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**Integrating and Applying Conservation Development Principles to Commercial Sites: A
Business Park in Bristol, TN**

A Thesis Presented for
The Master of Landscape Architecture
Degree
The University of Tennessee, Knoxville

Christopher Lee Chandler
August 2011

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Dedications

"We Abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." -Aldo Leopold, Ecologist.

"I think the environment should be put in the category of our national security. Defense of our resources is just as important as defense abroad. Otherwise what is there to defend?" -Robert Redford

Cheers to the first MLA class in the State of Tennessee.

Acknowledgements

Thanks to all of my committee members for their guidance and help throughout this thesis. It has been a great experience and I look forward to using their insight and techniques as I continue on to the professional world.

Abstract

Throughout history, land has been treated as man's platform for development and expansion into new territories and the basis for our current infrastructure. Understanding existing properties and characteristics of the land has become imperative to successful development and strong networks that connect human beings to one another. As we discover ever changing natural tendencies, we are prone to rethinking the way in which the land is engaged from a developmental and conservational standpoint. Coexisting with natural processes of the earth and the land is of utmost importance to the success of human systems using it as a base for growth.

Land is becoming very scarce as the human race expands its network, which makes the term "Conservation Development" an integral part of the future of infrastructure. Conservation Development is defined as the process of planning, designing, building, and managing communities that preserves landscapes or other community resources that are considered valuable for their aesthetic, environmental, cultural, agricultural, and/or historic values (McMahon, 2010). Critically analyzing potential sites prior to any ground work is vital to successful conservation development. Specifically, Bristol West is a challenging site and as with every site it has specific constraints and opportunities for development. If developed using traditional methods, it has the potential of being built upon without responding to the existing features and natural resources, which could potentially lead to economic and environmental problems. Some problems include wildlife corridor interruptions, flooding problems within the site and contextually, destruction of the character and "sense of place" of Bristol, unsuccessful business applications, and strip development.

The appropriateness of conservation development to a site in Bristol will be examined through analyzing existing topography, natural drainage patterns, wildlife corridors, and relationships to surrounding context. Strip development of the site could hinder the economic and environmental integrity of Bristol, Tennessee if certain issues are not addressed throughout its planning process. Therefore, more responsible development strategies are explored as well as how economically efficient the site can be for its surrounding context and the City of Bristol, Tennessee.

Preface

Can development have a positive impact on the land, and at the same time have economic success that is incorporated into the overall infrastructure of an area? As we move into the future, development must be reworked and fine tuned to offer more successful strategies that respond to the natural environment. A plan for smarter growth and design must be implemented in order to address these vital areas of concern.

Land and its composing elements such as water, soil, and vegetation are precious natural resources, and as we all know, "They're not making anymore land." The United States has numerous cases of irresponsible development, which is a contributor to sprawl and inefficient infrastructure. Between 1982 and 1997 approximately 25 million acres (39,000 square miles) of rural land including forests, rangeland, pastures, cropland, and wetlands were converted to developed land, which includes sub-divisions, freeways, factories, strip malls, airports, and many other forms of development (NumbersUSA, 2010). Over a 20-year period (1970-1990), the 100 largest urbanized areas in the United States spread out over an additional 14,545 square miles. That was more than 9 million acres of natural habitats, farmland, and other rural space that was covered over by the asphalt, buildings and sub-divisions of suburbia (NumbersUSA, 2010). According to Edward McMahon, the most recent statistics from the USDA's National Resources Inventory report that from 1997 to 2003 developed land increased to more than 35 million acres in the United States. Statistics further suggest that the rate of land conversion is accelerating, with a prediction that the developed area in the U.S. will increase by 54.4 million acres during the next 25 years (McMahon, 2010).

Deciding whether or not to develop a site can affect its area and or region at a micro and macro scale. An example would be whether or not to develop a piece of farmland that has been an important source of goods to a specific area or region, and will development provide a more prosperous economy and efficient foundation to the local area and surrounding region. How a site is developed can either become a negative or positive aspect to a specific area and its overall infrastructure. One approach to mitigating these problems has been called "conservation development," and it can be outlined in a series of principles. These principles can help developers design communities that accommodate this growing market while sitting lightly on the land and preserving natural amenities that are most attractive to people (McMahon, 2010).

The purpose of this thesis is to explore the idea that manipulating the land to satisfy our growth and development needs is not the answer, rather that working with the land and meshing our infrastructure within existing profiles is key to a better overall foundation. Also, understanding the idea of conserving natural resources through new and improved development strategies is imperative. Nature provides unique unforgettable experiences, and at the same time provides necessities and resources for the human race that must be carefully managed and conserved. It is our job as designers to respond to the existing features and values of a site internally and externally throughout a design process. We must then fully understand a historical perspective through an in-depth analysis, which can help compose a solution that betters the quality of life without destroying "the sense of place" and the character of an area.

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Chapter 1: Introduction to Conservation Development

What is Conservation Development?

Construction development standards across the United States have been in constant flux throughout the last century to present day. Acknowledging our environment along with the way we shape the infrastructure of our society is essential to its stability. The way in which our society transforms itself socially and culturally has a direct impact on environmental aspects, economic prosperity, and community livability. The idea of "conservation development," also called "cluster development," addresses these aspects, and how they can become positive if certain parameters are followed throughout design processes. The word "conservation," means a careful preservation and protection of something; especially: planned management of a natural resource to prevent exploitation, destruction, or neglect (Merriam-Webster, 2010).

"Development" refers to the process of economic and social transformation that is based on complex cultural and environmental factors and their interactions, and/or the process of adding to a parcel of land, such as grading, subdivisions, drainage, access, roads, and utilities (WebFinance, 2010). One goal of conservation development is improving community livability. In this context, "community" refers to a unified body of individuals: as the people with common interests living in a particular area (Merriam-Webster, 2010). Conservation development can be interpreted as a strategy to provide a rich quality of life through growth and expansion, but at the same time not endangering the very resources that are essential to life and its prosperousness. In this thesis, it is hypothesized that by using practices of conservation development including the consideration of existing topography, soils, vegetation, natural drainage patterns, and other sensitive or unique landscape features, a site can maintain its environmental integrity, be economically prosperous, and at the same time retain its community livability.

Aspects of Conservation Development

Maintaining the environmental integrity of an area can be very beneficial to its overall function within a larger context and vice versa. Specifically, through conservation development, this involves protection and improvement of the air, water, and land upon which all living things depend for sustained health. Instead of focusing on minimizing impacts, environmental protection should focus on enhancing the environment and increasing biodiversity through land use, development, and individual decisions and practices (The Nature Conservancy and Chicago Wilderness, 2004, 3).

Economic prosperity can be enhanced through conservation development in a way that is cost effective and specifically reduces flooding and water quality degradation. This can benefit new and existing residents by providing stable jobs and strengthening local, state, and federal governments. When a community becomes economically prosperous, it can lead to the attraction of high quality residential and commercial development, thus providing opportunities in business, recreation, community health, etc. for all residents (The Nature Conservancy and Chicago Wilderness, 2004, 3).

Community livability is enhanced through conservation development by providing access to recreational opportunities, open space, and trails that reduce the risk of flooding. Preserved natural areas can create a very diverse outlook on a specific community, and instill a richness upon residents of an area through views and engaging experiences. In order to maximize mobility and independence for all age groups, development should be located and designed to enhance transportation options and provide easy access to employment, education, and shopping (The Nature Conservancy and Chicago Wilderness, 2004, 3).

As the future approaches with more and more problems arising in our natural environment, our communities, and the world economy, it becomes crucial that we push for more efficient processes of development and overall infrastructure. This gives rise to the term “Growing Greener”, which enables communities to reach as high as their ideals, putting the greener vision of comprehensive plans into practice through conservation zoning and subdivision ordinances that set new standards for more creative development design (Arendt, 1999, xiii). Comprehensive planning by professionals and local stakeholders is an attempt to establish guidelines for the future growth of a specific community, and it is meant to be an all inclusive plan at addressing the issue (Conglose, 2010). Having such a plan can help the overall connectivity of a specific community as phases occur throughout the planned time period. Being an integral part of the concept of conservation development, analyzing any available plan for a specific area can influence the design and contribute to its success. The three major elements needed for managing growth to conserve land include a comprehensive plan, conservation zoning, and conservation subdivisions (Arendt, 1999, 19). Conservation zoning provides landowners and developers with a number of density options geared to a range of open space set aside requirements, while conservation subdivisions involves a design process that includes several different environmental factors (Arendt, 1999, 29&53). Another related concept to the idea of “Growing Greener” is Transfer of Development rights. This concept allows a bundle of development rights to be divided into pieces, and for the pieces to be transferred from one site to another site (City of Nashville, 2007, 2). This concept also ties in with conservation easements, which are a crucial part in preserving land that has certain aspects and qualities that must be protected.

Sprawl

Another very important term to understand is "sprawl," which is the spreading out of a city and its suburbs over more and more rural land at the periphery of an urban area (NumbersUSA, 2010). This involves the conversion of open space (rural land) into built-up, developed land over time (NumbersUSA, 2010). As concerns over issues such as "urban sprawl," open space preservation, environmental protection, and farmland loss have increased, some home buyers, developers, and community officials have started to question whether the traditional development pattern provides the quality of life that many people desire (Church, 2010). According to John Church, the most common name for this new development approach is "cluster development," but "conservation design" and a number of regional terms are applied to the concept. Regardless of its name, the main objective of cluster development is to allow residential, or even commercial development while still protecting the area's environmental features, allowing for more open space, and protecting farmland and the character of rural communities (Church, 2010).

