

Blacksburg Freshwater Heritage

A Conceptual Plan to Highlight History, Heritage,
and Environmental Stewardship at Owens
Street, Spout Springs, and Five Chimneys
Park

The Community Design Assistance Center (CDAC) is an outreach center of the College of Architecture and Urban Studies and Virginia Tech that assists communities, neighborhood groups and non-profit organizations in improving the natural and built environments through design, planning, and research. Through the integration of the learning and working environment, the Center will execute projects that link instruction and research and share its knowledge base with the general public.

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The CDAC design team would like to thank the excellent Town of Blacksburg staff for their assistance and guidance on the project:

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Susan Garrison	Environmental Manager/Public Works
Lee Hixon	Blacksburg Town Engineer
Terry Nicholson	Administrator for the Blacksburg Museum
Mike Rosenzweig	Blacksburg Town Council; Blacksburg Museum
Tom Sherman	Blacksburg Town Council
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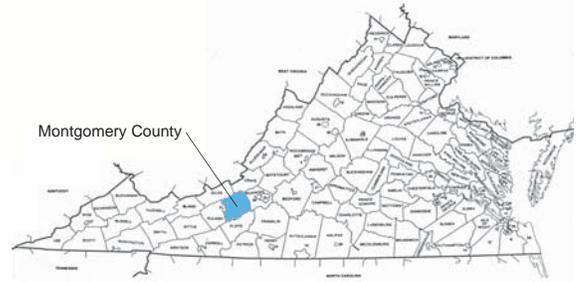
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Introduction

The Community Design Assistance Center worked with a team of project stakeholders to develop conceptual master plans for three town-owned properties: Spout Spring Park, Five Chimneys Park, and Owens Park. Each site contains fresh water and has opportunities for enhancement and education. The plans for each site highlight the history and heritage of freshwater resources in Blacksburg through design and signage, provide recommendations to improve water quality and soil stabilization through plantings, and demonstrate possible alternatives for stormwater management.

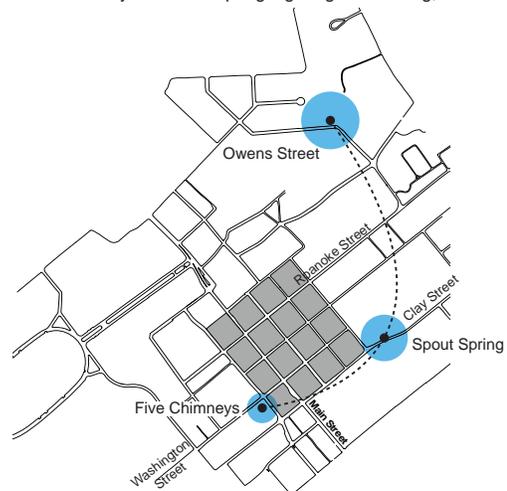
The Town of Blacksburg is located in Montgomery County in southwest Virginia. The three parks identified for this project are in or near the town's historic 16 squares, in the heart of Blacksburg. Spout Spring, located at the corner of Clay and Wharton Streets, is a pocket park with an historic spring on the edge of the property. Five Chimneys Park, located at the corner of Draper Road and Washington Street, offers one of the few opportunities to see Stroubles Creek above ground in downtown Blacksburg. Owens Park, located near the intersection of Owens Street and Harding Avenue, is a neighborhood park that serves as a temporary detention basin during storm events. The map on the following page indicates the locations of the parks within the town.



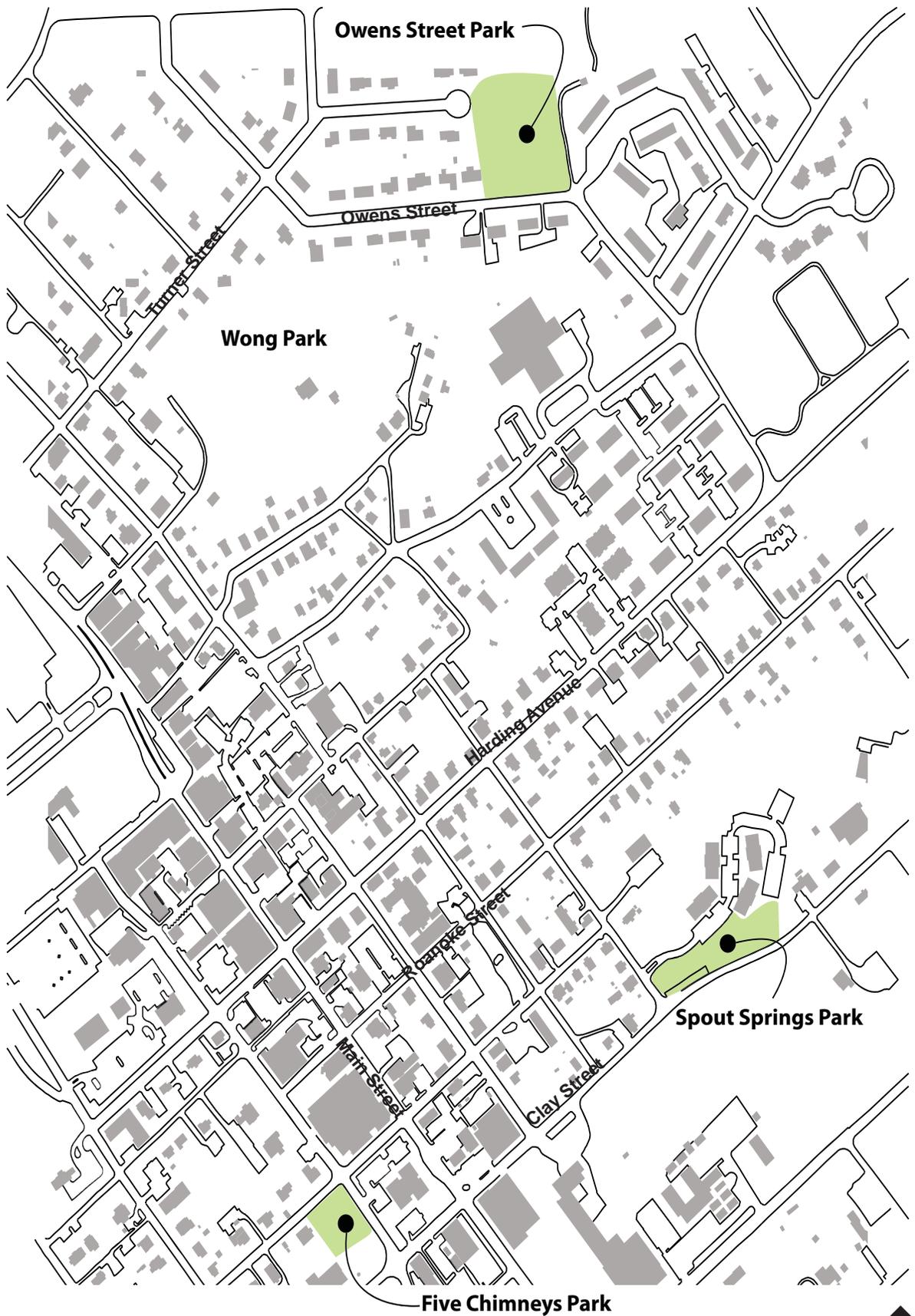
State context map highlighting Montgomery County



County context map highlighting Blacksburg, VA



Blacksburg context map highlighting the three parks



Design Process

Site Inventory and Analysis

A site inventory simply provides data about the site, so that opportunities and constraints can be identified. Inventory maps provide data needed for the next step of the design process, site analysis, long with simply documenting what exists on the site. This includes elements such as overhead wires, water features, telephone poles, etc. It provides information about the site, so that opportunities and constraints can be identified.

A variety of physical, biological, and cultural attributes can influence the suitability of a site for proposed uses. The scope of the inventory and analysis is narrowed by considering the assets and liabilities or the opportunities and constraints that the site poses for a specific program. A site analysis may be a single map that identifies significant opportunities and constraints for a proposed project. The site analysis summarizes the sites suitability for different programmed uses, so different goals for the projects can yield significantly different site analysis maps.

Design Development

Concept Plans spatially organize proposed site activities and improvements on the sites. More than one concept plan is often developed from a single site analysis. Creating two or more concept plans is particularly useful when seeking consensus from a diverse set of stakeholders. This shows clients and stakeholders that a range of potentially viable options were considered. An optimal concept plan may be created by merging two or more different concepts.

Project Design Process

Each of the three project sites went through a site inventory and analysis, which then transitions into the design development phase. In this phase two initial concepts were developed for each site. The concepts were presented to the stakeholders. Based on feedback, the concept designs were later combined into one final conceptual master plan for each site. Each final concept was accompanied by material and plant selections.

Inventory and Analysis

Analyzing each site and its context within the Stroubles Creek Watershed is an important step in planning and development. A selected subset of each site's physical, biological, and cultural attributes were then analyzed in order to adapt a development program to the unique conditions of the site.

Site Inventory: Physical Attributes

The site inventory is an essential step in understanding the character of the site and the physical, biological, and the cultural linkages between the site and the surrounding landscape. A site's physical attributes include hydrology, topography, and climate.

Site Inventory: Biological Attributes

A wide range of physical and biological attributes influence landscape biotic and abiotic processes. Landscape ecology provides a useful framework for studying these sites while making environmental planning, restoration, and management decisions.

Site Inventory: Cultural Attributes

Cultural context refers to the historical, legal, aesthetic, and other socially significant attributes associated with each site. Landscape cultural attributes can have a pronounced effect on a site's future land uses. A sense of place is strengthened by using forms and materials that are common to the region or local area.

Site Analysis: Integration and Synthesis

A site analysis is a program-driven assessment of a site's physical, biological, and cultural attributes. The site analysis identifies the opportunities and constraints for a specific land use program. The composite site analysis attempts to summarize all of the existing site and contextual conditions that could substantially influence the spatial organization for each site. Inventory of the physical site features and limitations.

The site analysis began with base maps and aerial photography provided by the Town of Blacksburg. In September 2008, the CDAC team members visited the Owens Street Park site. During this first initial visit, the team took photographs, inventoried existing vegetation, and assessed the various uses of focus areas, while conducting an overall site inventory. The findings for each of the project sites are described on the following pages.



Site analysis at Owens Street Park



Initial site photo at Spout Spring Park



Initial site photo at Five Chimneys Park

Inventory and Analysis Owens Street Park

Physical Attributes

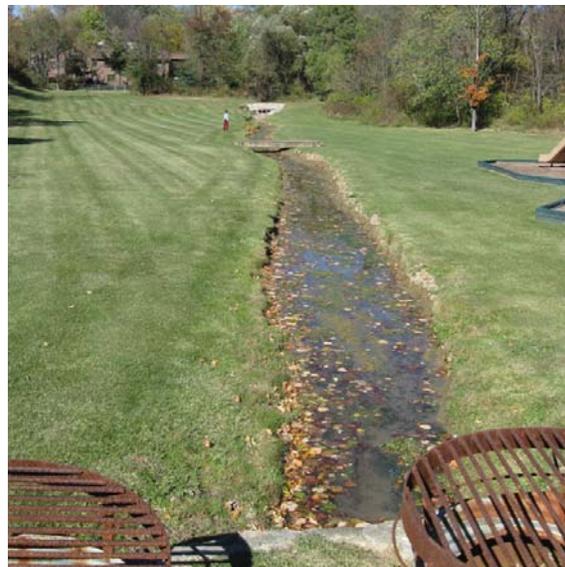
The Owens Street Park is a 1.6 acre site that is located adjacent to private residential lots and Apartment Heights housing complex. While the majority of the site exists as open space, most the property edges lie within dense brush. The grass path that runs adjacent to the park is not part of the site, but is part of a future planned connection to the central Blacksburg Greenway. The existing playground equipment in the park is sited to avoid damage during flood events (See Figure 1). The west side of the site is a steep sloping area that elevates up to College View Drive. The existing storm inlets on the site are in a state of disrepair, and show corrosive fractures along with rusting.



Owens Street Park from Owens Street (Figure 1)

Biological Attributes

Stroubles Creek runs directly up the middle of the park with one existing pedestrian bridge (See Figure 2). The park was designed to serve as a temporary flood storage area for storm events. The current maintenance of the park includes mowing to the edge of the creek, which is detrimental to the streams health. The banks along the stream show signs of vertical sheering which increases erosion throughout the site.



Owens Street Park above outlet structures (Figure 2)

Cultural Attributes

There is an implied connection that runs from the pedestrian bridge to the College View Drive cul-de-sac. This human-formed connection is apparent with an eroded path which shows muddy tracks and dying grasses due to frequent use between local area residents and park users. Two main uses for the park include recreational opportunities for children and open space for dog owners.

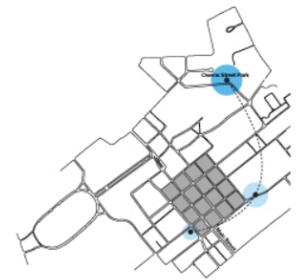
Integration and Synthesis

Due to the current human use and nature of the site, integrating design with ecological education will help improve the health of Stroubles Creek within the area watershed. This can be achieved through best management practices such as riparian buffers and demonstration areas promoting human interaction with the ecological functions of the site. It is also important to note that adjacent to this site is a proposed connection to the Central Blacksburg Greenway located on the east side of the site.

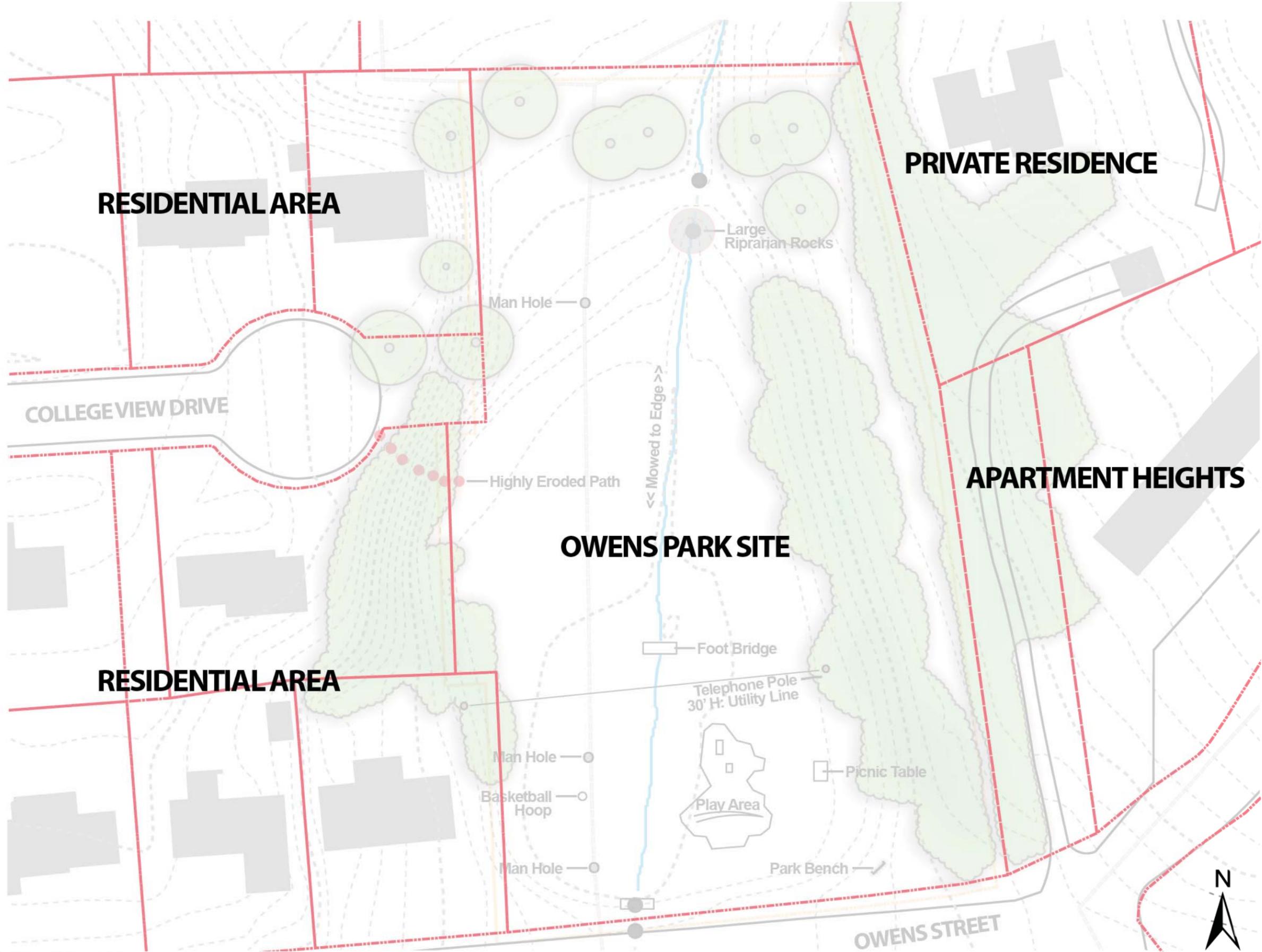


Owens Street Park from streambank (Figure 3)

The maps on the following pages indicate adjacent land uses and provide site inventor and analysis information.



