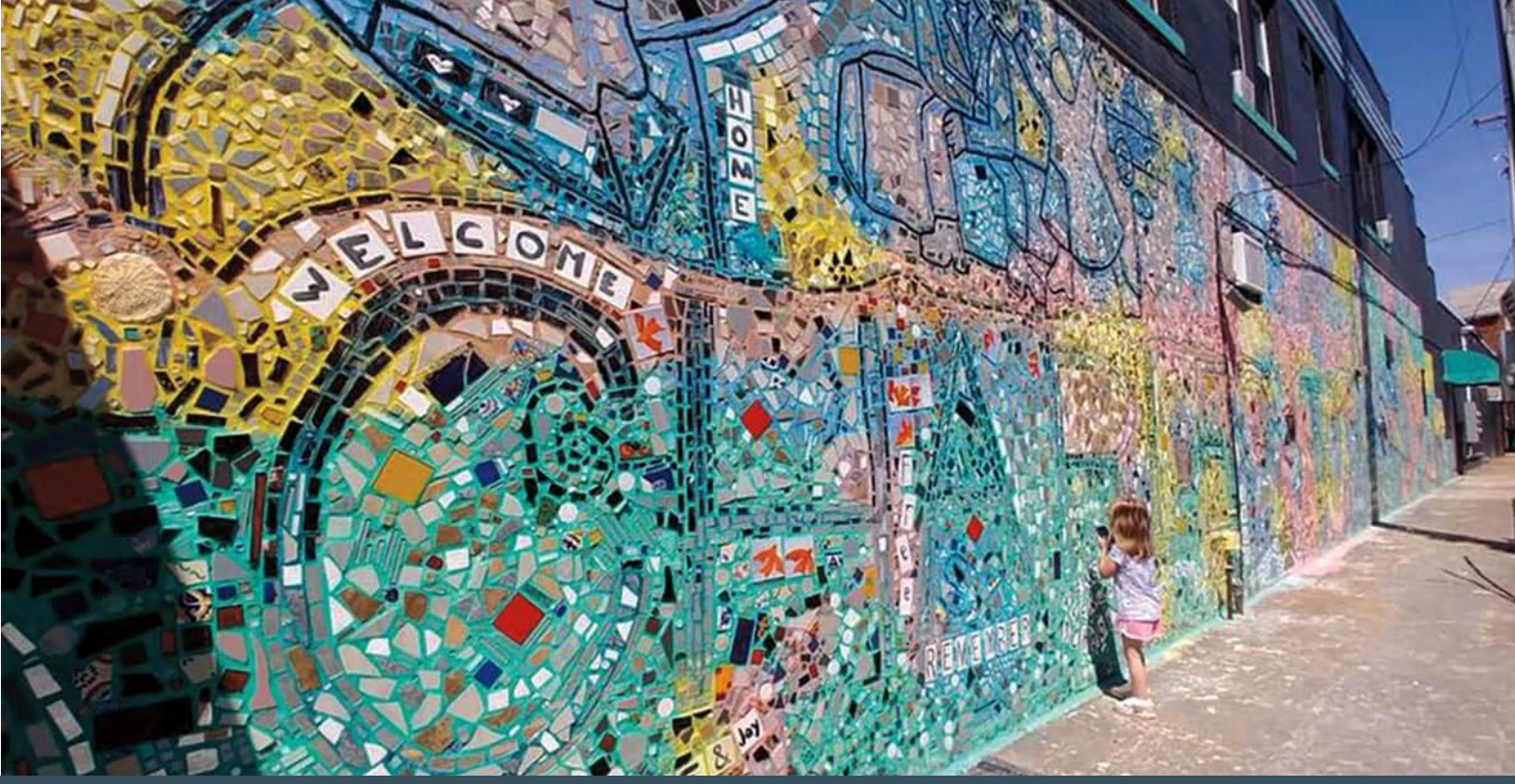


# Charles Street Clean and Green

## A Re-envisioned Green Infrastructure Concept Plan
## Charles Town Now

**Matt Pennington**

**Alexis Yost**

Downstream Strategies
Ideas that sustain.



**January 15, 2025**

**911 Greenbag Road**
**Morgantown, WV 26508**
**downstreamstrategies.com**

# Charles Street Clean and Green

Matt Pennington
Alexis Yost

## ABOUT THE AUTHORS

**Matt Pennington, CBLP, Senior Planner**

Mr. Pennington is an environmental, community, and economic development planner with extensive expertise helping local governments and organizations balance economic and population growth with the preservation of natural resources. He is a certified Chesapeake Bay Landscape Professional (CBLP) and an award-winning stormwater professional who focuses on comprehensive planning, green infrastructure design and implementation, hazard mitigation, and securing grants for community projects and programs.

Mr. Pennington has been providing technical assistance to local governments, watershed organizations and other nonprofits. He is experienced in creating targeted audience outreach campaigns to reduce nonpoint pollution reduction for 14 years. In 2018, he led the Local Engagement Initiative on behalf of the West Virginia Department of Environmental Protection and is the former chair of the U.S. Environmental Protection Agency's Chesapeake Bay Program Local Leadership Workgroup.

Mr. Pennington earned a B.S. in Urban and Regional Planning from Frostburg State University.

**Alexis Yost, Staff Planner**

Ms. Yost is a landscape designer and planner with a holistic approach to creating places that stand the test of time. With experience in the principals of conservation ecology and sustainable design, she aims to implement techniques that support science and serve communities within Appalachia and beyond. Her portfolio features a variety of projects spanning from small-scale parklets to large-scale urban and regional plans, with technical skills demonstrated that ensure each plan follows through to completion.

