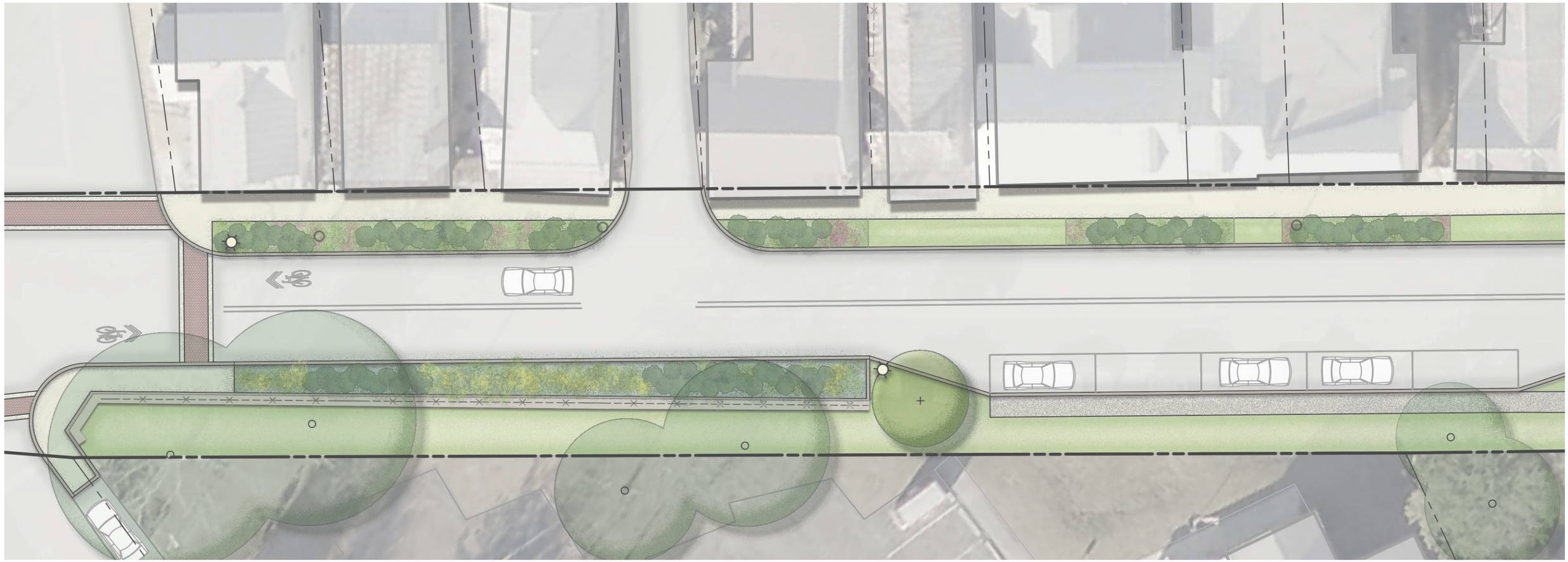
North Seton Ave
Green Street Concept Plan

Emmitsburg, MD
January 2021



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PROJECT OVERVIEW

North Seton Ave is a Nationally Designated Scenic Byway and acts as one of the main gateways into the historic village center of Emmitsburg, MD. It intersects Main St at the town square and includes a mix of commercial and residential uses.

The United States Environmental Protection Agency Region 2, Maryland Department of Natural Resources, and the Chesapeake Bay Trust has awarded the Town of Emmitsburg a Green Streets, Green Jobs, & Green Towns (G3) grant to develop a green street concept plan for North Seton Ave. The focus area of the plan is an approximately 1,500 linear foot section of North Seton Ave between Main St and Provincial Parkway.

Currently, storm water sheet flows down North Seton Avenue and goes directly into Flat Run Stream. This has resulted in stream bank erosion and frequent flooding that entraps the residents of the Northgate residential development.

In order to address these issues, this plan outlines ways to integrate green stormwater infrastructure into the streetscape that will greatly reduce the amount of stormwater runoff and pollution that is piped and discharged directly into Flat Run Stream.

North Seton Ave also acts as a main entry point into Emmitsburg and needs to ensure safe pedestrian and vehicular use, while creating a unique and distinct character that is special to Emmitsburg. The design guidelines provided in this plan will help enhance the aesthetic character, functionality, and walkability of North Seton Ave.

Finally, stream restoration techniques have been identified that will help stabilize the banks of Flat Run Stream, protect and restore the health of Flat Run Stream, and provide flood hazard mitigation.

GREEN STREET CONCEPT PLAN DESIGN GOALS

The design goals of the North Seton Ave Green Street Plan are rooted in the principles of the G3 Grant program and the recommendations put forth by the State Highway Administration for scenic byways. The G3 Grant program supports the design and implementation of green streets, which involves enhancing and increasing green spaces in communities, implementing urban green stormwater practices, and replacing impervious surfaces with permeable materials. Recommendations to enhance scenic byways include providing native plantings and landscaping, using bioretention and stormwater best management practices, and providing shared-use paths. With these principals and recommendations in mind, 3 main design goals have been identified for North Seton Ave, which are outlined below.

Design Goal 1: Incorporate green stormwater infrastructure

Green stormwater infrastructure consists of techniques that manage stormwater using systems that mimic larger natural systems through the use of vegetation, soils, and roots to slow, filter, and infiltrate stormwater. Such infrastructure helps mitigate the impacts of urbanized areas with high amounts of impervious surfaces. These impacts typically include flooding, erosion, and reduced water quality of natural water ways. This green street concept plan proposes the following green infrastructures to manage stormwater flow along North Seton Ave and improve water quality of Flat Run Stream.

Reducing Impervious Area

Reducing impervious area refers to the replacement of impervious surface with plantings or other pervious materials. Stormwater can then be taken up by plantings or infiltrate into the soil ultimately reducing the amount of stormwater that needs to be treated or managed via typical stormwater sewer infrastructure. Pervious pavements typically include a storage media such as stone beneath the permeable surface that provides the structural support of conventional pavement and also provides temporary storage of stormwater. Pervious pavements are ideal for areas of low traffic such as sidewalks or parking areas.

Images of a pervious concrete sidewalk. Courtesy of NYC Department of Transportation.

Stormwater Curb Extension

Stormwater curb extensions are planted curb "bump-outs" that serve to capture, slow, and infiltrate stormwater. Stormwater enters the bump-out through a curb opening in the planter where it can then be used by the plantings, infiltrate, or exit the planter via an under drain. See Figure 1 - Bioretention Planter Typical Section. By filtering the water through planting soil, water quality is improved. Stormwater curb extensions also serve as a traffic calming device by narrowing the street and reducing pedestrian crossing distances.

Image of a stormwater curb extension. Courtesy of Philadelphia Water Department.

Stormwater Planter

Stormwater planters are incorporated into sidewalks and collect stormwater from the adjacent sidewalk and street. Stormwater enters the planter through a curb opening where it can be taken up by plantings, infiltrate, or exit through an under drain. See Figure 1 - Bioretention Planter Typical Section. By filtering the water through planting soil, water quality is improved.

Image of a stormwater planter. Courtesy of Jersey Water Works.

