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## Westwood Multimodal Transportation Plan

Ashley N. Austin  
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# Westwood Multimodal Transportation Plan



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Master of Urban and Regional  
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L. Douglas Wilder School of  
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Virginia Commonwealth University

May 2020

# Westwood Multimodal Transportation Plan

**Prepared for:**

Henrico County Department of Public Works, Transportation Development Division  
Henrico County, Virginia



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May 2020



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## EXECUTIVE SUMMARY

Westwood is experiencing an industrial regeneration that will change the way the area is utilized by the surrounding communities. To be proactive, Henrico County is planning for the future by creating an overlay zoning district and striving for a multimodal environment to ensure the area grows in a sustainable manner.

This plan evaluates the study area, retrieves community engagement, and makes recommendations on streetscape design and public transit improvements to create a multimodal Westwood. Study area observations provided evidence that the streets in Westwood need to be redesigned to accommodate more for pedestrians and cyclists. Community outreach in the form of a survey was conducted to gather input on how the streetscape should be designed and what elements of the study area need the most attention. Results of the surveys and observations were analyzed and used to build the recommendations made for Westwood.

Various types of funding options are presented to implement this plan. Sustainable, connected, and integrated transportation is essential to success and livability of the fast-growing study area. The plan aims to supply the knowledge needed to create a livable and thriving Westwood.

# INTRODUCTION

## Plan Purpose

Due to the decline of the manufacturing industry in the United States, parcels that were once zoned for industrial purposes are now experiencing a shift into different land uses. This concept is known as post-industrial regeneration and Henrico County's Westwood area is now experiencing this shift. This once industrial zoned community recently acquired an overlay zoning district that allows for commercial and residential uses. While these land use changes are occurring, it is critical to integrate new transportation options into Westwood. This integrated system should offer the incoming residents and future visitors a multimodal transportation network. This will entail sidewalks and bike lanes and connecting them to the existing public transportation in the surrounding areas. Sustainable, connected, and integrated transportation is essential to the success and livability of Westwood. The purpose of this plan is to provide recommendations for using multi-modal transportation tactics to establish infrastructure that will support the emerging residential and commercial uses. Providing diverse forms of transportation creates a more equitable Westwood.

This plan is influenced by the Just City planning theory to ensure that Westwood Multimodal Transportation Plan addresses not only the transportation issues, but also the justice issues associated with transportation planning. The planning theory of the Just City was created by Susan Fainstein during the early 2000s and it stresses the significance of the values: diversity, equity, and democracy.<sup>1</sup> The theory identifies the importance for planners to use and reference these core values while making planning related decisions and interventions. This plan specifically addresses justice by planning for people of all socioeconomic statuses and physical capabilities.

## Client Description

Henrico County's Transportation Development Division is housed in the Department of Public Works. As a department, Public Works is responsible for establishing, improving and maintaining an efficient and safe transportation and drainage network for the County of Henrico. More specifically, the Transportation Development Division plans, programs and manages the transportation infrastructure projects and applies for its own funding sources for the Division's eligible projects. The Division does not only focus on transportation in the form of vehicular circulation, it also specializes in public transit in the form of rail and bus, as well as infrastructure for bicycling and walking.

To create efficient and effective transportation networks throughout the region, the Division coordinates with the Virginia Department of Transportation (VDOT), Virginia Department of Rail and Public Transportation (VDRPT), Plan RVA, the Greater Richmond Transit Company (GRTC) and other neighboring localities. The Transportation Development Division also oversees and manages the contract with GRTC to provide transit service in Henrico County including local and express bus service, as well as CARE specialized transportation.



## Outline of Plan

The Plan is comprised of three main segments: Westwood Area Study and Analysis, Multimodal Transportation Strategy Plan, and Implementation Toolkit

- **Westwood Area Study and Analysis:** Existing conditions analysis (zoning and physical conditions), surrounding areas' planning interventions, demographic analysis, and other significant information has been gathered and analyzed. These analyses inform the Methodology and approach of the *Westwood Multimodal Transportation Plan*.
- **Multimodal Transportation Strategy Plan:** Recommendations for roadway, pedestrian and bicycle infrastructure improvements are made based on the Westwood Area Study and the findings from the research methodology. Many of the recommendations are presented in the form of SketchUp models, GIS maps, charts, graphs, and tables.
- **Implementation Toolkit:** Strides for implementation, including timelines and job designations for specific County Departments and Divisions, and funding sources are presented.

2, the 530-acre Westwood area is surrounded by main roads. These roads are West Broad Street, Staples Mill Rd, Bethlehem Road and Interstate 64 to the north. Directly neighboring the study area, without the interruption of a highway, are the areas of Libbie Mill, Willow Lawn and Scott's Addition.

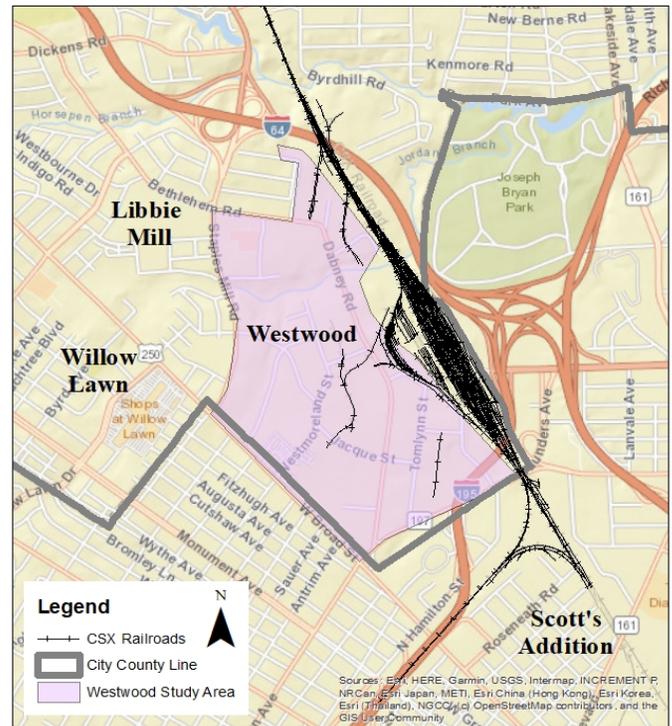


Figure 1: Study Area Vicinity Map  
Figure adapted from Henrico County GIS Data, 2018

## BACKGROUND

### Plan Context

In order to create a beneficial Westwood Multimodal Transportation Plan for Henrico County's Department of Public Works, data was analyzed to understand the existing conditions of the study area. In this section, the study area is discussed, including the surrounding uses and existing conditions.

