-Structural Soil® in 6-inch lifts and compact each lift.
    B. Compact all materials to at least 95% Proctor Density from a standard compaction curve AASHTO T 99 (ASTM D 698). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction if moisture content exceeds maximum allowable and protect CU-Structural Soil® during delays in compaction with plastic or plywood as directed by the engineer.
    C. Bring CU-Structural Soil® to finished grades as shown on the drawings. Immediately protect the CU-Structural Soil® from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the engineer.
    D. The engineer may periodically check the material being delivered, prior to installation for color and texture consistency with the approved sample provided by the installing contractor as part of the submittal for CU-Structural Soil®. If the engineer determines that the delivered CU-Soil™ varies significantly from the approved samples, the engineer shall contact the licensed producer.
    E. Engineer shall ensure that the delivered structural soil was produced by the approved CU-Soil™ licensee by inspecting weight tickets showing source of material.
    F. CU-Soil™ should not be stockpiled long-term. Any CU-Soil™ not installed immediately should be protected by a tarp or other waterproof covering.

12. FINE GRADING

A. After the initial placement and rough grading of the CU-Structural Soil® but prior to the start of fine grading, the installing contractor shall request review of the rough grading by the engineer. The installing contractor shall set sufficient grade stakes for checking the finished grades.

B. Adjust the finish grades to meet field conditions as directed.

C. Provide smooth transitions between slopes of different gradients and direction.

D. Fill all dips with CU-Soil™ and remove any bumps in the overall plane of the slope.

1. The tolerance for dips and bumps in CU-Structural Soil® areas shall be a 3" deviation from the plane in 10'.

E. All fine grading shall be inspected and approved by the engineer prior to the installation of other items to be placed on the CU-Structural Soil®.

F. The engineer will inspect the work upon the request of the installing contractor. Request for inspection shall be received by the engineer at least 10 days before the anticipated date of inspection.

13. ACCEPTANCE STANDARDS

A. The engineer will inspect the work upon the request of the installing contractor. Request for inspection shall be received by the engineer at least 10 days before the anticipated date of inspection.

14. CLEAN-UP

A. Upon completion of the CU-Structural Soil® installation operations, clean areas within the contract limits. Remove all excess fills, soils and mix stockpiles and legally dispose of all waste materials, trash and debris. Remove all tools and equipment and provide a clean, clear site. Sweep, do not wash, all paving and other exposed surfaces of dirt and mud until the paving has been installed over the CU-Structural Soil® material. Do no washing until finished materials covering CU-Structural Soil® material are in place.

SAND-BASED STRUCTURAL SOIL

This structural soil specification is adapted from the District Department of Transportation's 2014 Green Infrastructure Standards with permission. Sand-based structural soil specification was originally developed by Pine and Swallow Environmental in Groton, MA.

1. MATERIALS
   A. GENERAL
      1. Soils mixtures are composed of a blend of three base components: base loam, organic material and sand. The Soil Supplier is responsible for locating and obtaining approval of sources for base loam, organic material and sand that meet the Specification requirements. The Soil Supplier is responsible for mixing the components. Approximate mixing ratios are as specified herein, but may require adjustment, depending on the characteristics of the final base materials.
      2. Base Components
         a. Base Loam: a natural A-horizon growing medium free from admixtures.
         b. Organic Material or Compost: a fully decomposed yard waste organic material.
         c. Sand: uniformly graded medium to coarse sand.
      3. Soil medium materials shall fulfill the requirements as specified and be tested to confirm the specified characteristics.
   B. BASE LOAM
      1. Base Loam shall be natural A-horizon topsoil free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots or other objectionable, extraneous matter or debris. Base Loam shall also be free of quack-grass rhizomes, Agropyron Repens, and the nut-like tubers of nutgrass, Cyperus Esculentus, and all other primary noxious weeds. Base Loam shall not be delivered or used for planting while in a frozen or muddy condition. Base Loam for mixing shall conform to the following grain size distribution for material passing the #10 sieve by weight:

Table 4-7: Base Loam Grain Size Distribution Requirements

U.S. Sieve Size Number	Minimum Percent Passing	Maximum Percent Passing
10	100	---
18	85	100
35	70	95
60	54	85
140	42	68
270	36	60
0.002 mm	3	12

      2. Maximum size shall be one-inch largest dimension. The maximum retained on the #10 sieve shall be 20% by weight of the total sample. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after burning off organic matter by ignition. The organic content shall be between 3.0 and 6.0 percent by weight. Base Loam shall have a well-developed and stable crumb structure.
      3. Unless otherwise recommended by the Soil Supplier's Soil Scientist: Cation Exchange Capacity shall be not less than 12 and Soluble Salts shall be not more than 2,000 ppm/2.0 mmhos/cm.

C. COARSE SAND FOR SOIL MIXTURES

1. Sand for blending, protection layer above filter fabrics, and drainage below planting soils shall be uniformly graded medium to coarse sand consisting of clean, inert, rounded to sub-angular grains of quartz or other durable rock free from loam or clay, surface coatings and deleterious materials, include no more than 0.5% mica, and have the following gradation for material passing the #10 sieve by weight.

Table 4-8: Coarse Sand Gradation Requirements

U.S. Sieve Size Number	Minimum Percent Passing	Maximum Percent Passing
10	100	---
18	60	80
35	25	45
60	8	20
140	0	8
270	0	3
0.002 mm	0	0.5

   a. Maximum size shall be one-inch largest dimension. The maximum retained on the #10 sieve shall be 15% by weight of the total sample. The ratio of the particle size for 70% passing (D70) to the particle size for 20% passing (D20) shall be 3.0 or less (D70/D20 <3.0). Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after burning off organic matter by ignition.

   b. Coarse sand shall be non-calcite and shall not be derived from serpentine. pH shall be less than 7.5.

D. ORGANIC AMENDMENT (COMPOST)

1. Organic Matter for amending planting soils shall be a stable, humus-like material produced from the aerobic decomposition and curing of leaf and yard waste composted for a minimum of one year (12 months). The leaf and yard waste compost shall be free of debris such as plastics, metal, concrete or other debris. The leaf and yard waste compost shall be free of stones larger than 1/2", larger branches and roots. Wood chips over 1" in length or diameter shall be removed by screening. The compost shall be a dark brown to black color and be capable of supporting plant growth with appropriate management practices in conjunction with addition of fertilizer and other amendments as applicable, with no visible free water or dust, with no unpleasant odor, and meeting the following criteria as reported by laboratory tests.

   a. The ratio of carbon to nitrogen shall be in the range of 12:1 to 25:1.

   b. Stability shall be assessed by the Solvita procedure. Protocols are specified by the Solvita manual (latest version). The compost must achieve a maturity index of 6 or more as measured by the Solvita scale. Stability tests shall be conducted by a DDOT approved lab.

   c. Pathogens/Metals/Vector Attraction reduction for compost material derived from biosolids shall meet 40 CFR Part 503 rule, Table 3, page 9392, Vol. 58 No. 32, (for applications to soils with human activity).