## ACKNOWLEDGEMENTS

This concept plan was made possible by the National Main Street Center, West Virginia Main Street, a program of the West Virginia Department of Economic Development, and the Charles Town Now.

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# 1. INTRODUCTION

Charles Town Now seeks to redevelop one block of North Charles Street, which will transform the area into a flexible, user-oriented outdoor space. The goal is to expand the downtown experience, enhance economic opportunity, provide new and inviting networks for connectivity, and preserve the cultural and environmental integrity of the area. To achieve this, Downstream Strategies and the Charles Street Design Committee have completed a conceptual planning process and report that now serves as the basis for future engineering, design, permitting, and construction implementation.

## 1.1 Vision

Imagine a street that supports day-to-day commerce and operations, then effortlessly transforms into a charming venue. Unbound from curbs, Charles Street will come to life and play host to street cafés and community events.

## 1.2 Curbless streets

During discussions with the design committee, a curbless street concept grew from its identification in the Charles Town Comprehensive Plan and additional examples nationwide, such as Trade Street in Greer, South Carolina. The curbless street functions similarly to those with traditional, vertical curbs, but it maintains a consistent slope from the road centerline to the building façade. Charles Town will benefit from the flexibility to easily transition the streetscape from a functioning "9-to-5" commerical street into a fun outdoor event space.

# 2. NORTH CHARLES STREETSCAPE CONCEPT RENDERINGS

In addition to the curbless street, the design committee identified priorities that will create an inviting atmosphere. Furthermore, Downstream Strategies conducted site evaluations, engineering plan reviews, stakeholder interviews, and community input surveys. Combined this information determined the below key themes that influenced the final conceptual design on the following pages

## 2.1 North Charles Street Key Themes:

- Parking,
- Tree shade,
- Stormwater management, and
- Waste and refuse management