### Location and Surrounding Uses

The Westwood area is located in the County of Henrico right just adjacent to the western end of the City of Richmond. As seen below in Figures 1 and

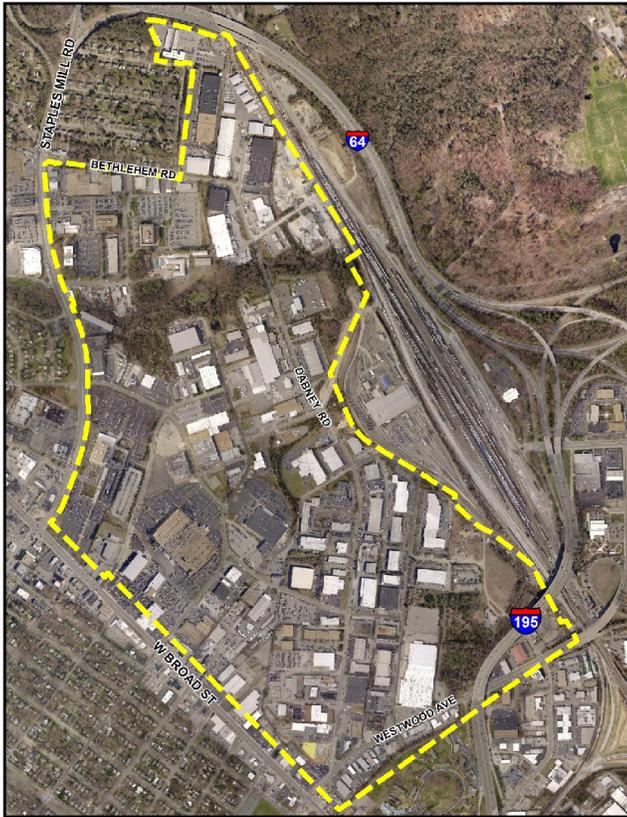


Figure 2: Study Area Boundary Map  
*Figure adapted from Henrico County GIS Data, 2018*

retail businesses and art studios. As for semi-public spaces, this includes quasi-public uses like private schools, churches, and hospital and care facilities. Willow Lawn is also home to GRTC Pulse’s most western bus station as seen below in Figure 3. GRTC’s Pulse connects many destinations along the broad street corridor.<sup>3</sup> In time, Westwood can be accessed through the popular bus rapid transit line because of the area’s close proximity to Broad Street.



Figure 3: Willow Lawn's GRTC Pulse Station  
*Retrieved from GRTC Transit System, 2019*

West of the study area is Libbie Mill. Libbie Mill is a developing urban mixed-use community with multifamily residential units above commercial units. Henrico County’s 2026 Comprehensive Plan states that the Libbie Mill development area’s future land use zoning is the same as its current zoning, urban mixed-use.<sup>2</sup> Henrico’s comprehensive plan categorizes this type of zoning as a range of residential, commercial, public and semi-public uses. The plan also recommends that Libbie Mill prioritize pedestrian oriented activity centers in the same areas as office, residential, and retail spaces.

Willow Lawn is a shopping and restaurant district in Henrico County, just southwest of the study area. Henrico County’s 2026 Comprehensive Plan has Willow Lawn Zoned for commercial concentration, multi-family residential, semi-public and office spaces. This means that the future Willow Lawn will continue to have apartments, townhomes and condominiums for housing options. It will have professional and administrative offices, as well as

To gain more case context, it is important to measure the Westwood’s proximity to the existing bus rapid transit line and other neighboring bus lines. Westwood neighbor’s three bus stops on GRTC’s Pulse line: Willow Lawn, Staples Mill East and Staples Mill West. The Pulse is a bus rapid transit system (BRT) that was completed in 2018, with future plans of expansion<sup>4</sup>. One of Westwood’s biggest strengths is its close proximity to these three stops on the Pulse’s line. The study area is also bordered by Route 91 on both the south-east and west sides, Route 18 that travels along Staples Mill Road, and Route 19 that continues west of the Willow Lawn BRT station. Bus stops that neighbor Westwood can be seen below in Figure 4. In addition to these existing bus routes in the area, the Virginia Department of Rail and Public Transportation Regional Transportation Vision Plan plans for the location of enhanced local bus routes with headway times of 15 – 20 minutes on both Westwood Avenue and Staples Mill Road in the coming years.<sup>5</sup>

## Demographics

A demographical analysis was completed to understand the age and income distributions of Westwood and its surrounding census tracts. The purpose for this analysis is to understand if the surrounding area has a high population of elderly or children or income disadvantaged because these groups may or may not have access to a car. The census tracts being studied, seen below in Figure 5 are 2003.01, 2004.04, 2005.01, 2005.02, 2006, 102, 501 and 502.<sup>7</sup> These tracts were selected because they border the Westwood study area. Though Westwood is located in Henrico County, it also borders the City of Richmond, so census tracts from both localities are included in this study. Three-digit census tracts are located in the City and tracts that start with the number “2” are located in the County. More census tracts located in the county are included to supply the client with additional information regarding its residents.

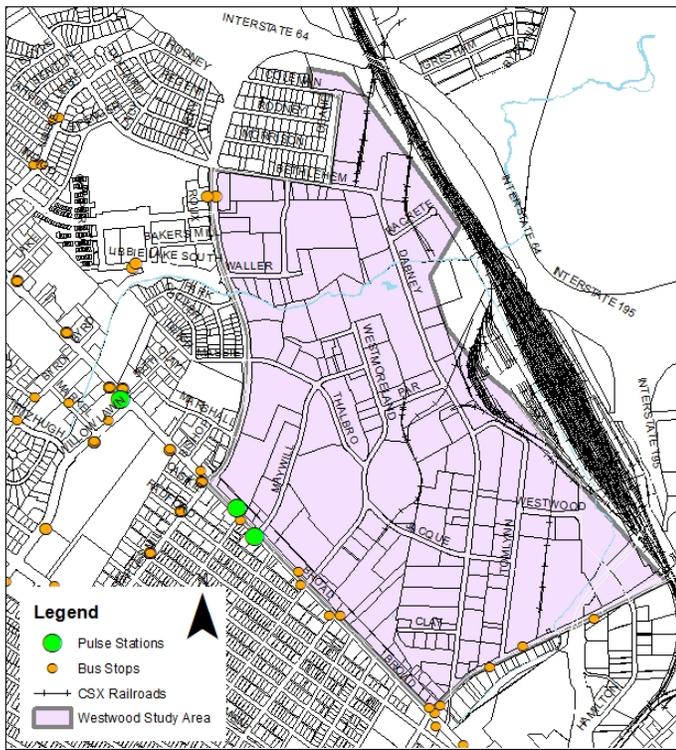


Figure 4: Study Area's Proximity to GRTC Bus Stops  
Figure adapted from Henrico County and GRTC GIS Data, 2018