Advantages and Disadvantages of Conservation Development

There are advantages and disadvantages to cluster development as it becomes apparent how important it can be for the overall community and its context. In most cases, local ordinances and regulations must be updated to facilitate building conservation development, which can include the redefining of traditional regulations to permit the preservation of environmentally sensitive areas, rural architecture, historic sites, and other unique characteristics of the land being developed (Church, 2010). Developers often cite local regulations as the primary reason more innovative designs are not used (Church, 2010). More flexible regulations does not mean "anything goes," and traditional codes must be replaced with new design

standards that address the goals of conservation development, such as open space preservation, etc (Church, 2010). According to John Church, many advantages of cluster development are related to specific uses of the open space and the “feeling” that this space generates for a community. Some of these advantages include the following: (McMahon, 2010, 26)

For developers conservation development can result in:

- Higher price premiums.
- Faster absorption rates.
- Cost savings from reduced infrastructure, as a result of clustering development on the site and taking advantage of natural storm water and other systems.
- Cost savings from reduced grading and other land preparation costs.
- Free positive publicity.

For local governments and communities, conservation development can result in:

- Decreased storm water runoff, due to less impervious surface area.
- Decreased storm water treatment costs.
- Reduced risk of flooding and other environmental hazards.
- Improved water quality, due to protection of riparian buffers, wetlands, and groundwater recharge zones, as well as to clustering development away from water resources.
- Protection of rural character, forests and fields, and tourism/agricultural economies.
- Land preservation at no cost to the community.
- Reduced demand for public land.
- Lower municipal service costs due to clustered development.
- Protection of critical habitat for a variety of species.

For homeowners and residents of a conservation community, conservation development can offer:

- Protection from inappropriate development.
- Higher home appreciation values.
- Access to natural areas and open space.
- Increased opportunities for healthy lifestyles.
- A greater sense of community and belonging.
- A serene and aesthetically pleasing environment.

Well designed cluster developments may benefit the whole community in terms of storm water management, in that they usually have less impervious surfaces and provide more open space for infiltration (Church, 2010). In turn, these factors can help reduce the amount of storm water runoff leaving the property, thus decreasing the chances that new development will cause flooding problems (Church, 2010). Natural areas, such as wetlands or native plantings, that are a part of the cluster development's open space can help manage storm water by reducing the volume of runoff and cleaning the storm water during the infiltration process.

According to John Church, disadvantages of cluster development include the following:

- Perhaps most important, local officials, developers, and the community may be predisposed toward traditional development designs because they are familiar and well understood. An education effort may be necessary to help these groups understand the goals and advantages of cluster development.

- During the planning phases, lot and home layout may take extra work to ensure that while homes are located closer together, they still take advantage of the open-space goals of the design.
- Methods to protect and maintain the open space must be carefully developed, implemented, and monitored.
- Although not necessarily a restricting disadvantage, the management of waste water must be carefully designed for smaller lots.
- It must be understood that a potential higher cost for development may occur, but with proper design and strategies for implementation such as phasing, and using tax incentives the potential for a higher return on investment (ROI) is much higher than that of traditional development practices.

According to Edward McMahon, a growing body of research shows that how we design our communities and buildings has profound impacts on our health. At a macro scale, a study in 2003 by Smart Growth America, indicated a clear correlation between sprawl and health problems such as obesity and hypertension (McMahon, 2010). Keeping a clear network of connectivity in communities through conservation development practices that preserve parts of the infrastructure such as open space and clustering buildings can serve as a model for future growth throughout our nation.

Chapter 2: Introduction to the Site and Precedent Studies

Tennessee Growth Policies

The State of Tennessee is a major contributor to agriculture, manufacturing, and tourism within the United States. Currently, it is the 14th fastest growing state in the union, and has the 4th fastest rate of land development based on data from the 1997 National Resources Inventory (State of Tennessee, 2010). Tennessee's General Assembly created a framework for development of sound growth policy in 1998 by enacting Public Chapter 1101, the Growth Policy Act (State of Tennessee, 2010). This act did not impose a single statewide solution, rather it included five statements of legislative intent: (State of Tennessee, 2010)

- to eliminate annexation or incorporation out of fear.
- to establish incentives to annex or incorporate where appropriate.
- to more closely match the timing of development to the provision of public services.
- to stabilize each county's education funding base and establish an incentive for each county legislative body to be more interested in education matters.
- to minimize urban sprawl.

Bristol, TN Demographics and Community Characteristics

Bristol, a town located in the Northeast corner of Tennessee bordering Virginia, has a unique characteristic of being divided by the state line (Figure 1 and 2). This makes Bristol, Tennessee, and Bristol, Virginia twin cities in two different states. The boundaries of both cities run parallel to each other along State Street in the common downtown district. Bristol is also part of a triangle network of three cities that is referred to the "Tri-Cities" region (Figure 3).

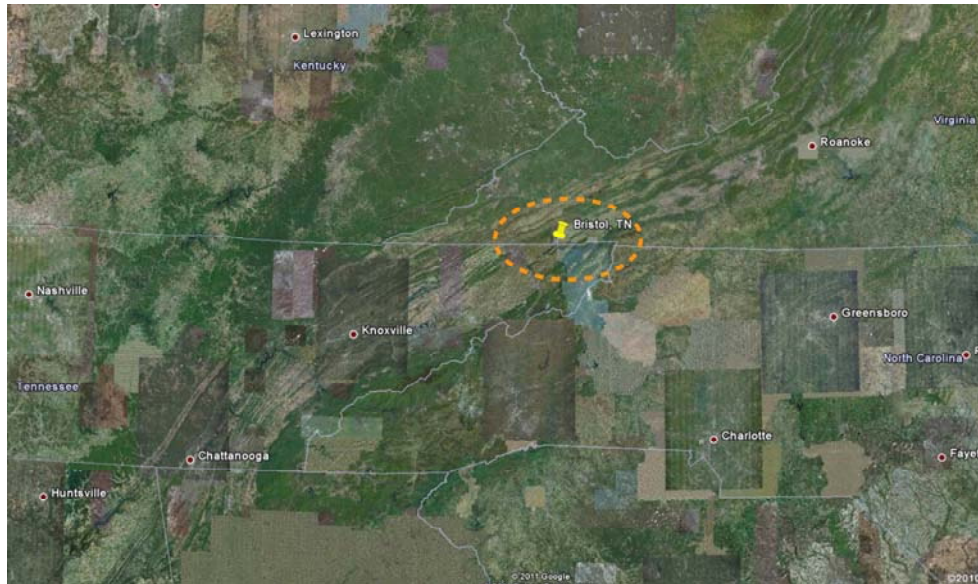


Figure 1: The location of Bristol TN/VA and its relation to surrounding states. Source: Google Earth.

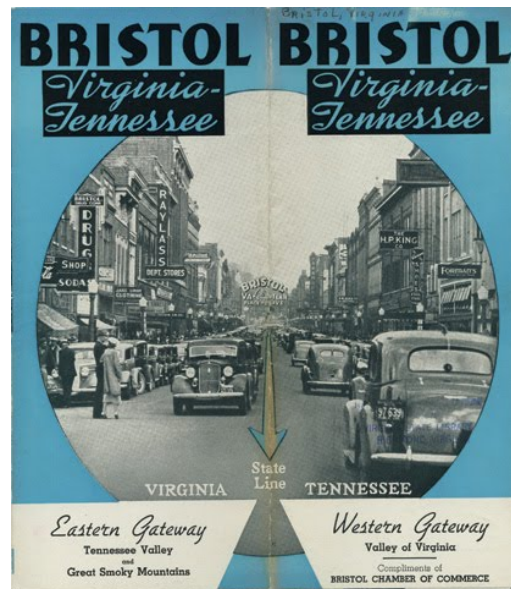


Figure 2: The City of Two States (n.d.). Note: Copyright Three Perfect Minutes, Milestone Recordings in American Music.



Figure 3: The Cities of Bristol, Johnson City, and Kingsport. Source: Google Earth.

According to the City Bristol Tennessee and Virginia the following demographics have been recorded:

Bristol, TN

Population (Bristol, TN)	25,821 (2009)
Population (Bristol, VA)	17,558 (2009)
Number of Households	11,578
Land Area	784 persons per square mile
Density	33 square miles
Yearly Budget	\$84,015,033.00
Median Age of Residents	39 years
High School graduate or higher education	76.1%

Bachelor's Degree or higher	17.4%
Median Income	\$30,039.00

The City of Bristol, TN has a total number of 331 employees including:

- Police Department 89
- Fire Department 58
- Public Works Department 102

According to the City of Bristol, its largest employers include the following:

1. Wellmont Health System	1,615 employees	13.0%
2. Touchtone Wireless	656 employees	5.3%
3. King Pharmaceuticals	510 employees	4.1%
4. Bristol, TN City Schools	427 employees	3.4%
5. City of Bristol, TN	337 employees	2.7%
6. Robinette Company	300 employees	2.4%
7. Bristol Metals LP	300 employees	2.4%
8. Exide Corporation	240 employees	1.9%
9. Embarq	231 employees	1.9%
10. GlaxoSmithKline Laboratories	140 employees	1.0%

The city currently has 24 total parks consuming 2,388 acres(11.3 %). One major park, Steele Creek Park, includes most of the acreage by covering 2,224 acres. Steele Creek Park's amenities include a nature center, golf course, multi-use lodge and shelters available for rent, paddle

boating on the 54 acre lake, and 21 miles of hiking and biking trails (City of Bristol Tennessee, 2010). Bristol residents have the luxury of experiencing all four seasons while enjoying the national forests, clean lakes, beautiful parks, and mountains surrounding the twin city. Bristol also offers many community events and attractions, including the Bristol Motor Speedway and the "Rhythm and Roots" country music festival.

A Brief History of Bristol

Every community around the world is unique in a historical context, and should be studied as part of the overall design process of a project. Referring back to the history of a site can relay information to new generations that otherwise may be lost, and at the same time it can preserve specific key elements and characteristics unique to an area. Our job as designers is to improve the quality of life, while designing around the local cultures without removing "the sense of place" of individual communities.