Land Ownership: Owens Street Park



Legend

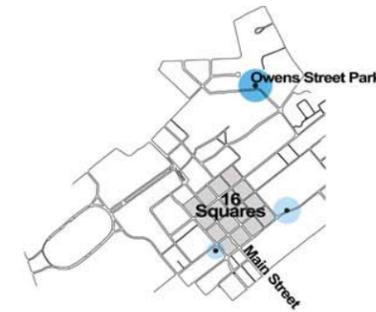
- Storm Inlets
- Buildings
- Existing Streams
- Roads
- - - Sewer Lines
- - - 2ft Contours
- - - Stormwater Pipes
- - - Property Lines

0 10 20 40 60 80 Feet
1 inch equals 50 feet

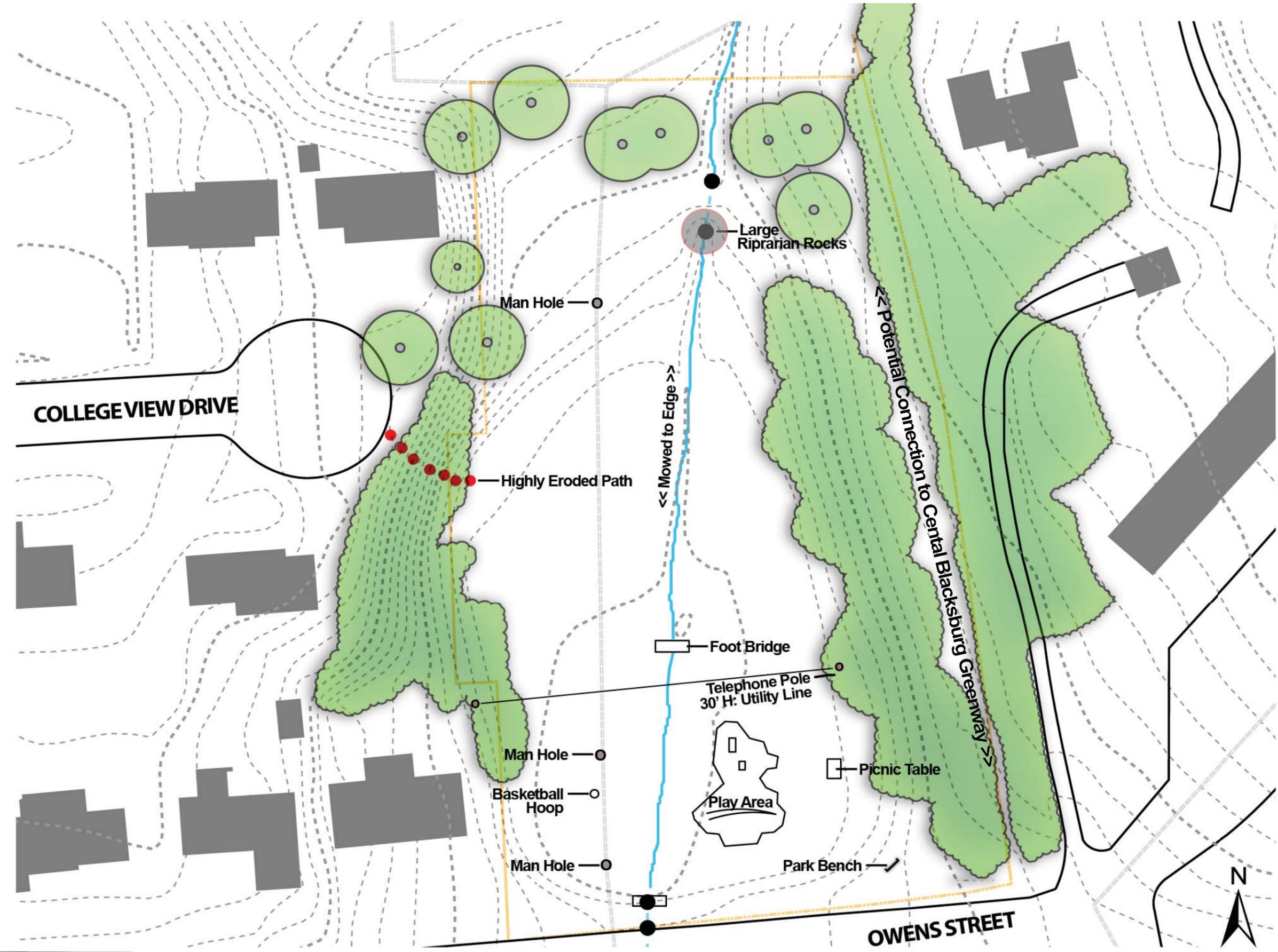


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Inventory & Analysis: Owens Street Park



Legend

- Storm Inlets
- Buildings
- Existing Streams
- Roads
- Sewer Lines
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Inventory and Analysis

Spout Springs Park

Physical Attributes

The Spout Springs Park is a 1.0 acre site that is located next to a private residential lot, First Baptist Church, the old Blacksburg Middle School property, and the Berryfield Apartment complex. The property runs along Clay Street and terminates at a resident-owned concrete wall. A gravel parking lot is located on the site and is separated from the park area by wooden bollards (see Figure 1).

Biological Attributes

The center half of the site consists of dense vegetation, where a stream flows from a spring on site. The edges of the site are open, grassed spaces with little to no programming or vegetation. This stream is piped underneath the open area of the site, parallel to the parking area. Erosion issues occur near the steep sloping boundaries of the site, next to Berryfield Apartments and along Clay Street (see Figure 2).

Cultural Attributes

The Spout Spring Park is named after one of the first springs to provide Blacksburg with drinking water. Known as Spout Spring this spring still exists on site within the confines of the dense vegetation. The lower corner of Spout Spring Park marks a corner of the Historic 16 squares, a street grid established during Blacksburg's initial development.

Integration and Synthesis

An important goal for this site is to provide an engaging atmosphere that promotes exploration. Allowing people to explore the site will yield opportunities for education about the environment and history of the site. The site could provide enhanced pedestrian connectivity as well as highlight the stream and spring. The site will also seek to address the current transition of a natural vegetated environment into an urban corner of a town.

The following are a land ownership map and the inventory and analysis map, which summarizes the above information.



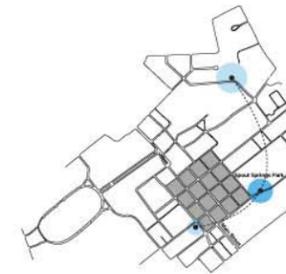
Spout Spring Park from Wharton Street (Figure 1)



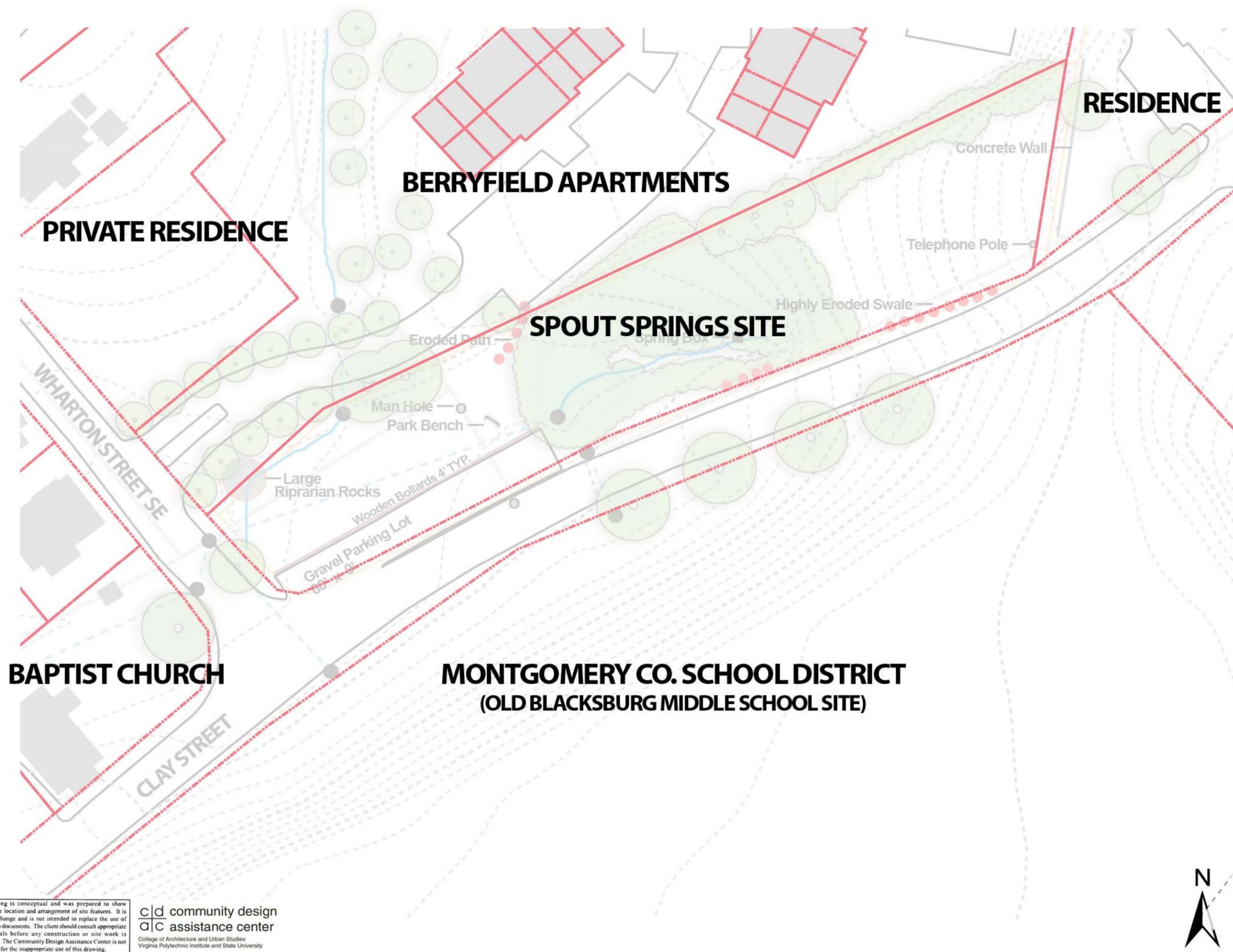
Dense vegetation along Clay Street (Figure 2)



View from the top of the site (Figure 3)



Land Ownership: Spout Springs Park



Legend

- Storm Inlets
- Buildings
- Existing Streams
- Roads
- - - Sewer Lines
- - - Stormwater Pipes
- - - 2ft Contours
- Property Line

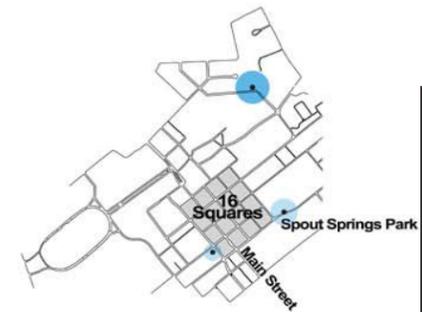


1 inch equals 50 feet

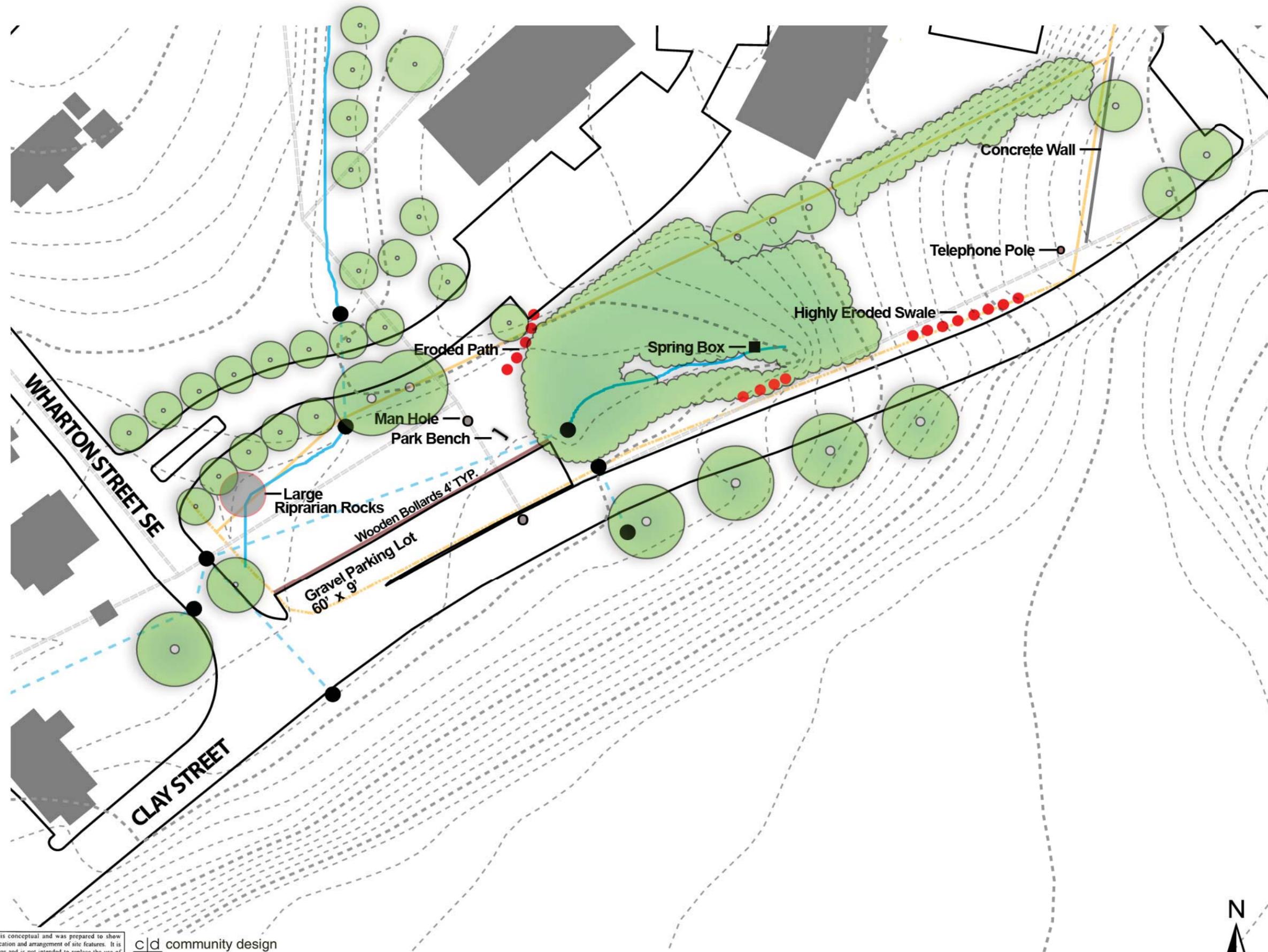


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Inventory & Analysis: Spout Springs Park



Legend

- Storm Inlets
- Buildings
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Inventory and Analysis

Five Chimneys Park

Physical Attributes

The Five Chimneys Park is a 0.5 acre site that is located next to lots and structures that were formerly residential. Five Chimneys is a town-owned structure/site. Behind Five Chimneys is a business and the Blacksburg Police Department. The property is located at the intersection of Washington Street and Draper Road. The Huckleberry Trail runs adjacent to the site. The inlet and outlet structures of the site are large and don't function to their full potential (see Figure 1).

Biological Attributes

Five Chimneys Park contains one of the few urban sections of Stroubles Creek; however this stream is in immediate need of repair. The banks of the stream are slightly vegetated, but still display a lot of vertical sheering (see Figure 2). During storm events, this stream section is subject to large volumes of water causing previous attempts to control these flows to fail.

Cultural Attributes

Located on the extreme west side of the site is a historic path known as Huckleberry Trail that provides a connection through the site and follows an old train route. As a historic destination the majority of the Five Chimneys site is decorated with ornamental plant species (see Figure 3). The edge of the site at the intersection of Draper Road and Clay Street (see following maps), marks another corner of the Sixteen Squares street grid in Blacksburg. Dr. Smith, known as an avid horticulturist, owned this property in the 1800's and gave the site its distinct outdoor rooms.

Integration and Synthesis

It is key for the Five Chimneys Park to integrate its history and culture with the ecological functions of the site. Currently, both of these functions are very segregated. Bringing design ideas together that incorporate a healthy stream and highlight a historical landmark will yield the best results for this park.



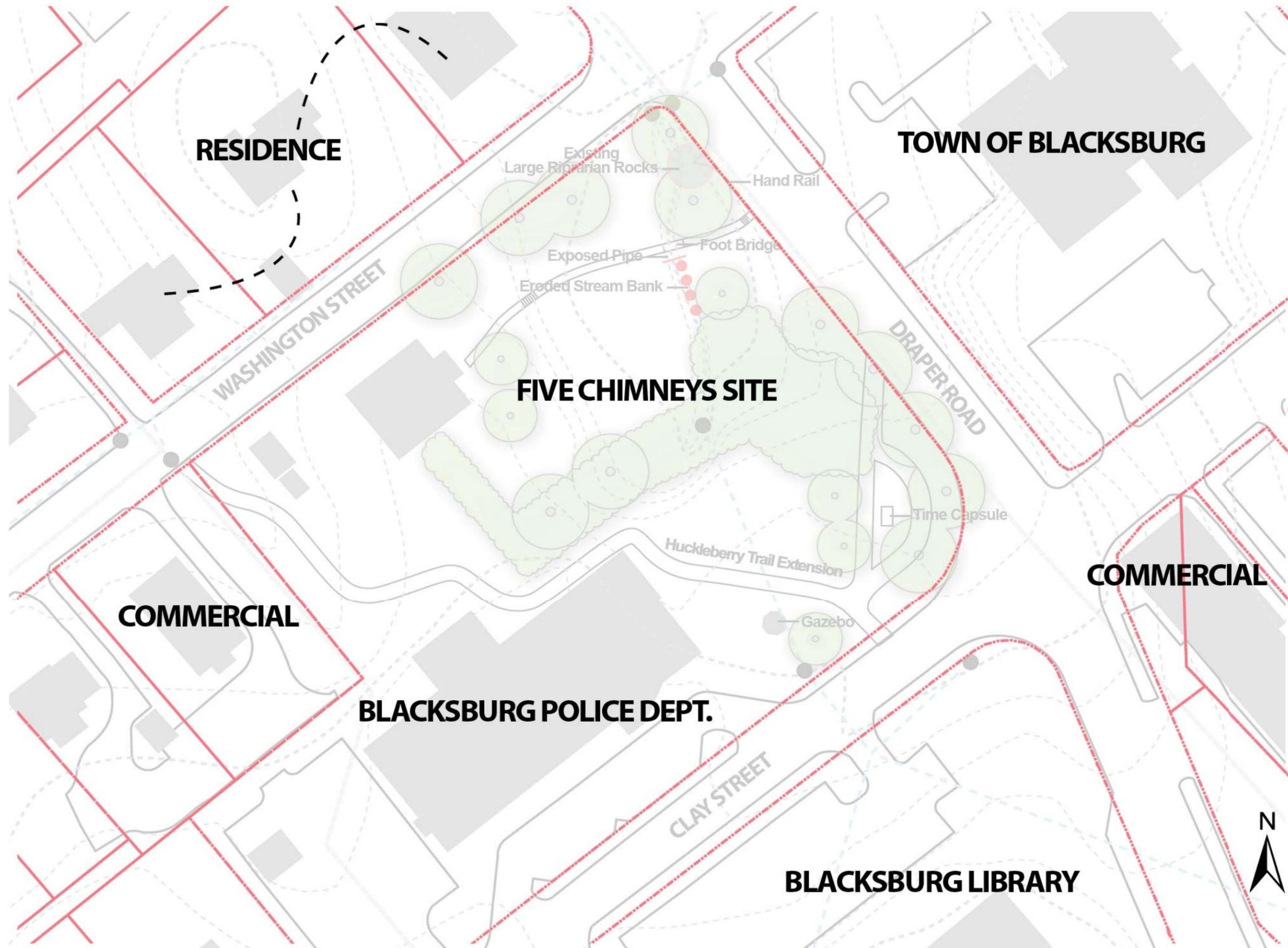
Inlet structure into the Five Chimneys site (Figure 1)



Eroded streambanks throughout the site (Figure 2)



Historic Residence and Ornamental Plantings (Figure 3)