South east of the study area is Scott's Addition, a popular area in the City of Richmond with entertainment facilities, restaurants, bars and breweries. Scott's Addition used to be zoned for mainly industrial purposes, until there was no longer a use for the large warehouses in the area. The City of Richmond's Master Plan 2000-2020 has zoned Scott's Addition for continued corridor mixed-use, nodal mixed-use, and industrial mixed-use.<sup>6</sup> Scott's Addition's redevelopment has motivated and informed Henrico County to redevelop Westwood.

### Westwood Existing Conditions

Analyzing the context for the existing conditions in Westwood informs the *Westwood Multimodal Transportation Plan*. The existing conditions analysis includes demographics, zoning, street network, and a preliminary strengths, weaknesses, and opportunities analysis.

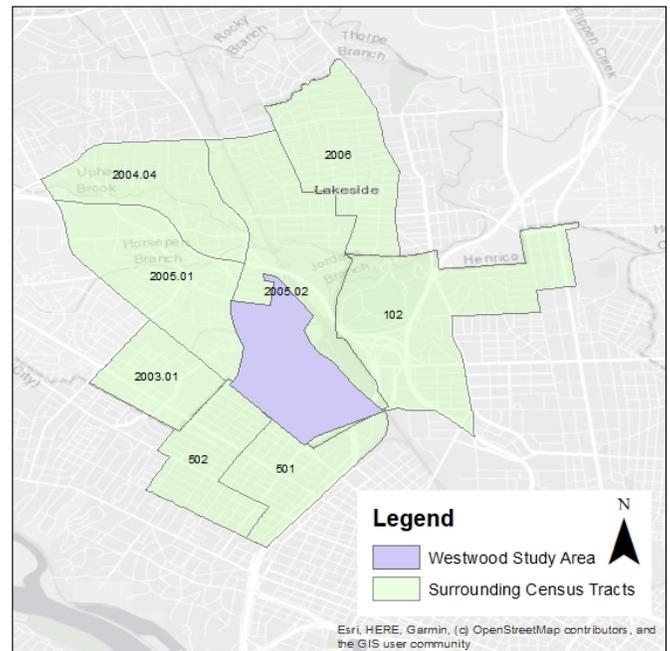


Figure 5: Surrounding Census Tracts  
Figure adapted from U.S. Census Bureau, 2017

To understand the area's age distribution, population data was analyzed. As seen below in Table 1, the highest age group percentile is 18 to 24 years of age at 19% of the population. The lowest percentile is ages 25 to 34 at 6% of the population. It can be seen here that there is a significant number

of elderly and children in this area. Twenty-five percent (25%) of the population is under the age of seventeen years old. The Social Security Administration considers elderly to be sixty-five years of age and over. This means twenty-six percent (26%) of the Westwood’s surrounding area is elderly. In total, fifty-one percent (51%) of the area’s population is made up of children and elderly people; meaning, it can be argued there is a need for alternative transportation methods that do not include an automobile for this area.

Table 1: Age Distribution for the Census Tracts Surrounding Westwood  
*Table adapted from U.S. Census Bureau, 2017*

Age	Percent of Total Population
Under 5 years	16%
5 to 17 years	9%
18 to 24 years	19%
25 to 34 years	6%
35 to 44 years	7%
45 to 54 years	9%
55 to 64 years	8%
65 to 74 years	13%
75 years and over	13%
Total	100%

As for income levels, most Westwood and its surrounding neighborhoods’ households fall in the middle-class income levels. It can be seen below in Table 2 that the most prominent household income level range is \$20,000 to \$39,999. 54% of the households in the census tract have a household income of \$59,999 or lower. As result, it can be argued there is a need for more modes of transport in this area because of these income levels. It is important to note however, income is not always the deciding factor for not owning and/or utilizing a car. Households with income levels higher than \$60,000 may still prefer not to drive due to accessibility, parking, personal preference, etc.

Table 2: Household Income Levels for Westwood and Surrounding Census Tracts  
*Table adapted from U.S. Census Bureau, 2017*

Household Income Level	Percent of total Population
\$0 - \$19,999	16%
\$20,000 - \$39,999	21%
\$40,000 - \$59,999	17%
\$60,000 - \$74,999	10%
\$75,000 - \$99,999	12%
\$100,000 - \$149,999	13%
\$150,000 and Up	12%
Total	100%

### Zoning

The existing zoning in the study area is important to note because the change in land uses will demand differing transportation needs. Westwood was historically zoned for industrial purposes. Although the areas surrounding Westwood are used for business and other medium-intensity commercial uses, the study area is zoned for industrial uses because it is adjacent to the CSX railroad’s Acca Yard<sup>8</sup>. In the past, the businesses that were in Westwood used the railroad’s close proximity to their advantage because the businesses were highly industrial. While certain industries still use railroads to move supplies, trucking companies have risen in popularity for this type of transport, resulting in less of a demand for railroad usage. Henrico County’s small area study on the Westwood area touches on this and concluded that the study area is not likely to be as railroad dependent as it has been in the past.<sup>8</sup> For example, some of the new developments such as Top Golf, Lidl, Triangle Rock Club, and Cube Smart are less industrial in nature.

The study area's zoning now differs from the County's 2026 Comprehensive Plan. As seen below in Figures 6 and 7, the study area is comprised of a mix of office, business, and industrial uses. The study area is zoned mainly industrial, with a high concentration of M-2, otherwise known as General Industrial District. However, many of the current businesses do not necessarily require M-1, M-2, or M-3 zoning to operate. It is important to note that the current zoning seen in Figure 7 differs from the 2026 Comprehensive Plan's zoning seen in Figure 6. This shows that Westwood was not expected to be used for a small amount of offices and the rest industrial purposes. Because of the post-industrial regeneration trend, the county's Comprehensive Plan is now outdated and this is why the county has allowed the zoning to stray away from the 2026 Comprehensive Plan's zoning.