   d. Organic Content shall be at least 20 percent (dry weight). One hundred percent of the material shall pass a 3/8-inch (or smaller) screen. Debris such as metal, glass, plastic, wood (other than residual chips), asphalt or masonry shall not be visible and shall not exceed one percent dry weight. Organic content shall be determined by weight loss on ignition for particles passing a number 10 sieve.

   e. pH: The pH shall be between 6.5 to 7.2 as determined from a 1:1 soil- distilled water suspension

using a glass electrode pH meter American Society of Agronomy Methods of Soil Analysis.

f. Salinity: Electrical conductivity of a one to five soil to water ratio extract shall not exceed 2.5 mmhos/cm (dS/m).

g. The compost shall be screened to 1/2 inch maximum particle size and shall contain no more than 3 percent material finer than 0.002mm as determined by hydrometer test on ashed material.

h. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Magnesium, Tron, Manganese, Lead, Soluble Salts, Cation Exchange Capacity, soil reaction (pH), and buffer pH. The Soil Supplier's Soil Scientist shall provide a recommendation as to the suitability of the compost based on review of the test results.

E. SOIL ADDITIVES

1. Ground Limestone: dolomitic limestone and contain not less than 50 percent of total carbonates and 25 percent total magnesium with a neutralizing value of at least 100 percent. Material shall be ground to such fineness that 40 percent will pass through the 100 mesh U.S. standard sieve and 98 percent will pass through the 20 mesh U.S. standard sieve.
2. Acidulant for adjustment of planting soils pH shall be commercial grade sulfur, ferrous sulfate, or aluminum sulfate for horticultural use that are unadulterated. Acidulants shall be delivered in unopened containers with the name of the manufacturer, material, analysis and net weight appearing on each container.
3. Fertilizer: slow-release granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in a composition as recommended by the Soil Testing Laboratory.
4. Use of peat moss is prohibited.

F. SAND

1. For the layer underneath structural soil as called for in the Contract Documents shall meet the gradation requirements of the Coarse Sand For Soil Mixtures section above.

2. SUBMITTALS AND TESTING

A. Critical Path Processing - Soils Testing Report Submittals.

1. The Contractor is responsible for recognizing that these project materials warrant timely and serious attention, that the testing process to achieve approved materials shall be considered a lead time item, and that under no circumstance shall failure to comply with all specification requirements be an excuse for a delay or for expedient substitution of unacceptable material(s).
2. Sources for Soil Components and Soil Mixes: Within seven (7) days after notice to proceed, submit information identifying sources for soil components and the firm responsible for mixing of soil mixes:
   a. Soil mix supplier shall have a minimum of five years of experience supplying custom planting soil mixes.
   b. Submit supplier name, address, telephone and fax numbers and contact name.
   c. Submit certification that accepted supplier is able to provide sufficient quantities of materials and mixes for the entire project.
3. Testing Agency: Within seven (7) days after notice to proceed, Contractor shall furnish the name and location of the proposed testing agency. Agency proposed for testing of horticultural soils shall be an approved member of the Performance Assessment Program (PAP) administered by the North American Proficiency Testing (NAPT) Oversight Committee. The Testing agency shall be accepted by the Chief Engineer

4. Product Data: No later than 30 days prior to planned soil construction, submit most recent printed information from manufacturer for:
    a. Organic Material: identify the material(s) from of which is it composed and identify the location where material was composted.
    b. Fertilizers
    c. Ground Limestone
    d. Sulfur
5. Samples and Test Reports: Submit representative samples and reports to the Chief Engineer and the Testing Agency as described herein for approval. Delivered materials shall closely match the approved samples.
    a. Submit 1 gallon soil samples and horticultural soil test reports in two phases.

B. Planting soil base components:

- Base Loam
- Organic Amendment (Compost)
- Sand

1. Submit samples of above to the Testing Agency. Submit soil testing reports to Chief Engineer no later than 21 days prior to planned soil construction.
2. Only after approval of base components, submit soil blend mixes / mediums for approval. Mixing and batching of soil mediums in the same manner as bulk soils will be prepared for delivery to site.
3. Submit samples of above to the Testing Agency. Submit duplicate samples and soil testing reports to Chief Engineer no later than 14 days prior to planned soil construction.
4. Samples soil type delivered to the site shall taken and tested for conformance with the Specification Requirements. Submit duplicate samples and soil testing reports to Chief Engineer.
5. Soil Sampling: Sampling shall be done by the Soil Supplier. Samples shall be representative of the material to be brought to the site. Each sample shall be a Composite Sample, which consists of 5 separate sub-samples taken from a minimum of (5) different locations at each source and mixed together to make the test sample.
6. Test Reports shall be certified and shall cover the items below. All reports must be from recent analyses, less than 90 days old, and represent materials that are available for delivery to the site.
7. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System.
8. The silt and clay content shall be determined by a Hydrometer Test of soil passing the #270 sieve. Percent clay (0.002 mm) shall be reported separately in addition to silt (ASTM D-422-63, hydrometer method).
9. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Magnesium, Aluminum, Manganese, Cation Exchange Capacity, Soluble Salts, acidity (pH) and buffer pH.
10. Tests shall be conducted in accordance with Recommended Soil Testing Procedures for the Northeastern United States, Current Edition, Northeastern Regional Publication No. 493; Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Tsland, Vermont and West Virginia. Tests include the following:
    a. Test for soil Organic Matter by loss of weight on ignition, as described in Northeastern Regional Publication No. 493.

b. Test for soil CEC by exchangeable acidity method as described in Northeastern Regional Publication No. 493.

c. Test for soil Soluble Salts shall be by the 1:2 (v:v) soil:water Extract Method as described in Northeastern Regional Publication No. 493.

d. Test for Buffer pH by the SMP method as described in Northeastern Regional Publication No. 493.

e. Certified reports on analyses from producers of composted organic materials are required. Analyses will include all tests for criteria specified herein.

f. Density Tests: Tn-place density testing is required in all areas. Placed planting soils must be inspected for compaction level by the soil scientist or by the following: ASTM D1556 Density of Soil and Rock Tn Place Using Sand Cone Method, ASTM D6398-10 Nuclear Methods or ASTM D2167-08 Rubber Balloon method. AASHTO T-99 (Standard Effort) in accordance with DDOT specifications shall be used for Laboratory Compaction Characteristics of Soil unless otherwise directed.

11. Contractor shall perform Tn-place density tests at a rate of one test per 2,000 square feet for each type of material placed.

12. Test data and recommendations for soil amendments including but not limited to: nitrogen, phosphorus, potassium and limestone

3. 3. PROPORTIONING

A. Soil Supplier shall uniformly mix ingredients on an approved hard surface area or with soil blending equipment. Soils and Organic Amendment shall be maintained moist, not wet, during mixing. Amendments shall not be added unless approved to extent and quantity by the owner and additional tests have been conducted to verify type and quantity of amendment is acceptable. Percentages of components, unless otherwise noted, will be established upon completion of individual test results for components of the various mixes.