Before 1852, what is now the heart of the City of Bristol Tennessee/Virginia was part of the vast plantation of Rev. James King. Rev. King had a son-in-law, Mr. Joseph R. Anderson, then a merchant of Blountville, Tennessee, who upon learning that two railroads would meet on the King's land, foresaw that the site would be ideal for the founding of a city. On July 10, 1852, Anderson contracted for 100 acres of the King plantation, forty-eight acres in Tennessee and fifty-two acres in Virginia. On July 16, 1852, he chose the name "Bristol" for his planned city, narrowly edging out the name "Paradise" by only one point. The survey of Bristol began August 1, 1852, and continued for three days. During the summer of 1853, Mr. Anderson had combined a residence and business house erected on what is now the southwest corner of State Street and Martin Luther King Blvd. This was the first building erected in the Town of Bristol and was the

beginning of this city. Anderson moved his family from Blountville to this house on September 18, 1853. The Bristol post office opened in this house on November 5th. His general mercantile store opened for business on December 24th of the same year. Banking began in 1854. This corner is now called the Birthplace of Bristol. Samuel Goodson, who owned land that adjoined the original Town of Bristol at its northern boundary, started a development known as "Goodsonville". In 1856, that town and the original Bristol, Virginia were merged to form the composite town of Goodson, Virginia. However, the depot continued to be known as Bristol, Virginia. In 1890, all the development on the Virginia side returned to the name "Bristol" and so remains today (Phillips, 2010). Bristol was the site of some of the first commercial recordings of country music, with singer/songwriters such as Jimmie Rodgers and the Carter family. It became a popular venue for the mountain musician Uncle Charlie Osborne. In 1998, Congress recognized Bristol as the "Birthplace of Country Music," as well as the birthplace of Tennessee Ernie Ford (Stone and Haskins, 2005). Bristol celebrates part of its history as being a twin city with a lighted sign located in the downtown area where the state line splits State Street down the middle (Figure 4).



Figure 4: The Sign of Bristol, TN/VA located downtown (2009). Note: Copyright Topix (Owner: Jasper).

Precedent Studies

In order to prepare a stronger case and design for the Bristol West site, similar projects are compared and analyzed to understand where certain developments succeeded and failed. Projects to be analyzed include developments with a conservational approach, commercial centers, business parks, open green space, and pedestrian friendly corridors. Also, looking at sites of strip development, where a site has been completely altered to conform to a specific design, in turn creating a place with negative environmental impacts, economic issues, and community fragmentation will be presented. The three main precedent study categories include master planned communities, business parks, mixed-use developments, and mixed-use strip developments.

Master Planned Communities

Daniel Island, Charleston, South Carolina

Daniel Island is a master planned community located on an island of the same name at the northern end of Charleston, South Carolina. Developed by the Daniel Island Company, the project embodies new urbanist principles while providing retail, employment, and a range of housing opportunities. At build out, expected in 2015, the 4,000-acre development will contain 6,000 homes, two golf courses and a country club, 2 million square feet of office space including a corporate headquarters and regional offices, 1.2 million square feet of retail space, three schools, a marina, and at least 400 acres of open space (The Daniel Island Company, 2011). The 400 acres of open space accounts for 10% of its 4,000 acres, which is under the minimum 50% open space standard for conservation development. However, this does not include protected areas for wildlife and habitat, as well as the two golf courses on the island. An aerial shows the current condition followed by some internal views of Daniel Island (Figure 5, 6, and 7).



Figure 5: Aerial view of Daniel Island, South Carolina (n.d.). Note: Copyright Daniel Island Company.



Figure 6: Real estate on Daniel Island (n.d.). Note: Copyright Daniel Island Company.



Figure 7: Pedestrian corridors on Daniel Island (n.d.). Note: Copyright Daniel Island Company.

Hidden Springs, Ada County, Idaho

Hidden Springs is a 1,756 acre master planned community built around a 130 acre working farm in the Dry Creek Valley, about 20 minutes northwest of downtown Boise, Idaho. The community, which at build out will contain 850 residential units and a mix of retail, recreational, and educational facilities, includes more than 1,000 acres of open space dedicated to a variety of uses, including preserved lands, hiking trails, agriculture, wetlands, and wildlife preserves, as well as landscaped greens and playing fields. The majority of the open space, more than 800 acres, is under conservation easement. The rest is protected by underlying zoning. In contrast to conventional subdivisions in the area, the site plan for Hidden Springs preserves environmentally and visually sensitive slopes as open space by clustering homes in a village on the valley floor or tucked within hidden side valleys, where they do not dominate the landscape. The project also features an innovative wastewater reclamation system, community-supported agriculture, an elementary school, a public library, a village store and cafe, and comprehensive design guidelines (McMahon, 2010, 148). This becomes a good case study for conservation development, in that it encompasses many of the aspects to be presented and designed for at the Bristol West site. The 1,000 acres of preserved open space accounts for 57% of the site, which is within the standards of conservation development design. In comparing this site to Bristol West, many elements are similar, including topography and extending large conservation easements throughout the site to preserve sensitive areas less suitable for development. The Precedent 1 attachment shows the location of conservation easements throughout the master plan, along with the cluster development of residential and commercial lots. The proposed master plan is shown

below with an internal view of the development depicting its character and its ability to capture important views (Figure 8 and 9).



Figure 8: Hidden Springs proposed master plan(2010). Source: McMahon, p.156 (2010).



Figure 9: View of Hidden Springs (2010). Note: Copyright Realty In Idaho.

Serenbe, Fulton County, Georgia

Serenbe is a 1,000 acre mixed-use conservation community located in the Chattahoochee Hills of Fulton County, Georgia, just 32 miles from downtown Atlanta. It is the first development to be approved since the Fulton County Board of Commissioners adopted the Chattahoochee Land Use Plan, which calls for rural green space to be preserved by focusing development in historic villages and hamlets. This comprehensive land use plan covers 40,000 acres in Fulton County and calls for 80 percent of it to remain as green space (McMahon, 2010, 198). This covers the standard for setting aside 50% or more of the green space, and preserving it naturally. Figure 10 shows the architecture of the dwellings within the community, and represents the character as well. Figure 11 displays the master plan for the Georgia community.



Figure 10: Serenbe residential architecture (2008). Note: Copyright Serenbe Community.

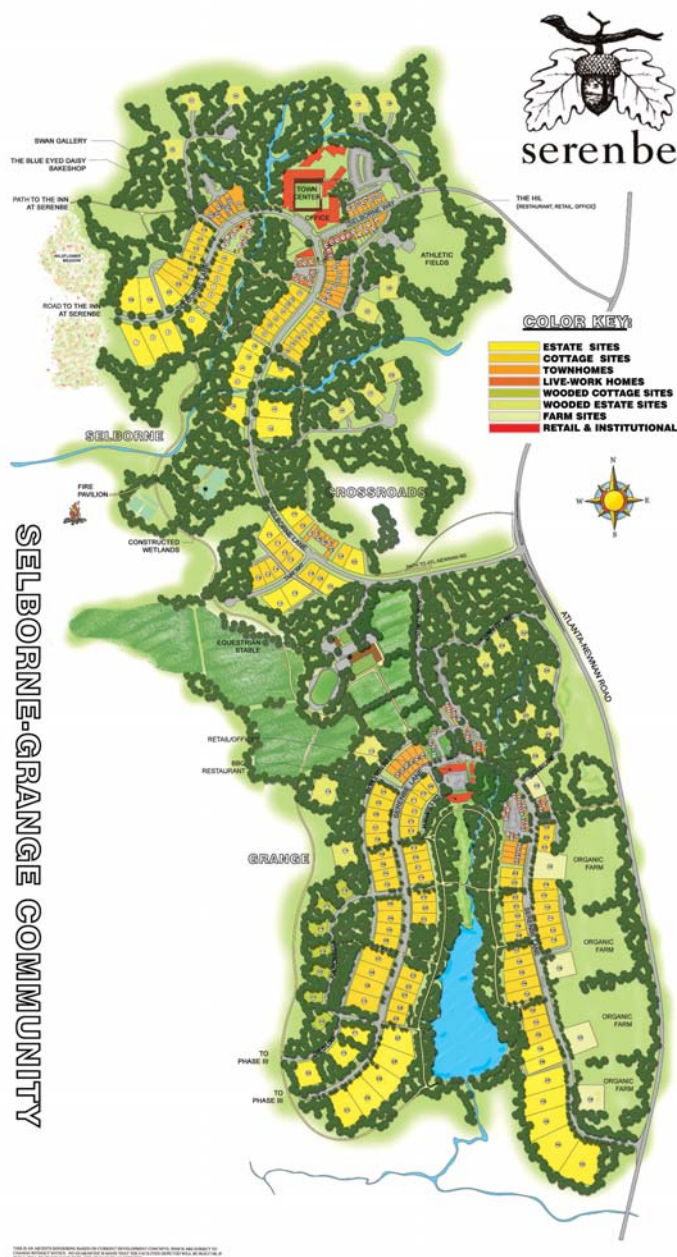


Figure 11: Serenbe Community Master Plan(2008). Note: Copyright Serenbe Community.

Business Parks

Avis Research and Business Park, Ann Arbor, Michigan

Avis Research and Business Park is an environmentally sensitive 156 acre development located just south of Ann Arbor, Michigan. The park's proximity to the University of Michigan has attracted many high tech tenants desiring a modern campus environment and access to a highly trained pool of knowledge workers. The site layout is dictated largely by the natural contours of the land in order to take best advantage of the natural features of the environment. The sometimes unusually shaped lots created through this practice have encouraged the development of uniquely designed buildings. The developer has gone to considerable expense in its commitment to preserving the environment by routing streets and utility lines around existing stands of mature trees, and by tunneling under the roots of a 100-year-old oak tree to install sewer pipes. An existing farmhouse and outbuildings on the site have been converted into apartments and conference space (Urban Land Institute, 2010). The open space preserved is around 92 acres, which translates to 58% of the total area. The master plan shown in Figure 12 shows the site layout, with the beginning phases of the site development.



Figure 12: Avis Research and Business Park master plan(2011). Note: Copyright LoopNet.