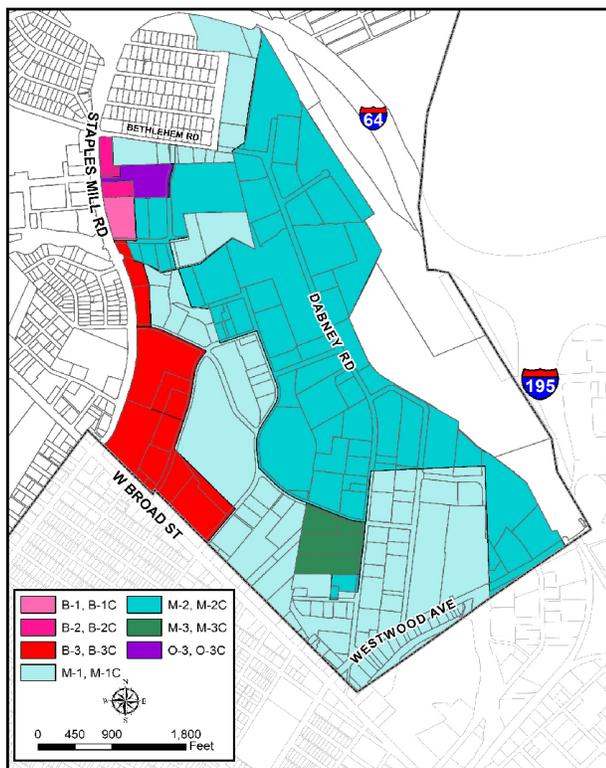


Figure 6: 2026 Comprehensive Plan Zoning  
 Figure retrieved from "Westwood Small Area Study" Henrico County, 2018

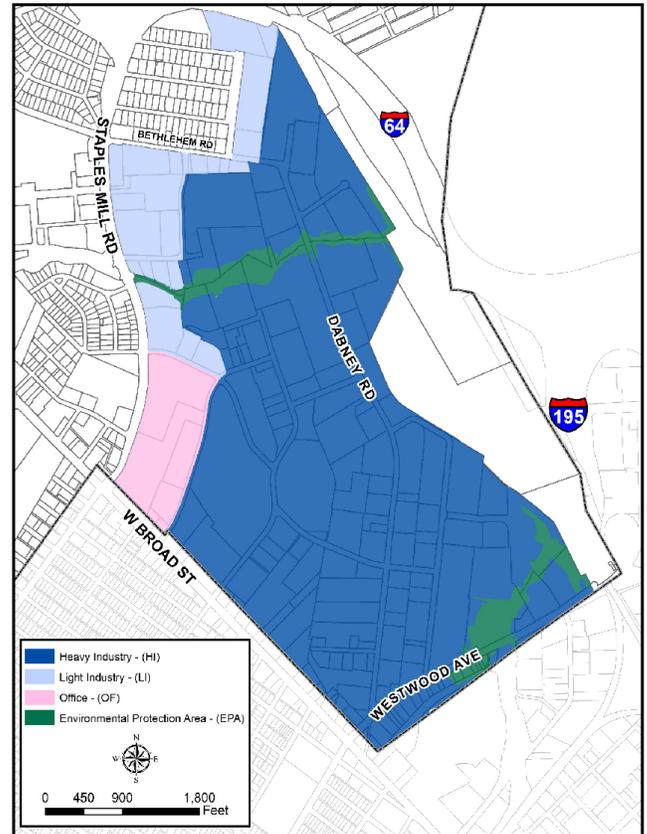


Figure 7: Current Zoning  
 Figure retrieved from "Westwood Small Area Study" Henrico County, 2018

The "Westwood Redevelopment Overlay District" was established in December 2018 as a result of the Henrico County Planning Department's Westwood Small Area Study.<sup>8</sup> The main change in the zoning ordinance is to allow for provisional uses including multifamily dwelling units in conjunction with nonresidential development uses and structures that would not otherwise comply with the current setback and height provisions. In addition, the overlay district requires any provisional use to comply with the 2026 Master Plan's design, pedestrian accommodations, open space, landscaping, and site lighting requirements. With these changes comes the need for a more easily accessible environment, which is what this *Westwood Multimodal Transportation Plan* addresses.

## Street, Sidewalk, and Trail Network

The Westwood area is currently comprised of very large blocks, so even if people use the adjacent BRT line to access the study area, in its current state, their walk may be lengthy and inefficient due to the study area's large blocks. Because of this, Henrico County staff have already identified potential road additions to the area to create smaller blocks. The new roadways were created by avoiding existing buildings and traveling along property lines to minimize impacts on existing uses. It is important to note that Henrico County's Department of Public Works generally builds and maintains the roads in the County besides main arterial roads. In this case, Broad Street (borders the study area to the south) and Staples Mill Road (borders the study area to the west) are main arterials that are maintained by the Virginia Department of Transportation (VDOT). The current street network and potential road additions are seen below in Figure 8.

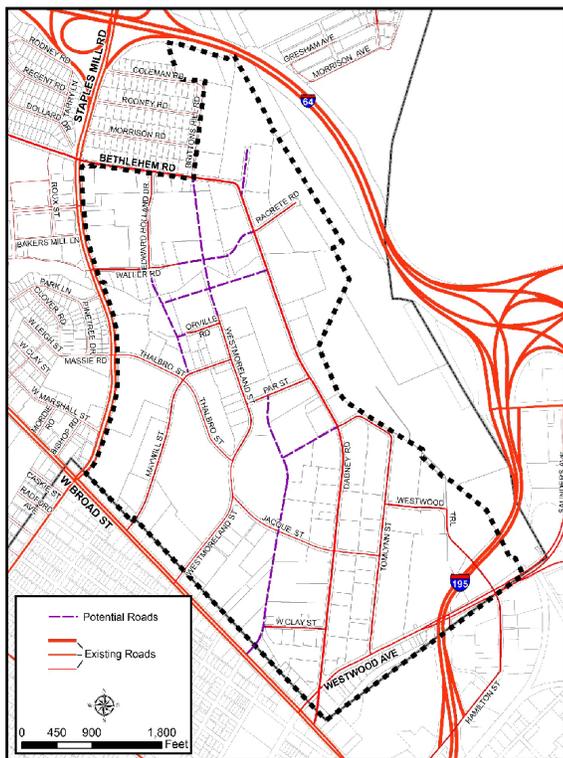


Figure 8: Study Area's Existing Road Network  
 Figure retrieved from "Westwood Small Area Study"  
 Henrico County, 2018

Westwood and the surrounding areas do have existing trails and sidewalk, but there are also plan for connectivity additions. As seen below in Figure 9, there is an existing walking and bicycle trail, seen in red, around the neighboring Libbie Mill development. The orange path is all existing sidewalk in and around the study area. Yellow paths are future shared use path, sidewalk, and bike lane projects that are funded or pending funding currently.