Land Ownership: Five Chimneys Park

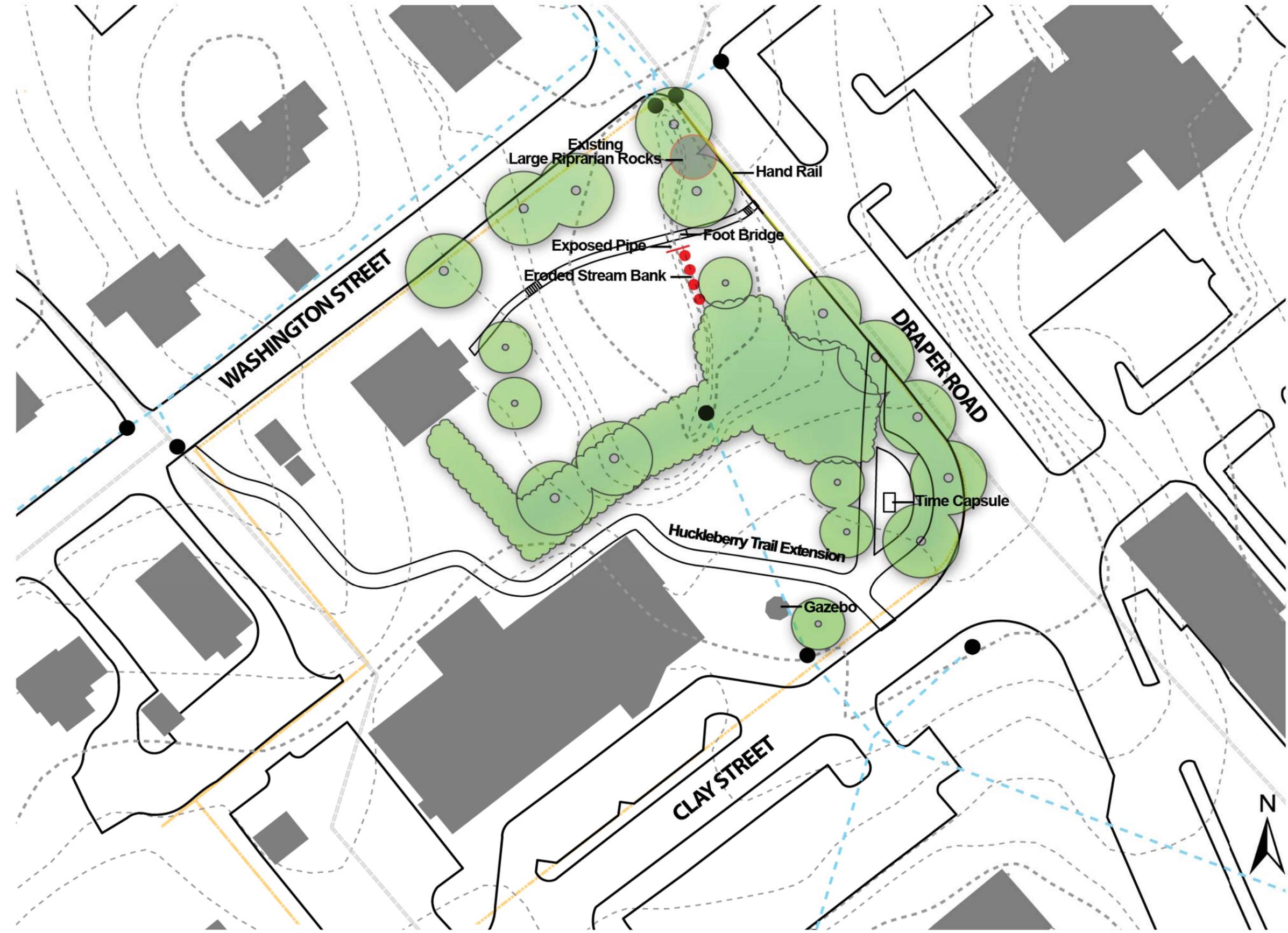
Legend

- Storm Inlets
- Buildings
- Existing Streams
- Roads
- Sewer Lines
- - - 2ft Contours
- - - Stormwater Pipes
- - - Property Line

0 10 20 40 60 80 Feet
1 inch equals 50 feet



Inventory & Analysis: Five Chimneys Park



Legend

- Storm Inlets
- Buildings
- Existing Streams
- Roads
- - - Sewer Lines
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- ▭ Property Line

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Design Development

The CDAC design team for this project was comprised of three members: Kim Steika, CDAC Project Coordinator; Josh Franklin, Landscape Architecture Student Designer; and Autumn Visconti, Landscape Architecture Student Designer.

CDAC made various site visits and one Blacksburg Stream Tour during the length of the project. The Stream Tour was led by Dr. Michael Rosenzweig, Project Stakeholder. The individual site visits began in September 2008 after meeting with stakeholders to learn about the opportunities and issues that are present, and the visions that the town had for the parks.

The CDAC design team took what they learned during the first site visit and created two design concepts for each park. One concept shows a scheme for immediate construction and the other concept implements future additions. These concepts were then presented to the stakeholders at the CDAC office on April 21, 2009. The design team took note of any needed changes that the community wanted for the designs and adjusted the plans to meet their needs.

On May 27, 2009, a final design concept was presented to stakeholders. The plans were refined to fit the needs of the community and the health of the stream. They also include an overview for plant specific massing and building materials.

Each site is presented in the pages that follow. Each design contains an initial concept diagram, Existing and proposed conditions for the site, and two concept designs. There is also a copy of the final master plan and material choices for each of the sites. The sites are presented on the following pages starting with Owens Street Park and ending with Five Chimneys Park.



Dean Crane, Director of Parks and Recreation, discusses the designs with the CDAC team.



Town Representatives review the initial plant recommendations



Josh Franklin and Autumn Visconti describe the initial site base map

Owens Street Park

Conceptual Design Diagram:

There is a large vegetative buffer that runs along the eastern part of the site, which is also adjacent to the proposed Central Blacksburg Greenway. The stream that runs directly up the middle of the site has been under-utilized and damaged due to constant lawn maintenance. A proposed vegetated buffer coupled with extended stream banks would promote a healthier stream corridor. The re-established entry onto the site would allow users to experience both social gathering and play areas. Images on the following pages provide a sense of proposed concepts and drawings.

Existing and Proposed Conditions:

Riparian Buffer:

A riparian buffer is a vegetated area near a stream, which helps shade and protect the stream from the impact of adjacent land uses. It plays a key role in increasing water quality in associated streams and rivers thus enhancing environmental benefits.

Structural Integrity:

The existing storm drain inlet is designed to drain excess rain and ground water from the park. Storm drains vary in design from small residential dry wells to large municipal systems. They are fed in areas which experience heavy rainfall and flooding during regular storms.

Stream Restoration:

A stream corridor is a complex and valuable ecosystem which includes the land, plants, animals, and network of streams within it. Recognition of the value of stream corridors has come with the understanding of what has been lost through uninformed actions on many streams and the watersheds that nourish them.

Conceptual Design 1:

This concept dealt with providing connections and improving the quality of Stroubles Creek. The design provides a more formal path that connects Owens Street to a cul-de-sac. There is also an improved stream corridor where the stream banks are pulled back and riparian plants are mixed into the existing vegetation. A reconstructed footbridge is also key for easy access to both sides of the park.

Conceptual Design 2:

An important design element for this project was providing space for people to recreate. The main design element is an outdoor pavilion near the existing playground. A path connects the pavilion to the reconstructed footbridge.

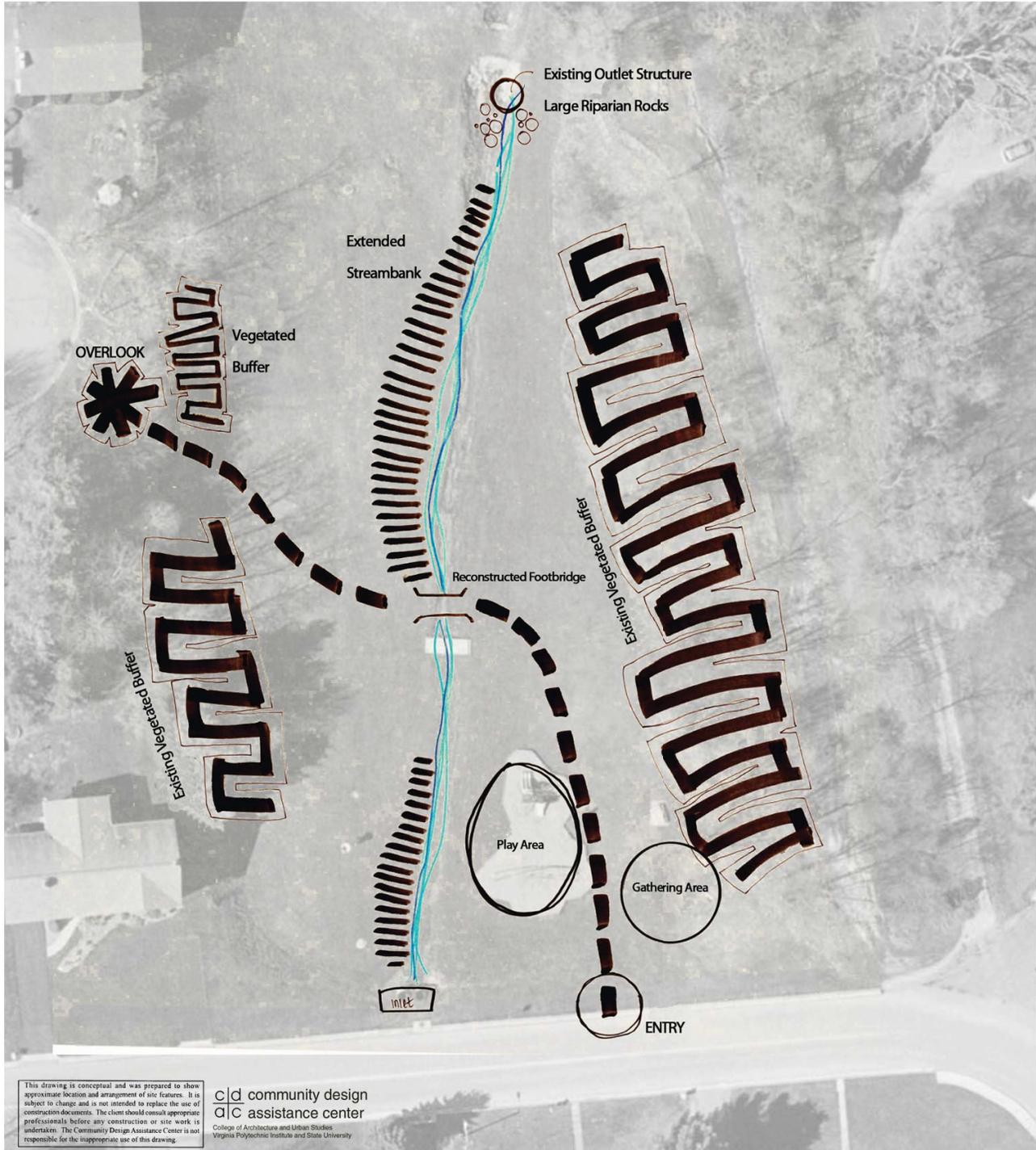
Design concepts for both alternatives can be seen on pages 18 and 19.

Feedback and Comments:

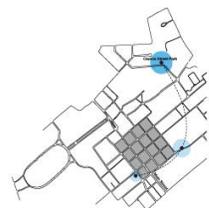
The client team liked components from both Conceptual Design 1 and 2. The idea of creating a visually interactive riparian area near the playground was well received. Since the park also serves as a detention basin in heavy rain events, the outdoor pavilion was deemed as impeding the storage capacity of the area. The client team did like the concept of shade, seating, and even a small overlook near the playground and encouraged the CDAC team to explore creating this area through grading rather than built structures. After discussions with Town Engineer Lee Hixon, the client team also expressed a desire to see additional plantings added to the northern half of the site. Both preliminary concepts showed gravel walking paths on site. The client team requested that those paths be removed from the design concepts, allowing users to define their own routes through the mowed grass areas.

Final Design:

The final design proposes an improved stream bank corridor that is composed of riparian plant masses. The proposed plantings allow for a change in site maintenance that will enhance the stream bank and prevent sedimentation from the bank sloughing into the waterway. There are ample opportunities for users on the site to interact with the open stream, either at its edge or by simply crossing over it. Users can overlook the park from the proposed terraced bank that also serves as a gathering space. Educational signage is proposed near this area. The concept proposes planting the northern end of the site with larger size and quantities of vegetation such as woody shrubs and larger trees. The front of the site will be planted with perennials and medium-sized canopy trees to allow for open views from the street.



Conceptual Design Diagram: Owens Street Park



Existing and Proposed Conditions Owens Street Park

Riparian Buffer

Existing:



The Existing Stream that runs through the middle of Owens Street Park presents a great opportunity for developing a stream riparian buffer, similar to the buffer indicated in the proposed image.

Proposed:



Structural Integrity

Existing:



Another design opportunity is evident through the restoration of the existing control structures of Owens Street Park. Developing the structure into a more appealing piece of site infrastructure will give the park more visual approval.

Proposed:



Stream Restoration

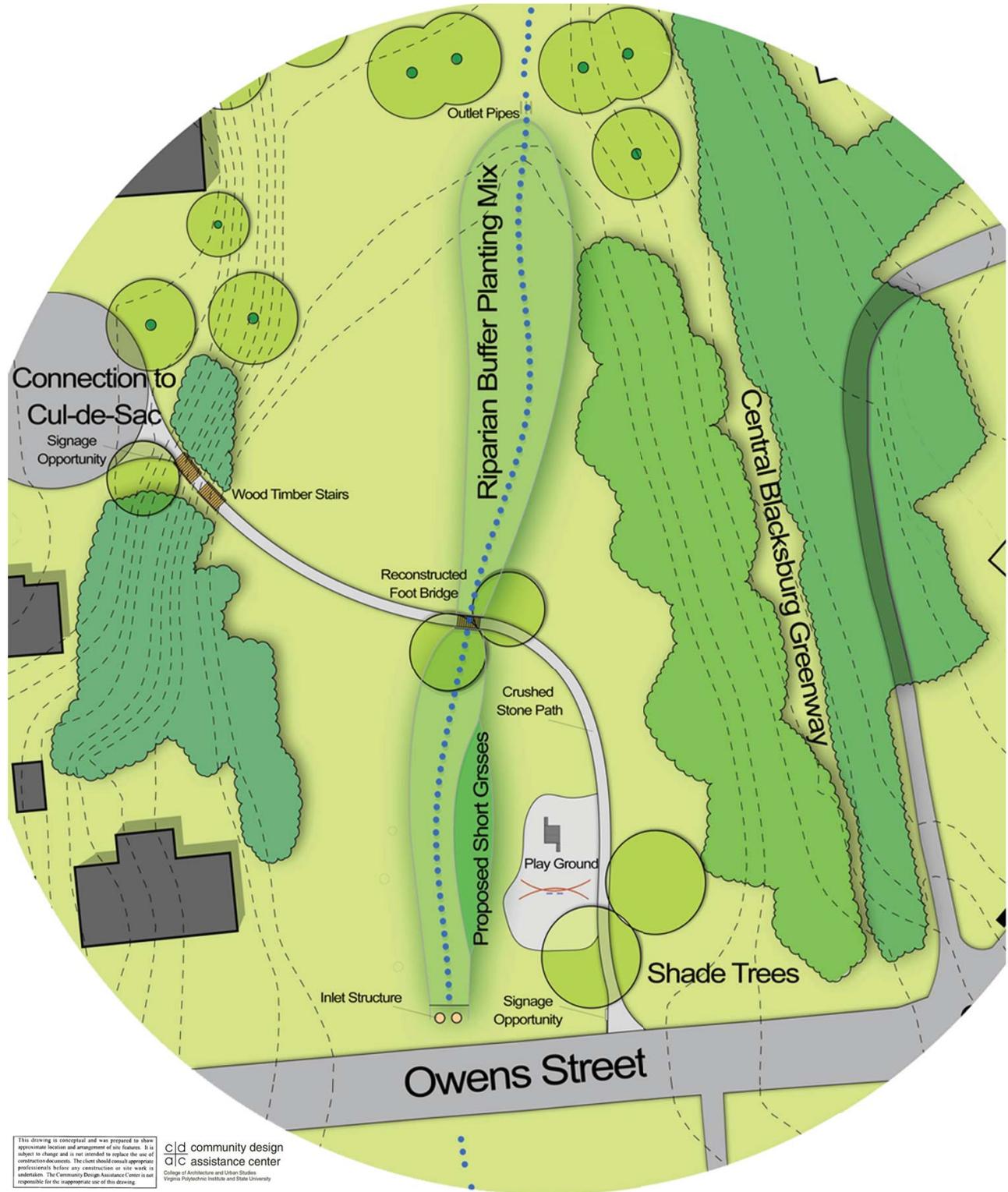
Existing:



The stream banks along the edges of Owens Street Park are experiencing stream bank cut. A more sustainable stream bank should be introduced that gently slopes down toward the waters edge.