**Figure 1: Charles Town Comprehensive Plan Examples**

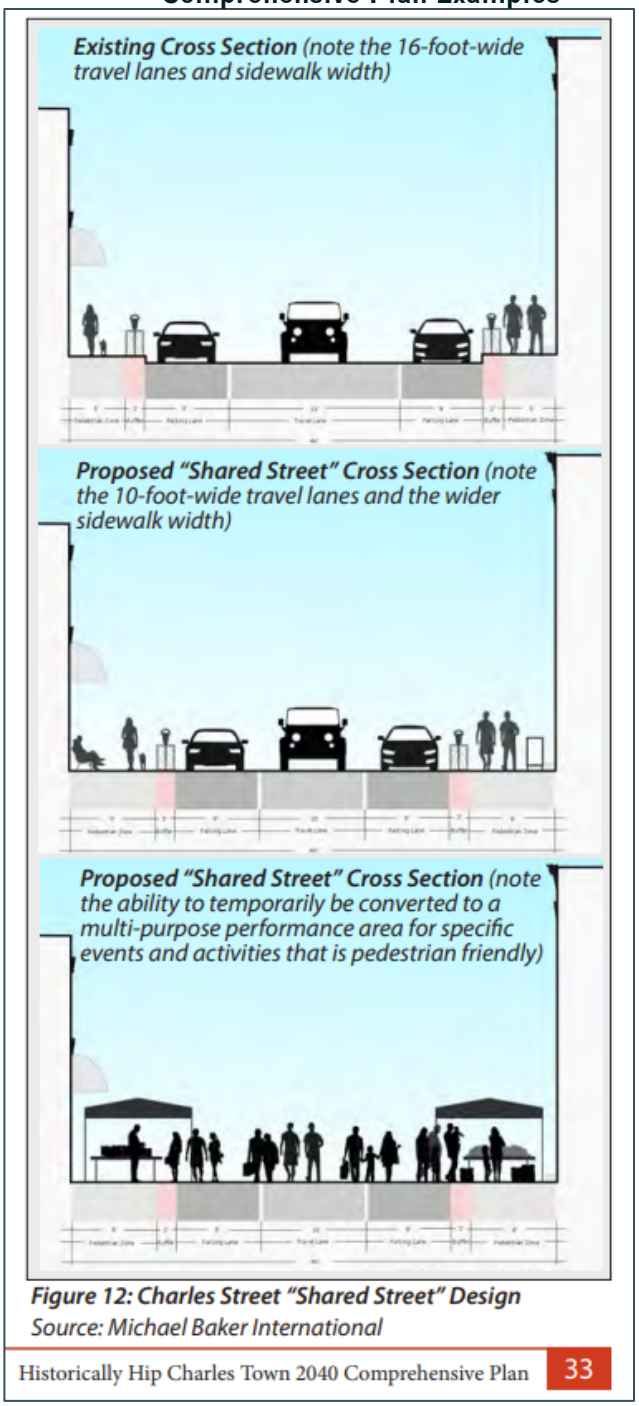



Image Source: Charles Town Comprehensive Plan, 2024

**Figure 2: North Charles Street Concept Overview**

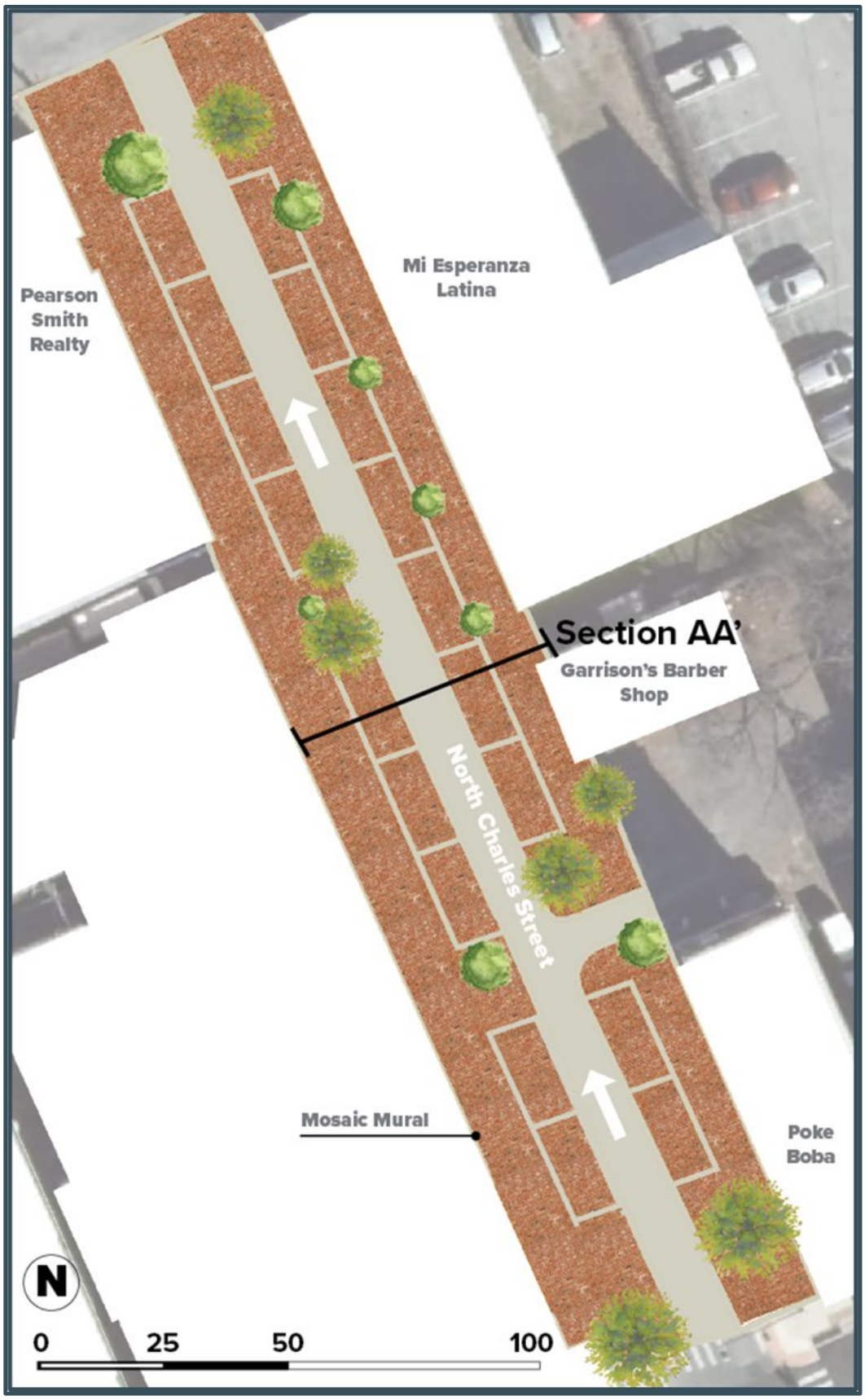


**Figure 3: North Charles Street Rendering 1 of 3**

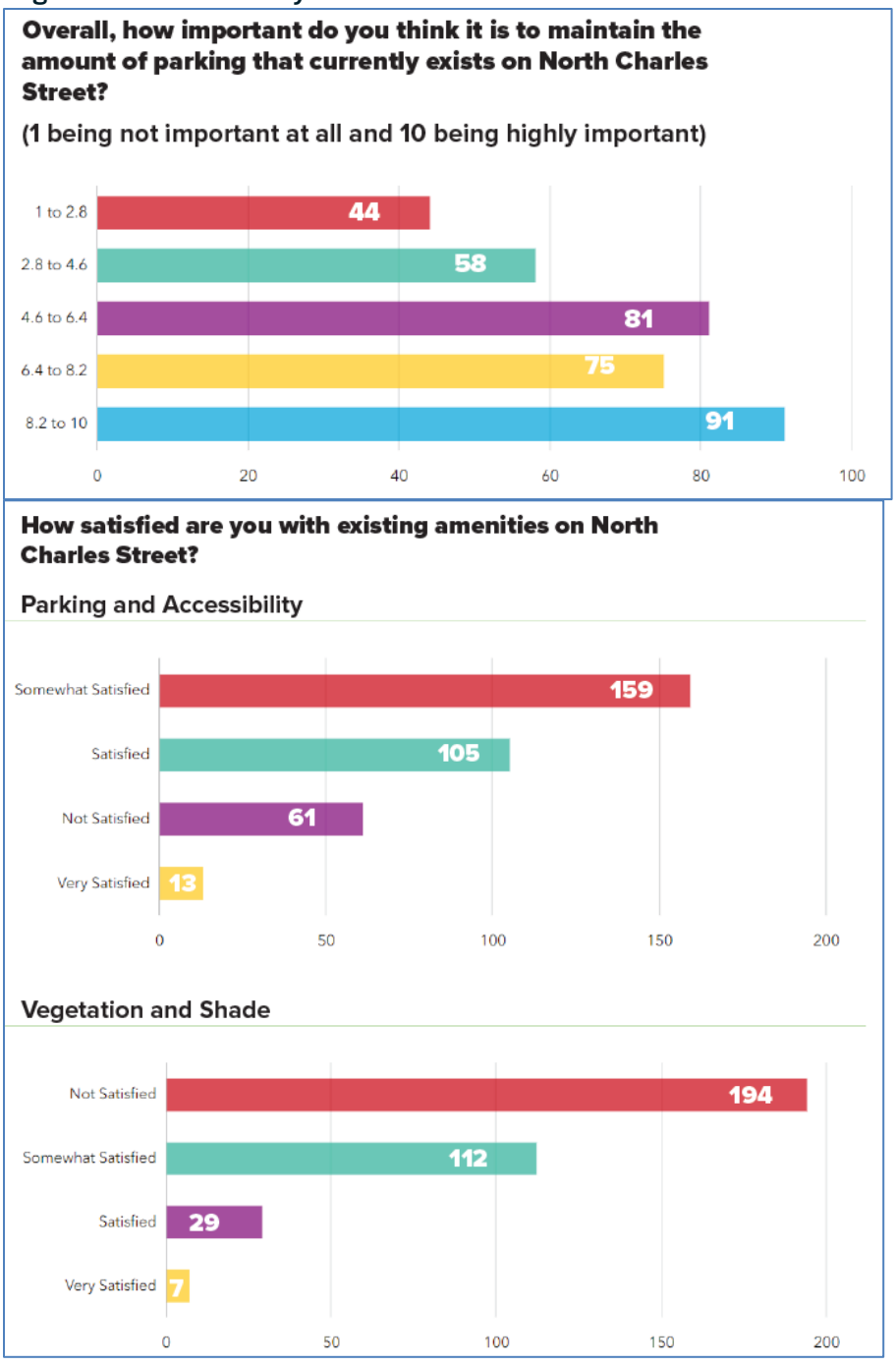
**Figure 4: North Chares Street Rendering 2 of 3**