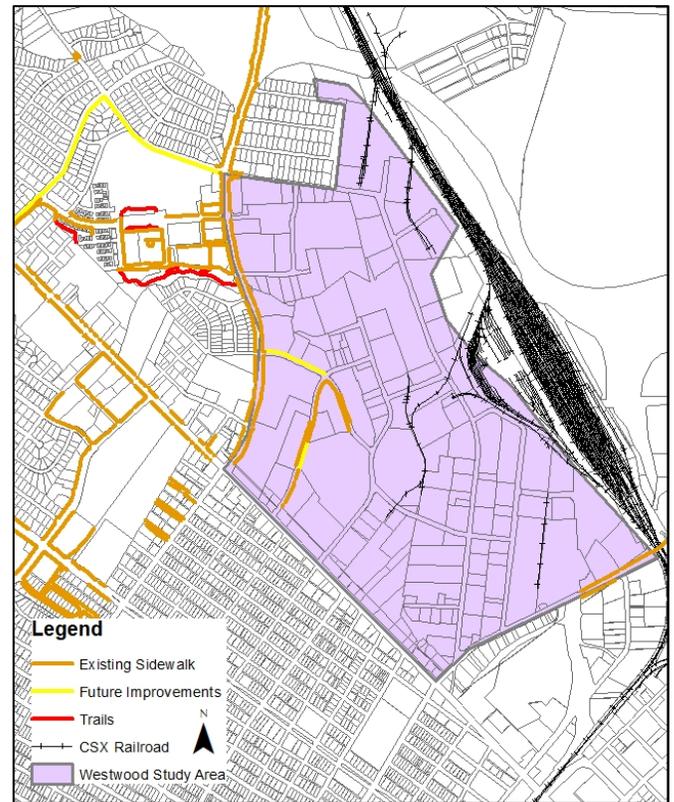


Figure 9: Sidewalk and Trail Inventory  
 Figure adapted from Henrico County GIS Data, 2019

*Preliminary Strengths, Weaknesses, and Opportunities (SWO) Analysis*

To examine existing conditions, a preliminary strengths, weaknesses, and opportunities (SWO) analysis was conducted to help guide the future recommendations in the proposed plan. Factors in each SWO category are identified from Westwood site visits. Table 3 below shows the SWO Analysis that was conducted for Westwood. Descriptive photographs for the SWO analysis can be seen below in Figures 10 - 13.

Table 3: Westwood SWO Analysis

Strengths	Weaknesses	Opportunities
New businesses are creating more density	Lacking sidewalks Absence of bike lanes	Wide roads can be restriped for the addition of bike lanes
Close proximity to GRTC's Pulse line	Large parking lots	Introduce more street lighting
Close proximity to Broad Street	Large building setbacks	Create sidewalk network
One pedestrian signal	Little to no street lighting	Connect sidewalks to broad street
Diverse land uses	Study area is currently car dependent	
	Inconsistencies in roadway and sidewalk conditions	



Figure 11: Westwood Right of Way Conditions  
Photo taken by Ashley Austin



Figure 12: Westwood's One Pedestrian Signal  
Photo taken by Ashley Austin



Figure 10: Existing Streetscape in Westwood  
Photo taken by Ashley Austin



Figure 13: Westwood Roadway  
Photo taken by Ashley Austin

## Existing Knowledge

It is important to reference previous research that has been completed regarding this plan's focal point. The overall topic of this research background is understanding why post-industrial spaces are regenerating and the role for the transportation network within and around these spaces. The complete streets theory informs the existing information section by guiding the themes of the literature review. The Complete Streets theory in urban planning encourages diversifying transportation options and improving street safety to create a more livable and engaging street.<sup>9</sup> The Richmond region's local planning district commission, PlanRVA, defines complete streets as, "Complete Streets are designed to facilitate safe access for pedestrians, bicyclists, motorists and transit riders of all ages and abilities. They make it easy to cross streets, walk to retail areas and travel to work. They also allow buses to run on schedule and make it safe for people to travel to and from train stations."<sup>10</sup> The integration of land uses and transportation and multimodal transportation networks are both crucial aspects of a complete street.

The research has been organized thematically into four themes of literature:

1. Post-Industrial Regeneration
2. Integrated Land Use and Transportation
3. Multimodal Transportation Networks
4. Transportation Planning and Civic Engagement

### *Post-Industrial Regeneration*

Post-industrial spaces have become prone to urban redevelopment due to their large underutilized footprints. As a result, these post-industrial redevelopments have the potential to support urban planning and economic development goals.<sup>11</sup> When these types of places redevelop, they create more jobs, improve the positive aesthetic view of its area, produce a sense of place and "belonging", create more green space and it also reduces further urban sprawl.

To further analyze post-industrial spaces, it is important to note in the past 40 years industrial districts in cities have been abandoned due to the downsizing of the manufacturing corporations across the US.<sup>12</sup> The traditional manufacturing economy based off of basic goods is declining in America. Some research declares there is an emerging artisan-based entrepreneurship concept that is not fully replacing manufacturing, but is becoming more valued across the country. The concept is based on human talent rather than materials and its purpose is to generate new ideas and innovation. This new economy that the US is involuntarily adopting is comprised of a diverse group of entrepreneurs such as brewers, software creators, furniture makers, fine artists and musicians. It can be recognized that not only is this industry replacing manufacturing in the economy, but it is also taking over abandoned post-industrial spaces.<sup>12</sup> Research capitalizes that architects, planners and urban designers should realize and take advantage of these post-industrial spaces to reuse them for new uses that can include artisan-based businesses, residential uses, restaurants, etc. While doing so, planners must make the city "whole" again.<sup>12</sup> This can be done by adding in proper transportation methods to partner these new urban developments. Literature explains these urban landscape transformations in the post-industrial city have created "epicentres" and they have produced modern urban spaces as a result of the redevelopments that are happening.<sup>13</sup>

Literature states that the restoration and revitalization of inner city and post-industrial areas include the reflection of two questions.<sup>13</sup> The first question is the relocation and displacement of the current users of these industrial spaces in their current form. The second is the sustainability of the modern epicentres that are arising after these redevelopments. Both of these questions should be analyzed for Westwood. As Westwood redevelops, Henrico County planners should aim to approve development related to the existing businesses in the area to not only keep the current users' placement, but also enhance the area in a way that reflects the needs and wants of the employees and business owners in Westwood. As for the

sustainability factor, redevelopments should include a mix of uses.<sup>13</sup> It is likely that in the future another recession will hit. When it does, some of the uses in the new epicentres may be affected, but with a diversity of uses, it will make it difficult for the redevelopment to completely be affected and abandoned.<sup>13</sup> Research also recommends as transport technologies improve, they should be implemented in these new epicentres, because these technologies create a more sustainable and beneficial refurbishment as well.