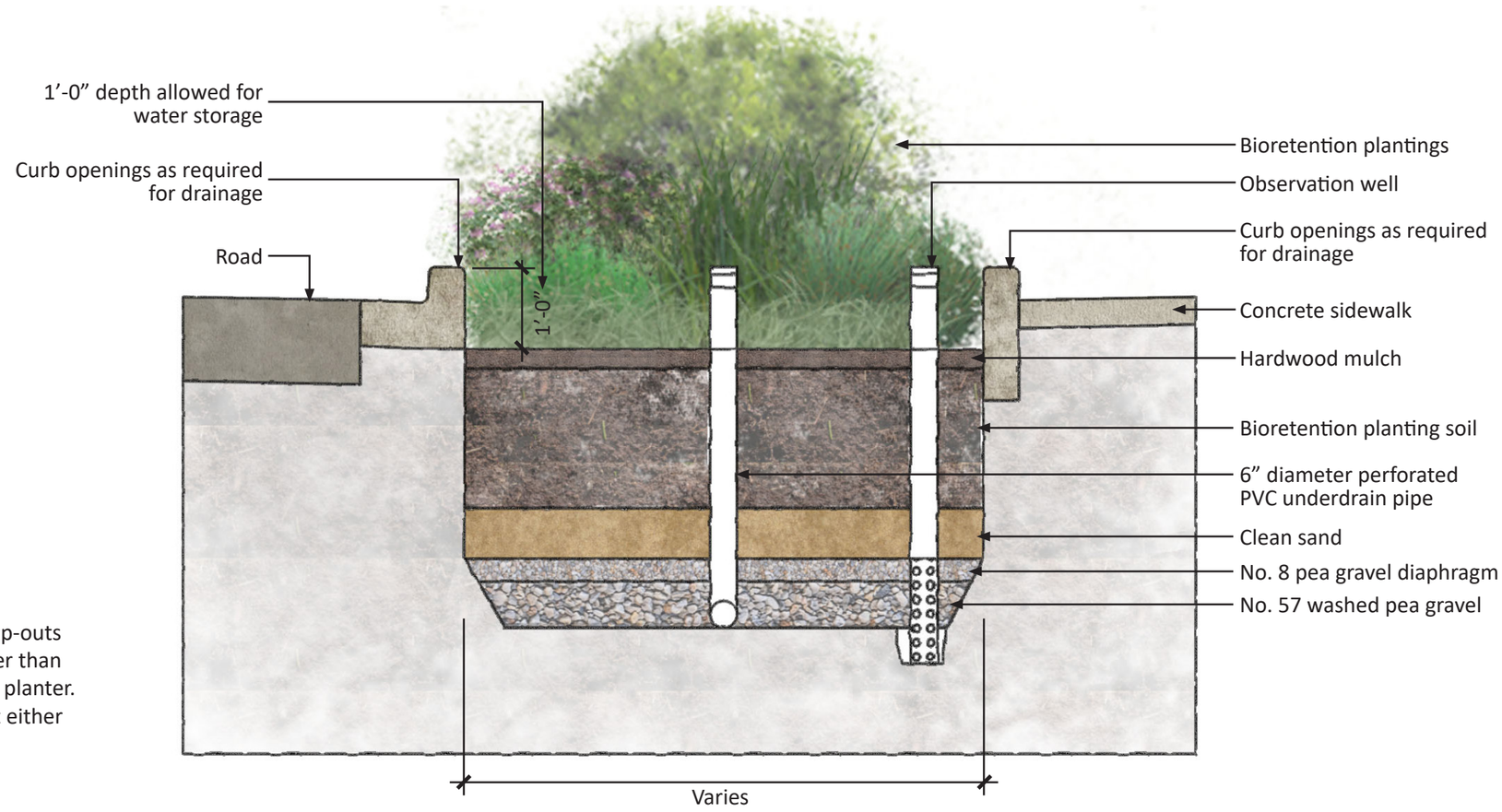


Figure 1. Bioretention Planter Typical Section.
Planters can be incorporated in the sidewalk area or as curb bump-outs that extend into the street. The top of the planting media is lower than the street’s gutter elevation so that water drains directly into the planter. This also allows for stormwater to be stored in the planter until it either infiltrates or drains back to the sewer via an underdrain.

Design Goal 2: Implement complete street design elements

The concept of complete streets is to design and utilize the entire street right of way to provide safe access for all users. Key elements of complete street design include traffic calming, pedestrian safety, bicyclist safety, and vehicular access. Placemaking is also a critical element of complete streets and serves to enhance a village or downtown by transforming streets into vibrant community spaces.

An easy starting point to achieve a complete street is to study the overall road width. Narrowing roads and providing only the minimum widths necessary for vehicular access can allow for portions of the street right-of-way to be reallocated for alternative uses, such as plantings, street parking, or sidewalks. Narrowing roads also helps calm traffic, ensuring safety for a variety of users. Providing sidewalks that are wide enough for pedestrians to feel safe and comfortable ensures the walkability of a city, and creates a public space for people to walk, gather, and interact. Including street plantings provides a buffer between sidewalks and street traffic and also serves to slow traffic, increasing safety for all users.

Crosswalks are essential for pedestrian safety and can also enhance the visual interest of a street by being marked with special materials beyond the typical striping. For example, existing crosswalks at the intersection of Main St and N Seton Ave are delineated with red pavers, defining the main downtown core of the City.

Pedestrian scale lighting, such as street lamps, that illuminates sidewalks further increase pedestrian safety and comfort. Lighting design can also define and enhance the character a streetscape. The street lamps along Main Street in Emmitsburg fit well within the historic quality of the City.

To ensure safety for bicycle traffic, shared lane markings are a useful tool to indicate a shared use of the drive lane for both motorists and bicyclists. Shared lane markings also reinforce the legitimacy of bicycle traffic on the street. Including signs stating “Bikes may use full lane” further increase the safety for bicyclists. Such markings are helpful when the road right of way does not offer enough width for a separate bike lane, while still allowing the road to be accessible and safe for all users.

Image of a bicycle shared lane markings. Courtesy of National Association of City Transportation Officials.

Image of a complete street with clearly delineated crosswalks and streetscape plantings. Courtesy of Millburn, New Jersey Complete Streets Ahead project.

Image of a crosswalks at Main St in Emmitsburg. Crosswalks are delineated with pavers, helping to slow traffic and define the main downtown intersection of the City.

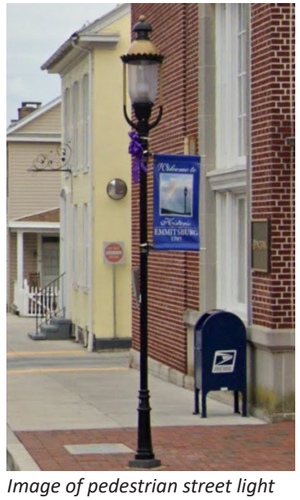


Image of pedestrian street light along Main St in Emmitsburg.