**Figure 5: North Chares Street Rendering 3 of 3**

# 3. PARKING

The design committee and public stakeholders expressed the importance of parking. This is common across America. According to Donald Shoup— Urban Planning professor at UCLA, and author of the "High Cost of Free Parking"— "Motorists have a strong preference for convenient parking, even if it means driving around the block several times to find it" (Shoup, 2011). Parking input was further emphasized during Charles Town Now's community survey and community stakeholder sessions. Additionally, vegetation and shade resulted in prioritization and are addressed in this report.

**Figure 6: Public Survey Results**



# 4. URBAN TREES

The Charles Street design committee envisions most community events to occur during the warm seasons. Concerns over rising temperatures and heavier rainstorms created an opportunity to incorporate green infrastructure (GI) principles (U.S. Environmental Protection Agency, 2024; U.S. Department of Agriculture, 2024). GI uses vegetation and soil to address flash flooding from stormwater, as opposed to gray (traditional) infrastructure, which uses pipes and concrete. GI practices can range from planting trees to installing native perennial flower rain gardens. A tree's leaf canopy can intercept up to 15% of rainwater before it ever touches the ground to become stormwater runoff (U.S. Department of Agriculture, 2018). Trees also provide other co-benefits, such as cooler urban temperatures and improved aesthetics along city streets; trees can even influence higher customer spending habits (Wolf, 2009). The design committee prioritized incorporating larger shade trees into the streetscape design.

**Figure 7: Tree Canopy Intercept Illustration**

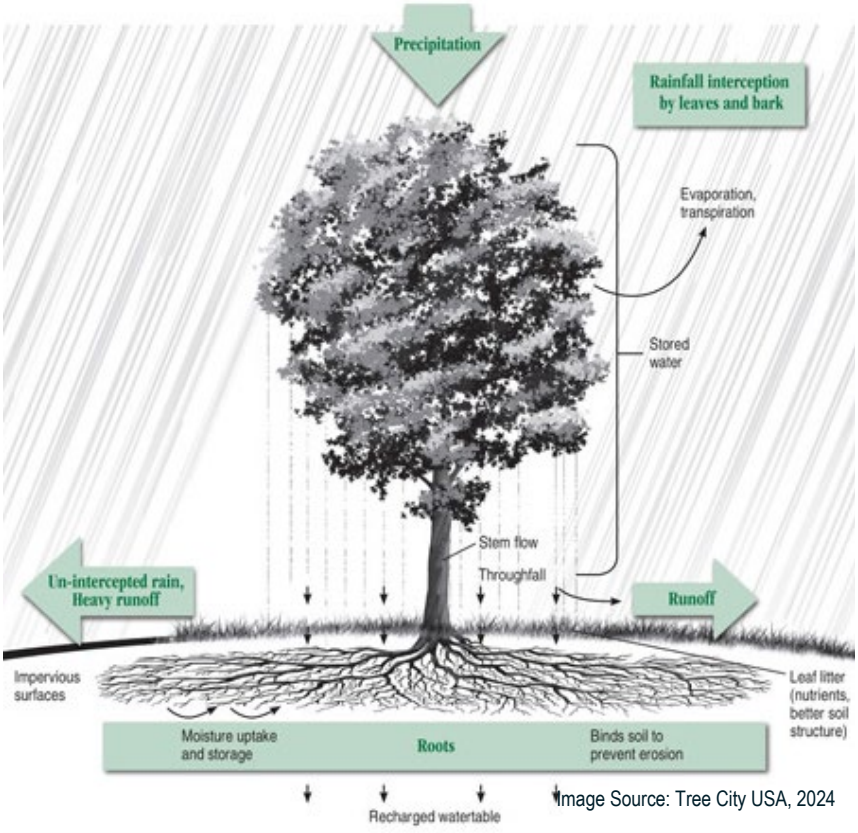



Image Source: Tree City USA, 2024

Soil compaction must be reduced in order to encourage successful growth of these trees and their root systems. Reducing compaction underground will also aid in the absorption and filtration of stormwater. While developing curbless street concepts, the City of Cumberland, Maryland unveiled a curbless street which incorporated permeable pavers and subsurface stormwater storage cells.