Proposed:





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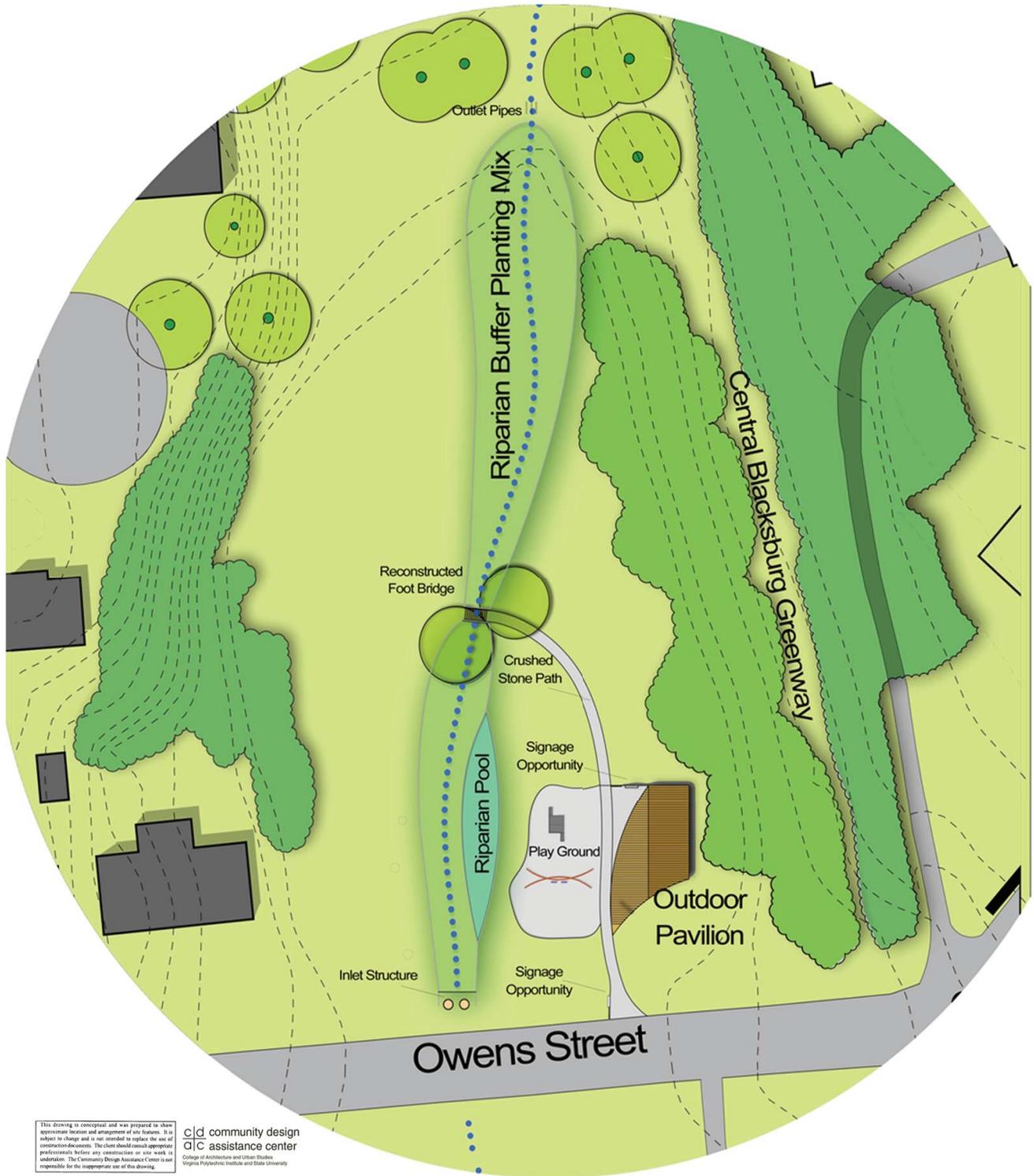
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Concept Design 1: Owens Street Park



0 5 15 25





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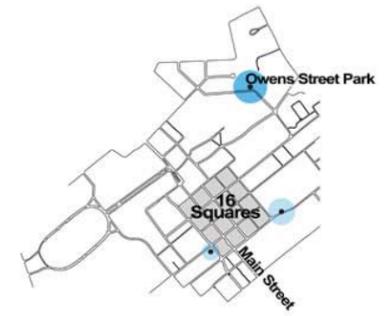
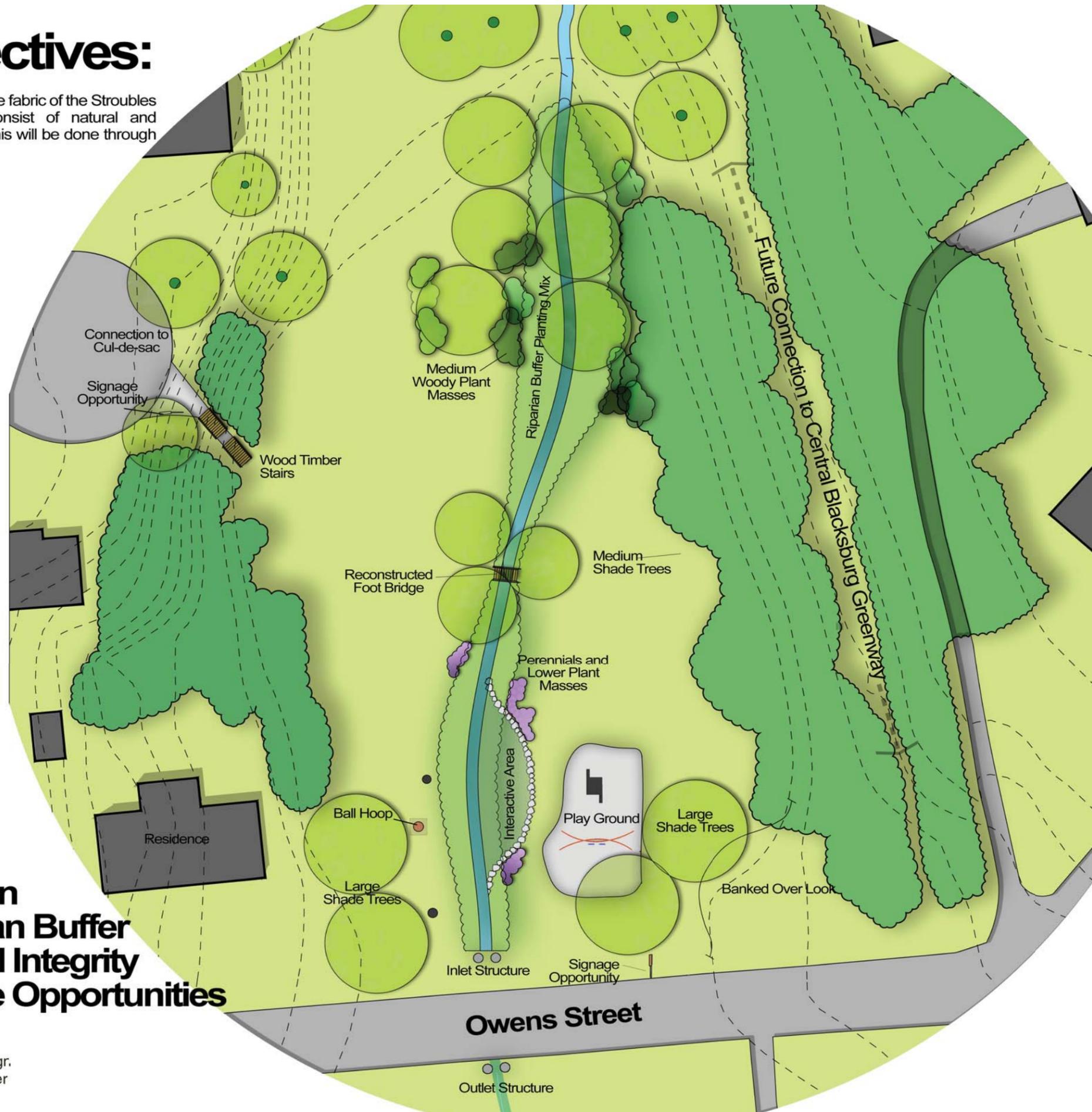


Concept Design 2: Owens Street Park

Goals + Objectives:

To introduce a more natural setting within the fabric of the Stroubles Creek Watershed. The park should consist of natural and man-made elements that work together. This will be done through the following methods:

- + Seasonal Mowing
- + Stream Restoration
- + Establish a Riparian Buffer
- + Improve Structural Integrity
- + Provide Interactive Opportunities

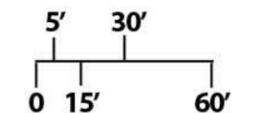


Final Design Owens Street Park

Legend

- Existing Tree
- Proposed Tree
- Proposed Perennial Plant Mass
- Proposed Woody Plant Mass
- Existing Vegetation
- Interactive Area
- Riparian Grass Buffer
- Existing Play Swing
- 2' Contours

scale: 1:60



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Goals + Objectives:

+ Seasonal Mowing

Allow the stream corridor to grow back to its natural environment.

+ Stream Restoration

The Stream banks in Owens Street Park are experiencing stream bank cut. A more sustainable stream bank should be introduced that gently slopes down towards the waters edge.

+ Establish a Riparian Buffer

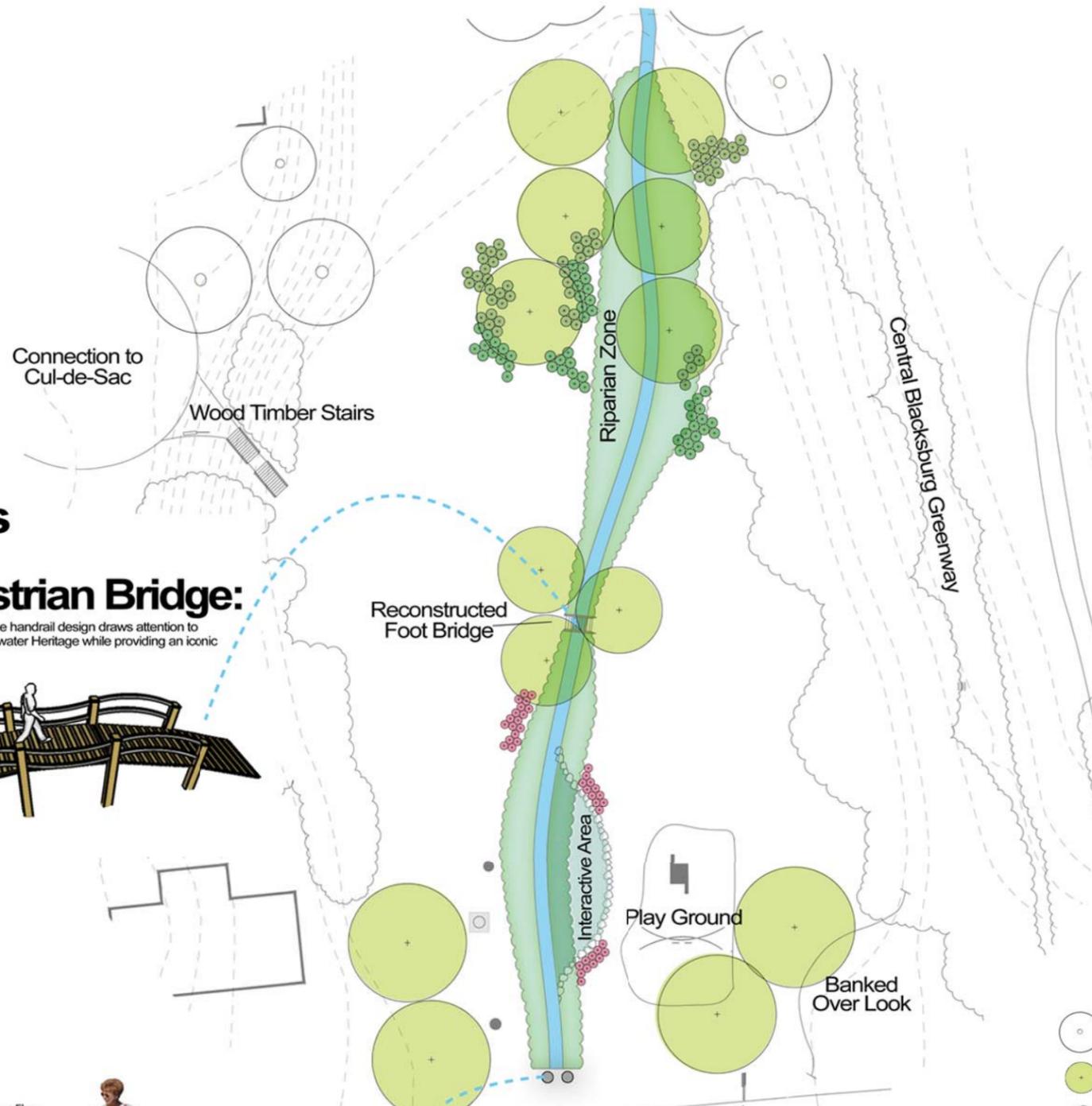
The existing stream that runs through the middle of Owens Street Park presents a great opportunity for developing a stream riparian buffer.

+ Improve Structural Integrity

Another design opportunity through the restoration of the existing control structures of Owens Street Park by developing the structure into a more appealing part of site infrastructure.

+ Provide Interactive Opportunities

The site provides opportunity for people to explore the natural conditions of the creek as it runs through the park.

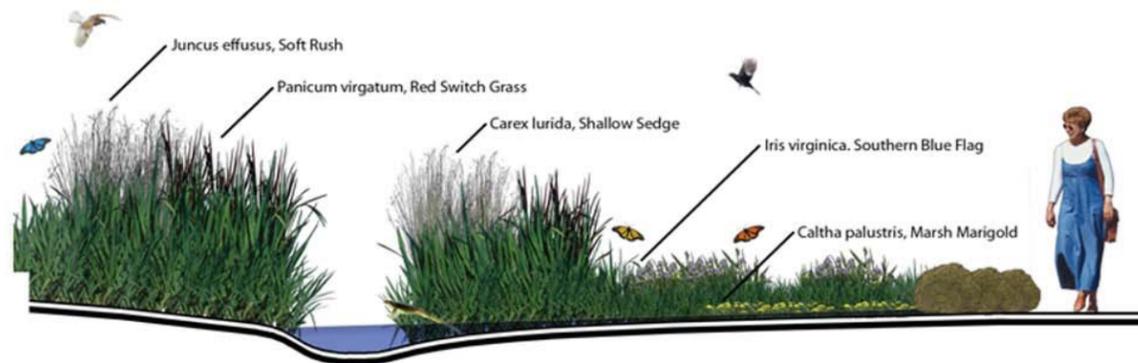


Pedestrian Bridge:

The proposed bridge handrail design draws attention to Blacksburg's Freshwater Heritage while providing an iconic feature to each site.



Creek Section:



This section crosses through the Interactive Area incorporating riparian buffer plant masses.

Design Elements Owens Street Park

Legend

- Existing Tree
- Proposed Tree
- Proposed Perennial Plant Mass
- Proposed Woody Plant Mass Shaded + Sunny
- Existing Vegetation
- Riparian Grass Buffer
- 2' Contours
- Stroubles Creek



Reface Stone Inlet:



In order to approve the aesthetic qualities of the site, refacing the inlet structure with stone will improve its overall appearance.

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Spout Springs Park

Conceptual Design Diagram:

Being that the site is located on the corner of the original Blacksburg 16 Squares, there is a viable option to allow connection to the town for self-guided tours. Given the topographic features of the site, this allows for more over-looks to occur along the exposed stream corridor and towards the downtown area.

Existing and Proposed Conditions:

Freshwater Heritage:

Freshwater refers to naturally occurring water on the surface such as bogs, ponds, lakes, rivers and streams, and underground in aquifers and underground rivers. The use of water by humans for activities such as irrigation and industrial applications can have adverse impacts on down-stream ecosystems. A spring box is a structure engineered to make optimum use of a natural spring.

Connections:

Various meeting and observation areas would help establish a connection for users to learn more about the historical nature of the park and the existing spring box. The following page provides examples of existing conditions and proposed ideas.

Conceptual Design 1:

A key for this design was the day-lighting of a section of Stroubles Creek. By day-lighting the creek, the design allows people the opportunity to interact with the creek as well as the existing on site spring. A reconstructed spring box allows people to access a once important source of water for the Blacksburg community. The opportunities to interact with the stream come through the construction of decks connected by a boardwalk.

Conceptual Design 2:

This design interacts with the natural meandering of the existing stream in relation to the spring box. There is a proposed connection opportunity with both Clay Street and Berryfield Apartments. The proposed boardwalk allows an uninterrupted flow in the stream as it runs parallel to the walk. Both the deck and corner signage areas serve as gathering spaces for educational and social benefits.

Design concepts for both alternatives can be seen on pages 25 and 26.

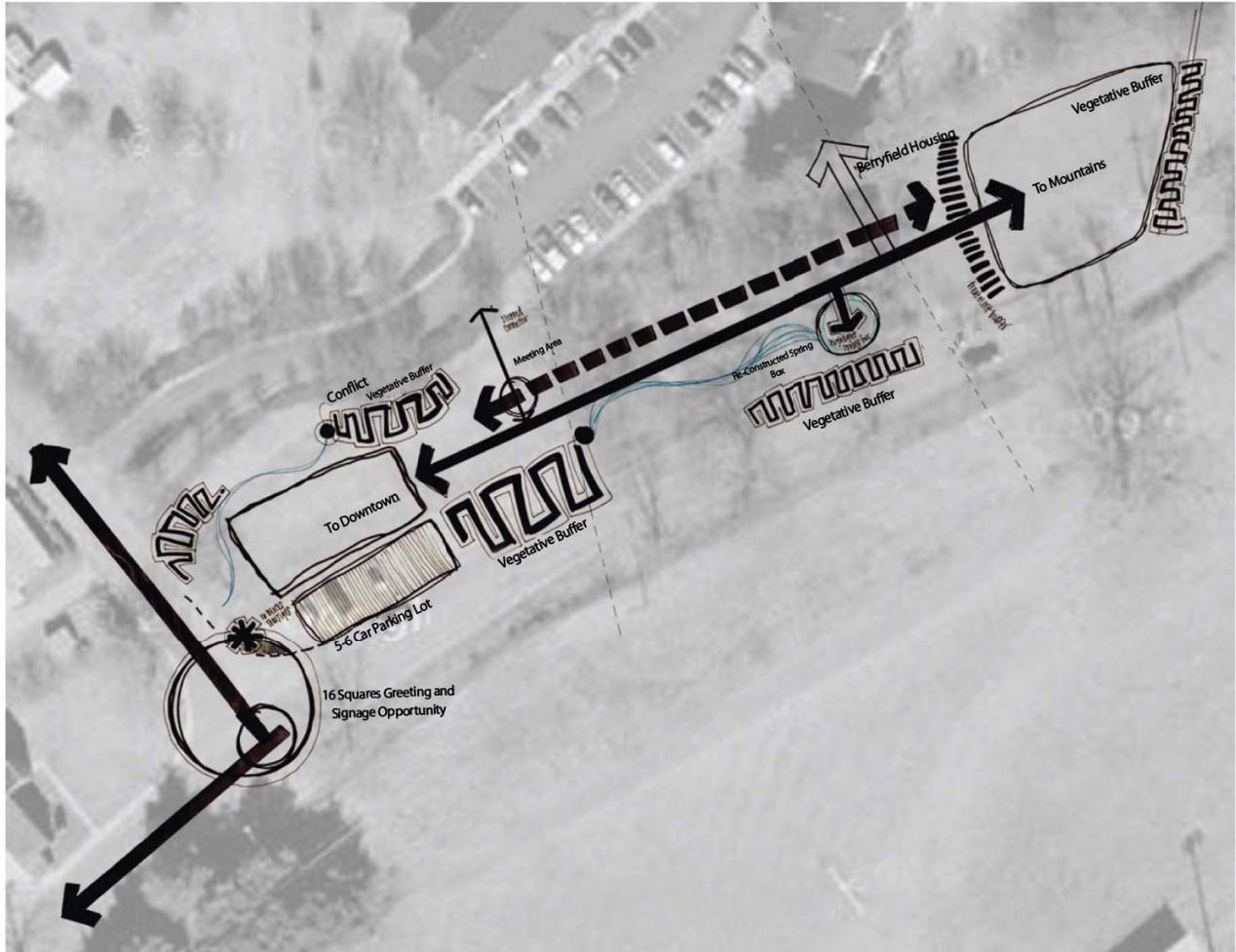
Feedback and Comments:

Pedestrian circulation through the site, recognition of the site's place within the 16 Squares and the history of the Town's development, and identification and preservation of the springs on and adjacent to the site were the three primary areas of comment from the client team. Because of the area's topography, the current increase in vehicular traffic on Clay Street, and the lack of pedestrian accommodations, this client team felt that this site should invite pedestrians into the site and offer a safe and visible walking route through the site. The client team expressed a preference for day lighting the creek and adding additional riparian buffers on the northern edge of the creek. The CDAC team was also encouraged to explore angled parking as a response to the parking area currently on site.

Final Design:

The final design for Spout Springs Park takes a gem in the rough and "polishes" it for the community to enjoy. Strategic pedestrian entry points onto the site offer the casual passerby a safe way to traverse this portion of Clay Street and invite residents and visitors to stop and explore a significant portion of the Town's history found on the site. As a corner edge of the historic Sixteen Squares, the Spout Springs Park can serve as a gathering place for the start of walking tours. Site signage is proposed in this area.