### *Integrated Land-Use and Transportation*

Now that it is understood how post-industrial spaces are transforming into new developing districts, it is important to learn how to integrate transportation into these new land uses. Literatures with a spotlight on integrated land use and transportation explain why this integration is so critical.<sup>14</sup> In current practice, only a handful of metropolitan planning agencies actually measure the effects that transportation system alterations have on land use. Integrated land use and transportation systems can affect the traditional transportation planning measures of vehicle miles traveled, vehicle hours traveled, and hours of congestion a day depending on how integrated the two systems are. The impact of transportation improvements on urban development can possibly be considered one of the most important and questioned topics in metropolitan planning today says UC Berkeley city and regional planning professor, Paul Waddell.<sup>14</sup> This is because the location of certain uses like office spaces, real-estate, businesses, etc. demand different amounts of transportation accessibility. What does all of this mean for the Westwood area? Literature says that even though the land use is normally controlled by local municipalities, and transportation decisions are traditionally dispersed at the various levels of government, that they must cohesively be managed and planned for. Luckily, Henrico County maintains the roads in the county besides the main arterials and highways, so this justifies this plan's purpose.

There are strong arguments regarding why land use and transportation integration are so

powerful in various literatures. Transit oriented development, new urbanism, higher density developments, sprawl, and travel behaviors all work together fluidly, or at least literature states that it should.<sup>15</sup> Various types of urban forms influence travel and transportation, which ultimately will continue to affect land use. The integration of development patterns, spatial structure, household preferences, and circulation speeds and patterns should be referenced to plan a functional post-industrial development.<sup>15</sup> Studies propose that traffic volume is a primary cause in pedestrian and vehicle collisions.<sup>16</sup> In addition to traffic volume, land areas zoned for neighborhood and commercial mixed use, land area, proportion of people living in poverty, and proportion of people aged 65 and over are also significant predictors of pedestrian-vehicle collisions. Research claims that land use and transportation planning decisions directly affect the amount of vehicle-pedestrian injury crashes.<sup>16</sup> Literature recommends that "micro-level" approaches should be used where the most collisions happen. This means implementing street design techniques that slow down traffic to support safer pedestrian pathways, improved biking and public transit to decrease driving, and creating these types of environments close to residences, schools, and senior centers. This topic leads into multimodal focused environments themed literature.

### *Multimodal Transportation Networks*

The idea of a multimodal transportation network is the basic concept of having multiple ways of getting around such as bicycling, walking, riding public transit or driving.<sup>17</sup> Because a multimodal transportation system implies more bicyclists and pedestrians on the roads and sidewalks, literature states how important it is that the infrastructure for these two methods of transport needs to improve when creating a multimodal transportation network. As more people use bike lanes and sidewalks, the more likely these people will be exposed to car collisions.<sup>17</sup> Because of this, research supports the idea of implementing "safety countermeasures" to prevent crashes with vehicles and cyclists and pedestrians. This can be done by increasing the sidewalk area and adding bike lane

buffers to lower the number of motorized crashes as seen in a Chicago case study.<sup>17</sup> This literature is very important to acknowledge if the proposed Westwood plan mentions transit improvements.

Multimodal transportation is more than just having various modes of transportation available, it's also about connecting the different modes. Some argue that the purpose of a multimodal transportation network is to find a reasonable and optimal path involving motorized roads, pedestrian pathways, bicycle pathways, and transit lines.<sup>18</sup> An important takeaway from research is the significance of transfer points where people can change from one mode of transportation to the other. Literature calls this a "Switch Point".<sup>18</sup> Switch points refer to the specific places that people can switch modes like parking areas, park and rides, public transit stations, and bike parking. Having multiple switch points creates a more beneficial and effective multimodal transportation system. Some literature argues that the switch points should have sufficient "Switch Conditions".<sup>18</sup> A switch condition can be described as the measurable quality of a switch point. A positive switch condition could be in the form of a bench at a bus stop, street lighting or even proper bike racks. Not having some of these features could result in a negative switch condition. Having more switch points and positive switch conditions will likely result in a more useful multimodal system.

#### *Transportation Planning and Civic Engagement*

While researching post-industrial regeneration, integrated land use and transportation, and multimodal transportation network themed literature, another valuable theme was discovered: Transportation planning and civic engagement. Literature states that redevelopment and transportation planning should include public participation in order to see how the newly developing spaces should grow and what they should include.<sup>19</sup> Literature insists that public engagement should be continuing, deliberative, participatory, collaborative, dynamic, flexible, and independent of any planning option in the early planning stages.<sup>20</sup> The engagement should be

consistently practiced in every stage of the transportation planning process. The engagement's main purpose should be to specifically engage proper stakeholders and the general public with multiple forms of dialogue. Literature says that it should preferably include quantitative input on the suggested plan and/or policy.<sup>20</sup> Most importantly, the stakeholder and public consultation should directly coordinate with implementation of the planned decisions. This type of engagement can be accomplished in the form of focus groups, surveys, interviews, public meetings, etc. as long as it carries out the needs and interests of the public and stakeholders. For the *Westwood Multimodal Transportation Plan*, public engagement is picking up where the client left off. The client justified the purpose for the plan; to follow, this plan continued to develop by engaging with stakeholders regarding their *wants* and *needs* for the recommendations portion of the plan.

To conclude the research background, it is important to recognize the major takeaways from this review. Post-industrial regeneration is happening across the US and is creating new land uses that are needing transportation improvements along with the restoration. It is important to alter the transportation network accordingly to these changes to ensure the safety of the areas' users. While improving the transportation networks, it is beneficial to make these networks multimodal, so people of all demographics can use these spaces to live, work, and play. Furthermore, while improving any type of transportation network, it is critical to include civic engagement to ensure the plan is beneficial for the study area's users. Completing this analysis of literature has helped solidify the *why* and *how* for the *Westwood Multimodal Transportation Plan*.