B. After component percentages are determined by the Soil Supplier's Soil Scientist, each planting soil medium shall be tested for physical and chemical analysis.

C. Sand-based structural soil

1. Sand-Based Structural Soil shall consist of a blend of approximately 60% by volume Coarse Sand, 15% by volume Base Loam and 25% by volume Organic Amendment. The components shall be blended to create a uniform mixture. Percentages will be adjusted as necessary to achieve the following grain size distribution and criteria below for material passing the #10 sieve by weight:

Table 4-9: Sand-Based Structural Soil Grain Size Distribution Requirements

U.S. Sieve Size Number	Minimum Percent Passing	Maximum Percent Passing	
10	100	---	(Coarse Sand)
18	68	90	(Coarse Sand)
35	38	63	(Coarse Sand)
60	18	39	(Fine Sand)
140	10	18	(Fine Sand)
270	8	10	(Silt)
0.002 mm	1	4	(Clay)

2. Maximum size shall be one-inch largest dimension. The maximum retained on the #10 sieve shall be 15% by weight of the total sample.
3. The ratio of the particle size for 70% passing (D70) to the particle size for 20% passing (D20) shall be 3.0 or less (D70/D20 <3.0).
4. The final mix shall have a saturated hydraulic conductivity of no less than 6.0 inches per hour according to test procedure ASTM D5856-95 (2000) when compacted to a minimum of 88 percent of the maximum density as determined by AASHTO T-99, unless the soil will be placed in an area that experiences loading. Tf the soil will be placed under sidewalk, curbs or gutter, the density shall be a minimum of 93 percent maximum dry density as determined by AASHTO T-180. The mixes shall be compacted at 60% to 80% optimum moisture content.
5. Organic content shall be between 2.5 and 3.5 percent by weight.
6. Unless otherwise specified or recommended by the Soil Supplier's Soil Scientist: pH shall be between 6.5 and 7.2; CEC shall be a minimum of 6; and Soluble Salts shall be less than 500 ppm/0.5 mmhos/cm.

4. SUBGRADE PREPARATION
   A. Coordinate the following scarification work to eliminate subgrade compaction resultant from Construction Operations when located in lawn and planting areas.
      1. General Site Subgrade Compaction Mitigation for all planting areas that are not heavily compacted:
         a. Immediately prior to placing any Planting Soil or any drainage materials beneath planting soils, the entire subgrade shall be loosened to a minimum depth of 3-inches using the teeth of a backhoe or other suitable equipment.
         b. After the subgrade soils have been loosened, re-compressed and inspected, remove any stones or debris 6" or greater and dispose off of the project site. Do not bury large stones or debris.
5. PLACEMENT OF DRAINAGE MATERIALS AND SOIL LAYERS
   A. Preparation for Placement of Planting Soils
      1. Prevent compacting soils by beginning work in corner, against walls, or the center of isolated beds, and progressing outwards towards borders.
      2. Never move or work Planting Soils when wet or frozen.
      3. Place barricades as required to prevent compaction of planting soil from vehicles, equipment, or pedestrian traffic.
6. GENERAL PLACEMENT REQUIREMENTS
   A. No rubber-tired equipment or heavy equipment except for a small bulldozer shall pass over the subsoils (subgrade) after they have been loosened and recompressed. Tf the Contractor plans to utilize such areas for any use of heavy equipment, this work should be carried out prior to beginning the process of loosening soils or filling in that area.
   B. Place and spread Planting Soils in layers as specified to a thickness greater than required such that after settlement,
   C. The surface area of each lift, including the subgrade after it has been compacted, shall be scarified by raking immediately prior to placing the next lift.
   D. Place and spread topmost layers of planting medium to the thickness such that, after settlement, finished grades conform to the lines, grades and elevations shown on the Drawings. Ensure proper drainage in an uninterrupted pattern free of hollows and pockets.

E. Place Sand Based Structural Soil as follows:

1. Beneath Pavements: Spread in lifts not greater than eight inches and compact with a minimum of two passes of vibratory compaction equipment to a density of 93% plus or minus 1% of maximum density as determined by AASHTO T180.
2. As Horticultural Subsoil: Spread in lifts not greater than twelve inches and compact to a density of 85% plus or minus 1% of maximum density as determined by AASHTO T-99.

7. PROTECTION

A. Protect newly graded areas from traffic, freezing and erosion. Keep free of trash, debris or construction materials from other work.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs, before final acceptance or during the warranty period, remove finish surfacing, backfill with additional approved soil, compact to specified rates, and restore any disturbed areas to a condition acceptable to the Owner.

MISCELLANEOUS LANDSCAPE MATERIAL

GRAVEL: Washed gravel shall be clean, crushed stone complying with ASTM C.33, size 8 or 9.

FILTER MAT: Fiberglass mat filter: "Poly-filter G-8", manufactured by Carthage Mills, or equal.

ANTI-DESSICANT: Emulsion type, film forming agent similar to Dowax by Dow Chemical Company, or Wilt-proof By Nursery Specialty Products, Inc., designed to retard excessive loss of moisture from plants.

WRAPPING: 4" wide, standard manufactured tree wrapping paper, brown in color with crinkled surface, and installed to prevent water collection with a 2" overlap. Trees should be wrapped only for transit to the site. Wrapping should be removed upon installation.

STAKING: Trees over 4" in caliper should not be staked or received guy wires.

STEEL EDGING: Shall be 16"x4" in size and manufactured by Ryerson and Son, Inc. or an approved alternative.

P.V.C. PIPE: Type 1, Grade 1, Normal impact unplasticized, high density polyvinyl chloride. Sized according to the drawings.

4.3 Furniture

4.3.1. Bench Specifications

All benches must comply with standards in Section 3.6.1.

On the Central Green Loop provide the SteelSites RB Contoured Wood Slat Bench by Victor Stanley or equivalent.

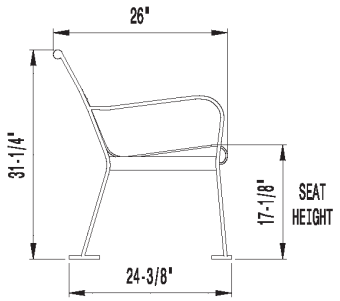
In all other ROW locations, provide the SteelSites RB All Steel Contoured Bench by Victor Stanley or similar bench that meets performance standards in Section 3.6.1.