Stroubles Creek is daylighted for the entirety of the site and pedestrian activity on the site is redefined to the southern half of the site, allowing natural plantings to protect and enhance the bank on the northern edge. The vehicular parking on site was adjusted to allow for more space for the creek. Proposed porous pavers will replace the gravel in the parking area. As users meander through the site, they will walk along a tree-covered boardwalk and pass by a constructed spring house, highlighting the original Town spring on the site. An additional spring is located across Clay Street. Signage is proposed for this area as well. A bioretention area will help keep stormwater from polluting the spring source. This design offers an inviting and educational way to enjoy and explore the historical nature of the site.

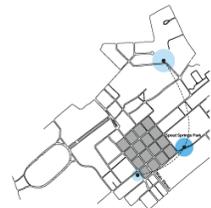


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Conceptual Design Diagram: Spout Springs Park



Existing and Proposed Conditions Spout Springs Park

Freshwater Heritage

Existing:



The Spout Spring site is home to one of the first springs used by Blacksburg residents. The spring should become a celebrated historical destination.

Proposed:



Connections

Existing:



A key design consideration for this site is the development of pathways through the site that allow people access the entire Spout Spring site without difficulty.

Proposed:

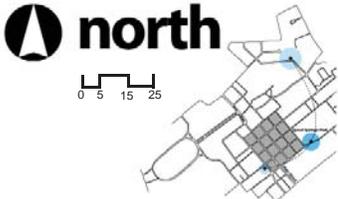




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Concept Design 1: Spout Springs Park

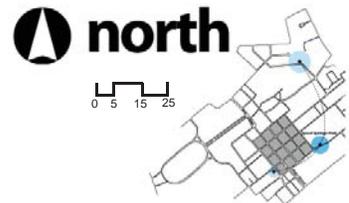


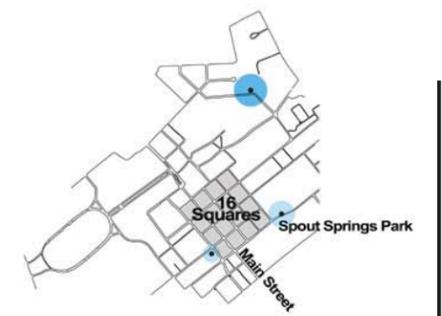
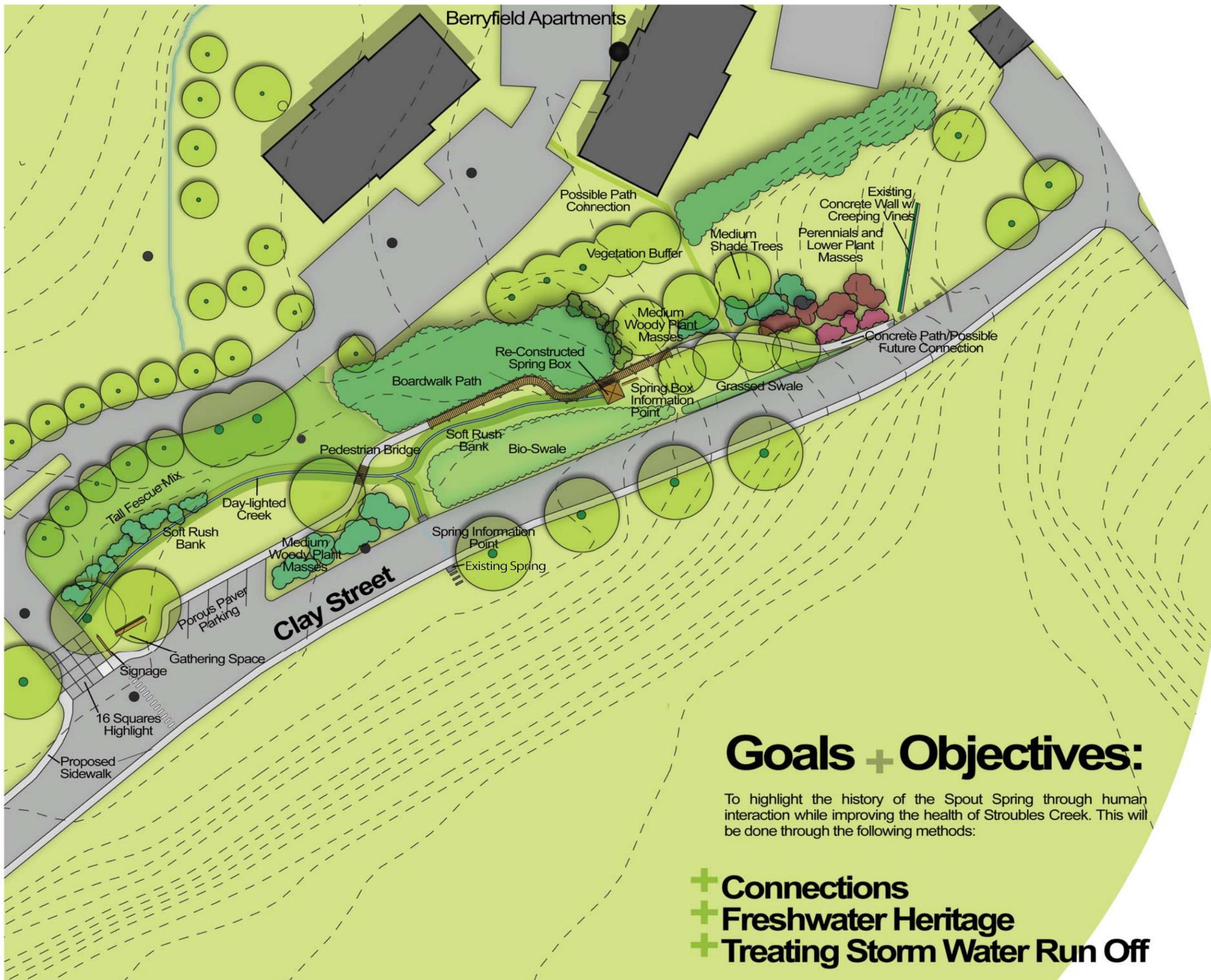


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Concept Design 2: Spout Springs Park





Final Design

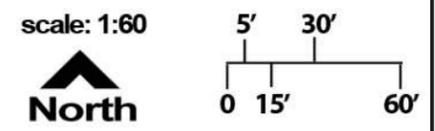
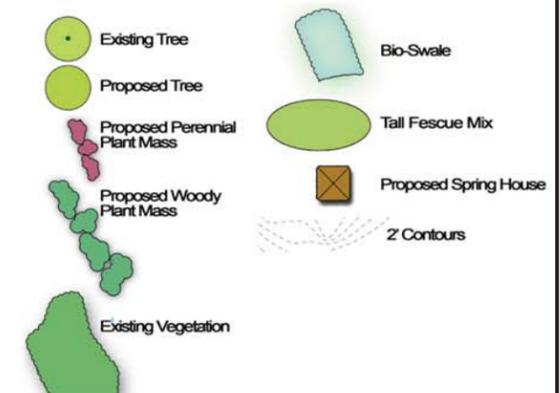
Spout Springs Park

Goals + Objectives:

To highlight the history of the Spout Spring through human interaction while improving the health of Stroubles Creek. This will be done through the following methods:

- + Connections
- + Freshwater Heritage
- + Treating Storm Water Run Off

Legend



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Goals + Objectives:

+ Connections

A key design consideration for this site is the development of pathways through the site that allow for people to access the entire Spout Spring site without difficulty.

+ Freshwater Heritage

The Spout Spring site is home to one of the first springs used by Blacksburg residents. The spring is located on the site and should be celebrated as a historical artifact.

+ Treating Storm Water Run Off

The incorporation of a bio-swale along with tall fescue mixes will allow for natural storm events to pass through the site without doing harm to the freshwater creek.



Boardwalk Path:



The raised wooden pathway runs through the well-vegetated part of the site. It provides a connection between the lower and upper ends of the park while providing opportunity for interaction with the Spring house, ultimately highlighting Spout Spring.

Daylighting:



Daylighting is the redirection of a stream into an above-ground channel. The banks of the channel will be planted with soft rushes - which help improve the health of the freshwater creek as well as ease maintenance issues for the site.

Creek Section:



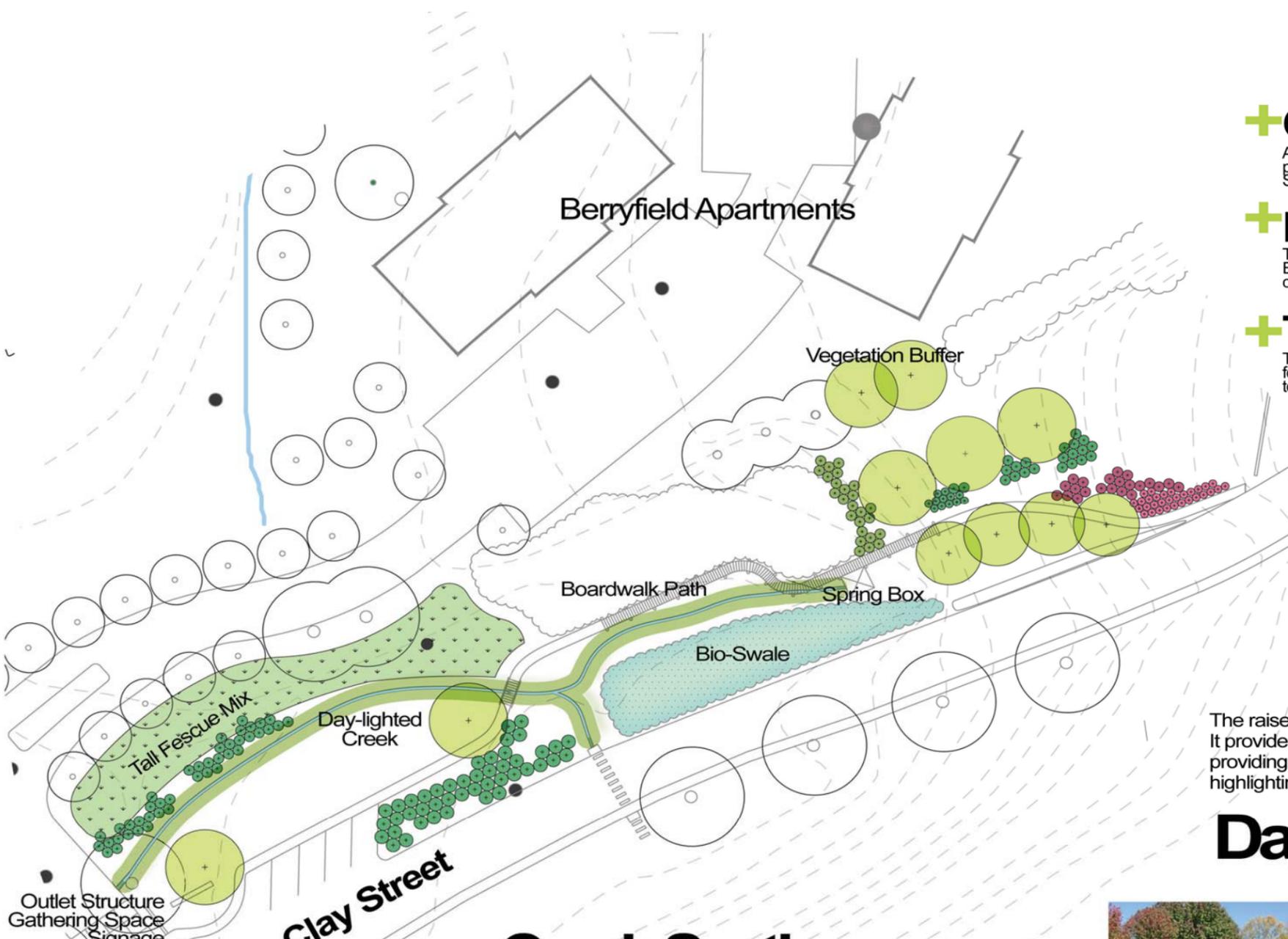
The varied vegetation height between the street and the park allows for easy pedestrian and automobile visibility. This also creates an ample opportunity for users that are passing by the site to become aware of what the park offers.

Design Elements
Spout Springs Park

Legend

- Existing Tree
- Proposed Tree
- Proposed Perennial Plant Mass
- Proposed Woody Plant Mass
- Proposed Tall Fescue Mix
- Existing Vegetation
- Proposed Bio Swale
- 2' Contours
- Stroubles Creek
- Proposed Spring House

scale: 1:60



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Five Chimneys Park

Conceptual Design Diagram:

The stream corridor that runs through the Five Chimneys Site has undergone through extensive stream bank erosion. A terraced stream bank edge would allow ample opportunity to re-vegetate and stabilize the health of the stream, also providing habitat for existing species. A communal gathering space is also needed and would allow users to experience the ornamental value of the site along with learning opportunities about the Huckleberry Trail and the stream corridor as it runs through the urbanized area of Blacksburg. The following page provides a conceptual diagram of these ideas.

Existing and Proposed Conditions:

Improve Stream Channel:

Natural channel design uses engineering, geological, and biological principles to improve the hydrology, habitat, and aesthetics of a stream, considering current and future watershed conditions. The natural channel design approach uses reference streams as a blueprint (stream shape and biology) to devise a comprehensive project aimed at restoring and maintaining natural stream functions over the long term.

Stabilize Stream Banks:

Natural stream functions and stability are threatened by changes in watershed hydrology and land use. This results in unstable streams with poor habitat and water quality. Impacts include eroding streambanks, unsafe water supplies, reservoir siltation, impaired habitat, fish kills, and loss of floodplain function. Causes of stream impairment include channelization, stormwater runoff, road crossings, sediment loads, and loss of riparian vegetation.

Reduce Flow Velocity:

Streamflow is the flow of water in streams, rivers, and other channels, and is a major element of the water cycle. It is one component of the runoff of water from the land to waterbodies, the other component being surface runoff. Water flowing in channels comes from surface runoff from adjacent topography, from groundwater flow out of the ground, and from water discharged from pipes.

Conceptual Design 1:

This design conceptualizes the need for terraced stream banks and learning opportunities where a

proposed natural pond is located. The ponding area is suitable for energy dissipation as well as habitat for existing species. A new entry into the park is also proposed connecting the pedestrian movement of Draper Road directly to the proposed observation point.

Conceptual Design 2:

The second design proposal encompasses the need for increased pedestrian movement throughout the park. This design also proposes an observation point/pedestrian bridge over the 9'x4' storm outlet. This will allow users to watch the stream move through the site from beneath their feet. This feature also provides ample opportunity for educational and directional signage.

Design concepts for both alternatives can be seen on pages 32 and 33.

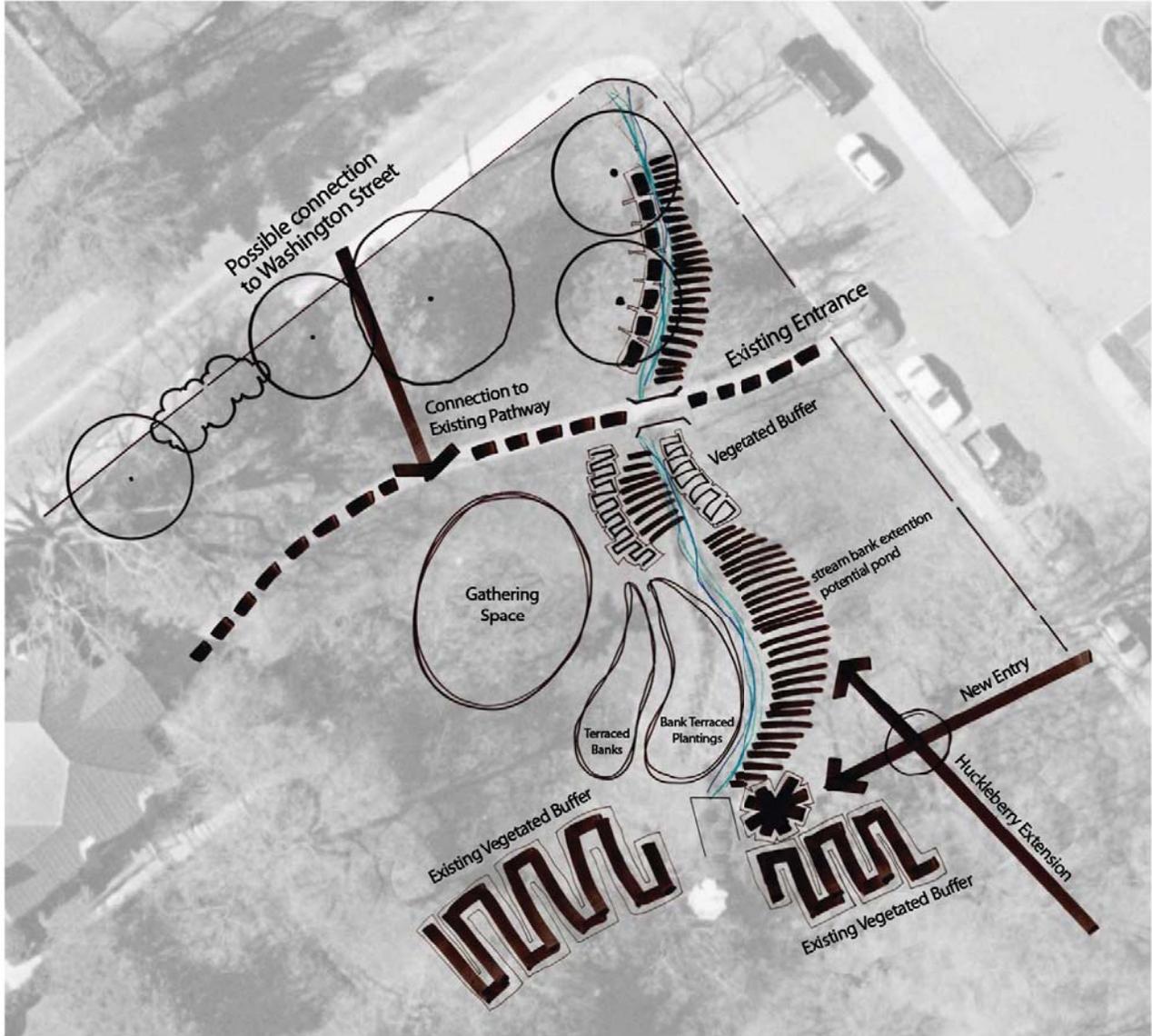
Feedback and Comments:

The client team was very enthusiastic about components in each of the conceptual designs. The concept of bring people into the site from Marcia's Park and offering them a view from on top of the box culvert was received very favorably. The client team preferred the proposed pedestrian entrance from Draper Road as shown in Conceptual Design 1, and they preferred the idea of a pedestrian bridge as shown in Conceptual

Design 2. The CDAC team was encouraged to explore opportunities to enhance the pedestrian experience along Draper Road by enhancing the sidewalk and edge of the site.

Final Design:

The final design for Five Chimneys Park promotes a more inviting atmosphere for park users. The gathering space above the culvert combines a seating area/overlook with signage, and educational benefits. The health of the stream will be restored by transforming the stream banks into gentle terraces, along with re-establishing a strong root system through its plant massings. The existing ornamental nature on the site is also recognized in the proposed planting and hardscaping design.



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Conceptual Design Diagram: Five Chimneys Park



Existing and Proposed Conditions Five Chimneys Park

Connections

Existing:



Proposed:



Image Source: State of Virginia Department of Environment

Rocks and naturalized perennial plantings along the channel will reinforce the edges between the stream and its banks.