## METHODOLOGY AND APPROACH

The methodology and approach sections of this plan is highly influenced by the Just City theory in the sense that the research questions are formed around the 3 values of diversity, equity, and democracy. The stakeholder outreach proposed will interact with the public to entail a democratic process. The research aims to obtain a diverse set of survey responses in order to supply an equal outcome for all Westwood users. In addition to the focus on democracy and diversity, the plan also intends to recommend a streetscape that allows access for people of all skill sets to create equality.

### Research Questions

An important step in the planning process is developing key research questions that inform the recommendations for the plan. The plan aims to answer the following questions:

1. What modes of transport are currently being utilized in the study area?
2. What type of bike and pedestrian infrastructure additions do the stakeholders want to see implemented in Westwood?
3. What street designs influence the most utilization and allow for users of all physical abilities?

### Sources of Information

Because the study area is so large, question one involved observing the study area at peak and nonpeak locations for an hour at a time to find quantitative data from individuals within the study area. These two locations are yet to be determined. Counts have been completed for pedestrians, cyclists and cars. The goal of this method was to understand how the users of the study area are getting around currently, and it is significant to recognize this so the plan can adequately recommend more or less sidewalks, bike lanes, crosswalks, transit stops, or other road improvements. Factors such as weather, holiday proximity, day and night, and proximity to areas of

interest were analyzed to ensure the data is not skewed.

Question two utilizes stakeholder input to gather appropriate data and to generate recommendations regarding the study area. Surveys were electronically distributed to the people surrounding the study area and who currently use Westwood in their day to day routine. The surveys focus on understanding what types of pedestrian and bike infrastructures the stakeholders wished to see implemented in Westwood. This was completed in the form of a visual preference survey. In addition to the transportation related content, the surveys also included demographic questions like age, race, gender, and zip code in order to make sure there was diversity in the sample.

The third research question's purpose is to make sure the *Westwood Multimodal Transportation Plan* is planning equally for all people to no matter their age or physical abilities. To recommend safe, multimodal streets in Westwood, the *2010 ADA Standards for Accessible Design* and the National Association of City Transportation Official's (NACTO) *Urban Bikeway Design Guide*. These guides help inform and develop an effective streetscape design for the streets in the Westwood study area. Appropriate sidewalk and bike lane widths and specific infrastructures are some examples of insight that ADA and NACTO supplied for this plan.

### Stakeholder Outreach

The Westwood Multimodal Transportation Plan engaged with stakeholders in early 2020 through an online survey. The survey was created through an online website, Survey Monkey. The survey was displayed on Henrico County Public Works Department, posted on flyers throughout the study area, posted on Facebook pages of some businesses that are in Westwood. The survey had questions related to demographics, pedestrian and bicycle infrastructure priorities, and visual preference.

## Analytical Methods

To reach the final recommendations and designs, the analytical methods described in Table 4 were used.

Table 4: Methodology Summary Table

Research Question	Information Source	Analytical Methods
1. What modes of transport are currently being utilized in the study area?	Observational Data	Illustrative visuals and charts were used to present the data found from the observation site visit.
2. What type of bike and pedestrian infrastructure additions do the stakeholders want to see implemented in Westwood?	Survey Responses	Graphs and charts provide a visual for the findings that come from the stakeholder outreach survey.
3. What street designs influence the most utilization and allow for users of all physical abilities?	ADA Standards and NACTO Guidelines	Standards are used to guide the recommendations. SketchUp was utilized to create digital models of the spatial feel for the plan's design and implementation recommendations.

were considered when observing the space and analyzing data. Observation locations can be seen below in Figure 14.

Figure 14. Observation Locations

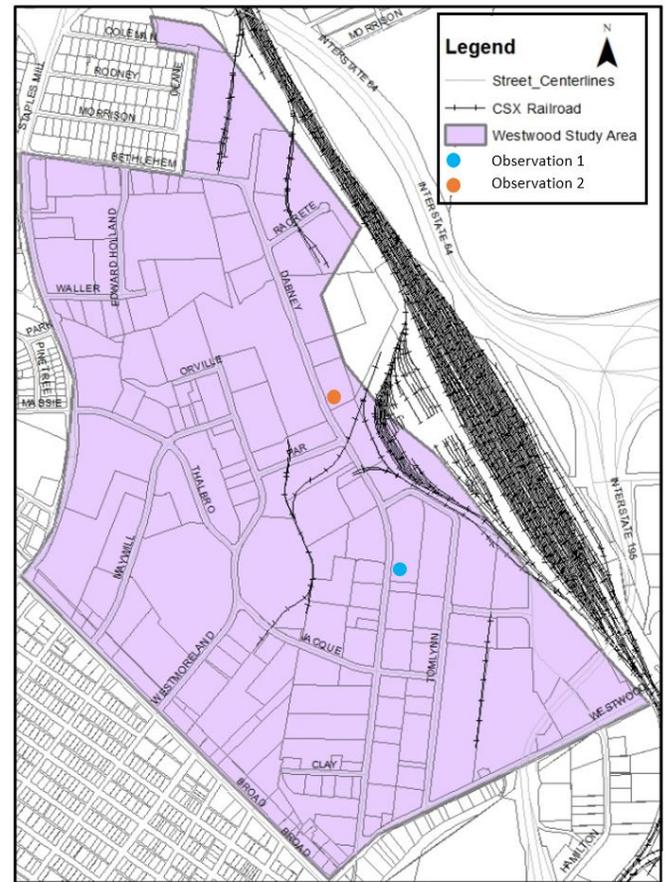


Figure adapted from Henrico County GIS Data, 2020

## FINDINGS

In this section of the plan, the results from the survey and study area observations are presented and analyzed. This section helps inform the recommendations section of the plan.

### Observations

Two observations of the study area were completed in January 2020 at peak locations and times in order to gain an understanding of how people currently move within and around the Westwood area. These observations acquired quantitative data from individuals in the study area boundary. The counts were completed for cars, cyclists, and pedestrians within Westwood. Weather, holidays, time of day, and areas of interest

Observation 1 on Friday, February 7, 2020 from 6:30pm – 7:30pm:

During Observation 1, the weather was 44 degrees Fahrenheit and cloudy. The observation did not transpire near any national holidays. Some businesses in Westwood were open, but many workplaces with an office setting seemed to be closed. The observation location was in the Strangeways Brewing parking lot. Strangeways was having a comedy event on the night of the observation, so it generated some movement within the study area. Observation 1 found mainly vehicular traffic in the study area with 197 cars in one hour. Very little pedestrians were seen during observation 1 possibly because there is very little lighting in Westwood at night. Data found from Observation 1 can be referenced in Figure 15 and Table 5.