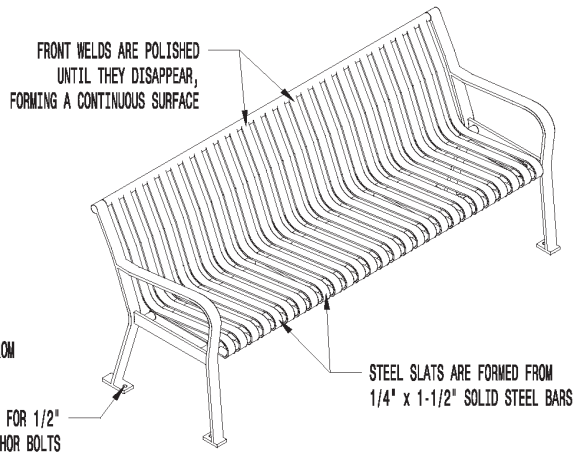
VICTOR STANLEY®

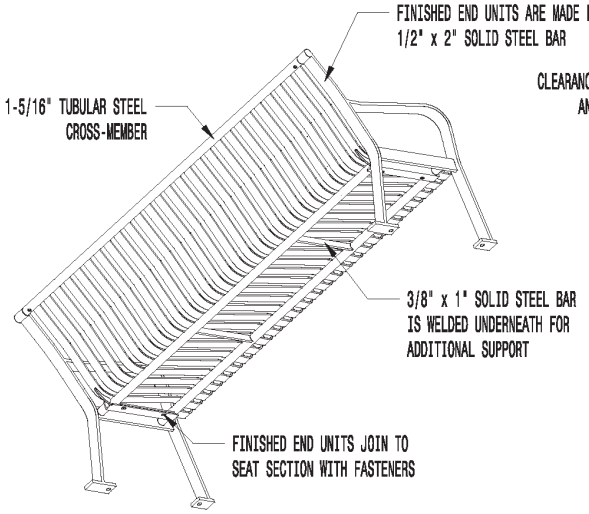
Create a timeless moment.®

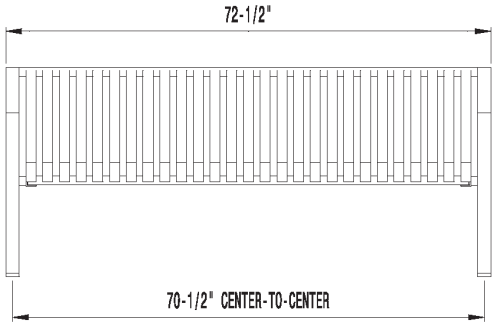
P.O. DRAWER 330 - DUNKIRK, MD 20754 USA
TOLL FREE: (800) 368-2573 (USA & CANADA)
TEL (301) 855-8300 - FAX (410) 257-7579
WEB SITE: HTTP://WWW.VICTORSTANLEY.COM

* ALL DIMENSIONS ARE IN INCHES *









AVAILABLE OPTIONS:

POWDER COATING
10 STANDARD COLORS, 2 OPTIONAL METALLIC COLORS, CUSTOM COLORS (INCLUDING THE RAL RANGE)

INTERMEDIATE & CENTER ARMRESTS (BOLT-ON)
4', 6', & 8' AVAILABLE WITH OPTIONAL SOLID STEEL ARMRESTS

LENGTHS
STANDARD 4'
STANDARD 6' (AS SHOWN)
STANDARD 8'

NOTES:

1. DRAWINGS NOT TO SCALE. DO NOT SCALE DRAWINGS.
2. ALL FABRICATED METAL COMPONENTS ARE STEEL SHOTBLASTED, ETCHED, PHOSPHATIZED, PREHEATED, AND ELECTROSTATICALLY POWDER-COATED WITH T.G.I.C. POLYESTER POWDER COATINGS. PRODUCTS ARE FULLY CLEANED AND PRETREATED, PREHEATED AND COATED WHILE HOT TO FILL CREVICES AND BUILD COATING FILM. COATED PARTS ARE THEN FULLY CURED TO COATING MANUFACTURER'S SPECIFICATIONS. THE THICKNESS OF THE RESULTING FINISH AVERAGES 8-10 MILS (200-250 MICRONS).
3. IT IS NOT RECOMMENDED TO LOCATE ANCHOR BOLTS UNTIL BENCH IS IN PLACE. THIS VICTOR STANLEY, INC. PRODUCT MUST BE PERMANENTLY AFFIXED TO THE GROUND. CONSULT YOUR LOCAL CODES FOR REGULATIONS.
4. ANCHOR BOLTS NOT PROVIDED BY VICTOR STANLEY, INC.
5. FOR HIGH SALT ABUSIVE CLIMATES, HOT-DIP GALVANIZING BEFORE POWDER COATING IS AVAILABLE. HOT-DIP GALVANIZING IS PERFORMED FOR VICTOR STANLEY, INC. BY AN EXPERIENCED QUALIFIED FIRM TO WHICH PRODUCTS ARE SHIPPED FOR GALVANIZING. HOT-DIP GALVANIZING INCLUDES AN AGGRESSIVE PRE-TREATMENT AND IMMERSION IN A TANK OF CHARGED LIQUID ZINC AT OR AROUND 860°F (460°C). THE RESULTING SURFACE IS RESISTANT TO RUST BUT HAS SOME UNEVENNESS RESULTING FROM THE BONDING OF THE ZINC TO THE STEEL SURFACE. AS A RESULT, THE POWDER-COATING SURFACE FINISH OVER THAT GALVANIZED SURFACE MAY EXHIBIT BUMPS, UNEVENNESS, AND MAY NOT BE AS SMOOTH AS THE STANDARD FINISH; THIS UNEVEN AND INCONSISTENT FINISH IS NORMAL FOR GALVANIZING. CONTACT MANUFACTURER FOR DETAILS.
6. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE. CONTACT MANUFACTURER FOR DETAILS.
7. THIS PRODUCT IS SHIPPED PARTIALLY UNASSEMBLED.

RB-28

STEELSITES™ RB

ALL STEEL CONTOURED BENCH
SHOWN: STANDARD 6-FOOT LENGTH

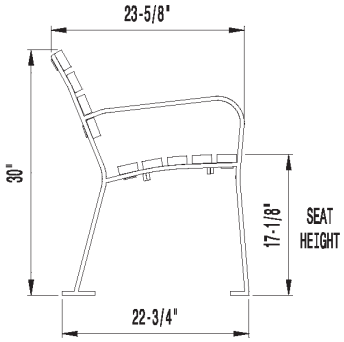
REV. 2/7/22 DRAWN V.F.T. 2022-60

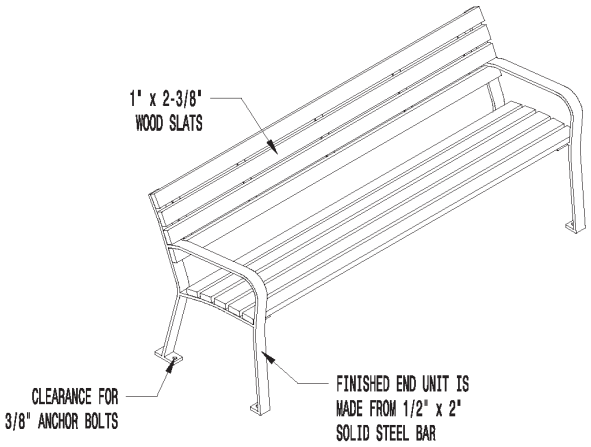
VICTOR STANLEY®

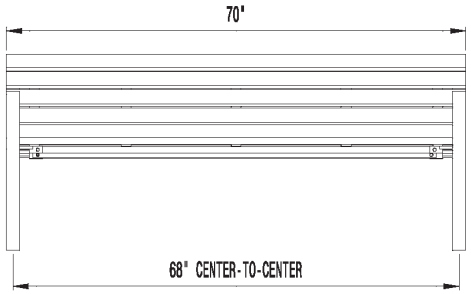
Create a timeless moment.®

P.O. DRAWER 330 - DUNKIRK, MD 20754 USA
TOLL FREE: (800) 368-2573 (USA & CANADA)
TEL (301) 855-8300 - FAX (410) 257-7579
WEB SITE: HTTP://WWW.VICTORSTANLEY.COM