Stabilize Stream Bank

Existing:



Proposed:



Image Source: State of Virginia Department of Environment

Plantings such as rushes, sedges, and grasses along with re-grading the streams back will recreate the original meanders of the stream.

Reduce Flow Velocity

Existing:

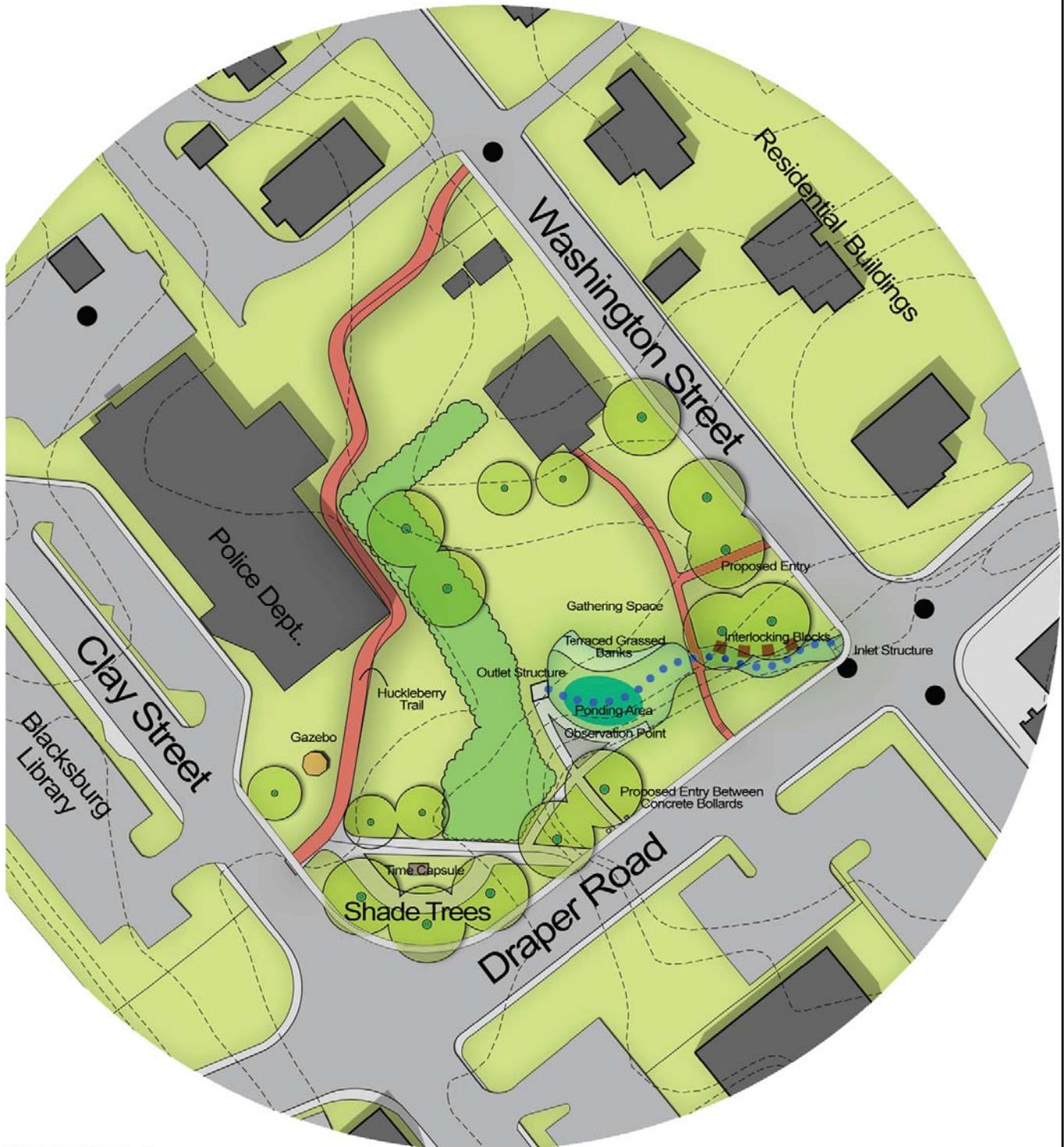


Proposed:



Image Source: University of Virginia

Proposed view flowing out of the outlet structure: the added boulders will dissipate the energy, slowing the water velocities and ultimately mitigating erosion.



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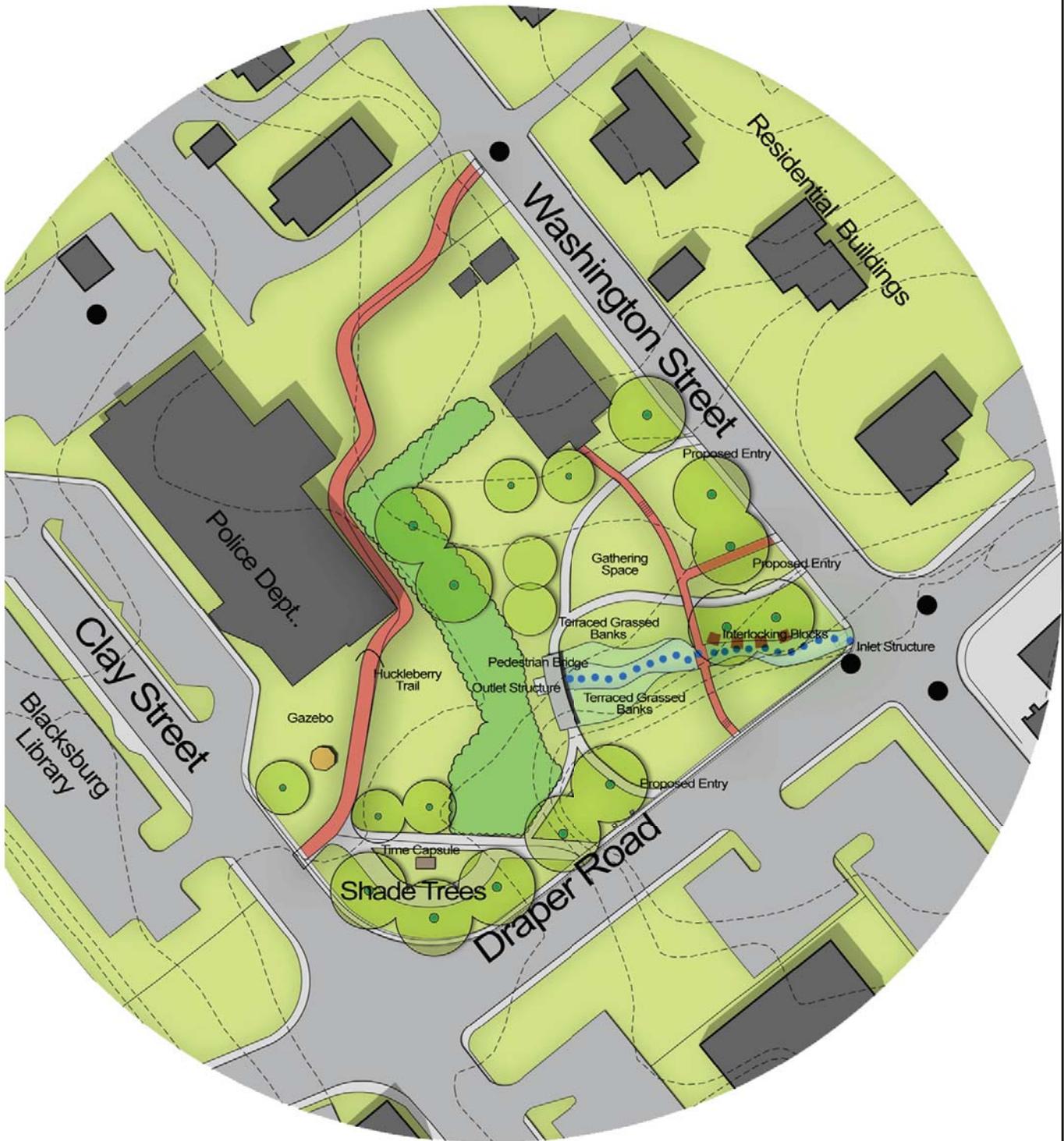
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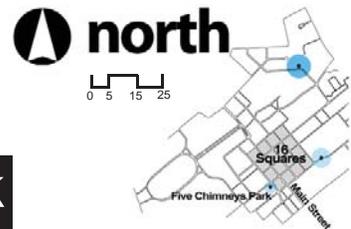
Concept Design 1: Five Chimneys Park



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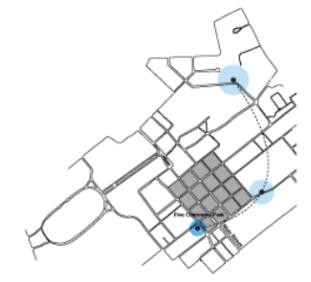
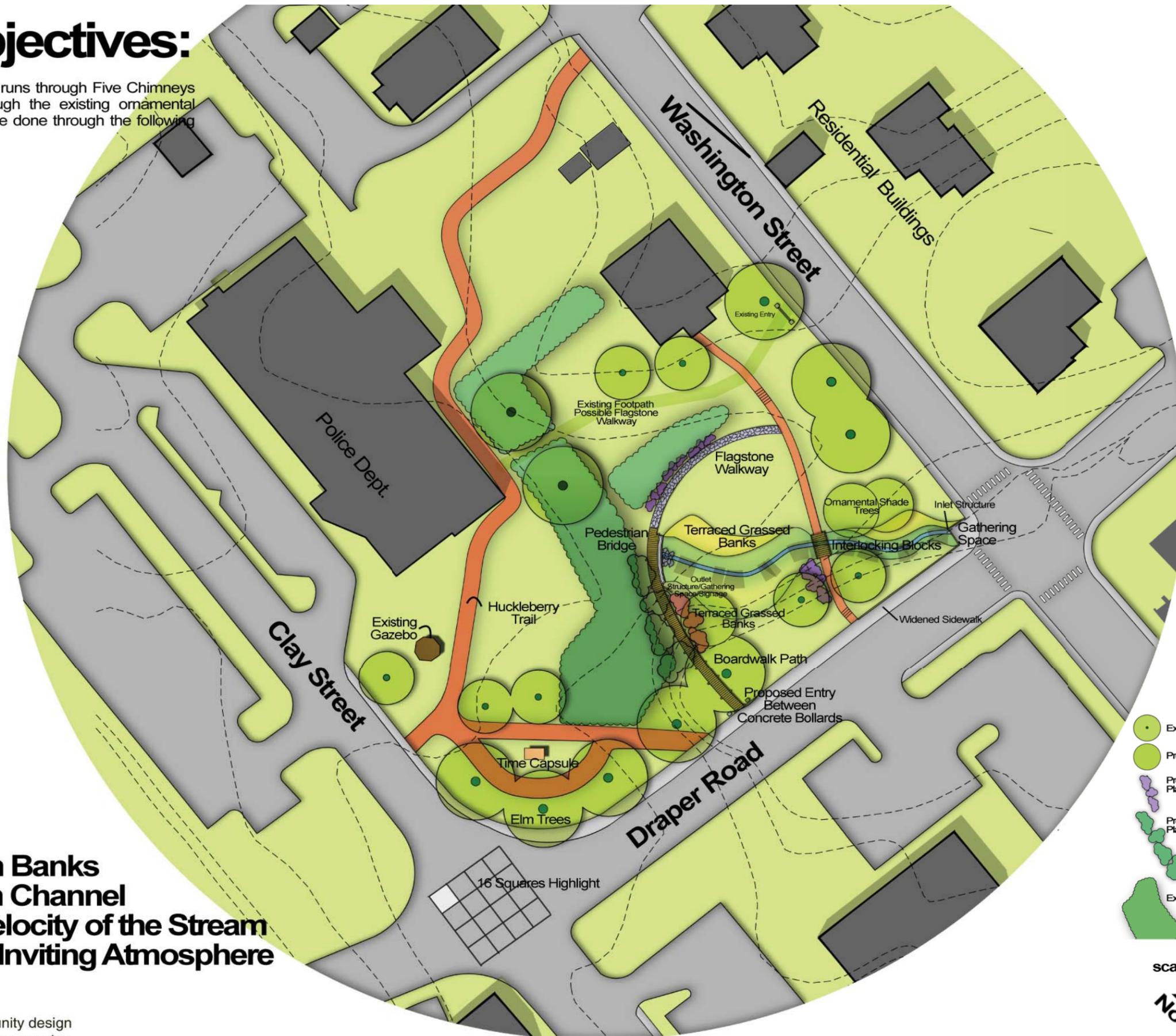
Concept Design 2: Five Chimneys Park



Goals + Objectives:

To re-stabilize Stroubles Creek as it runs through Five Chimneys Park while implicating design through the existing ornamental characteristics of the site. This will be done through the following methods:

- + Stabilize Stream Banks
- + Improve Stream Channel
- + Reduce Flow Velocity of the Stream
- + Provide a More Inviting Atmosphere



Final Design Five Chimneys Park

Legend

- Existing Tree
- Proposed Tree
- Proposed Perennial Plant Mass
- Proposed Woody Plant Mass
- Existing Vegetation
- Grassed Bank
- Riparian Grass Buffer
- 2' Contours

scale: 1:60



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Goals + Objectives:

+ Stabilize Stream Banks

Rocks and naturalized perennial plantings along the channel will reinforce the edge between the stream and its banks.

+ Improve Stream Channel

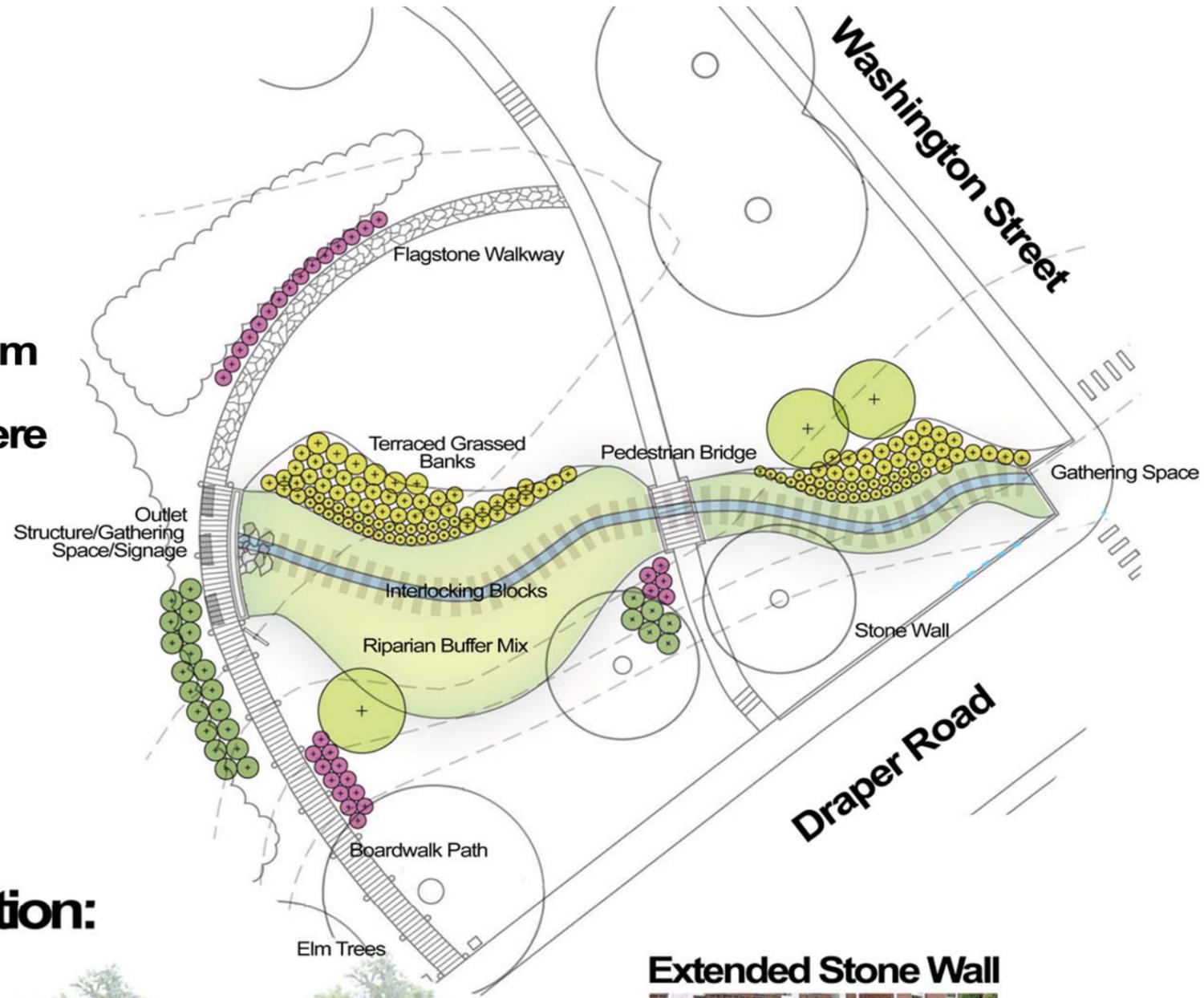
Plantings such as rushes, sedges, and grasses along with re-grading the stream bank will improve the quality of the stream channel.

+ Reduce Flow Velocity of the Stream

Added boulders will dissipate the energy, slowing the water velocities ultimately mitigating erosion.

+ Provide a More Inviting Atmosphere

By capturing the already existing nature of the Five Chimneys Site, ornamental plantings paired with inviting viewsheds will create an enjoyable atmosphere.

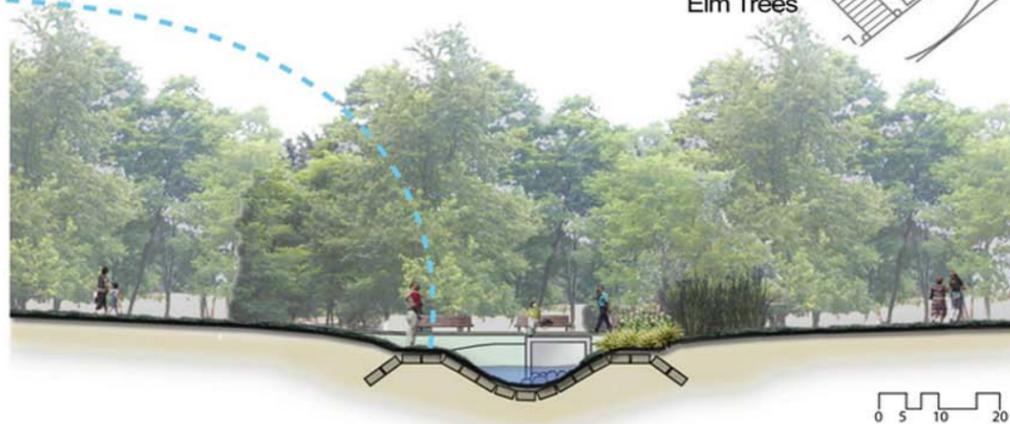
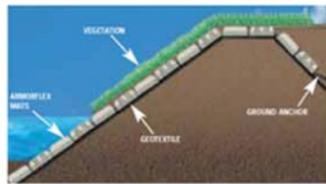


Design Elements Five Chimneys Park

Creek Section:

Interlocking Blocks

The interlocking matrix of concrete blocks combine the favorable aspects of lightweight blankets and meshes, such as porosity, flexibility, vegetation encouragement, and habitat enhancement.