The Branches, Reston, Virginia

The Branches is a 25-acre site developed for small office buildings in a heavily wooded, scenic environment in the town of Reston, Virginia. The project is targeted to attract trade associations and small corporations. It has open space and accommodates the needs of a business park in the area, and is located conveniently off Virginia State Highway 267 (Urban Land Institute, 2010). This project was analyzed and compared to Bristol West for an estimated build out square footage of office buildings. This can be seen in more detail in the Sheet 1 attachment.

Mixed-use Developments

Fair Lakes, Fairfax, Virginia

Fair Lakes is a 657-acre, multiuse planned development that at build out will contain over 5 million square feet of office and research space with supporting residential, retail, hotel, and recreation uses. Building is occurring through land sales, build-to-suit, and speculative development programs. With its completion in 1995, Fair Lakes exemplifies the type of negotiated public/private agreements now common to long-term projects. Its land uses include a mixed-use district, fitness center, apartments, hotel, multifamily housing, business park, research and development, retail, and open space (Urban Land Institute, 2010). The open space preserved by the site is approximately 30% of the total 657 acres. Figures 13 and 14 show some internal views of the developed site. More analysis and statistics can be found in the Sheet 1 attachment.



Figure 13: East Market at Fair Lakes(n.d.). Note: Copyright The Peterson Companies.



Figure 14: Fair Lakes shopping center(n.d.). Note: Copyright The Peterson Companies.

Mixed-use Strip Developments

Exit 7, Bristol, Virginia

Exit 7 is a concentrated business development along Virginia's I-81 corridor that has spurred rapid growth. This Bristol "hot spot" features fine dining, lodging franchises such as Marriott and Holiday Inn, and major retail giants such as Target, Wal-Mart, Home Depot, and Lowe's, drawing patrons from across Northeast Tennessee and Southwest Virginia (Bristol Virginia Office of Economic Development, 2010).

Another perfect example of stripping the land is Exit 7, with its large building footprints and enormous impervious parking surfaces. This development heavily relies on the automobile in order to move from store to store, with very few pedestrian corridors emphasized throughout the site. It has minimal or no open green space, especially the kind that can be engaged by shoppers, visitors, and local residents. Large amounts of runoff come from a surplus of impervious surfaces, causing flooding during heavy downpours and storms. This contributes to its failure as a pedestrian friendly site. It may be economically prosperous at this time, but as smarter growth is utilized within its surroundings, it may decline. Figures 15, 16, and 17 display pre-development, during development, and post development aerials showing the land being cleared to a clean slate to allow the structures to be implemented. This development strategy deteriorates wildlife habitats, community functionality, and ultimately economic prosperity.



Figure 15: Exit 7 prior to development(1993). Source: City of Bristol, Virginia.



Figure 16: Exit 7 during development(1996). Source: City of Bristol, Virginia.



Figure 17: Exit 7 after development(2006). Source: City of Bristol, Virginia.

Turkey Creek, Knoxville, Tennessee

Turkey Creek is Knoxville's premier shopping venue. Turkey Creek is the largest commercial development ever built in the metropolitan area of Knoxville. Designed for mixed use and beautifully landscaped, Turkey Creek boasts more than 300 acres of space zoned for retail shopping outlets, medical facilities, theaters, office space, banks, restaurants, and hotels. The developers of Turkey Creek also created a 58-acre nature preserve and designed greenways throughout the site. Located only three miles from the junction of Interstates 75 and 40 to the west, and 14 miles from downtown Knoxville, this site is a quick drive from the urban center, suburban Knoxville, and surrounding rural counties (Image Builders, 2010).

This site is a perfect example of a poor development. With the description, it seems to have good intentions, but none of those were achieved. Turkey Creek has almost zero walkability, even though it has walkways. The vehicular traffic overwhelms the pedestrian with fast speeds and multiple lanes. The site layout does not allow the pedestrian to walk from store to store easily at all, which contributes to the congestion of vehicular traffic along the main road through the site. The comparison of paved impervious space to green space can be seen in the Sheet 1 attachment. The 358 acres of preserved green space within the site includes 58 acres (19%) of constructed wetlands, which is also shown in the precedent analysis sheet. Figures 18 and 19 show the Turkey Creek location during and after development.



Figure 18: Turkey Creek during development(n.d.). Note: Copyright First Commercial Real Estate.



Figure 19: Turkey Creek as it appears today, post-development(n.d.). Note: Copyright Colonial Properties Trust.

The preceding case studies allow the designer to understand where other developments failed and where they prospered. Analyzing and comparing projects with similar elements allows the designer to reach a potentially very successful design. For the purpose of this thesis, certain site elements were compared from specific case studies to guide the development of the Bristol West master plan. This analysis and research can be seen in the Sheet 1 attachment. It is important to study past projects in the design profession as it is with anything, and as George Santayana said, "Those who cannot learn from history are doomed to repeat it."

Chapter 3: Bristol West Site Analysis and Design Methods

The Bristol West Site Issue

Bristol West, within the site study boundary, is approximately 590 acres as it stretches into Sullivan County, Tennessee and Washington County, Virginia (Figure 20). The Tennessee side accounts for 269 acres, and the Virginia side makes up the remaining 321 acres. The site is a prime location for development as it relates to access and surrounding context. It is located a half mile from the intersection of Interstate 81 and Highway 11W, approximately five miles from downtown, and ten miles from the Tri-Cities Regional Airport. It is also centrally located to all of the Tri-Cities business districts (City of Bristol Tennessee, 2010). This site is potentially threatened by strip development, which has already occurred at the Exit 7, several miles to the north off Interstate 81. Having this threat of strip development could hinder Bristol West's overall niche in a larger plan for smarter growth.



Figure 20: Site Study Area as it Relates to its Surrounding Context. Source: Google Earth.

The Importance of The Issue

Conventional development strategies such as strip development and "cookie cutter" development have aspects that do not respect the existing lay of the land, and interrupt vital natural processes such as the hydrologic cycle, wildlife corridors and habitats, and many other unique landscape features. Often times, the specific character of an area and its "sense of place" are not taken into account when designing conventional developments at macro and micro scales. This can create a large disruption in the natural, social, and economic environments for a site. Conventional development practices are also responsible for sprawl at many different levels, as described in the introduction to this thesis. Understanding the economic, social, cultural, and environmental needs of a region and a specific site is imperative before jumping into the layout and design of a specific area. In order to fully engage sites through design and create an infrastructure that blends with the landscape, we must fully develop an idea of future growth and need, and analyze sites critically based on natural characteristics and their role in the larger context. Smarter development can help reduce the negative impacts on the environment, society, and the economy as a whole. Understanding and examining site characteristics to determine suitability of specific programs is vital to a more successful development of infrastructure as we progress into the future.

The Solution to The Issue

Conservation Development strategies including respect for existing site topography, soils, vegetation and wildlife corridors, natural drainage ways, and other sensitive features of the landscape will allow Bristol West to retain its environmental integrity, provide for an economically prosperous solution, and contribute to the overall livability within the community

at micro and macro scales. An in-depth site analysis is an important first step to successful conservational development site design. The analysis within the site at a micro scale and outside the site at a macro scale will assist in the formation of a successful design. By using an overlay system of analysis maps, originally developed by Ian McHarg, areas within the site will be identified as more or less suitable for development. Preserving open space is an important factor in the design process, and will contribute to the overall functionality and integrity of the site layout. With the use of conservation easements, sensitive areas throughout the site will be preserved for their natural character, importance in natural systems on and off site, and allocated as protected areas of conservation.

Bristol West Site History and Existing Characteristics

The Bristol West site has been used primarily for farming, historically for livestock and bailing of hay. Over the site's 590 acres, it has rolling topography with two ridges that connect with a valley in-between. The two ridges are mostly wooded with the valley being an open grazing land for cattle displaying the "agricultural character" of East Tennessee (Sheet 2). This site depicts at a micro scale the layout of Bristol and several other East Tennessee cities, in that it is situated between dominant ridges which give it a sense of enclosure with the mountains as the dominant background feature. It has great internal views and a mix of open and wooded space throughout its expanse (Sheet 2). Being located conveniently close to two major highways, it is easily accessible. It is also connected to existing bicycle routes within the City of Bristol (Map 1). Existing utilities include sewer, cable, electricity, gas, and storm water. Even though the site is adjacent to Interstate 81, the southeast ridge serves as a natural buffer to noise control from passing traffic. Currently the site has a main road that dead ends at the start of private property

with a cul-de-sac. The site contains a two story medical office building built in 2006, which has the purpose of providing a supplemental medical park for the Bristol Regional Medical Center to the south of the interstate (Sheet 3). The site has four specific barns that remain, which will have potential for reuse in the site design (Sheet 3). Other than the existing four lane road, medical building, and utilities, the site is relatively undisturbed.

Existing Zoning and Land Use

Currently the site is zoned as a general business district (B-3) according to the City of Bristol Planning Commission and is up for sale (Figure 21 and 22). It also has areas zoned for general industrial (M-2) and residential (R-2- Single family and duplex). The proposed site boundary stays within the urban growth boundary of both Bristol, Tennessee and Virginia. This helps the overall connectivity of the site back to the core of Bristol and does not encourage sprawl (Map 3). The existing land use map from the City of Bristol illustrates in more detail the specific uses of the site internally and externally (Map 4). A future land use map, provided by the City of Bristol, shows the specific uses from a 2005 study (Map 5). For the purpose of this thesis, an existing land use map was generated for the site along with its proposed boundary, which is shown in Map 6. This map shows that most of the Tennessee side of the site is vacant and has development potential.