* ALL DIMENSIONS ARE IN INCHES *







AVAILABLE OPTIONS:

- POWDER COATING
  - 10 STANDARD COLORS, 2 OPTIONAL METALLIC COLORS,
  - CUSTOM COLORS (INCLUDING THE RAL RANGE)
- INTERMEDIATE ARMRESTS (BOLT-ON)
  - 4' & 6' AVAILABLE WITH OPTIONAL ARMRESTS

LENGTHS

- STANDARD 2'
- STANDARD 4'
- STANDARD 6' (AS SHOWN)

NOTES:

1. DRAWINGS NOT TO SCALE. DO NOT SCALE DRAWINGS.
2. ALL FABRICATED METAL COMPONENTS ARE STEEL SHOTBLASTED, ETCHED, PHOSPHATIZED, PREHEATED, AND ELECTROSTATICALLY POWDER-COATED WITH T.G.I.C. POLYESTER POWDER COATINGS. PRODUCTS ARE FULLY CLEANED AND PRETREATED, PREHEATED AND COATED WHILE HOT TO FILL CREVICES AND BUILD COATING FILM. COATED PARTS ARE THEN FULLY CURED TO COATING MANUFACTURER'S SPECIFICATIONS. THE THICKNESS OF THE RESULTING FINISH AVERAGES 8-10 MILS (200-250 MICRONS).
3. IT IS NOT RECOMMENDED TO LOCATE ANCHOR BOLTS UNTIL BENCH IS IN PLACE. THIS VICTOR STANLEY, INC. PRODUCT MUST BE PERMANENTLY AFFIXED TO THE GROUND. CONSULT YOUR LOCAL CODES FOR REGULATIONS.
4. ANCHOR BOLTS NOT PROVIDED BY VICTOR STANLEY, INC.
5. FOR HIGH SALT ABUSIVE CLIMATES, HOT-DIP GALVANIZING BEFORE POWDER COATING IS AVAILABLE. HOT-DIP GALVANIZING IS PERFORMED FOR VICTOR STANLEY, INC. BY AN EXPERIENCED QUALIFIED FIRM TO WHICH PRODUCTS ARE SHIPPED FOR GALVANIZING. HOT-DIP GALVANIZING INCLUDES AN AGGRESSIVE PRE-TREATMENT AND IMMERSION IN A TANK OF CHARGED LIQUID ZINC AT OR AROUND 860°F (460°C). THE RESULTING SURFACE IS RESISTANT TO RUST BUT HAS SOME UNEVENNESS RESULTING FROM THE BONDING OF THE ZINC TO THE STEEL SURFACE. AS A RESULT, THE POWDER-COATING SURFACE FINISH OVER THAT GALVANIZED SURFACE MAY EXHIBIT BUMPS, UNEVENNESS, AND MAY NOT BE AS SMOOTH AS THE STANDARD FINISH; THIS UNEVEN AND INCONSISTENT FINISH IS NORMAL FOR GALVANIZING. CONTACT MANUFACTURER FOR DETAILS.
6. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE. CONTACT MANUFACTURER FOR DETAILS.
7. THIS PRODUCT IS SHIPPED PARTIALLY UNASSEMBLED.

RBW-28

STEELSITES™ RB

CONTOURED WOOD SLAT BENCH
SHOWN: STANDARD 6-FOOT LENGTH

REV. 9/21/15 DRAWN L.D.L. 2015-862

4.3.2 Trash and Recycling Receptacles

Continue to use the current standard trash and recycling receptacles as described below. For unusually high-traffic areas, consider solar compactors.

For most downtown locations:

Victor-Stanley SD-42 or SD-242 (2 canisters in one fixture).

SIZE: 36 gallon

LINER: galvanized steel, with latch closure.

LID: rain bonnet

COLOR: Tavern square green for trash, Blue for recycling

Optional bottom cap if desired. Option to bolt to the sidewalk if practical.

For high-traffic areas

Solar compactor trash can. Big Belly Sense/Smart or similar.

OPTIONS: soft-open hopper, multibin kiosk for trash and recycling, custom "Silver Spring" graphic for side panel to be provided by Urban District,

SD-35 SIDE-DOOR LITTER RECEPTACLE 24 gal (90 L).
SD-42 SIDE-DOOR LITTER RECEPTACLE 36 gal (136 L).

Standard tapered formed lid. Black plastic liner. Latch. Five leveling feet. Bottom recessed pedestal.

OPTIONS: Victor Stanley Relay™ Sensor & Service. Keyed lock. Dome lid (ashtrays available). Convex lid (self-close door available). Rain bonnet lid (ashtrays available). Enclosed dome lid for SD-42 (ashtrays available). Spherical dome lid for SD-42. Recycle lids *(learn more)*. Half-Moon liners for SD-42. Galvanized steel liner (powder coat available). Custom decals and plaques.

SD-45 SIDE-DOOR LITTER RECEPTACLE 45 gal (170 L).

Standard tapered formed lid. Black plastic liner. Latch. Five leveling feet.

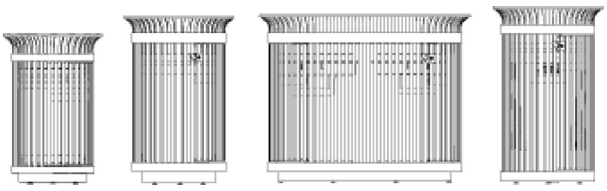
OPTIONS: Victor Stanley Relay™ Sensor & Service. Keyed lock. Dome lid (ashtrays available). Convex lid (self-close door available). Rain bonnet lid (ashtrays available). Enclosed dome lid (ashtrays available). Spherical dome lid. Recycle lids *(learn more)*. Half-Moon liners. Custom decals and plaques.

SD-242 SIDE-DOOR RECYCLING STATION

CAPACITY: two 36 gal (136 L) liners. Includes two lids in any combination: standard tapered formed lid, recycle lid, and/or slotted lid. Black plastic liners. Latch. Leveling feet. Standard decals. Bottom recessed pedestal.