Extended Stone Wall



The stone wall in the above image would be a nice extension to the existing stone wall of the Five Chimneys site. It could also provide seating opportunities for individuals.

Legend

- Existing Tree
- Proposed Tree
- Proposed Perennial Plant Mass
- Proposed Woody Plant Mass
- Proposed Short + Tall Grasses
- Existing Vegetation
- Riparian Grass Buffer
- 2' Contours
- Interlocking Concrete Blocks
- Stroubles Creek



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Conclusion

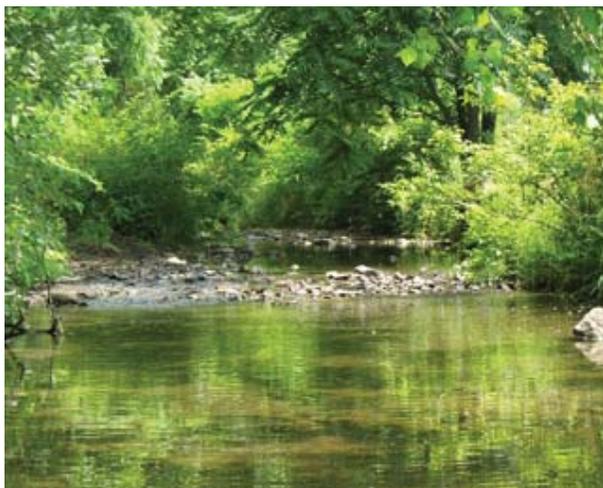
It is the intent of these proposals to encourage more people to take an interest in the Freshwater Heritage of Blacksburg, VA. The redesign of Owens Street, Spout Spring, and Five Chimneys Park will provide the Blacksburg community with more viable public space that highlight the history of Blacksburg as well as provides educational and recreational opportunities. Hopefully the implementation of these parks will spark an interest in the history of Blacksburg and the value of water to the community. Serving as demonstration projects, individuals can learn how to better enhance riparian corridors.



Discussing final plant recommendations



Reviewing the final design for Five Chimneys Park



The community of Blacksburg has many freshwater opportunities



Greenspace is an important part of an active community

Appendix

Stroubles Creek Watershed.....	A01
Owens Street Park - Plant Specifications.....	A02
Recommended Plants - Owens Street Park.....	A03
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Signage.....	A18

Stroubles Creek Watershed

As part of the Freshwater Heritage Project the CDAC team mapped the exposed areas of Stroubles Creek. This map developed after a tour with Mike Rosenzweig and displayed the exposed stretches of Stroubles Creek. The Map shows that Stroubles Creek has many different environmental conditions as it travels through the Town of Blacksburg. Some sections are in a very urban setting, while others resemble much more of a natural setting. By mapping out these conditions it gave the team the ability to see opportunities for improvement throughout the Stroubles Creek Watershed. It also provided ideas for what could potentially change in the site designs for the freshwater heritage project to benefit their sustainability.

Tour with Mike Rosenzweig



Crossing a small stream that flows into Stroubles Creek



Inside a spring house that also feeds into Stroubles Creek



Image of the upper end of the Stroubles Creek Watershed



View from outside of the spring house

Blacksburg Freshwater Heritage Project Exposed Stroubles Creek Watershed

The collage consists of 16 numbered photographs (1-16) and a central map of the Stroubles Creek Watershed. The map is titled 'Stroubles Creek Watershed' and shows the 'Upper Stroubles Creek Watershed' area. It includes a legend with categories: 'watershed', 'stream', 'road', and 'building'. The map also shows 'Crown Street Site', 'Spout Spring Site', and 'Five Chimneys Site'. The photographs show various environmental conditions: 1. A stream flowing through a wooded area. 2. A stream flowing through a grassy area. 3. A stream flowing through a wooded area. 4. A stream flowing through a wooded area. 5. A stream flowing through a wooded area. 6. A stream flowing through a wooded area. 7. A stream flowing through a wooded area. 8. A stream flowing through a wooded area. 9. A stream flowing through a wooded area. 10. A stream flowing through a wooded area. 11. A stream flowing through a wooded area. 12. A stream flowing through a wooded area. 13. A stream flowing through a wooded area. 14. A stream flowing through a wooded area. 15. A stream flowing through a wooded area. 16. A stream flowing through a wooded area.

Owens Street Park - Plant Specifications

Plant scientific name	Common name	Size at Maturity	Hardiness	Native Y/N	Form and habit	Seasonal characteristics	Culture	Notes
<i>Acer x freemanii</i> 'Armstrong'	Freeman maple	40-55' tall, 30-40' wide	to zone 3	N	deciduous tree	red fall foliage	Full sun to part shade, medium to wet soils	
<i>Liquidambar styraciflua</i> 'Rotundiloba'	Sweet gum	60-70' tall, 20-30' wide	to zone 5	Y	deciduous tree	yellow, purple, or red fall color	Full sun, medium to wet soils	This is the fruitless cultivar.
<i>Platanus occidentalis</i>	Sycamore	75-100' tall and wide	to zone 4	Y	deciduous tree		Full sun, medium to wet soils	
<i>Taxodium distichum</i>	Bald cypress	50-75' tall, 20-45' wide	to zone 4	Y	deciduous conifer	orange-brown fall color	Full sun, medium to wet soils	
<i>Aronia melanocarpa</i> *	Black chokeberry	3-6'	to zone 3	Y	deciduous shrub	white flowers in spring, blue berries, purple/red fall color	Full sun to part shade, medium to wet soils	Spreads by suckering, will form a colony. Can withstand wet conditions.
<i>Clethra alnifolia</i>	Sweet pepperbush	3-8' tall, 4-6' wide	to zone 3	Y	deciduous shrub	fragrant white flowers mid summer, yellow fall color	Full sun to part shade, medium to wet soils	
<i>Cornus sericea</i> 'Cardinal'	Redosier dogwood	8-10' tall and wide	to zone 2	Y	deciduous shrub	white flowers late spring, reddish purple fall color, red stems in winter	Full sun to part shade, medium to wet soils. Effective as a bank cover, holds soil well.	Best color on young stems, pruning is not necessary but for best color prune close to ground in early spring.
<i>Caltha palustris</i> *	Marsh marigold	1-2'	to zone 3	Y	flowering perennial	yellow flowers April-June	Full sun to part shade in wet soil to shallow water	
<i>Carex lurida</i> *	Sallow sedge	1.5-3'	to zone 3	Y	perennial grass	seedheads resemble sweetgum balls	Full sun to part shade, wet to moist soil	
<i>Iris virginica</i> *	Southern blue flag	1-3'	to zone 5	Y	flowering perennial	blue/purple flowers in May	Full sun medium to wet soils, or under water	
<i>Juncus effusus</i> *	Soft rush	2-4'	to zone 4	Y	grass like perennial	foliage yellow in fall, brown in winter	Full sun to part shade, wet to moist soil.	May control erosion on moist streambanks. Spreads by rhizomes, may also self seed.
<i>Panicum virgatum</i> 'Rostrahbusch'	Red switch grass	4-5'	to zone 5	Y	perennial grass	silvery green grass, turning burgundy in the fall, tan/beige in winter	Full sun to part shade, medium to wet soils.	
<i>Acorus gramineus</i> 'Ogon'	Variiegated sweet flag	1'	to zone 5	N	herbaceous perennial	golden variegated evergreen foliage	full sun to part shade, medium to wet soils	
<i>Carex flaccosperma</i>	Blue wood sedge	6" to 10"	to zone 5	Y	evergreen sedge		Part shade to full shade, wet to moist soil	
<i>Hosta sieboldiana</i> 'Elegans'	Hosta	2-3' tall, 3-4' wide	to zone 4	N	herbaceous perennial	white flowers May-July, bold blue-green foliage	Part shade to full shade, well drained soils	
<i>Lysimachia nummularia</i> 'Aurea'	Creeping jenny	3-6" tall, 1-1.5' wide	to zone 3	N	herbaceous perennial groundcover	yellow flowers early summer, lime green foliage throughout growing season	Full sun to part shade, medium to wet soils.	
<i>Matteuccia struthiopteris</i>	Ostrich fern	2-5'	to zone 3	Y	fern	bold plumelike foliage	Part shade to full shade, medium to wet soils	
<i>Osmunda cinnamomea</i>	Cinnamon fern	2-3'	to zone 3	Y	fern	foliage turns yellow in the fall	Part shade to full shade, medium to wet soil	
*Riparian Plantings								

Recommended Plants

Owens Street Park

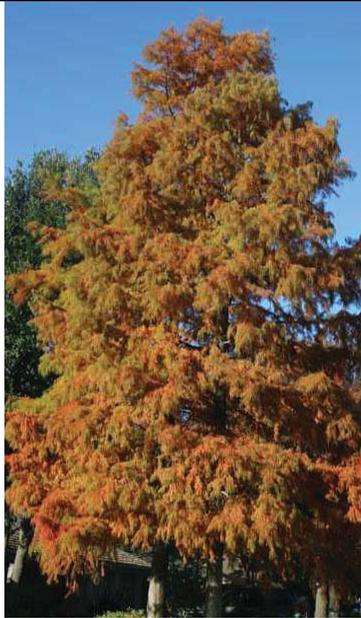


Photo courtesy mobot.org

Taxodium distichum
Bald cypress



Photo courtesy mobot.org

Platanus occidentalis,
Sycamore



Liquidambar styraciflua
'Rotundiloba'
Sweetgum



Photo courtesy mobot.org

Acer x freemanii 'Armstrong'
Freeman maple



Photo courtesy mobot.org

Aronia melanocarpa
Black chokeberry



Photo courtesy mobot.org

Clethra alnifolia
Sweet pepperbush

Recommended Plants

Owens Street Park



Photo courtesy mobot.org

Cornus sericea 'Cardinal'
Redosier dogwood



Photo courtesy ncstate.edu

Caltha palustris
Marsh marigold



Photo courtesy psu.edu

Carex lurida
Sallow sedge



Photo courtesy mobot.org

Iris virginica
Southern blue flag



Photo courtesy mobot.org

Juncus effusus
Soft rush



Photo courtesy mobot.org

Panicum virgatum 'Rostrahlbusch'
Red switch grass

Recommended Plants

Owens Street Park



Photo courtesy mobot.org

Acorus gramineus 'Ogon'
Variegated sweet flag



Photo courtesy mobot.org

Carex flaccosperma
Blue wood sedge

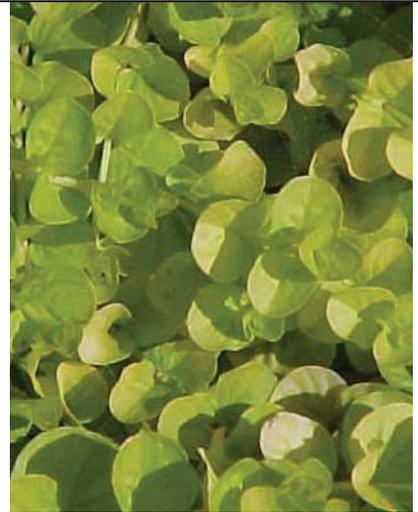


Photo courtesy mobot.org

Lysimachia nummularia 'Aurea'
Creeping jenny

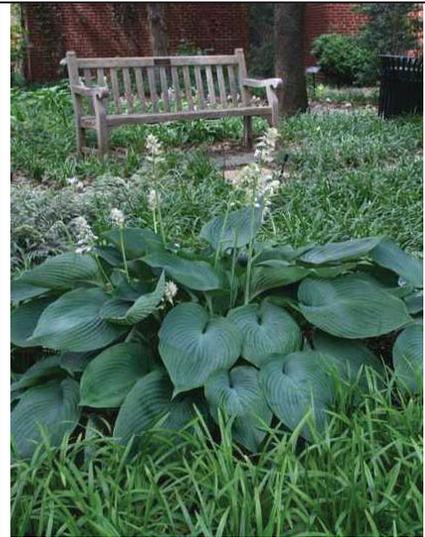


Photo courtesy mobot.org

Hosta sieboldiana 'Elegans'
Hosta

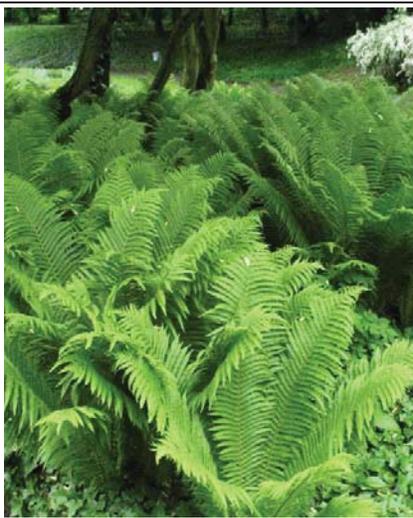


Photo courtesy mobot.org

Matteuccia struthiopteris
Ostrich fern



Photo courtesy mobot.org

Osmunda cinnamomea
Cinnamon fern

Spout Springs Park - Plant Specifications

Plant scientific name	Plant common name	Size at Maturity	Hardiness	Native Y/N	Form and habit	Seasonal characteristics	Culture	Notes
<i>Betula nigra</i>	river birch	40-70' tall, 40-60' wide	to zone 4	Y	deciduous tree	yellow fall color	Full sun to part shade, medium to wet soils	
<i>Ostrya virginiana</i>	American hophornbeam	25-40' tall, 20-30' wide	to zone 3	Y	deciduous tree	yellow fall color, male catkins throughout winter	Full sun to part shade, moist, well drained soils	
<i>Taxus cuspidata</i> 'Capitata'	Japanese yew	10-25' tall, 5-10' wide	to zone	N	needle evergreen shrub	evergreen foliage	full sun to part shade, medium moisture, well drained soils	Can be pruned at any time during the year.
<i>Abelia x grandiflora</i> 'Sherwoodii'	glossy abelia	3-4' tall and wide	to zone 5	N	deciduous shrub	white tinged pink flowers summer till frost, semi evergreen foliage	Full sun to part shade, medium well drained soils	
<i>Aronia melanocarpa</i> 'Morton' (Iroquois Beauty)*	black chokeberry	2-3' tall, 4-5' wide	to zone 3	Y	deciduous shrub	white flowers in spring, blue berries, purple/red fall color	Full sun to part shade, medium to wet soils	Spreads by suckering, will form a colony
<i>Clethra alnifolia</i> 'Hummingbird**	sweet pepperbush	2-4' tall, 3-5' wide	to zone 3	Y	deciduous shrub	fragrant white flowers mid summer, yellow fall color	Full sun to part shade, medium to wet soils	
<i>Forsythia intermedia</i> 'Courtasol' (Gold Tide)	forsythia	1-2' tall, 1-4' wide	to zone 5	N	deciduous shrub	Yellow flowers early spring	Full sun to part shade, average well drained soils	
<i>Hydrangea quercifolia</i> 'Pee Wee'	oakleaf hydrangea	3-4' tall, 2.5-3' wide	to zone 5	Y	deciduous shrub	White panicles of flowers early to late summer	full sun to part shade, medium moisture, well drained soils	
<i>Acorus gramineus</i> 'Ogon**	variegated sweet flag	1'	to zone 5	N	herbaceous perennial	golden variegated evergreen foliage	full sun to part shade, medium to wet soils	
<i>Artemisia</i> 'Powis Castle'	wormwood	2-3' tall, 1-2' wide	to zone 6	N	herbaceous perennial	silvery foliage	Full sun, well drained soils	semi-woody habit, can be pruned in early spring
<i>Geranium macrorrhizum</i> *	bigroot geranium	1' tall, 1.5-2' wide	to zone 3	N	herbaceous perennial	magenta flowers late spring through early summer, red fall foliage	Full sun to part shade, well drained soils	spreads by rhizomes to form a groundcover
<i>Hosta</i> 'Sum and Substance	hosta	2-3' tall, 3-5' wide	to zone 3	N	herbaceous perennial	white flowers in August	Full sun to part shade	
<i>Matteuccia struthiopteris</i> *	ostrich fern	2-5'	to zone 3	Y	fern	bold plumelike foliage	Part shade to full shade, medium to wet soils	
<i>Pennisetum alepecuroides</i> 'Hameln'	fountain grass	1.5-2.5' tall and wide	to zone 5	N	ornamental grass	wheatlike flower spikes in late summer	Full sun to part shade, medium to wet soils	
<i>Salvia nemorosa</i> 'Ostfriesland' (East Friesland)	garden sage	1-1.5' tall, 1' wide	to zone 4	N	herbaceous perennial	purple flower spikes in summer	Full sun, well drained soils	
*Bioswale Plantings								

Recommended Plants

Spout Spring Park



Photo courtesy mobot.org

Betula nigra
River birch

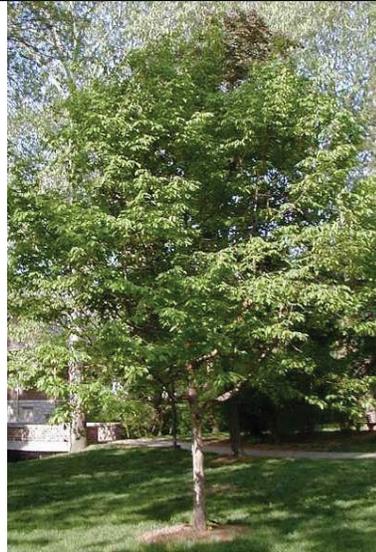


Photo courtesy mobot.org

Ostrya virginiana
American hophornbeam



Photo courtesy mobot.org

Taxus cuspidata 'Capitata'
Japanese yew



Photo courtesy mobot.org

Abelia x grandiflora 'Sherwoodii'
Glossy abelia



Photo courtesy mobot.org

Aronia melanocarpa 'Morton'
(Iroquois Beauty)
Black chokeberry

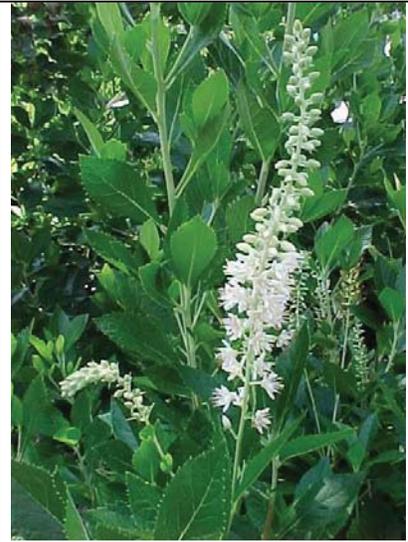


Photo courtesy mobot.org

Clethra alnifolia 'Hummingbird'
Sweet pepperbush

Recommended Plants

Spout Spring Park

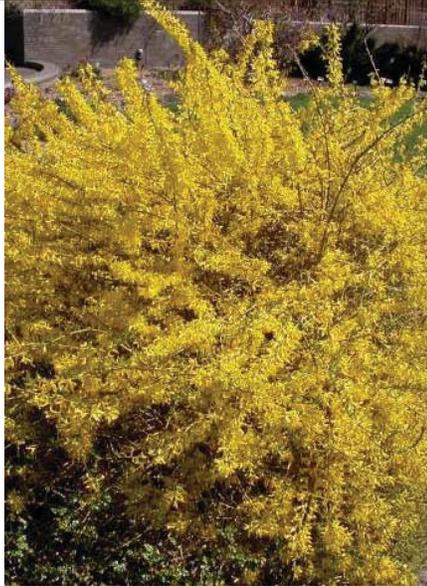


Photo courtesy mobot.org

Forsythia x intermedia 'Courtasol'
(Gold Tide)