Bristol Existing Zoning Map

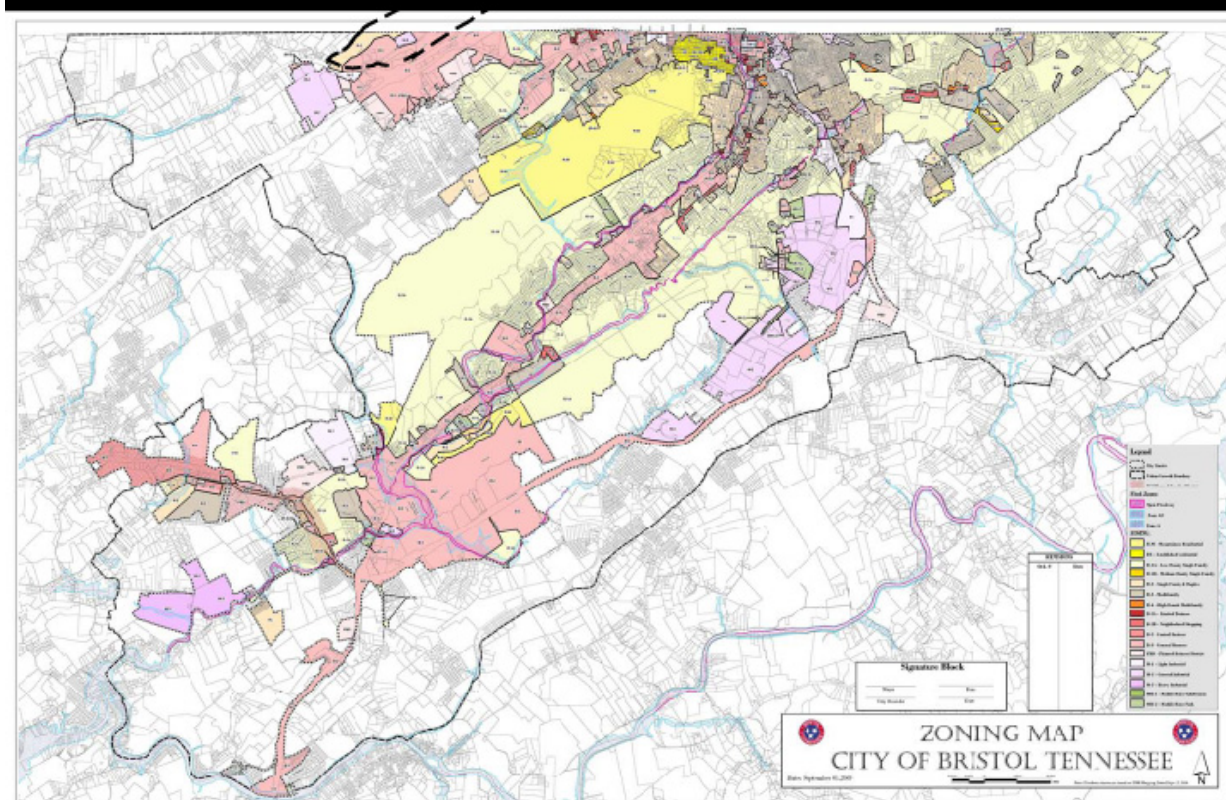


Figure 21: Existing zoning of the City of Bristol Tennessee (Map 2). Source: City of Bristol, Tennessee.

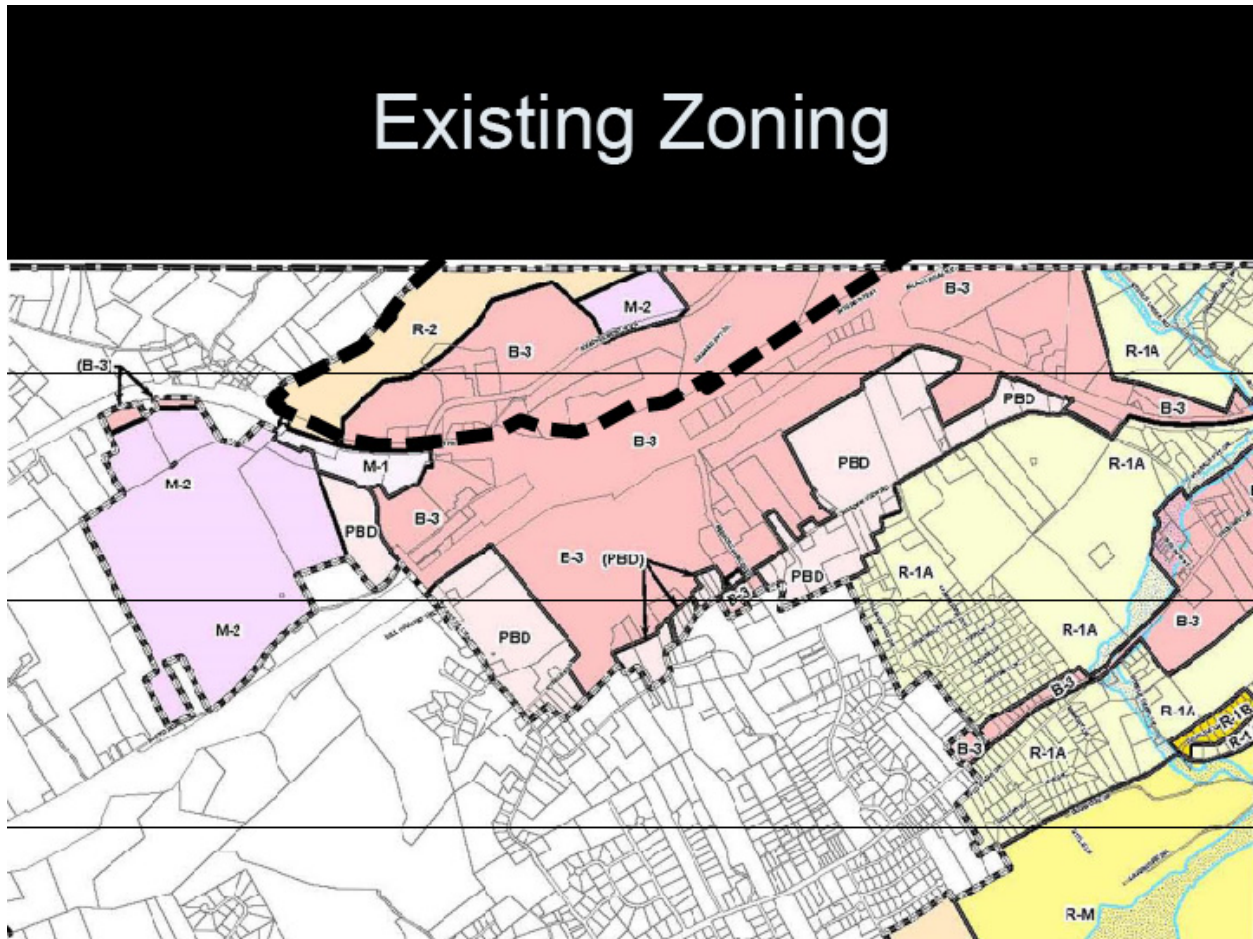


Figure 22: Current zoning provisions on the Bristol West site. Source: City of Bristol, Tennessee.

Long Term Development Strategies

The City of Bristol, Tennessee has developed a long term economic growth strategy, which plays a big role in the development of the Bristol West site. One development goal is to provide an adequate and compatible mix of land uses to meet the public's needs and desires. The Bristol West site has a potential for mixed uses as it relates to its surrounding context. For the purpose of this thesis, the goal of this site will be to provide a mixed-use development that bridges the gap between the rural Washington County with its agricultural lands and the suburban Sullivan County with its commercial, public, industrial, and residential uses. Within the

long term economic plan of Bristol, the idea that public transit must become more widely networked throughout the area is stressed, as well as alternate modes of transportation such as bicycle routes. The long term development plan has also proposed the need for more business parks that can allow professional services locally, regionally, and nationally to settle in the Bristol area. Also, to serve the local residents of Bristol and travelers using the I-81 corridor, a commercial/retail element must be integrated to accommodate their needs (City of Bristol Tennessee, 2010).

S.W.O.T Analysis

SWOT is an acronym for an analysis of the strengths (S), weaknesses (W), opportunities (O), and threats (T) of a site. This procedure allows designers to see areas and aspects of a site to capitalize on, and at the same time elements that must be reshaped for successful development. A SWOT analysis was recorded for the Bristol West site, and is shown below in the four categories defined above.

Strengths

- Good Access
 - o 11W
 - o I-81
 - o Existing Boulevard
- Mostly Undeveloped (Undisturbed)
 - o Minimal Grading has been done to overall site
- Has open space and wooded stands
- Somewhat Isolated by two ridges from Interstate corridor
- Existing utilities
 - o Mostly Underground(Except Power lines)
- Within City of Bristol Urban Growth Boundary

Weaknesses

- Multiple Property Owners
- Existing Development
 - Has not succeeded
 - Erosion Problems
 - Large Footprint(especially parking)
 - Wasted Space
 - Impervious surfaces
- Above ground power lines
- Steep Topography

Opportunities

- Site Views
 - Internally and Externally
- Existing Structures
 - Barns
- Through Connection to Bristol, VA
 - Potential Development for both municipalities
- Existing stream(s)/wetland(s)
- Preservation of pastureland for commons and green space
- Existing Hotel
- Possible trail system on ridges and throughout site
- Conservation easements to preserve potential wildlife corridors, and possible Transfer of development rights
- Provide a model and triggering mechanism for better smarter growth
- Potential development savings
- Integration of storm water management systems
- Potential destination as mixed use conservation development

Threats

- I-81 & 11W
 - Strip Development could occur
- Developers looking for a quick in and out
- Ridge top Development
- Private Land Owners
 - Not selling

Site Physical and Environmental Characteristics

In order to develop the Bristol West site in accordance with "conservation development" standards, an in-depth site analysis and site inventory is imperative. To comply with the standards of this development practice and for the purpose of this thesis the following characteristics will be analyzed; existing slopes, soils, aspect, hydrology, vegetation, and circulation. After an analysis of each category, a compiled suitability map is generated to show areas that are more or less suitable for development. This stage in the design process is very crucial and will take precedent on design decisions made when laying out the master plan.

Existing Slopes of Bristol West

The Bristol West Site and surrounding context have the typical profile of east Tennessee with mountain ranges and ridges, and flat to rolling valleys in-between. For the purpose of this thesis, using conservation development, it is imperative to analyze the slope to understand which areas are suitable for development. Steeper slopes are less suitable, accommodating less density of built structures per acre. For the general slope analysis of the site and surrounding context, 5 percent increments have been used to classify the changes in grade throughout the site and surrounding area. Red indicates steeper slopes, while green areas are those with less steep slopes (Map 7).