## 4.1 Increase tree canopy and native landscapes

The City of Charles Town is eligible to participate in programs that seek to increase tree canopies. The Cacapon Institute assists West Virginia's eastern panhandle communities with hosting tree planting events. If selected, the applicant receives all trees, materials, and professional assistance to implement a tree planting at their property. Applicants are required to conduct necessary preparations such as inviting volunteers and digging holes for trees.

CACAPON INSTITUTE
*Protecting Rivers & Watersheds Since 1985*

The Charles Town tree board could be engaged and activated to submit a proposal for street trees.

# 5. SUBSURFACE STORMWATER STORAGE AND INFILTRATION

Charles Street will feature door-to-door streetscaping that will facilitate pedestrian activity, community events, and vehicles throughout the year. In order to manage precipitation, the design committee members evaluated the co-benefits associated with incorporating GI into the curbless street. Permeable pavers allow water to flow through cracks then enter into underground chambers. Another option could be strategically located drainage inlets. Both options come in several different varieties and should be evaluated and engineered to meet proper surface-level load capacity and stormwater runoff capacity. For Charles Street, the storage system should conform to the Permeable Pavers (PP-3) design specifications found in West Virginia Department of Environmental Protection (WVDEP) Stormwater Manual.

**Figure 8: Subsurface storage options**

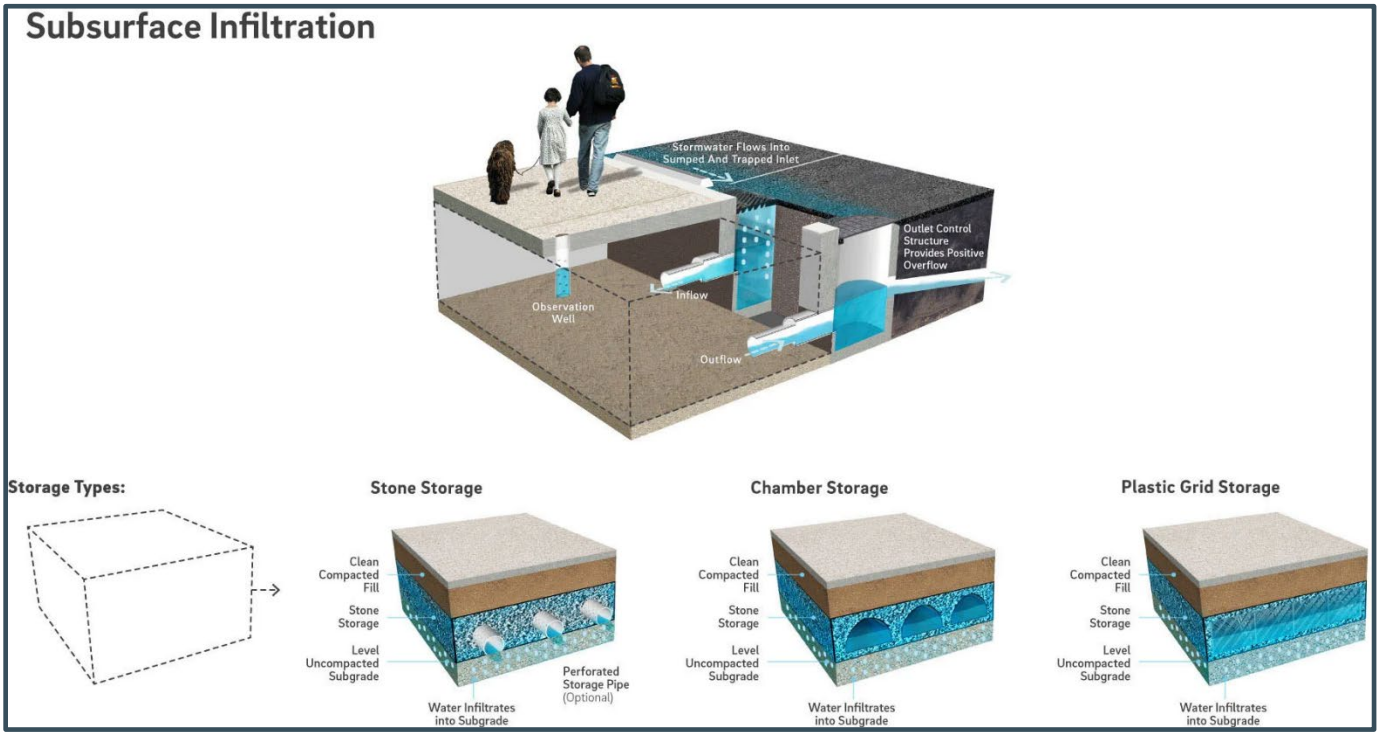



Image Source: Philadelphia Water Department, 2024

Charles Town's location in karst geology may limit infiltration. Additional testing is required to determine if infiltration is appropriate. If engineering reports do not recommend infiltration, subsurface storage underdrains can be connected to the existing stormwater system after initial treatment. Several communities in the eastern panhandle have overcome similar design limitations in Karst.

For example, the Town of Bath, West Virginia incorporated the plastic grid storage option, often referred to as Silva Cells. These milk crate–like configurations provide structural support above the surface and reduces soil compaction in the urban landscape below. This system allows larger trees and vegetation to thrive in a hardened environment and provides stormwater treatment that is more favorable for pedestrians and public gatherings.