OPTIONS: Victor Stanley Relay™ Sensor & Service. Keyed locking mechanism. Dual-flow lid. Dome lid (ashtrays available). Convex lid (self-close door available). Rain bonnet lid (ashtrays available). Enclosed dome lid (ashtrays available). Spherical dome lid. Half-Moon liners. Galvanized steel liner (powder coat available). Custom decals and plaques.

VICTOR STANLEY RELAY™
Efficient resource allocation saves an estimated 70–90% in collection expenses.



SD-35	SD-42	SD-242	SD-45
25 in (635 mm) w	28 in (711 mm) w	28 x 53 in (711 x 1346 mm) w	28.125 in (714 mm) w
36.75 in (933 mm) h	41.75 in (1060 mm) h	42 in (1067 mm) h	44.25 in (1124 mm) h

Overall dimensions w=width h=height

SD-35 *SD-45. Dome lid.*

SD-242.
Slotted lid and standard lid.

SD-242.
Slotted lid and recycle lid.

VICTORSTANLEY.COM

Bigbelly Sense Max

Built on Bigbelly's fundamentally better bin, the Sense Max is a 150-gallon (570 L) capacity, compacting bin with built-in LED indicators that provide bin fullness status at a glance - ideal for deployments where collection staff are nearby. The Sense Max can be deployed standalone or in combination with any other Bigbelly bin type to form a multi-stream kiosk.

With its fully-enclosed Hopper disposal interface, the Sense Max is uniquely equipped to keep waste contained and out of sight, even from trash pickers. The integrated compactor provides 5-10x greater capacity compared to traditional waste bins and is designed for high-waste volume locations.

The Sense Max is equipped with sensors that monitor and indicate fullness level. The Sense Max can be solar-powered for outdoor use or AC-powered for indoor use.

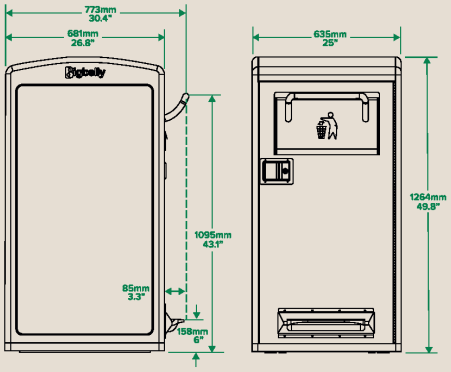
Waste Interfaces and Streams

Hopper, Chute, or Open Disposal Interface
Waste, Single-Stream Recycling, or Compost

Hopper Disposal Interface with Foot Pedal

Chute Disposal Interface with Foot Pedal

Technical Specifications



Overall Machine Dimensions

- Height: 49.8" (1264 mm)
- Width: 25" (635 mm)
- Depth: 26.8" (681 mm)
- Handle Height (ADA Compliant): 43.1" (1095 mm)
- Weight: 270 lbs (122 kg)
- Shipping weight: 300 lbs (136.08 kg)
- Bin Volume (Hopper or Chute): 32 gal (120 L) compacted trash; approx. 150 gal (568 L) uncompacted trash.
- Bin Dimension: 24" x 20.4" x 21.65" (609 mm x 518 mm x 549 mm)

Disposal Interface Dimensions

- Hopper Opening: 16.5"W x 5"H x 8"D (419 mm x 127 mm x 203 mm)
- Chute Opening: 16"W x 5.5"H x 15"D (406 mm x 140 mm x 381 mm)

Technical Specifications - Continued

Bigbelly Sense Max Features

- Bigbelly's fully-enclosed Hopper disposal interface, standard on Sense Max bins, eliminates visible waste, rat and pest access, windblown litter, and prevents strewn litter caused by trash picking. The Hopper incorporates a 70° dump angle which reduces waste disposal jams.
- Embedded sensors detect fullness level.
- LED indicators on the front of the Sense Max display readiness to collect status (fullness level), machine status, and error codes.
- Unique built-in compaction technology delivers a 5-10x compaction ratio due to superior compaction penetration (ram travels to 9" from bottom of bin).
- The integrated Foot Pedal provides hands-free use.

Safety Features

- CE marked
- Hopper disposal interface provides a physical barrier between the user and the compacting mechanism
- Soft-open Hopper response with use of Foot Pedal
- Interlocked access doors protect users and service personnel
- Collection door automatically locks when closed
- No pinch points, sharp edges or corners

Durability

- Weather-resistant, UV-stabilized polyester powder-coat finish on all exterior parts
- Electronic components temperature range of -40°F to +185°F (-40°C to +85°C)
- Fully weatherized; in the event of a flood, the bin can withstand:
  - Up to 20" (508 mm) of water without harming the electronics
  - Up to 36" (915 mm) of water with only minor damage to electronics

Materials

- RoHS compliant
- Galvanized sheet metal steel interior and exterior construction
- Heavy-duty, recycled plastic side panels for dent and scratch resistance
- Leak-proof interior bin made of low-density polyethylene (LDPE) plastic

Power and Electronics

- Average operation uses less than 3 Wh energy per day, ensuring performance in any location, including in shade and under cloud cover
- Patented Skip-a-Cycle™ energy management technology protects against battery damage
- 28 Ah sealed lead acid, maintenance-free, extended life battery with insulation for optimized performance (average lifespan 5-8 years)
- Solar panel (up to 40 W)
- Solar panel protected by polycarbonate bubble
- Self-powered unit requires no wiring

Options and Accessories

- Chute disposal interface
- Custom Graphic Wraps, Message Panels, and Stickers
- Wheeled Interior Lift Bin (bar and comb styles)
- AC Adapter for indoor use
- Ashtray and Stub-out Plates
- Security Plates
- Odor Mask

Bigbelly

Sense Max Product Sheet 2301

5 Appendix

5.1 Master Tree Planting Table

5.1 Master Tree Planting Table

Note: This table should be reviewed and edited as needed every 5-7 years.