Forsythia



Photo courtesy mobot.org

Hydrangea quercifolia 'Pee Wee'
Oakleaf hydrangea

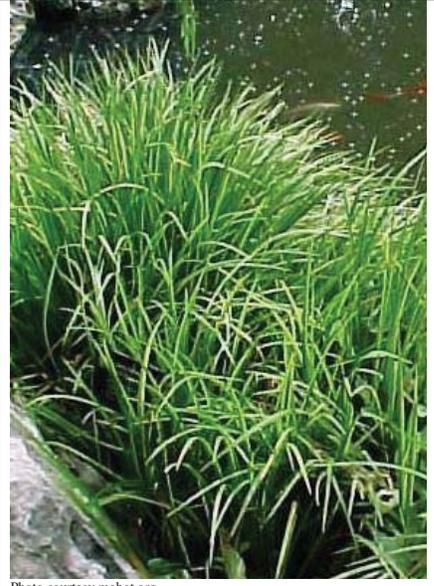


Photo courtesy mobot.org

Acorus gramineus 'Ogon'
Variegated sweet flag



Photo courtesy mobot.org

Artemisia 'Powis Castle'
Wormwood



Photo courtesy mobot.org

Geranium macrorrhizum
Bigroot geranium



Photo courtesy mobot.org

Hosta 'Sum and Substance'
Hosta

Recommended Plants

Spout Spring Park

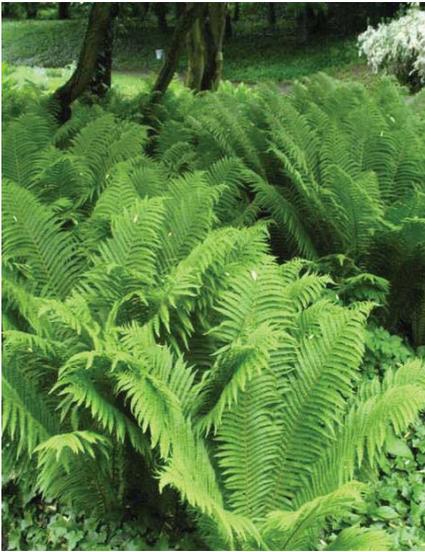


Photo courtesy mobot.org

Matteuccia struthiopteris
Ostrich fern



Photo courtesy mobot.org

Pennisetum alepecurioides 'Hameln'
Fountain grass



Photo courtesy mobot.org

Salvia nemorosa 'Ostfriesland' (East Friesland)
Garden sage

Five Chimneys Park - Plant Specifications

Plant scientific name	Common name	Size at Maturity	Hardiness	Native Y/N	Form and habit	Seasonal characteristics	Culture	Notes
<i>Betula nigra</i> 'Little King' (Fox Valley)	River birch	8-10' tall, 9-12' wide	to zone 4	N	multi-stemmed deciduous shrub	exfoliating bark, yellow fall foliage	Full sun to part shade, medium to wet soils	
<i>Cercis canadensis</i> 'Covey'	Weeping eastern redbud	4-10' tall and wide	to zone 4	N	weeping deciduous tree	lavender flowers early spring, yellow fall foliage	Full sun to part shade, medium, well drained soils	May be staked to promote upright habit to desired height
<i>Magnolia virginiana</i> 'Jim Wilson' (Moonglow)	Sweetbay magnolia	15-35' tall, 10-20' wide	to zone 5	N	broadleaf evergreen tree	white flowers May-June, evergreen foliage	Full sun to part shade, medium to wet soils	
<i>Acorus gramineus</i> 'Ogon'	Variiegated sweet flag	1'	to zone 5	N	herbaceous perennial	golden variegated evergreen foliage	full sun to part shade, medium to wet soils	
<i>Miscanthus sinensis</i> 'Zebrinus'	Zebra grass	5-8' tall, 4-6' wide	to zone 5	N	perennial grass	white flower spikes late summer through winter	Full sun to part shade, well drained soils	Cut down grasses in late winter, early spring
<i>Panicum virgatum</i> 'Rostrlbusch'	Red switch grass	4-5'	to zone 5	Y	perennial grass	silvery green grass, turning burgundy in the fall, tan/beige in winter	Full sun to part shade, medium to wet soils.	
<i>Pennisetum alepecurioides</i> 'Hameln'	Fountain grass	1.5-2.5' tall and wide	to zone 5	N	perennial grass	wheatlike flower spikes in late summer	Full sun to part shade, medium to wet soils	
<i>Aronia melanocarpa</i> 'Morton' (Iroquois Beauty)	Black chokeberry	2-3' tall, 4-5' wide	to zone 3	Y	deciduous shrub	white flowers in spring, blue berries, purple/red fall color	Full sun to part shade, medium to wet soils	Spreads by suckering, will form a colony
<i>Dicentra spectabilis</i>	Bleeding heart	2-3' tall, 1.5-2.5' wide	to zone 3	N	herbaceous perennial	pink flowers early spring	Part shade to full shade, moist soils	Foliage fades in summer, plant among later blooming perennials
<i>Geranium macrorrhizum</i>	bigroot geranium	1' tall, 1.5-2' wide	to zone 3	N	herbaceous perennial	magenta flowers late spring through early summer, red fall foliage	Full sun to part shade, well drained soils	spreads by rhizomes to form a groundcover
<i>Helleborus foetidus</i>	Bearsfoot hellebore	1-2' tall and wide	to zone 5	N	herbaceous perennial	white flowers late winter, early spring, evergreen foliage	Part shade to full shade, moist soils	
<i>Heuchera villosa</i> 'Autumn Bride'	Hairy alumroot	1.5-3' tall, 1.5-2' wide	to zone 3	N	herbaceous perennial	white flowers late summer til frost	Full sun to part shade	
<i>Matteuccia struthiopteris</i>	Ostrich fern	2-5'	to zone 3	Y	fern	bold plumelike foliage	Part shade to full shade, medium to wet soils	
<i>Mertensia virginica</i>	Virginia bluebells	1.5-2' tall and wide	to zone 3	Y	herbaceous perennial	blue flowers in early spring	Part shade to full shade, moist soils	Foliage fades in summer, plant among later blooming perennials

Recommended Plants

Five Chimneys Park



Photo courtesy mobot.org

Betula nigra 'Little King' (Fox Valley)
River birch



courtesy mobot.org

Cercis canadensis 'Covey'
Weeping eastern redbud

Photo



Photo courtesy mobot.org

Magnolia virginiana 'Jim Wilson'
(Moonglow)
Sweetbay magnolia



Photo courtesy mobot.org

Acorus gramineus 'Ogon'
Variegated sweet flag

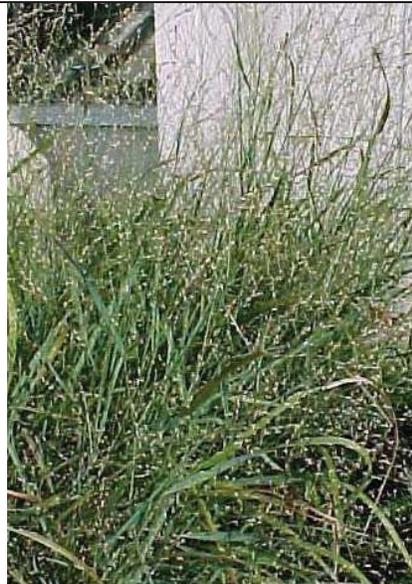


Photo courtesy mobot.org

Panicum virgatum 'Rostrahlbusch' red
switch grass



Photo courtesy mobot.org

Pennisetum alepecuroides
'Hameln'
Fountain grass

Recommended Plants

Five Chimneys Park



Photo

courtesy mobot.org

Miscanthus sinensis 'Zebrinus' Zebra grass



Photo courtesy mobot.org

Aronia melanocarpa 'Morton'
(Iroquois Beauty)
Black chokeberry



Photo courtesy mobot.org

Dicentra spectabilis, Bleeding heart



Photo

courtesy mobot.org

Geranium macrorrhizum
Bigroot geranium



Photo courtesy mobot.org

Hellebous foetidus
Bearsfoot hellebore

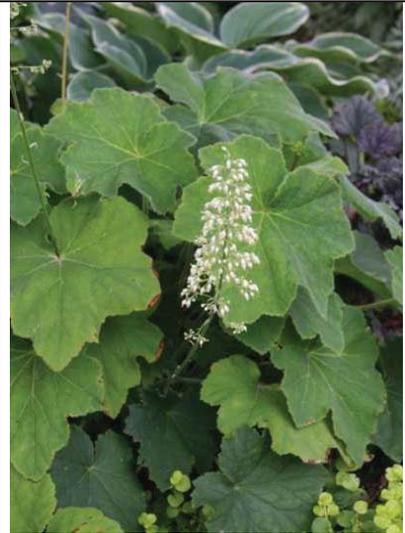


Photo courtesy mobot.org

Heuchera villosa 'Autumn bride'
Hairy alumroot

Recommended Plants

Five Chimneys Park



Photo courtesy mobot.org

Matteuccia struthiopteris
Ostrich fern



Photo courtesy mobot.org

Mertensia virginica
Virginia bluebells

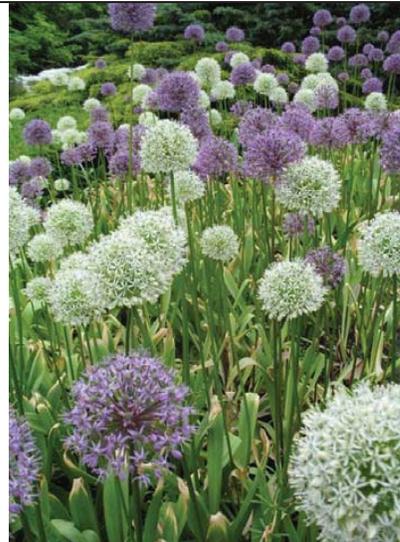


Photo courtesy mobot.org

Allium giganteum
Giant onion



Photo courtesy mobot.org

Aster novae-angliae 'Purple Dome'
New England aster



Photo courtesy mobot.org

Hemerocallis 'Happy Returns',
Daylily



Photo courtesy mobot.org

Hosta 'Sum and Substance'
Hosta

Recommended Plants

Five Chimneys Park



Photo courtesy www.mobot.org

Narcissus hybrids Daffodil



Photo courtesy mobot.org

Salvia nemorosa 'Ostfriesland' (East Friesland)
Garden sage



Photo courtesy mobot.org

Veronica prostrate
Prostrate veronica

Interlocking Blocks

Interlocking blocks for the stabilization of stream and river banks and cut lines, road bed embankments, and boat ramps, are made of concrete, and have a high proportion of open area. Interlocking connections between adjacent blocks are made by radial projecting members and recesses on the periphery of each block, the projecting members of one block fitting into the recesses on adjacent blocks (see page A16). Projections and recesses are alternately provided at regular angular intervals such that blocks can be assembled in either square or an equilateral triangular patterns. A layer of filter cloth material is laid on the sloping surface and upon which the blocks are then placed; this filter cloth slows down the leaching of water through the open areas between the interlocking blocks and prevents the washing away of sand and silt by stream or river water or rainwater runoff (see page A15).

Concrete blocks cemented to a fabric liner or linked by cables form a flexible and porous mat that allows grasses and other plants to grow through the openings in the mat. The blocks are available from several manufacturers in numerous sizes, shapes, sizes, and colors. The block mats are limited to mild slopes and mild velocities because the mats can be undermined by turbulent, debris-filled floodwaters. Their effectiveness is dependent on their mass and their ability to resist being dislocated and transported by flowing water. The same limitations that apply to rip-rap apply to these systems.

ArmorFlex Blocks

Though there is some variation between the different types of systems (size, strength, durability, etc.) most solve the same problem in a similar fashion. The information on the following pages is provided by ArmorTec Erosion Control Systems. The specific system ArmorTec markets is calling ArmorFlex. The following pages discuss the products features and benefits as well as is installation process.



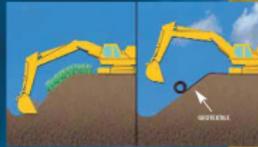
Information provided by ArmorTec



The Interlocking block systems can prevent erosion situations similar to this image from happening. Image provided by: <http://soer.justice.tas.gov.au/2003/image/108/index.php>

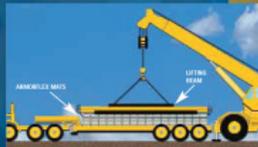
ARMORFLEX® INSTALLATION

■ Armorflex arrives on-site as a system of factory-assembled mats. Armorflex is placed on a site specific geotextile which has been placed on a prepared subgrade using conventional construction equipment.



SITE PREPARATION

■ Mats are supplied on 42-foot trailers, up to 1600 square feet per truck.



DELIVERY & UNLOADING

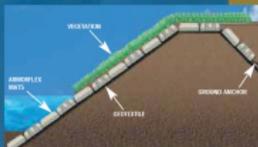
■ Mats can be handled with a spreader bar which is provided by Armortec with the initial load.

■ Permanent anchorage can be achieved by connecting the mat cables to patented anchors such as "Helix" or "Duckbill".



INSTALLING & LIFTING DEVICE

■ Mats subject to wave attack should be blinded with a sand/gravel mixture. Above normal waterline mats may be topped and seeded to give a "green" effect.



BACKFILL & VEGETATION

■ Proper toe trench requires a minimum of 2 rows of block buried below predicated soil depth.

■ Mats subject to wave attack are required to have a bedding layer of crushed stone or gravel.

OTHER ARMORTEC® BROCHURES

ARMORLOC • A-JACKS COASTAL
A-JACKS STREAMBANK & SCOUR
ARMORTEC MULTI-PRODUCT
ARMORFLEX HAND PLACED • ARMORFLEX OS
ARMORWEDGE



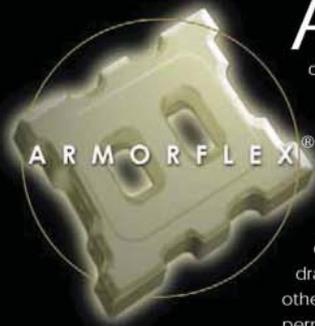
ARMORFLEX®



ARTICULATING CONCRETE BLOCK REVETMENT SYSTEM

APPLICATIONS

CHANNEL LINING • RIVERBANK PROTECTION
DRAINAGE DITCH LINING • PIPELINE PROTECTION
BOAT RAMPS • RESERVOIR SLOPE PROTECTION
LAKE SHORELINE PROTECTION
BRIDGE ABUTMENT PROTECTION
DIKES AND LEVY PROTECTION
DAM CRESTS AND SPILLWAYS
WEIRS AND OVERFLOW CHANNELS



ArmorFlex is a flexible, interlocking matrix of concrete blocks of uniform size, shape and weight connected by a series of cables which pass longitudinally through preformed ducts in each block. ArmorFlex is installed over site specific filter fabric on a prepared surface. ArmorFlex revetment systems combine the favorable aspects of lightweight blankets and meshes, such as porosity, flexibility, vegetation encouragement and habitat enhancement with nonerrodible, self-weight and high tractive force resistance of a rigid lining.

ArmorFlex has proven to be an aesthetic and functional alternative to dumped stone riprap, gabions, structural concrete and other heavy-duty, durable erosion protection systems. ArmorFlex is easy to install, therefore, can dramatically reduce overall project costs. More specifically, when compared to other systems, life-cycle costs have been reduced because ArmorFlex is a permanent system and saves on subsequent maintenance expenses.

BLOCK STYLES

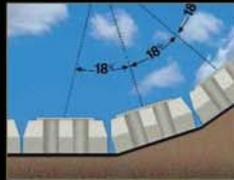
OPEN CELL CLOSED CELL



20% OPEN 10% OPEN

When placed on a site specific filter fabric, the permeability of the revetment system relieves hydrostatic pressure in the subgrade. The system's capability for soil retention prevents leaching of subsols throughout the installation.

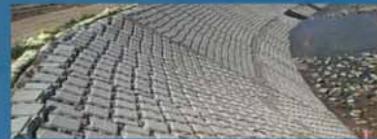
FLEXIBILITY



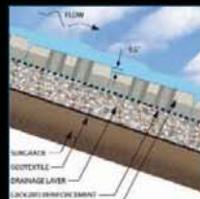
ArmorFlex blocks are interconnected by flexible cables, providing articulation between adjacent blocks. Block walls are designed with beveled side walls to allow for flexibility in all directions.

FEATURES & BENEFITS

- STABILITY
- FLEXIBILITY
- PERFORMANCE
- COST-EFFECTIVE
- VEGETATION
- PERMEABILITY
- EASY TO INSTALL



DAMS, SPILLWAYS, AND HIGH VELOCITY CHANNELS



ArmorFlex T-Series

ArmorFlex unique Tapered block design offers superior protection for embankment dams, spillways, and high velocity channels and chutes. The essential design component of the ArmorFlex Tapered system is a 0.5-inch taper that virtually eliminates destabilizing impact flow forces, thereby providing higher factors of safety. The ArmorFlex Tapered block system has been successfully tested under hydraulic jump conditions at Colorado State University.

Signage

An additional goal of this project was to provide some insight for signage opportunities on the three sites. It is important to create a sign that displays important information about the site, but also ties into the existing signage of the Town of Blacksburg. For this reason, the signage board uses a template already developed for future signage in Blacksburg and modifies it to fit the needs of the parks. The following page displays an example for signage on the Spout Spring site (see page A19). It provides information about the spring that runs through the site as well as the historic spring house located on Wharton Street.

The logo below represents the Historic Sixteen Squares - the sixteen original planned blocks in the Town of Blacksburg. The logo was modified slightly for the signage board to help reference where the parks are within the Sixteen Squares.





Spout Springs

Spout Spring is a natural spring that begins at the headwaters of Stroubles Creek on the northern part of the town of Blacksburg, VA. This spring marks the origin of Blacksburg's early water supply. Throughout its history the importance of this spring has been forgotten and lost within the vegetation of the town property. Spout Spring Park revitalizes this once forgotten asset of the town by creating a place that people seek to explore.



Spout Spring House

The Spout Spring House, also known as the Tucker House is one of Blacksburg's oldest standing structures. This house built partly of log timber construction seems to be oriented to the grid of Blacksburg which would date it after 1797. This house sits on top of a small hill located to the southwest side of Spout spring directly in line with Washington Street.



Town of Blacksburg