**Figure 9: Plastic grid storage rendering**

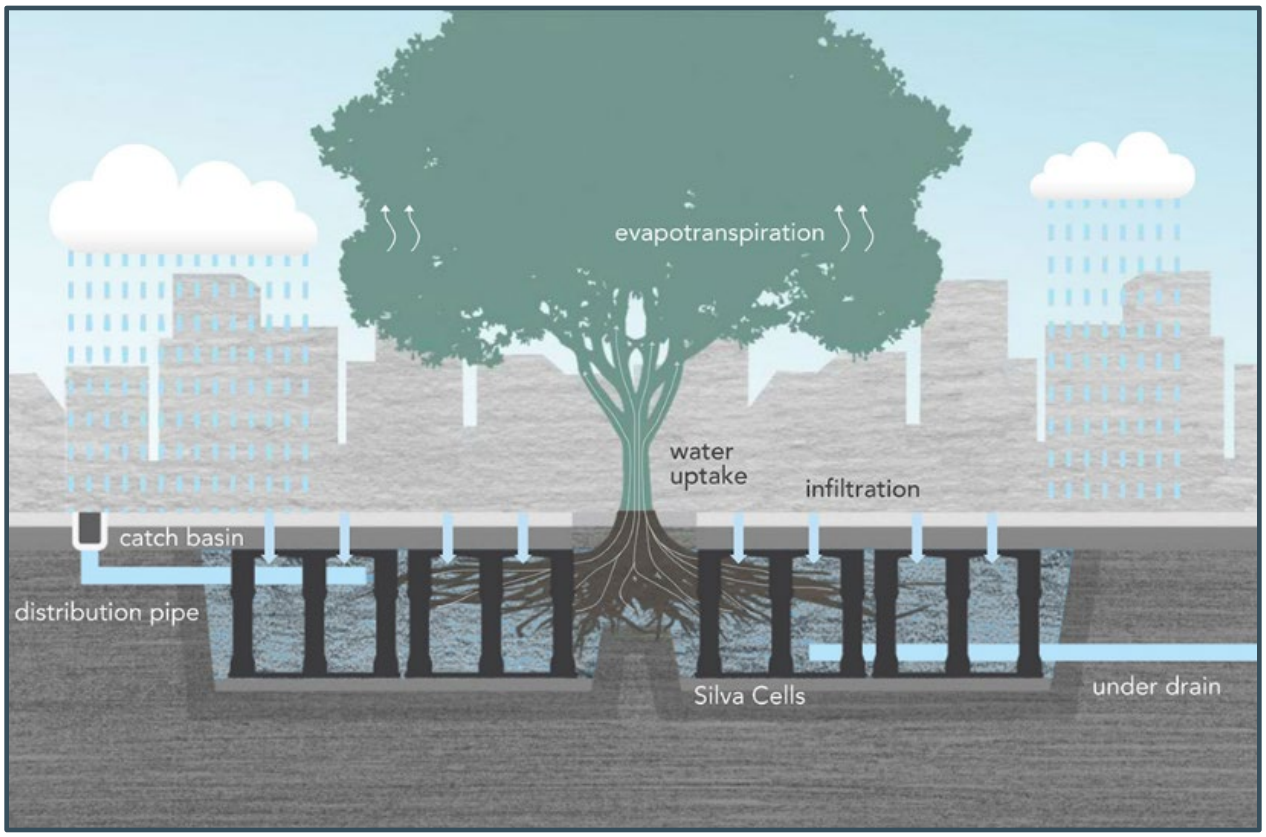



Image Source: Deeproot, 2024

# 6. CURBLESS EXTENSION BIORETENTION PLANTERS

In addition to underground storage, the concept design identified vegetated planting areas suitable for bioretention. Typically called curb extensions, these now "curbless" bioretention planters extend into the parallel parking lanes and collect stormwater runoff.

Bioretention uses enhanced soils and plants to soak up and filter runoff, thus reducing flooding risks. In addition to managing surface water, these curb extension planters improve urban aesthetics and improve pedestrian safety by reducing crossing distance (U.S. Department of Transportation, 2024). Similar to the subsurface storage best management practice —limitations for infiltration may exist for these bioretention planters. For Charles Street, these planters may install an underdrain and connect to the existing stormwater system after treatment and should conform with WVDEP Bioretention specifications (BR-7).