Scientific Name	Common Name	Native	Height	Spread	Number of Reliant Butterflies, Moths and Skippers	Crown Form		Hardiness Zones	Heat Zones	Soil Conditions	Drought Tolerant	Air Pollution Tolerant	Salt Tolerance
Large Trees (50' and over)			**Physical Characteristics**					**Growing Conditions**					
Carya ovata	Shagbark hickory	X	60'–80'	35–50'	Medium	Oval		4 to 8	8 to 1	adaptable	X	X	X
Celtis occidentalis	Hackberry	X	40'–60'	40'–60'	Low	Vase/Oval		3 to 9	9 to 1	rich, moist, withstands alkaline	X	X	X
Fagus grandifolia (low branches)	American beech	X	50'–70'	50'–70'	Medium	Oval		4 to 9	9 to 1	Well-drained, acidic	X		
Gleditsia triacanthos var. inermis 'Shademaster'	Thornless honeylocust	X	30'–70'	30'–70'	Low	Spreading		4 to 9	9 to 1	adaptable	X	X	X
Gymnocladus dioicus 'Stately Manor'	Fruitless Kentucky coffeetree	X	50'–70'	30'–50'	Very Low	Spreading		3b to 8	9 to 2	adaptable	X	X	X
Liquidambar styraciflua 'Cherokee'	Cherokee Sweetgum	X	40'–50'	25–30'	Very Low	Oval/round		5 to 9	n/a	deep, moist, slightly acidic	X	n/a	X
Liquidambar styraciflua 'Rotundiloba' (fruitless)	Low fruiting Sweetgum	X	60'–75'	40'–50'	Very Low	Oval		6 to 9	n/a	deep, moist, slightly acidic		n/a	X
Liriodendron tulipifera	Tuliptree, tulip-poplar	X	60'–90'	35–50'	Very Low	Columnar		4 to 9	9 to 2	deep, moist, well-drained		n/a	n/a
Platanus occidentalis	Sycamore	X	75'–100'	75'–100'	Low	Round/Spreading		4 to 9	5 to 9	deep, moist, well-drained soils	X	X	X
Platanus x acerifolia	London planetree	X	70'–100'	65'–80'	Undetermined	Spreading		5 to 8	n/a	adaptable	X	X	
Quercus alba	White oak	X	50'–80'	50'–80'	High	Round/ Spreading		3b to 9	8 to 1	moist, well-drained, acidic	X	n/a	X
Quercus michauxii	Swamp chestnut oak	X	40'-80'	30'–60'	High	Round		5 to 9	8 to 1	adaptable	X	X	
Quercus coccinea	Scarlet oak	X	60'–80'	40'–50'	High	Round		5 to 8	9 to 4	adaptable	X	n/a	
Quercus falcata	Southern red oak	X	70'–80'	70'–100'	High	Round/ Spreading		7 to 9	9 to 5	adaptable		X	X
Quercus imbricaria	Shingle oak	X	50'–60'	50'–60'	High	Pyramidal/ Spreading		4 to 8	8 to 4	adaptable	X	n/a	X
Quercus lyrata	Overcup oak	X	40–60'	40'–50'	High	Round		5 to 9	8 to 4	adaptable		n/a	X
Quercus macrocarpa	Bur oak	X	70'–80'	70'–80'	High	Round		3 to 8	9 to 1	adaptable	X	n/a	X
Quercus palustris (plant off streets-parks)	Pin oak	X	65–70'	25–40'	High	Pyramidal		4 to 8	7 to 3	moist, rich, well drained, acidic	X	X	
Quercus phellos (low branches)	Willow oak	X	40'–60'	30'–40'	High	Oval/Pyramidal		5 to 9	9 to 3	adaptable		X	X
Quercus rubra	Northern Red oak	X	60'–75'	60'–75'	High	Round		3b to 7	9 to 5	Well-drained, sandy loam, slightly acidic	X	X	X
Quercus shumardii	Shumard oak	X	50'–90'	40'–50'	Undetermined	Columnar			9 to 5	Moist or dry	X	X	
Quercus texana	Texas red oak	X	50'–80'	40'–60'	Undetermined	Pyramidal/ Spreading		4 to 8	9 to 3	adaptable	X		X
Tilia americana	American linden, basswood	X	60'–80'	30'–55'	Medium	Oval		3b to 8	8 to 1	moist, well drained			X
Tilia cordata	Littleleaf linden		60'–80'	30'–50'	Medium	Oval/Round		3b to 8	8 to 1	deep, moist, fertile		X	X
Tilia tomentosa	Silver linden	X	50'–70'	35–45'	Medium	Oval/Pyramidal		4 to 7	9 to 1	deep, moist, fertile	X	X	X
Ulmus americana 'Jefferson'	Jefferson american elm	X	60'–80'	30'–50'	Medium	Vase		4 to 7	8 to 2	adaptable	X	X	X
Ulmus americana 'New Harmony'	New harmony American elm	X	60'–70'	60'–70'	Medium	Vase		5 to10	8 to 2	rich, moist preferred but adaptable	X	X	X
Ulmus americana 'Valley Forge'	Valley Forge American elm	X	60'–70'	60'–70'	Medium	Vase		4 to 9	8 to 2	adaptable	X	X	X

Medium Trees (35'-50')			Physical Characteristics					Growing Conditions					
Scientific Name	**Common Name**	*Native*	*Height*	*Spread*	*Number of Caterpillar Species*	*Crown Form*		*Hardiness Zones*	*Heat Zones*	*Soil Conditions*	*Drought Tolerant*	*Air Pollution Tolerant*	*Salt Toleran*
Betula nigra 'Dura Heat' (single stem)	Dura Heat river birch	X	30'–40'	30'–40'	Very Low	Pyramidal		3b to 9	9 to 1			X	X
Cladrastis kentukea	American yellowwood	X	30'–50'	40'–55'	Undetermined	Round/Spreading		4 to 8	9 to 1	adaptable		X	X
Nyssa sylvatica	Black gum, black tupelo	X	30'–50'	20–30'	Very Low	Pyramidal		4 to 9	9 to 7	moist, well-drained, acidic		X	X
Celtis laevigata	Sugarberry	X	40-60'	40'–55'	Medium	Round/Spreading		6 to 9	5 to 9	Clay, well drained, wet	X		
Quercus michauxii	Black locust	X	30'–50'	20'–35'	Low	Irregular		4 to 8	9 to 3	adaptable	~~X~~		~~X~~