Slope Suitability

Slope suitability, in this context, refers to the ability to build a structure on certain slopes. The more suitable an area, the more density of built structures it can handle. Because sloping terrain is prone to severe erosion if disturbed, slopes over 25 percent should be avoided for clearing, re-grading, or construction (Arendt, 1999, 56). Slopes of between 15 percent and 25

percent require special site planning and should also be avoided whenever practicable. Erosion and the overland flow of soil sediments into streams, rivers, ponds, and lakes are detrimental to water quality and aquatic life (Arendt, 1999, 56). According to conventional subdivision design, the only restrictions that may make some of the land within a parcel legally unfit for building are those which have very steep slopes, contain a wetland, or are inside the floodplain. It is not specified in great detail as to what these slopes may be, which is addressed in the slope suitability map of the Bristol West site. Map 8 shows the slope suitability map generated of the study area, and is divided into increments of 0-15 percent, 15- 25 percent, and 25 percent and above. Grading the site with a bulldozer to create a clean slate is not the solution. Preserving the existing soil structure and topography with minimal grading is imperative to conservation development principles.

Existing Soils of Bristol West

The soils within and around the Bristol West site are typical of eastern Tennessee, with a clayey and loamy subsoil underlain with shale and limestone bedrock (Map 9). The soils range from silty clay loams to silt loams. Understanding soil properties also plays an important role in what can be implemented within a site. Factors such as drainage, structural suitability, agricultural suitability, and woodland suitability are focal points for the purpose of this conservation design.

Soil Analysis

Five properties including pastureland suitability, row crop suitability, woodland suitability, urban development suitability, and drainage suitability were analyzed to further determine areas deemed for specific uses and infrastructure. These analysis results are based on the Washington County, Virginia and Sullivan County, Tennessee most current soil surveys. The ability of soils throughout the site to accommodate pastureland is shown in Map 10. The soils are rated as well, moderately, or poorly suited. Row crop suitability is shown in Map 11, where the classification is

either well, moderately, or poorly suited. Woodland suitability, shown in Map 12, is also categorized as well, moderately, or poorly suited. The woodland suitability illustrates large areas deemed suitable, which may indicate the site may have been wooded before its known historical use of pasture and graze land for cattle. Certain soils may have better structural stability than others due to specific composition and locations on slopes. The urban development suitability map shows soils that are well, moderately, or poorly suited for potential development (Map 13). Drainage is an important factor to be analyzed among all soils that may have permanent structures such as buildings, parking lots, roads, etc. The ability of water to percolate and disperse into local watersheds and aquifers is an important characteristic that must be examined prior to development. The drainage suitability map classifies the soils at Bristol West as either well, moderately, or poorly drained (Map 14).

Aspect Analysis

The aspect of a specific slope is defined as the main compass direction in which that slope faces (Geography-Dictionary, 2010). Facing direction can influence micro climates on slopes with changes in temperature, sunlight exposure, and other climatic conditions. Typically, the southern facing slopes tend to have more sunlight which keeps them warmer than the north facing slopes. This can become a factor, especially when siting buildings, that influences the energy usage to heat and cool structures. The aspect map generated of the Bristol West site shows the majority of slopes facing southeast, south, and northwest directions (Map 15).

Hydrology Analysis

Hydrology refers to the scientific study of the waters of the earth, especially with the relation to the effects of precipitation and evaporation upon the occurrence and character of ground water (Geography-Dictionary, 2010). For the purpose of this thesis and designing with the principles of conservation development, water resources and existing drainage ways must be understood and analyzed throughout the site. Any disruption to the existing water flow patterns can lead to flooding

issues down the road. This must be accounted for when implementing structures and specific impervious surfaces such as parking garages and parking lots. However, this site design will integrate porous surfaces along with green roofs on built structures to cut down on excessive runoff. These applications, along with preserved green space, will help to intercept water at the source and allow infiltration throughout the site instead of one area being designated for catchment. The use of bioswales, rain gardens, and wetland areas will also be part of the management system for storm water. The existing drainage ways on the site and where water tends to collect in low areas are shown in Map 16, which will help in the strategic placement of roads, buildings, and other structures. Map 17 shows the existing storm water network that is already installed on the site. This will be used as a backup during intense downpours and heavy flow periods. The goal is to treat as much water in the site as possible without having to shoot it off-site to alleviate flooding. According to the City of Bristol, the site currently has no flooding problems, and adjustments will be made as more structures are added to the final master plan.

Site Vegetation and Wildlife Corridors

The existing vegetation within the site and its surrounding context shows a wide network of wooded areas that lead to larger areas of timber stands and areas regionally that have wildlife habitats including parks and national forests (Map 18). The northern ridge of the site is mostly wooded and is part of a typical pattern of linear parallel ridges throughout the area (Map 19). It is anticipated that local wildlife species such as deer, bear, turkey, etc. will use this as a corridor through the site leading to other areas of cover and refuge. With the design principles of conservation development, the before indication of a possible wildlife corridor calls for an area of preservation and little disturbance. Also, another factor that justifies the preservation of the wooded areas is that they occur on slopes that are poorly suited for development. This may be

achieved through conservation easements, which allow a specific area of land to remain protected in order to maintain a healthy environment for wildlife and other natural aspects such as views and green space.

Site Circulation

Site circulation is key to any successful design and must be understood before structures are located and proposed. The existing circulation on the site is very basic, with a four lane boulevard, one medical park with parking, one gas station and vacant diner with parking, and a single lane access farm road at the end of the four lane boulevard. The site currently has no pedestrian corridors, which is an important element to conservation design. Map 20 shows the existing site circulation and how it relates to the context.

Suitability Map

As part of the process of design for a conservation development, a compiled suitability map of all site analysis elements is generated to understand what areas are more suitable for development and those that are better off being preserved. Ian McHarg describes this as his overlay method in which a site's physical and environmental characteristics are laid over top of one another to see where opportunities and constraints become more or less of an issue. The following graphic displays the overlays used in the generation of the suitability map for this thesis (Figure 23).

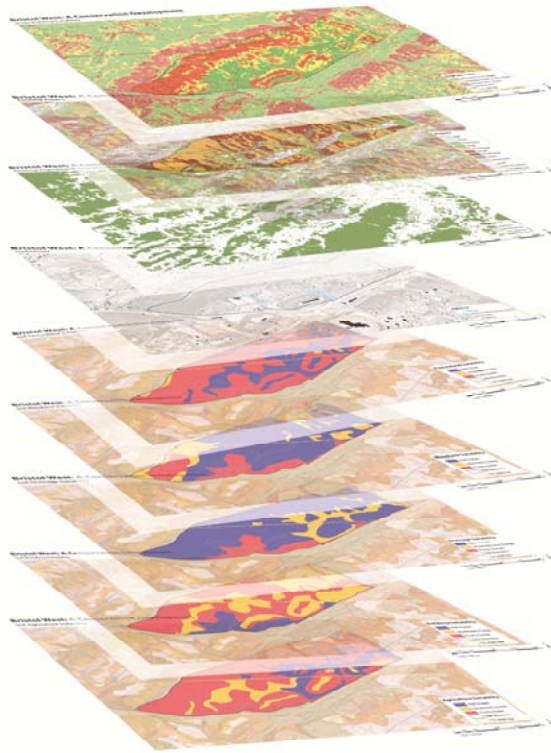


Figure 23: Site Analysis Overlay Method. Source: Chris Chandler.

Through the overlay process, a suitability map was generated which shows areas that are more or less suitable for development. Factors influencing the suitability map include slope, aspect, vegetation, hydrology, and soils. Each element was given a value based on its suitability for development. For example, slopes 25 percent and over were given a black value, while slopes 0-15 percent were given a white value. Map 21 shows the compiled suitability map and a rating scale that gives the areas of whiter value more suitability for building and the areas that are darker less suitability. This map influences the areas specifically developed within the site as well as the layout, which will be seen in the proposed land use plan and site master plan.

Site Design

The site design for Bristol West involves a number of elements that must be addressed and taken into consideration before placing structures and buildings. First, a program was created based on the needs of the Bristol area and the surrounding context. Next, a proposed land use map was generated based on the program and the suitability map. From here, a site layout and concept was explored. After laying out the programmatic elements, a site master plan was developed in more detail. Supplemental drawings, such as sections to better understand how this conservation development works with the land instead of against it, were also generated.

Site Program and Proposed Land Use

The site program determines what will be built and for what purpose certain entities are included in the master plan. The main purpose of the program for the Bristol West site is to create a mixed-used development that preserves and conserves natural systems and adds to the community prosperity and functionality of Bristol, Tennessee and Bristol, Virginia. The program is including in the following bullet list:

Conservation Based Mixed-Use Development to include:

- Circulation
 - Roundabout(s)
 - Complete streets and boulevard (bike, pedestrian, mass transit, on street park oriented)
 - Greenway system
 - Walking/Hiking trails
- Pocket Parks
 - Gathering Shelters
 - Play structures
 - Water features
 - Un-programmed open space
- Convenience Center

- o Fueling Station
 - o Full service automotive shop
 - o Diner
- Grocery
- Hardware Store
- Pharmacy
- Retail stores and shops
 - o Specialty shops
 - o Outdoor/Recreational shops
 - o Clothing shops
 - o Local cultural heritage shops (e.g. music shops)
 - o Art Galleries
 - o Boutiques
- Restaurants
 - o Coffee shop(s)
 - o Bistro
 - o Bakery shop
 - o Grill and Brewery
- Business Park(s)-catering to local small privately owned businesses and potential regional entities
 - o 1-2 story office buildings
 - o Bank
 - o Professional service offices (e.g. Accounting, Design firms, Environmental agencies)
- Single Family Residential Housing
- Onsite Stormwater Management Initiatives
 - o Bioswales
 - o Rain Gardens
 - o Constructed Wetland(s)
 - o Pond(s)
 - o Green Roofs
- Agri-tourism (interactive agriculture)
 - o Vineyard