**Figure 10: Curb extension bioretention planter illustration**

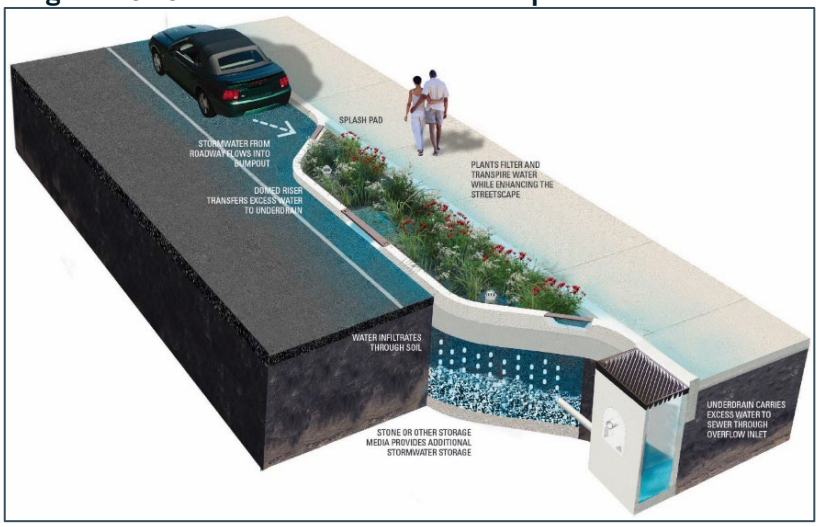



Image Source: Philadelphia Water Department, 2024

**Figure 11: WVDEP Stormwater Manual Bioretention (BR-7) Detail**

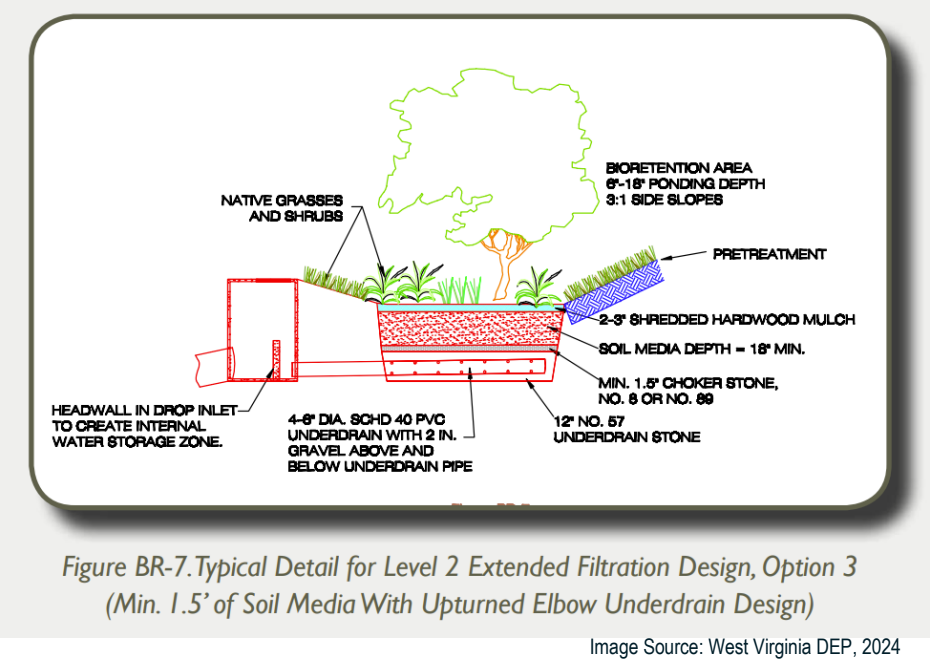



*Figure BR-7.Typical Detail for Level 2 Extended Filtration Design, Option 3 (Min. 1.5' of Soil Media With Upturned Elbow Underdrain Design)*

Image Source: West Virginia DEP, 2024

# 7. CENTRALIZED TRASH

Currently, garbage bags and cans are permitted to line the Charles Street. The City of Charles Town can work with property owners to coordinate a centralized approach to waste collection. Modular containers such as "CITIBIN" trash enclosures, pictured below, could manage streetside pickup while also serving as temporary barricades when Charles Street is closed to vehicles during community events.

**Figure 12: CITIBIN Examples**

# 8. DRAINAGE AREA

Figure 13 illustrates an overview of the Charles Street drainage area. Impervious surfaces make up over 95% of the land cover in the area. Priliminary analysis of the drainage area found that approximately 2.16 acres (94,062 square feet) flow toward the proposed treatment areas along Charles Street. However, this concept plan recommends additional analysis be conducted to determine how rooftop conveyance via gutter and downspouts will be incorporated into the sizing of GI practices.

Drainage area will influence the overall cost and benefit the City will encounter as it continues to develop the green streetscape project.