Street Trees (35' and under)			Physical Characteristics					Growing Conditions					
Scientific Name	**Common Name**	*Native*	*Height*	*Spread*	*Number of Caterpillar Species*	*Crown Form*		*Hardiness Zones*	*Heat Zones*	*Soil Conditions*	*Drought Tolerant*	*Air Pollutio Tolerant*	*Salt Tolerance*
Amelanchier arborea	Downy serviceberry	X	15'–25'	15'–25'	Medium	Vase		4 to 9	9 to1	moist, well-drained, acidic			n/a
Amelanchier canadensis	Shadblow Serviceberry	X	5'–20'	15'–20'	Medium	Vase		3 to 7	7 to 1	bogs, swamps			
Amelanchier x grandiflora	Apple serviceberry	X	15'–25'	15'–20'	Medium	Vase		4 to 9	7 to 1	moist, well-drained, acidic		X	X
Amelanchier laevis	Allegheny serviceberry	X	15'–25'	15'–25'	Medium	Vase		4 to 9	9 to 1	moist, well-drained, acidic			
Carpinus caroliniana 'palisade'	Palisade American hornbeam	X	20'–30'	20–30'	Low	Round		3b to 9	9 to 1	moist, well-drained, acidic	X	n/a	n/a
Carpinus caroliniana	American hornbeam	X	20'–30'	20–30'	Low	Round		3b to 9	9 to 1	moist, well-drained, acidic		n/a	n/a
Cercis canadensis	Eastern redbud	X	25'–30'	25–35'	Very Low	Round		4 to 9	9 to 6	moist, well-drained	X	X	
Chionanathus retusus	Chinese fringetree		25'–30'	25–30'	Very Low	Round/Spreading		4 to 9	9 to 1	deep, moist, acidic	X	X	X
Chionanthus virginicus	White fringetree	X	25'–30'	25–30'	Very Low	Vase		4 to 9	9 to 1	deep, moist, acidic	X	X	X
Cornus florida	Flowering dogwood	X	20–30'	20–30'	Medium	Round		5 to 9	9 to 3	Wet, acidic, well-drained			X
Crataegus phaenopyrum	Washington hawthorn	X	25'–30'	20–25'	Medium	Pyramidal		4 to 8	10 to 1	moist, fertile		X	
Crataegus viridis	Winter king hawthorn	X	20'–30'	20–35'	Medium	Pyramidal		3 to 8	10 to 1	adaptable		X	
Magnolia virginiana	Sweetbay magnolia	X	10-35'	20–35'	High	Spreading		3 to 8	10 to 1	adaptable		X	
Malus spp.	Praire fire	X	15'–25'	10'–20'	High	Spreading		4a to 8a	n/a	moist, well-drained, acidic			X
Ostrya virginiana	American hophornbeam	X	25'–40'	15'–25'	Low	Pyramidal		3b to 9	9 to 5	moist, well-drained, acidic	X		
Parrotia persica 'Streetwise'	Streetwise Persion ironwood		20'–30'	10'–20'	Undetermined	Columnar		3b to 9	9 to 5	well-drained	X		
Celtis laevigata	Sugarberry	X	40-60'	40'–55'	Medium	Round/Spreading		6 to 9	5 to 9	Clay, well drained, wet	X		
Prunus x incamp 'Okame'	Okame cherry		15'–25'	20'-25'	Undetermined	Oval/Round		6b to 9b	9 to 5	adaptable	X	X	n/a
Prunus avium	Sweet cherry		15'–30'	15'–30'	High	Columnar		3 to 8	8 to 1	moist well-drained, moderately acidic			n/a
Prunus serrulata 'Kwanzan'	Kwanzan cherry		15'–25'	20'–25'	Undetermined	Oval/Round		5 to 8	9 to 4	damp, well-drained fertile		X	
Prunus virginiana	Choke cherry	X	15'–30'	15'–35'	High	Oval/Round				Rich moist soil. Sandy. Clay Loam			
Prunus virginiana 'Schubert' *	Purple-leaf chokecherry	X	15'–30'	15'–35'	High	Oval/Round				Rich moist soil. Sandy. Clay Loam			
Viburnum prunifolium	Blackhaw viburnum	X	10'–15'	10'–15'	Medium	Vase		3 to 9	n/a	adaptable	X		

Small Shrubs for Locations without Trees			Physical Characteristics					Growing Conditions					
Scientific Name	Common Name	Native	Height	Spread	Number of Caterpillar Species	Crown Form		Hardiness Zones	Heat Zones	Soil Conditions	Drought Tolerant	Air Pollutio Tolerant	Salt Tolerance
Hypericum x hidcoteense 'Hidcote'	St. John's wort	X	1'–3'	1–3'	Very Low	Round		5 to 9		well-drained			
Ilex glabra	Inkberry	X	3'–4'	4–6'	Low	Round		5 to 9		adaptable	X		X
Ilex glabra 'compacta'	Compact inkberry	X	3'–4'	4'–6'	Low	Round		5 to 9		adaptable	X		X
Ilex verticillata 'nana' red sprite *	Compact winterberry holly	X	3'–4'	2'–4'	Low	Round		5 to 9		adaptable	X		X

Definitions of Terms in Table 5.1

Hardiness Zones: The USDA's Hardiness Zone Map divides the U.S. into 11 zones based on average minimal winter temperature. A plant's Hardiness Zone rating refers to a plant's ability to thrive in the corresponding map location.

Soil Conditions: A tree's preferred soil moisture level, drainage and pH level. Zone refers to a plant's ability to thrive in the corresponding map location.

Light Conditions: The amount of sun and/or shade required for a tree to grow and thrive (Full Sun: direct sunlight for at least 6 hours a day during the growing season, Partial Shade: approximately 3-6 hours of direct sunlight, Shade: less than 3 hours of sunlight).

Drought Tolerant: Trees that can generally survive several weeks between deep waterings (after a three-year establishment period).

Air Pollution Tolerant: Trees generally not harmed by airborne pollutants.

Salt Tolerant: Trees generally not harmed by road and sidewalk deicers.

Heat Zones: The American Horticultural Society defines 12 regions in the continental U.S. by the average number of "heat days" (temperatures over 86°F) each zone will experience per year. The Mid-Atlantic region includes areas in Heat Zones 4, 5, 6 and 7. Zone 4, the Northernmost areas of the region, experiences 14-30' days over 86°F. The Southernmost areas of the region (Zone 7) experience 60'-90 days over 86°F.

Number of Reliant Butterflies, Moths and Skippers: High: 250'-50'0. Medium: 100-249. Low: 35-99. Very Low: Under 35.

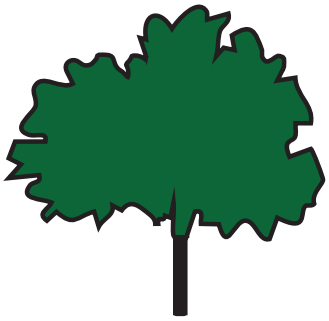
Crown Form Images:

Columnar

Cylindrical; vertical axis exceeds horizontal

Vase

Broadest at top, limbs spread upwards and outwards from trunk



Round

Rounded circular form, vertical and horizontal axis approximately equal

Pyramidal

Approaching triangular in outline, broadest at base

Oval

Elliptic to egg-shaped, broadest at base, vertical axis exceeds horizontal axis by 2 to 1 ratio

Spreading

Mature tree crown with a branch spread width of 35' or greater

References:

NC Extension Gardener Plant toolbox, https://plants.ces.ncsu.edu/

The Arbor Day Foundation, Tree Identification: https://www.arborday.org/trees/index-identification.cfm

Lady Bird Johnson Wildflower Center, Universtity of Texas at Austin, https://www.wildflower.org/

Missouri Botanical Garden, Plant Finder, https://www.missouribotanicalgarden.org/PlantFinder/plantfindersearch.aspx

City of Philadelphia Green Streets Design Manual, 2014

Doug Tallamy's Research on Lepidopteran Use of Native and Non-Native Plants

SILVER SPRING

DOWNTOWN AND ADJACENT COMMUNITIES PLAN

STREETSCAPE STANDARDS

DECEMBER 2025

Montgomery Planning

M-NCPPC
Montgomery County Planning Department
2425 Reedie Drive, Floor 14
Wheaton, MD 20902