Design Goal 3: Employ a native plant palette

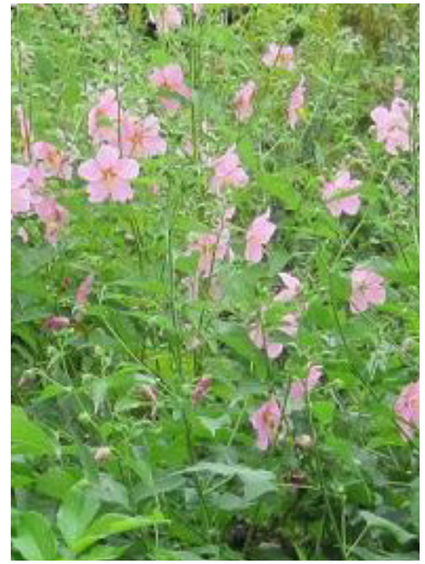
Native plantings add green space and provide ecological value by providing natural habitat. Plantings also enhance the aesthetic value of a street by providing seasonal interest, softening the hardscape, and providing separation between pedestrian and vehicular circulation.

The proposed street and stormwater plant palette includes plant species that will thrive within the street and stormwater context, while still providing visual interest. Selected plants are acclimated to streetscape conditions with high salt and pollutant tolerance. Proposed plants are able to withstand the varying wet and dry conditions typical of stormwater planters. The plant palette will also provide dense texture to slow stormwater and encourage infiltration. Seasonal interest will be created with evergreen species and grasses for winter interest, flowering shrubs and perennials with complimentary and long flowering times through the spring and summer, and plants with a variety of fall color.

See Appendix B for a full list of streetscape planting selections and images.

Platanus occidentalis (American sycamore in summer)

Clethra alnifolia
(Sweet pepperbush in summer)



Kosteletzkya virginica
(Virginia seashore mallow in summer)

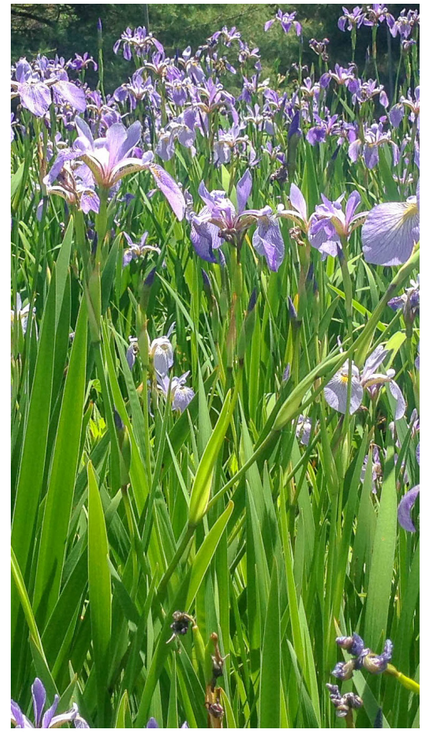
Clethra alnifolia
(Sweet pepperbush in fall)

Itea glabra 'Shamrock'
(Inkberry - evergreen)

Myrica pensylvanica
(Bayberry in winter)

Schizachyrium scoparium
(Virginia seashore mallow in winter)

Carex stricta
(Tussock sedge in spring)



Iris versicolor
(Blue flag iris in spring)

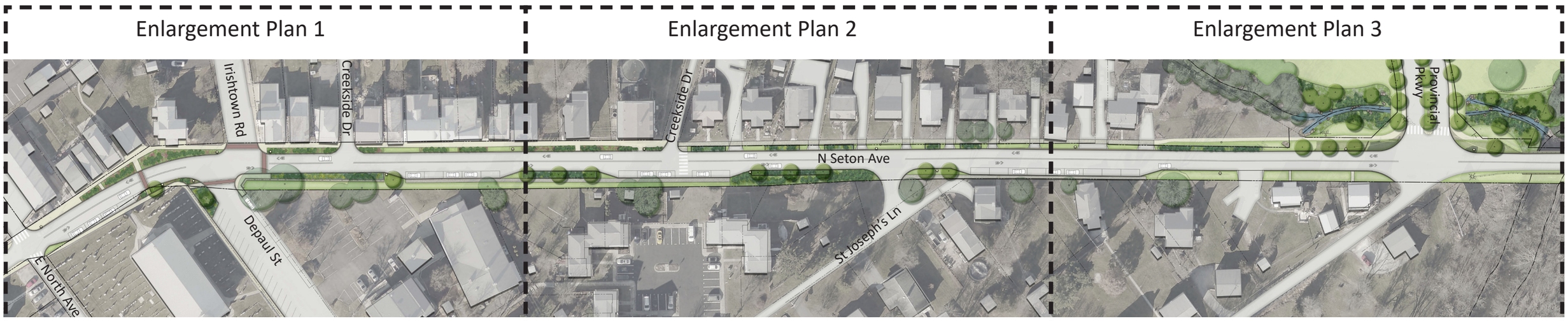
MEASURABLE IMPROVEMENTS

By focusing on the three design goals, the proposed green street concept plan effectively achieves several key measurable improvements. These improvements quantify the ways in which North Seton Ave can be improved and result in a street design that is an excellet example of a green street.

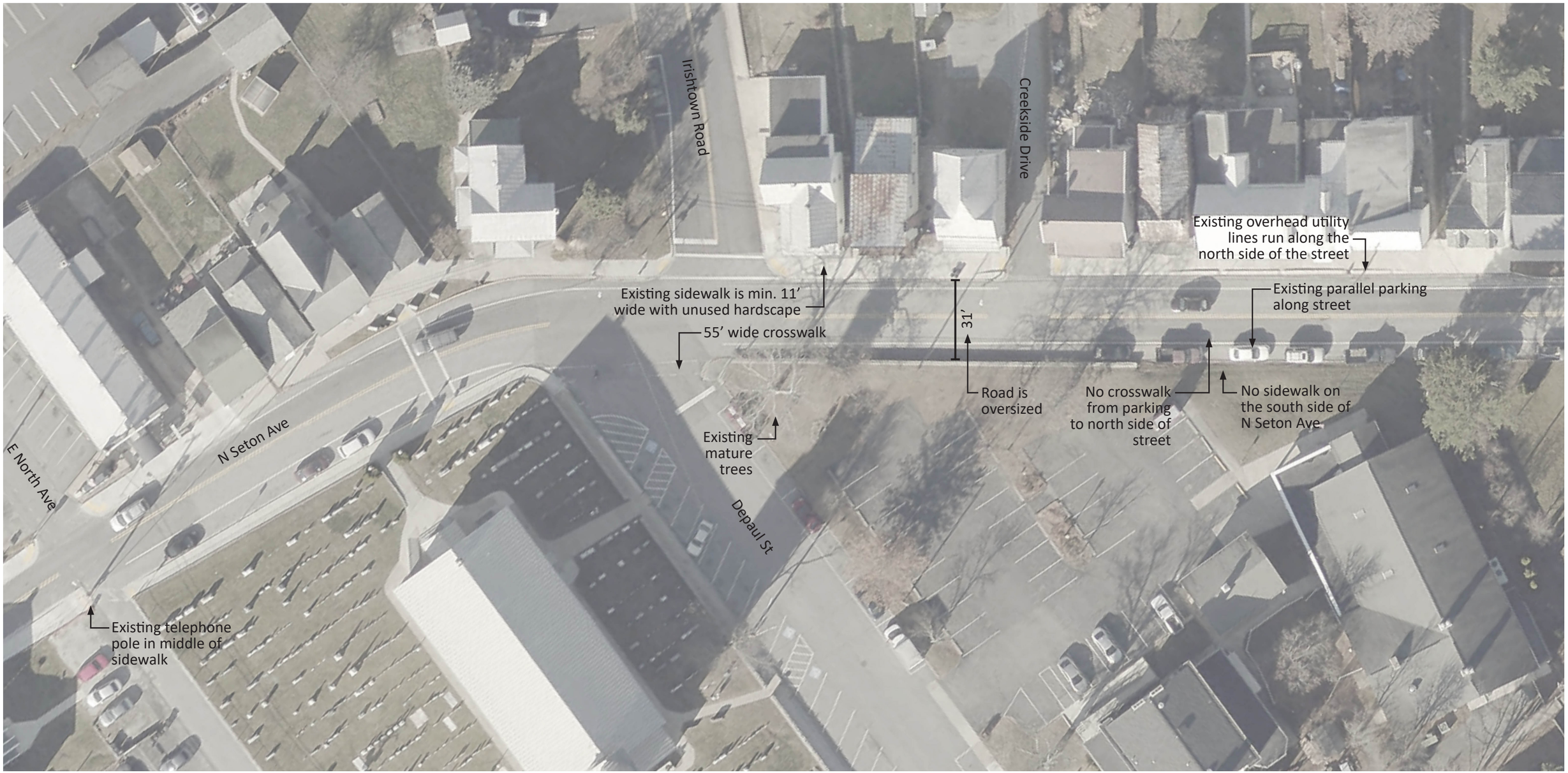
Improved stormwater management	Improved street access and safety for all users	Enhanced green space and native habitat
• 11,000 sq ft of impervious area removed and replaced with planting • 2,080 sq ft of impervious sidewalk replaced with permeable concrete • 4,040 sq ft of stormwater bioretention planter added • 9,630 cu ft of stormwater treated with green stormwater infrastructure	• 380 linear feet of permeable concrete sidewalk added • 23 existing parking spaces improved with clear parking delineation • 5 existing crosswalks enhanced with new striping or materials • 3 new crosswalks added • Bicycle safety increased with shared lane markings	• 17,000 sq ft of native planting area added • 27 street trees added