The preceding programmatic elements help in fulfilling the long and short term economic development strategies of Bristol, Tennessee and Bristol, Virginia. The integration of farmland with mixed-use development is imperative, as some farms in the area have been decimated by strip development and other forms of growth and expansion. According to the City of Bristol, the need for a business park is still unmet. This program and design will allow for the development of business facilities, which will encourage small businesses as well as regional and national

business expansion. Integrating a mix of shops, retail, restaurants, and convenience facilities will cater to the surrounding residents as well as to travelers and visitors utilizing the I-81 and 11-W corridors. Also, residential areas will be a part of the future land use plan that will help the mixed-use zone mesh with its rural areas to the north and suburban areas to the south. Integrating pedestrian friendly corridors within and outside the site will allow alternate modes of transportation to be utilized on and off-site. This will include bicycles, buses, walkers, and vehicles. A trail system is also part of the program that will allow pedestrians to utilize the site without the use of a vehicle. Hiking trails, integrated into the proposed conservation easement, will display signage with information pertaining to plant and animal species native to east Tennessee. In conjunction with an educational tool, it will also promote community health through walking and running corridors. In addition to preserving agriculture land within the site, an agri-tourism element will also be part of the master plan. Specifically, a well-placed vineyard would produce and distribute wine to the area, in addition to offering tours of the facility where visitors and local residents can learn about the process of wine making. The vineyard will also serve as a venue for weddings and other special occasions. Map 22 shows the proposed land use map, and where certain programmatic elements will fall within the site. This proposal's goal is to integrate an economically prosperous community that respects the existing natural features of the land, thus providing a model for future development. Further detail will be shown in the site master plan.

Design Concepts

A series of layout diagrams were drafted prior to any detailed design. An initial concept was formed, which set the premise for the final solution reached by this thesis. The purpose of

layout diagrams and concepts gives one the power to explore in more detail any opportunities and constraints that may not be shown by the compiled suitability map. It also allows the exploration for site circulation layout, which is imperative to a successful solution. Figures 24, 25, and 26 show initial diagramming of land uses, circulation, and conservation easements, which gave rise to the proposed land use map (Map 22).

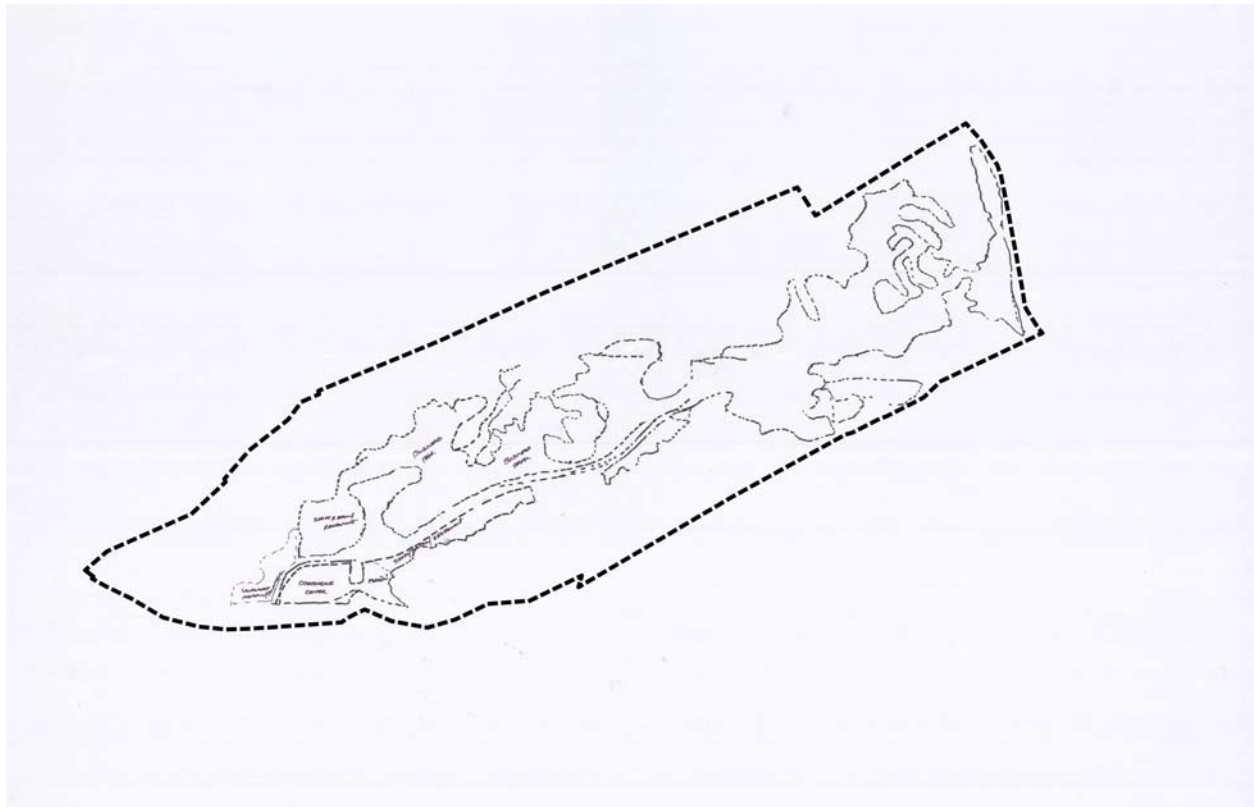


Figure 24: Land Use development diagram. Source: Chris Chandler

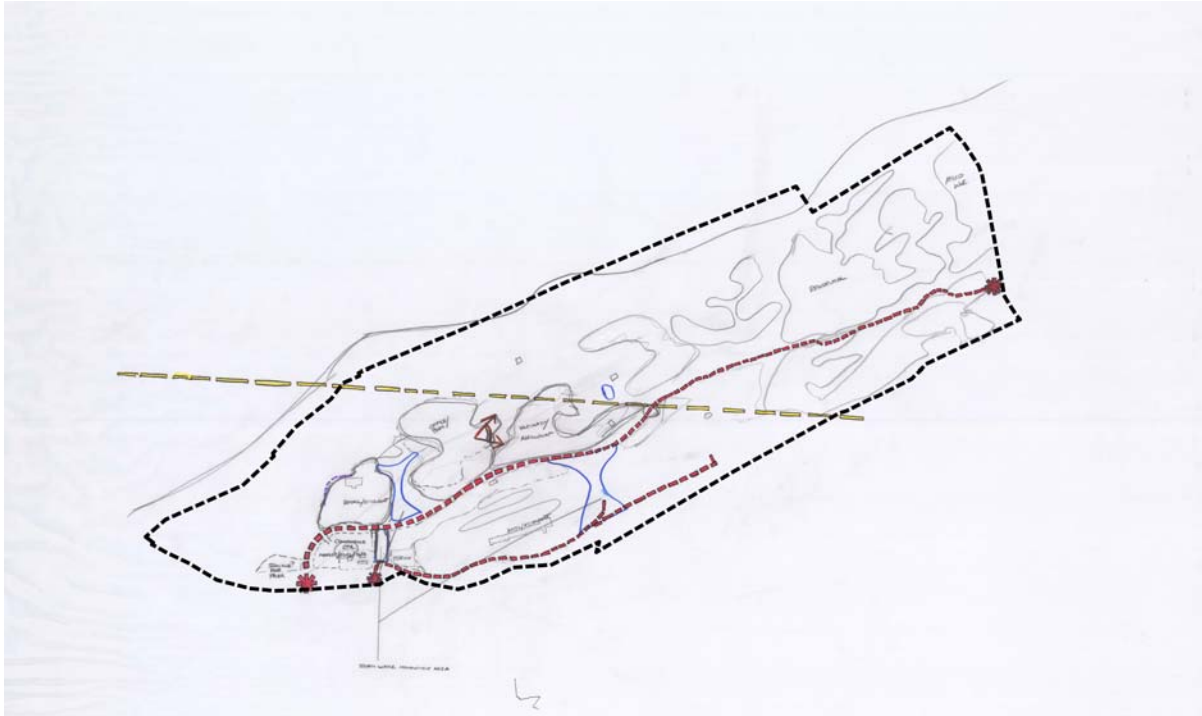


Figure 25: Site Circulation and land use development. Source: Chris Chandler

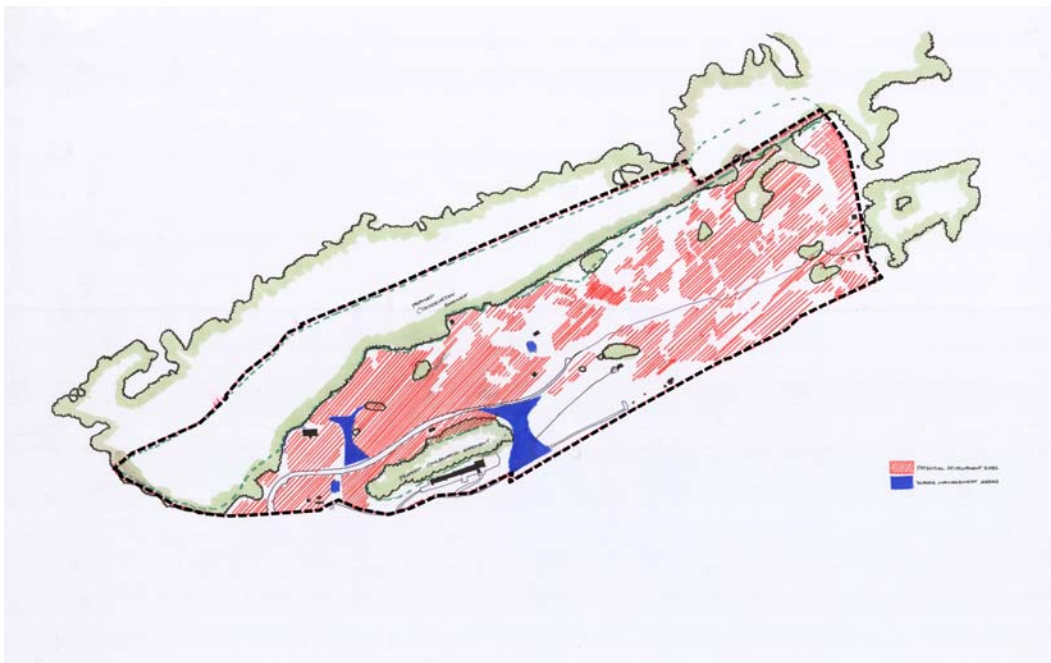


Figure 26: Easements, developable space, and areas of water collection. Source: Chris Chandler

After working with initial layout diagrams of the site plan and proposing a land use map for the site, a concept was formulated in more detail. This began to show the placement of certain clusters of built versus preserved spaces. Roads and major nodes of circulation were determined as well in the beginning concept. Figure 27 shows the development of the concept, which leads into a final proposal for the Bristol West site.