**Figure 13: Drainage area of site overview**

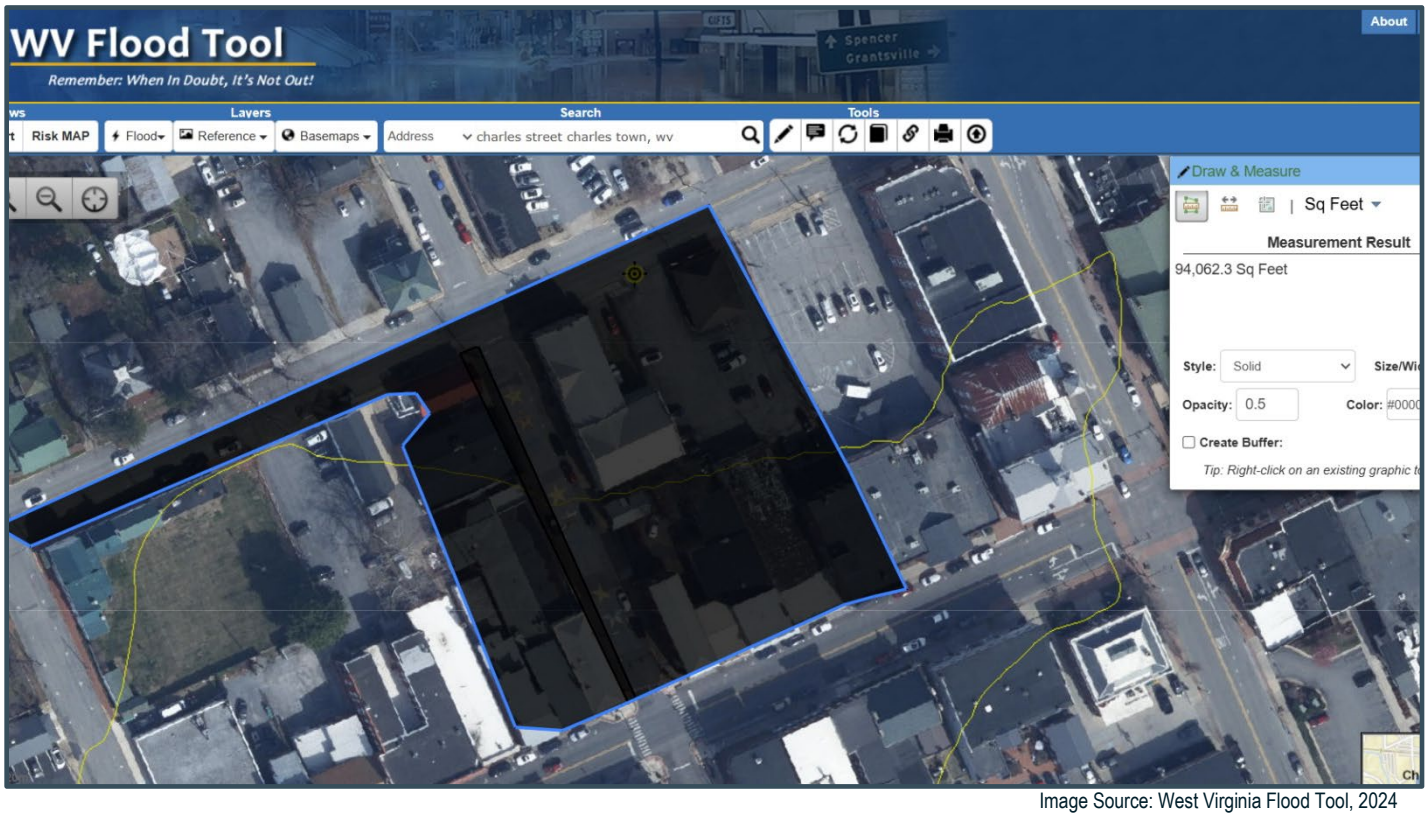



Image Source: West Virginia Flood Tool, 2024

# 9. COST ESTIMATE

Design costs will total $35,000 at $16,204 per acre treated. Current construction estimates total $61,950 at $28,680 per acre treated. This estimate does not include surface paving such as permeable pavers or other finished surfaces. These estimates will be refined during the design and engineering phase.

**Table 1: Preliminary cost estimates: North Charles Streetscape**

| Item | Cost/unit | Units | Qty. | Total |
|---|---|---|---|---|
| **Design and engineering estimates** | | | | |
| Surveying – field survey, LIDAR and orthoimagery | $125 | Hour | 24 | $3,000 |
| Engineering – hydrologic analysis | $150 | Hour | 30 | $4,500 |
| Engineering – rooftop into SWM treatment facility | $150 | Hour | 20 | $3,000 |
| Engineering – proposed grading & SWM treatment | $150 | Hour | 30 | $4,500 |
| Engineering – connection into municipal system | $150 | Hour | 20 | $3,000 |
| Engineering – plan development and permit acquisition | $150 | Hour | 50 | $7,500 |
| Landscape design | $125 | Hour | 16 | $2,000 |
| Final design | $150 | Hour | 30 | $4,500 |
| Scope and schedule meetings with client | $150 | Hour | 20 | $3,000 |
| **Subtotal design and engineering estimate** | | | | **$35,000** |
| **Conceptual construction estimates** | | | | |
| Silva Cell system (plastic grid, soil, and installation) | $15 | CF | 2,880 | $43,200 |
| Curb extension bioretention | $3,750 | EA | 5 | $18,750 |
| **Preliminary estimate** | | | | **$61,950** |

# 10. UTILITY CONFLICTS

Currently, both water and sanitary sewer are located along this block of North Charles Street. Surveys should locate the exact location of these utilities, and design considerations should be made accordingly.

Overhead utility lines are also located in the project area. In order to effectively transition the street into an event space, the City should consider a design that relocates these overhead lines underground during the construction process.

# 11. WEST VIRGINIA STORMWATER MANUAL

The green infrastructure refers to design standards found in the West Virginia Stormwater Management and Design Guidance Manual, issued by the West Virginia Department of Environmental Protection November 2012. This manual, or manuals from other similar Chesapeake Bay Watershed states, should be referenced during the design and engineering phase.

# 12. CONCLUSION AND NEXT STEPS

The next step for Charles Town is to develop grant proposals for submission to the Chesapeake Bay Trust Green Streets, Green Jobs, Green Towns (G3) program. A partner program funded by the U.S. Environmental Protection Agency, the West Virginia Department of Environmental Protection, and the Chesapeake Bay Trust, G3 supports the design and implementation of green streets, green infrastructure, and urban tree canopy projects. The application period is typically open January

through March. With the completion of this concept plan, Charles Town is well positioned to apply to G3 in the future for:

- Track 2: Engineered Designs for Green Streets/Green Infrastructure Projects (generally less than $35,000)
- Track 3: Implementation/Construction of Green Streets/Green Infrastructure Projects (generally less than $175,000)

Drainage information and cost estimates provided in sections 8 and 9 of this report will be required when submitting a grant application to the G3 program.

For more information please visit: cbtrust.org/grants/green-streets-green-jobs-green-towns

An additional funding opportunity is the National Fish and Wildlife Foundation's (NFWF's) Chesapeake Stewardship Fund. NFWF provides support to protect and restore the water quality and habitats of the Chesapeake Bay and its tributary rivers and streams. The Fund prioritizes green stormwater infrastructure and projects that reduce stormwater runoff. Once again, given Charles Town's current project status, it is recommended to apply for the Small Watershed Grants (SWGs). SWGs support design and implementation, with funding capped at $500,000.

Charles Town is encouraged to schedule a meeting with an NFWF field liaison to determine the next steps. Two liaisons with specialization in Charles Town's project are:

- Kristen Saacke Blunk, kristen@headwaters-llc.org, (814) 360-9766
- Dave Hirschman, dave@hirschmanwater.com, (434) 409-0993

For more information please visit: nfwf.org/programs/chesapeake-bay-stewardship-fund

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