MASTER ILLUSTRATIVE SITE PLAN

The proposed green street concept plan applies the three design goals to length of North Seton Ave between E North Ave and Provincial Parkway. The following enlargement plans and typical road sections illustrate how sidewalks, parking, proposed plantings and green stormwater infrastructure are incorporated into the existing right-of-way.



Enlargement Plan 1 - Existing



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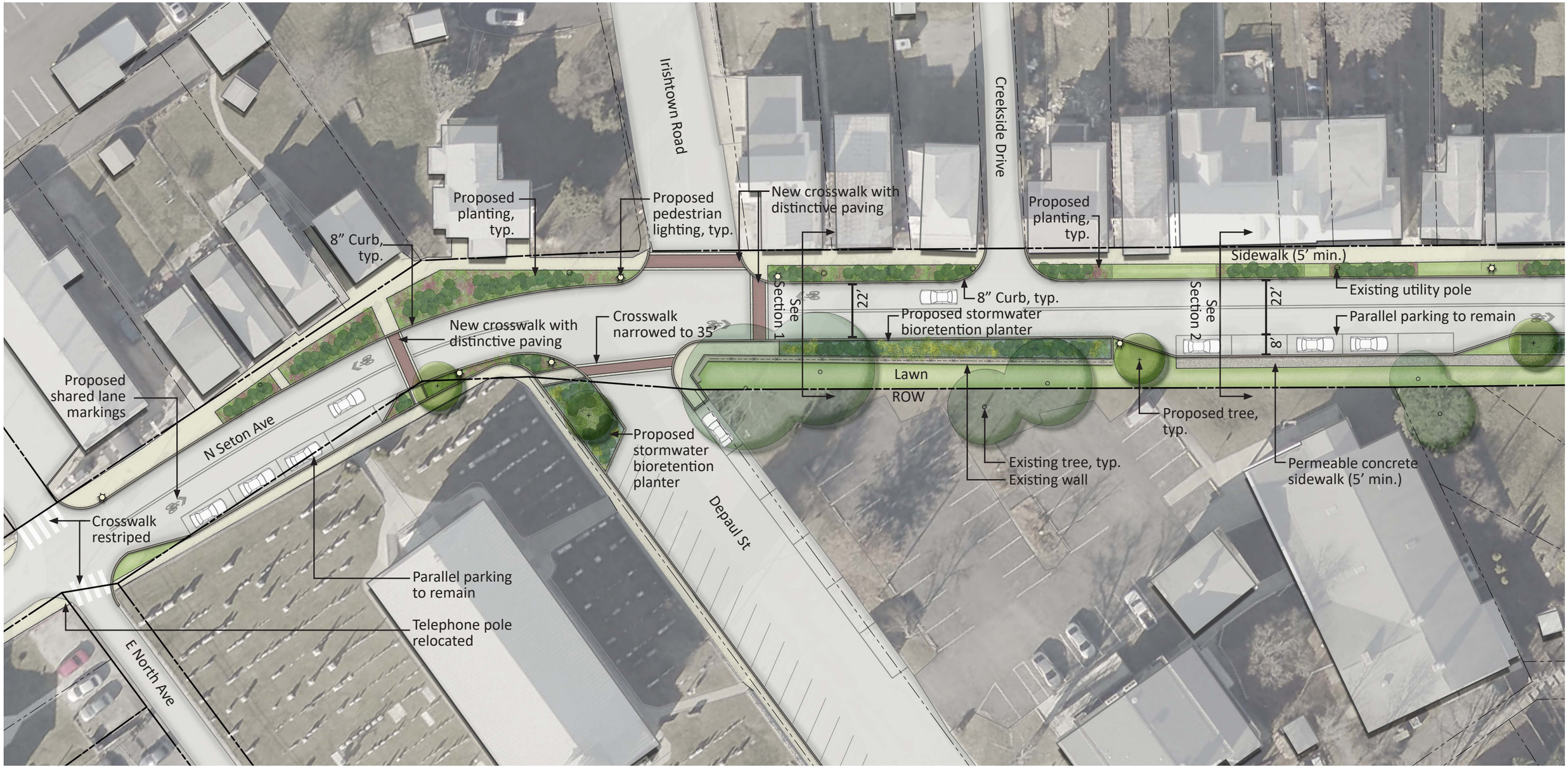
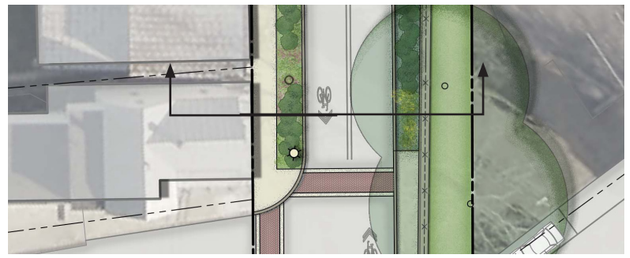
Enlargement Plan 1 - Proposed