Figure 27: Initial Concept Plan. Source: Chris Chandler

Chapter 4: Design Solution and Discussion

Site Proposed Master Plan

For the purpose of this thesis, a detailed master plan was proposed for the Tennessee side of the Bristol West Site. The proposed land use map, provides what and where future development may occur into the Virginia side of the site. The proposed program includes the Tennessee and Virginia sides of the site. Map 23 shows the final proposed master plan for the Tennessee side of the site and incorporates specific programmatic elements, which are labeled accordingly. Figure 28 shows an overview of the master plan and how it works with the existing features of the land.



Figure 28: Final Proposed Master Plan. Source: Chris Chandler

The proposed master plan addresses the issues of conserving the site's environmental integrity, providing an economically prosperous solution, incorporating and improving community livability, and also preserving the character and "sense of place" of eastern Tennessee. The environmental integrity is achieved by preserving open space through the use of conservation easements and cluster development. The conservation easement on the northern part of the site allows the preservation of potential wildlife corridors, and the engagement of the human being to nature. Trail systems integrated throughout the easement help to achieve this bond and allow local residents and visitors to understand natural processes in nature through interpretative signage (Figure 29). Also, maintaining existing drainage ways on site is achieved through open space preservation and cluster development. The incorporation of storm water management elements such as bioswales, rain gardens, and constructed wetlands allows water falling onto the site to infiltrate throughout instead of collecting into one large source.



Figure 29: Example of Interpretative Signage. Note: Copyright Wetlands Estonoa.

By comparing many precedent studies of the site to Bristol West, a solution of open space versus built space has been determined. This was analyzed in the precedent studies above taking into consideration such aspects as traffic counts, population, and median income to amount of built space on a specific site. According to Randall Arendt, a minimum of 50 percent open space should be preserved for conservation development projects, which has been established in the final master plan of the Bristol West site. Approximately 70 percent of the open space has been preserved through cluster development and conservation easements. The proposed areas for commercial development and other programmatic elements compared to the precedents analyzed is lower in most comparisons. However, the site topography of the precedents used is relatively flat compared to Bristol West. The site's topography limits the amount of developable area when using the practice of conservation development. The main point from the precedent studies is that the minimum of 50 percent open space was achieved in the final master plan at Bristol West, and the developed space in the concept is not over developed.

The master plan aims to maintain and improve community livability among Bristol residents and visitors to the area. This is done by providing an area for small business to be established and prosper with the access and marketability of a conservation development. Integrating bicycle lanes throughout the master plan that connect to existing and proposed routes on the exterior allows Bristol West to explore alternative modes of transportation. Within the site, a system of walking and bicycle trails has been designed to accommodate such uses. These help to lessen reliability on the automobile to move from place to place, and at the same time promote community health. The integration of mixed uses, including residential and agricultural, will give the community an opportunity to bridge the gap between the rural and suburban areas

of Bristol. Ideally, this is meant to encourage more conservative development centrally while maintaining local connections to food sources and promoting a healthy life style.

The preservation of an area's character and "sense of place" is also an important consideration when designing with conservation development. Understanding a site's history before dropping buildings in place is important to any design. In the case of Bristol West, several existing barns are used as programmatic elements giving the impression of continuation of a historical farm environment. The rustic look of these barns is a direct reference to their historical significance. Reusing and celebrating such features in the landscape is important to keeping not only a historical perspective, but in approaching site development and construction from a sustainable standpoint (Figure 30 and 31).



Figure 30: Existing barn to be reused as proposed bike rental and snack shop. Source: Chris Chandler



Figure 31: Existing barn to be used as proposed vineyard processing facility. Source: Chris Chandler

Site Proposed Sections

Working in section is very important when using environmentally sensitive design strategies such as conservation development. The existing section on the site gives one the sense of its location between two dominant ridges, one to the north and the other to the south (Figure 32). Dealing with parking for the proposed cluster developments on the site is important to understand in section as well. Challenging changes in topography present an opportunity to stack parking, balancing the cut and fill, and reducing parking footprint sizes (Figure 33). This also allows less impervious surface to be applied to the site. The use of impervious surfaces

throughout the master plan is minimal, and pervious asphalt and concrete will be used alternatively where possible. The proposed renovation to Bristol West Boulevard will allow pedestrian movement on foot and bicycle, and at the same time allow infiltration of storm water runoff via bioswales (Figure 34). Map 24 shows the three sections together, and Map 23 designates where each is cut through the site.



Figure 32: Existing site section between north and south ridges. Source: Chris Chandler



Figure 33: Proposed Section showing stacked parking and relation to topography. Source: Chris Chandler

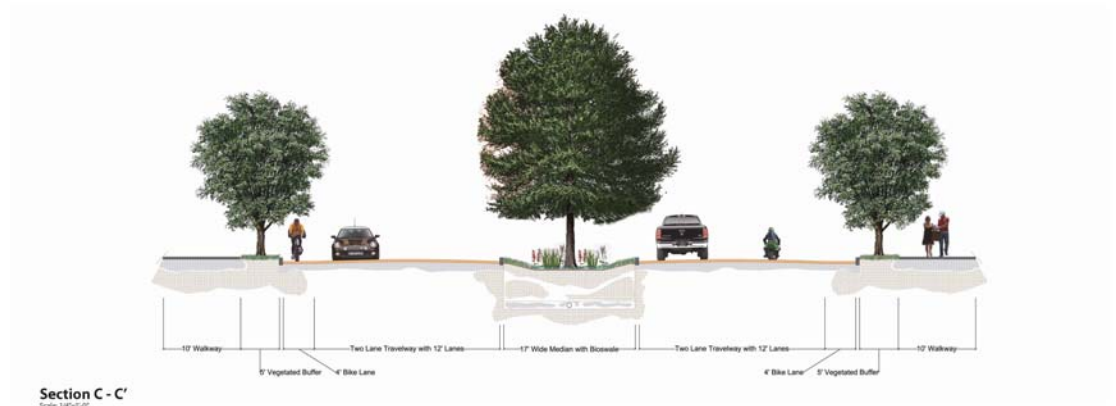


Figure 34: Proposed Bristol West Boulevard renovation. Source: Chris Chandler

Chapter 5: Concluding Remarks

Conclusions

The use of conservation development design strategies for the Bristol West site was successful, and will give an insight of how the site could potentially be developed. For the purpose of this thesis, the methods of analysis and design were explored to reach the solution in Map 23. However, further research of the project's economics must be done, which may alter the design. This could be a thesis in itself, involving cost analysis of conventional versus conservation techniques. Also, areas of return on investment and construction costs must be explored in more depth. The site is a good candidate for conservation development techniques, and has many opportunities and constraints that allow its development to an extent. The topography of this site is very challenging, which was not the case in most similar case studies. This became an obstacle for the comparison of built to open preserved space. Similar sites with similar program elements were compared to get a ratio of built square footage. The proposed final master plan is one option explored using conservation development practices, and is not the

only option by any means. Developing sites conservatively will be an important practice for the future of infrastructure all over the world. Communities can make the most of their context by preserving and celebrating their natural amenities. These include trees and woodland, high points and their views, existing topography and its drainage patterns, and wetlands and their buffers (Duany, 2010). Through "smart growth" and "conservation development," these elements can be celebrated in conjunction with the human race. Also, preserving and capitalizing on such entities can contribute to higher real estate value while sustaining the environment (Duany, 2010). By utilizing "smart growth" techniques, communities respond to climate conditions by conserving water, preserving topsoil during site development, and maintaining large open spaces with easy access by linking them into natural corridors for the benefit of both wildlife and humans (Duany, 2010).

Conservation development practices need to become more prevalent as we reshape the world's infrastructure to become more efficient, livable, and environmentally friendly. Educating and training professionals with the tools to critically analyze sites from all spectrums and turn them into successfully designed solutions is imperative to the future of the human race. Professional designers, developers, and builders need to be well informed on conservative practices for the built environment in order to allow man and nature to coexist more effectively. As technology becomes more advanced, we must explore alternate energy sources and conservative ways of integrating them into the landscape. The ability to integrate conservation into development is the key to preserving the natural environment, bettering the quality of life, and strengthening economic infrastructure throughout the world.

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Vita

Chris Chandler was born to John and Susanne Chandler in 1985 in Bristol, Tennessee, the second of two sons. He attended Avoca Elementary School, Vance Middle School, and Tennessee High School, all in Bristol. After four years at the University of Tennessee in Knoxville, he earned his B.S. in plant science with a concentration in landscape design and construction. During summers he gained practical experience in landscape design by working for many clients, as the head of his own design/building business. When the opportunity to be a member of the first class in the Master of Landscape Architecture Program at the University of Tennessee presented itself, he enthusiastically accepted the challenging three-year assignment. During those three years, he was able to study abroad for two weeks in Italy, he worked as a graduate assistant, helping with class preparation and teaching for undergraduates, and he had the opportunity to be a part of a research project on green roofs. In May 2011, Chris earned his masters degree from the University of Tennessee as a member of the first class in landscape architecture in the state of Tennessee. He is now pursuing a job with a landscape architecture firm as he begins his professional career.