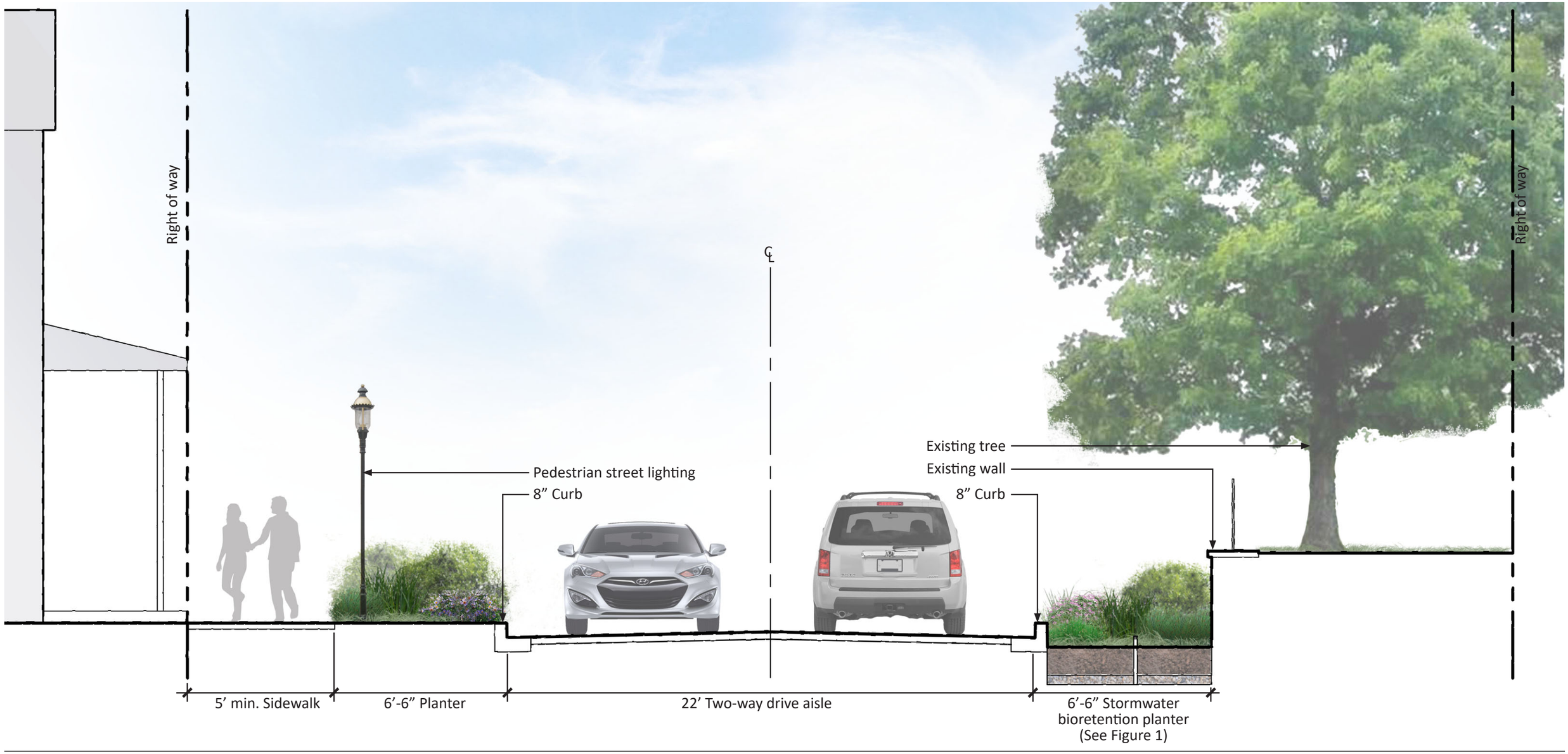


Section 1 - Existing view at Irishtown Road looking north

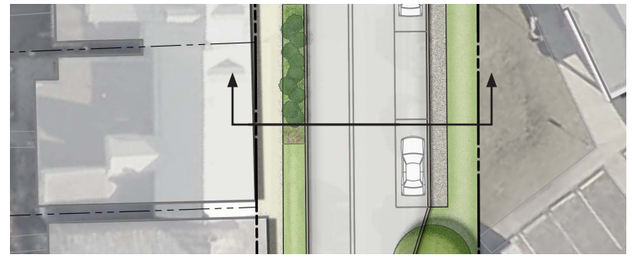


Key Plan

Section 1 - Proposed

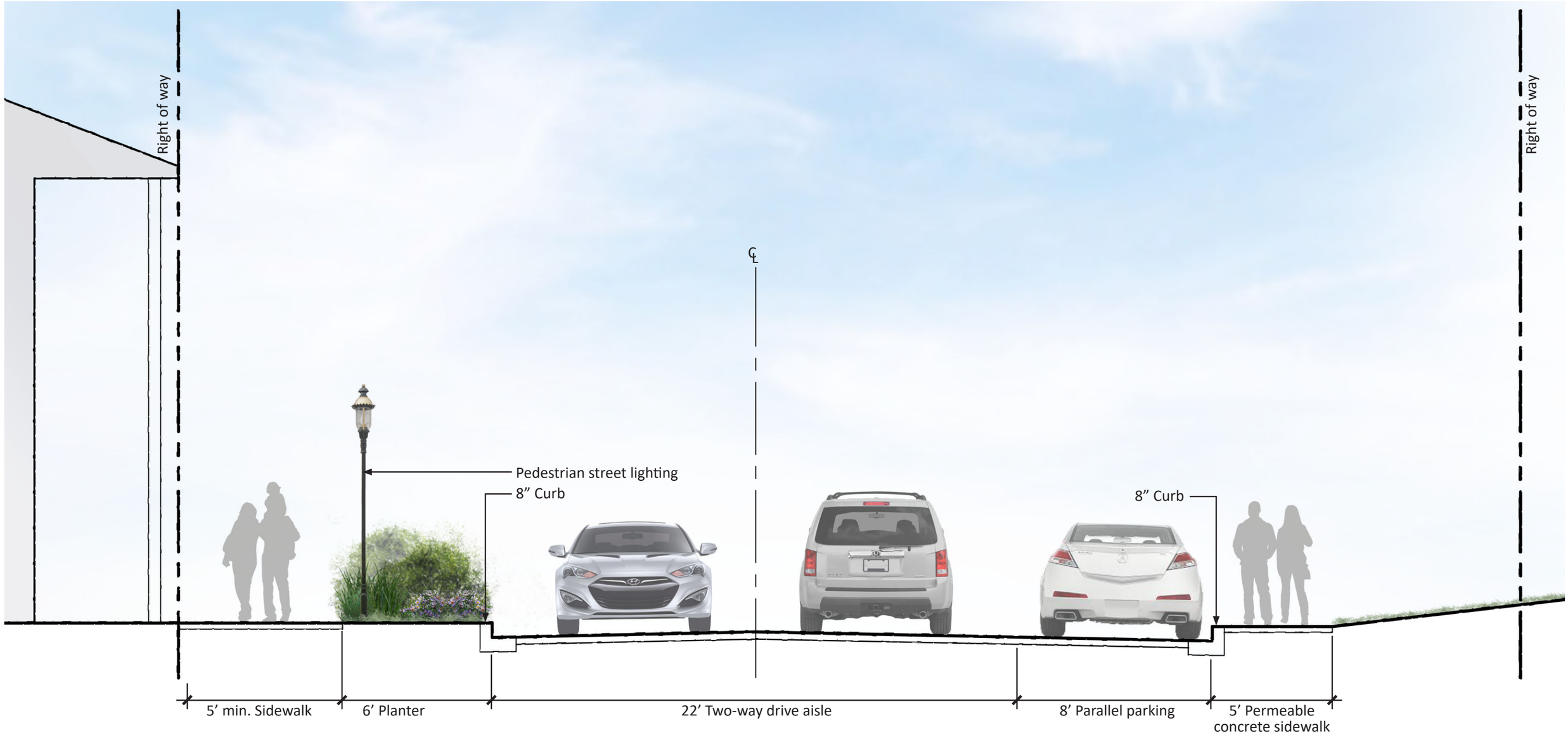


Section 2 - Existing view at Creekside Dr looking north



Key Plan

Section 2 - Proposed



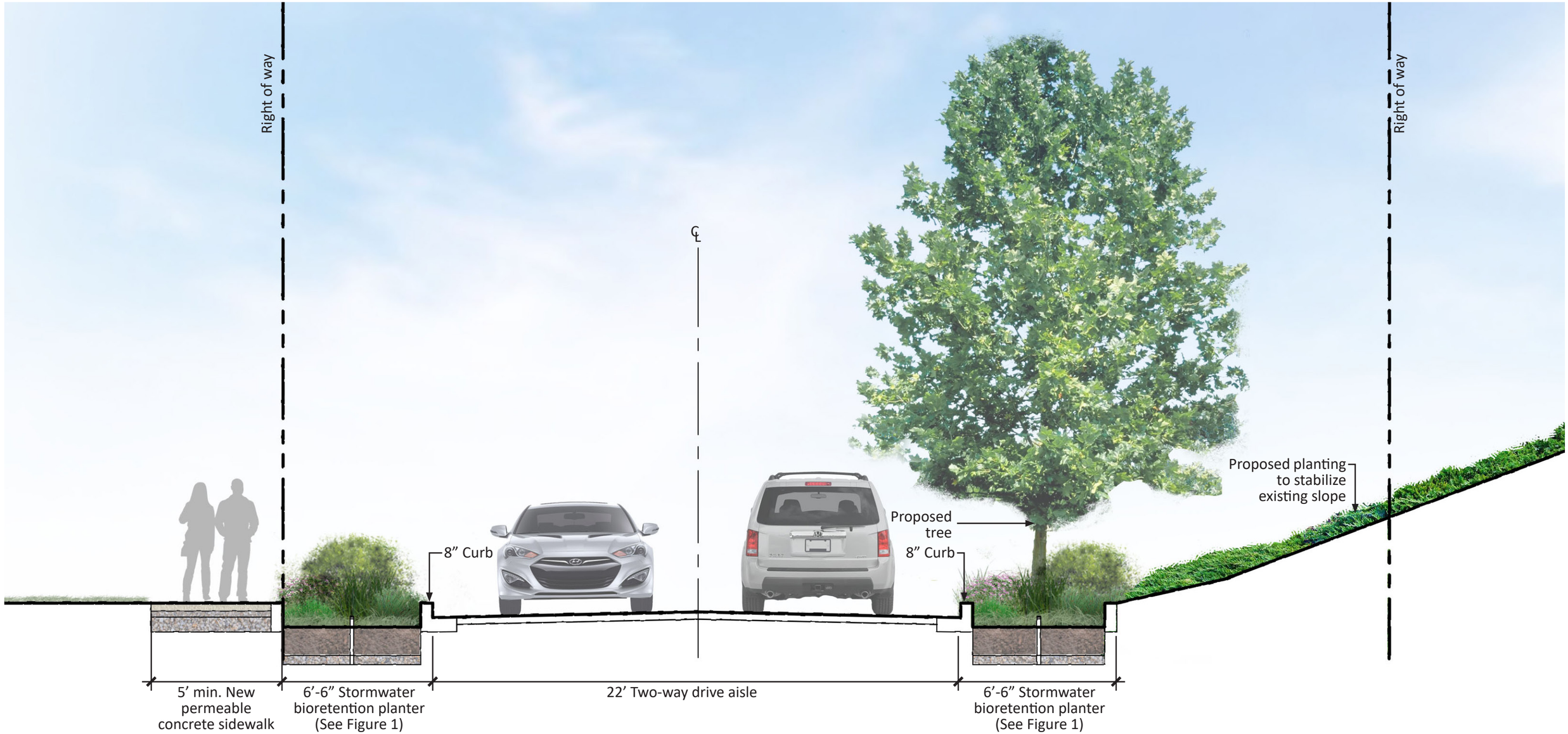
Enlargement Plan 2 - Existing

Enlargement Plan 2 - Proposed

Section 3 - Existing view looking north

Key Plan

Section 3 - Proposed



Enlargement Plan 3 - Existing

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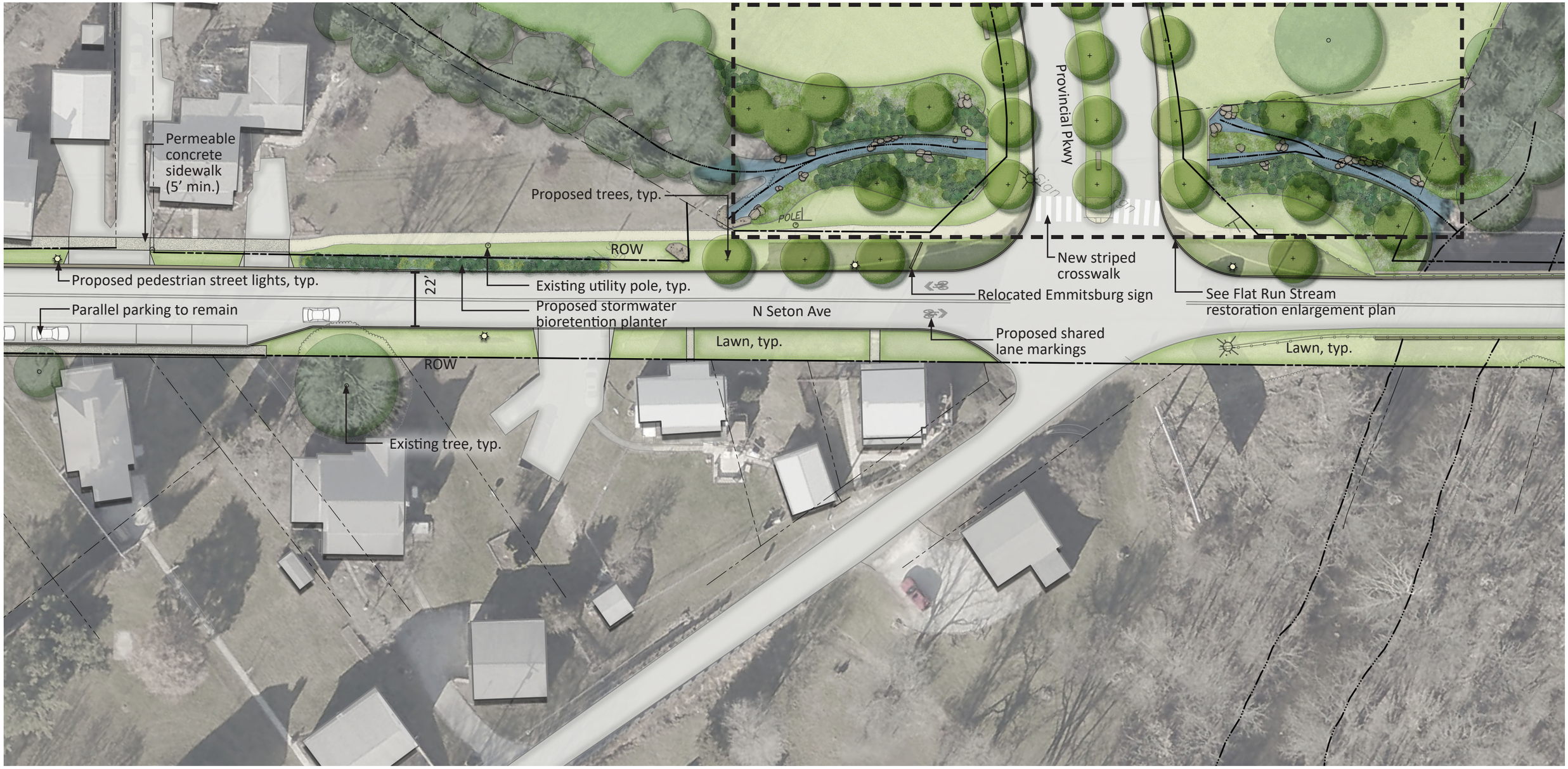
Enlargement Plan 3 - Proposed



FLAT RUN STREAM RESTORATION

Stream restoration is a practice that helps restore streams to a more natural condition so that they may provide the benefits inherent in a well balanced and functioning stream ecosystem. Stream habitats serve to filter pollutants and help improve water quality. Stream bank vegetation helps prevent flooding by slowing water flow and allowing plants to absorb water rather than sending it downstream. Revegetation also serves to stabilize stream banks and prevent erosion. Currently, the portion of Flat Run Stream that intersects Provincial Parkway has severely eroded stream banks and frequently floods. Restoring this section of Flat Run Stream will help prevent future flooding and restore the quality of Flat Run Stream.

Soil Bioengineering

Soil bioengineering is means of restoring the natural condition of a stream by using living structures to manage and mitigate erosion and flooding that may occur in natural waterways. By encouraging revegetation, stream banks are stabilized by plant roots, native plant communities are reestablished, and habitat is created. The following soil bioengineering techniques are proposed to restore the stream banks of Flat Run Stream.

Coir Logs

Coir logs are biodegradable coconut fiber rolls that protect a banks toe from water activity and erosion. Sediment is trapped in and behind the cylindrical structure helping to rebuild a stream bank. Coir logs also serve to protect new plantings until root systems are established. It can be molded to the existing curvature of a stream bank and requires minimal site disturbance.

Coir logs installed at the toe of the stream bank. Image courtesy of University of Wisconsin.

Coir logs installed at the toe of the stream bank. Image courtesy of Department of Environmental Protection Montgomery County, MD.

Live Stakes

Live stakes are live, rootable vegetative cuttings that are inserted into the ground to create a living root mat. This root structure serves to hold soil particles in place helping to stabilize stream banks. Live stakes can be planted at a greater density than typical nursery stock, allowing revegetation and soil stabilization to occur more quickly.

Live staking at installation and after 1 year of growth. Images courtesy of University of Wisconsin.

J-Hook Rock Vane

A j-hook rock vane consists of placing rock in the shape of a “J” in the stream to channel water flow away from eroding stream banks. This stream flow deflection helps prevent erosion and allows vegetation to become reestablished, restoring the stream bank and increasing the overall stability of the stream.

J Hook Rock Vane. Image courtesy of Department of Environmental Protection Montgomery County, MD.

Flat Run Stream Native Plant Palette

The proposed plant palette along Flat Run Stream includes plants that will quickly revegetate the slopes with root systems that will help hold soil in place and prevent erosion, ensuring stabilization of the stream banks. The proposed plants are species that thrive in wet conditions and are native to the area, providing ecological value and natural habitat. Seasonal interest will be created with winter fruiting shrubs and grasses for winter interest, flowering shrubs and perennials with complimentary and long flowering times through the spring and summer, and plants with a variety of fall color.

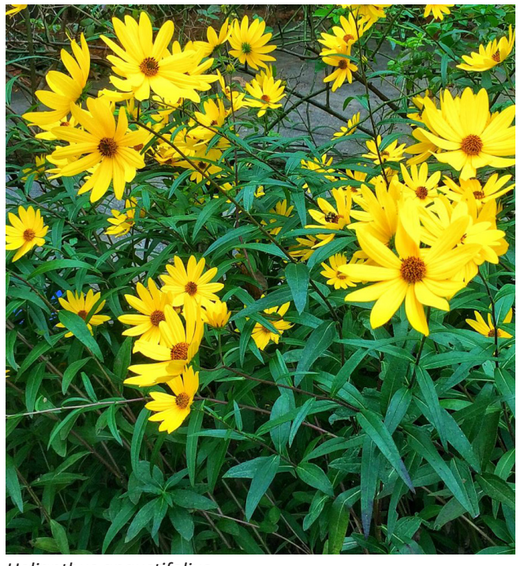
See Appendix C for a full list of stream restoration plant selections and images.

Cercis canadensis
(Redbud in spring)

Sambucus nigra
(American black elderberry in spring)

Ilex verticillata
(Winterberry in winter)

Cornus sericea
(Red-osier dogwood in fall)



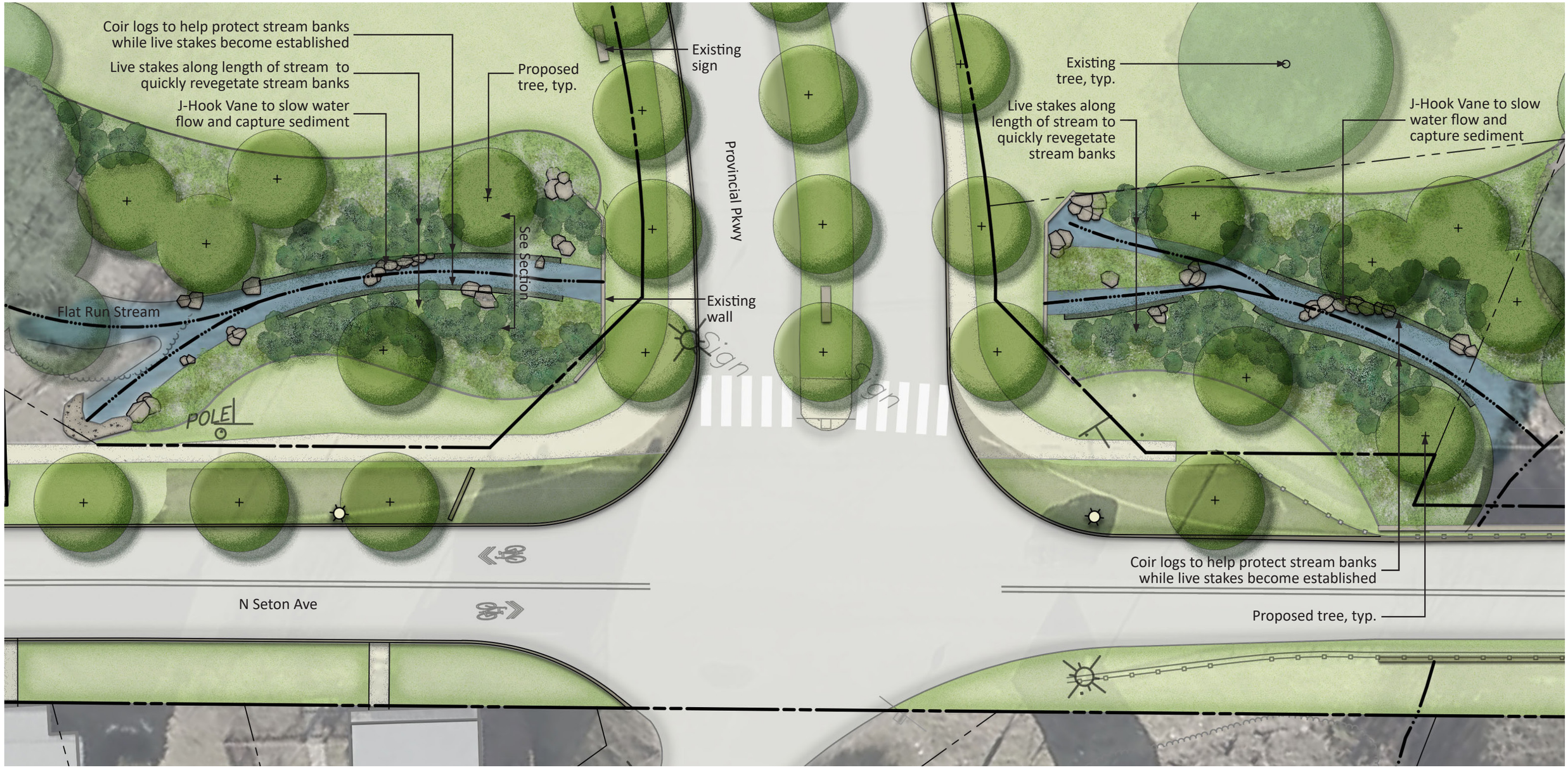
Helianthus angustifolius
(Swamp sunflower in early fall)

Carex lurida
(Shallow sedge in summer)

Itea virginica
(Virginia sweetspire in summer)

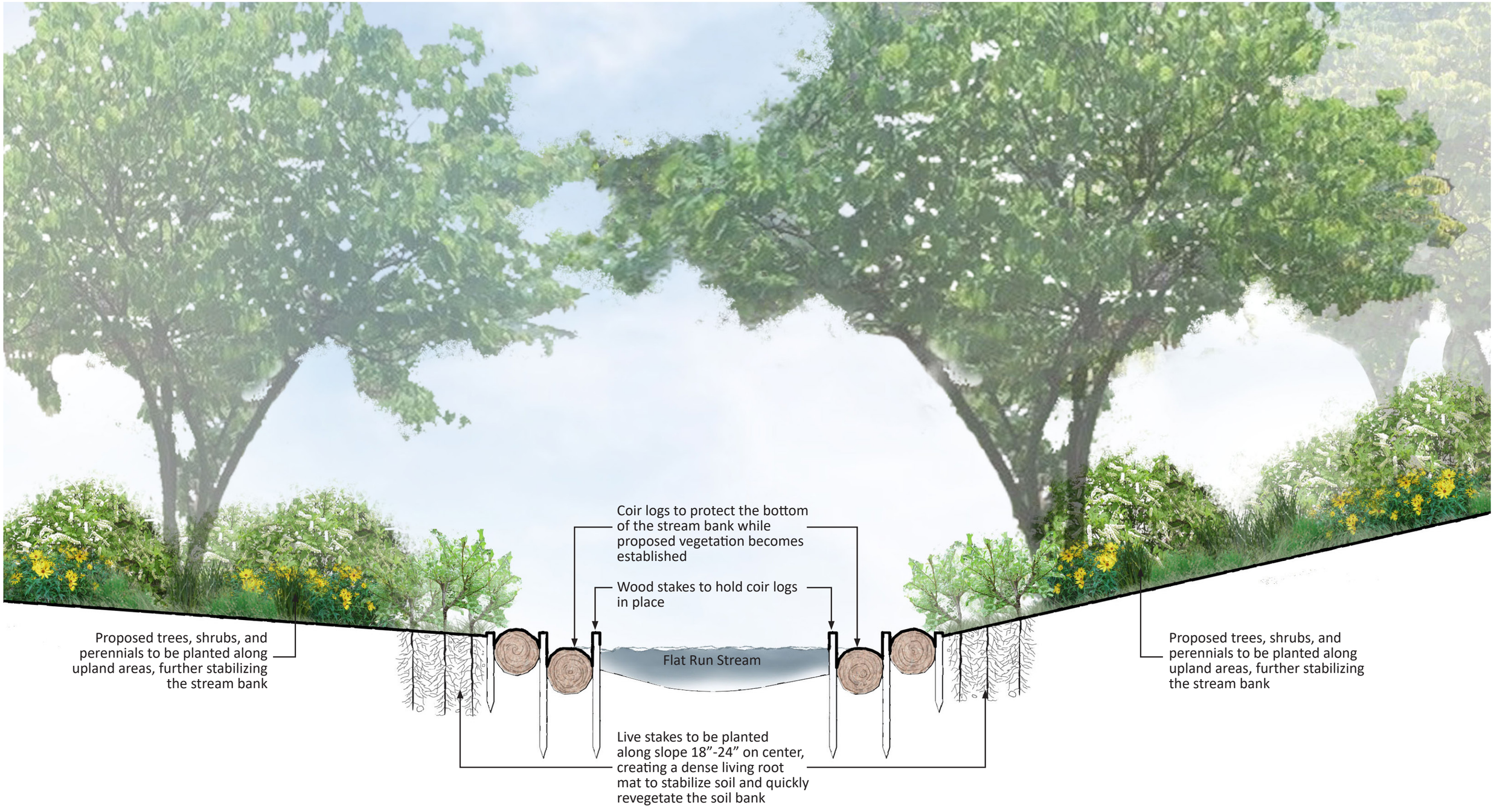
Flat Run Stream Enlargement Plan - Existing

Flat Run Stream Enlargement Plan - Proposed



Flat Run Stream - Existing

Flat Run Stream - Proposed Section



Stormwater Management Engineer's Estimate

Item	Quantity	Unit	Installed Unit Price	Subtotal
Permeable concrete sidewalk	4,610	SF	$45.00	$207,450.00
6" Header curb for SWM structures	745	LF	$50.00	$37,250.00
#8 Pea gravel	40	CY	$30.00	$1,200.00
#57 Stone	112	CY	$31.70	$3,550.40
Bio-filter plant media	300	CY	$75.00	$22,500.00
Hardwood mulch	40	CY	$25.00	$1,000.00
6: SCH 40 perforated under drain	675	LF	$12.00	$8,100.00
SWM shrubs	130	EA	$75.00	$9,750.00
			TOTAL	**$ 290,800.40**
			Cost to Treat 1" of Runoff/Acre 290,800 / 5.02ac = $57,928/ac.	