Table 5: Observation Data

Count Type	Observation 1	Observation 2
Car	197	304
Pedestrian	10	83
Cyclist	0	3

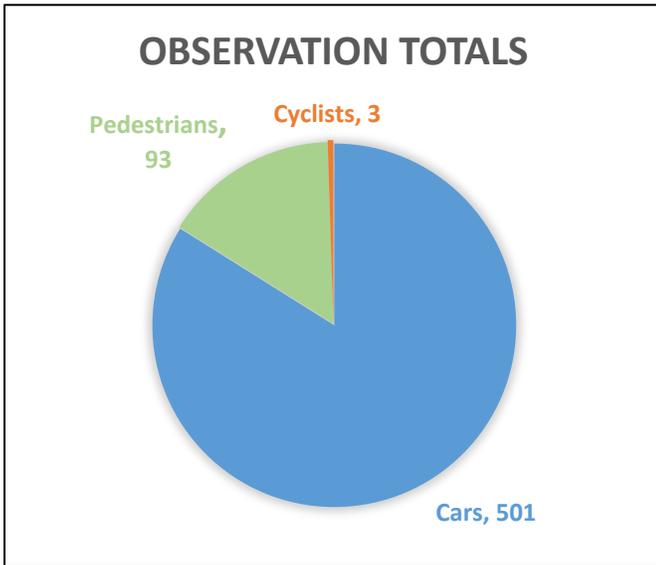


Figure 15. Observation Totals

Observation 2 on Tuesday, February 11, 2020 from 12:00pm – 1:00pm:

During Observation 2, the weather was 62 degrees Fahrenheit and mostly cloudy. The observation did not transpire near any national holidays. Most businesses in Westwood were open and many workplaces seemed to be on lunch break. The observation location was in the Pharmaceutical Product Development parking lot which is in very close proximity to the only pedestrian signal in the study area. Observation 2 found an ample amount of vehicular traffic in the study area with 304 cars in one hour. Some pedestrians used the crosswalk while others did not, to cross the road. Since there are no sidewalks present near the observation’s location, pedestrians were seen walking in the grass and on the side of the roadway. Data found from Observation 2 can also be referenced in Figure 15 and Table 5.

The observational data found that Westwood is currently an auto-oriented area. Most

of the movement in the study area is happening by car. While the offices in Westwood are open, the study area has a decent amount of pedestrian traffic. It was not uncommon to see pedestrians walking in the grass or in the roadway due to the lack of sidewalks in the area. Only 3 cyclists were seen during the observations. This could be because there are currently no bike lanes or bike racks in Westwood. To address these observations, the recommendations section aids vehicular traffic for Westwood, while also encouraging pedestrian and bicycle transportation.

### Survey

Twenty-two people completed the survey to inform the recommendations section of this plan. The survey consisted of 8 questions that were focused on both demographics and street design and amenity opinions. The survey was open to the public for two weeks, from to January 29, 2020 – February 12, 2020. The survey was posted on Henrico County’s Department of Public Works website. To inform people of the survey, flyers were posted at places like the nearby public library, Panera Bread, Starbucks, etc. The survey was also posted on many public Facebook pages of businesses in the study area. Results of the survey show that most respondents of the survey either live, work, or play in or around Westwood.

For demographical analysis, age and gender related questions were asked. It can be seen below in Figure 16 that most of the survey respondents were between the ages of 25 – 34. The age groups with the lowest respondents were aged 18 and under and 65 and up. Overall, the survey had at least one respondent from each age group. As for gender, more females responded to the survey than males. However, only two more females responded than males, so the genders distribution was almost equal.

## "WHAT IS YOUR GENDER?"

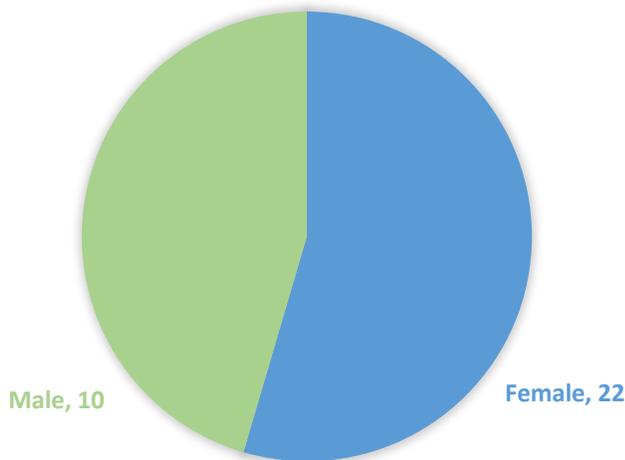


Figure 16. Gender Distribution

## "WHAT IS YOUR AGE?"

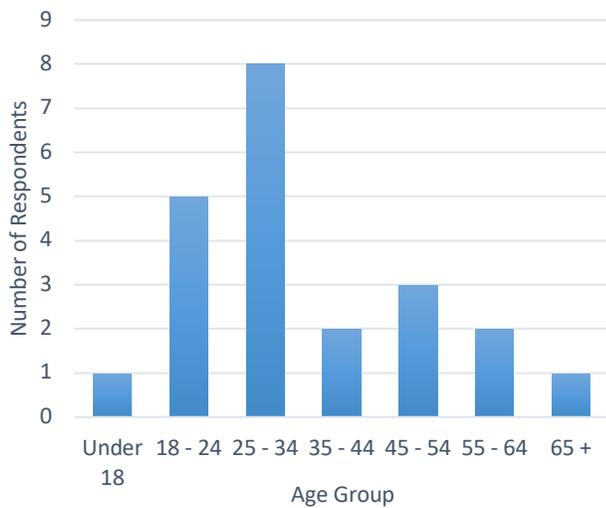


Figure 17. Age Distribution

The survey showed pictures of varying crosswalks designs and it asked respondents to choose the two crosswalk designs that he or she preferred the most. The two most preferred designs can be seen below in Figures 18 and 19. These responses may mean that stakeholders value safety and having a dedicated space for pedestrians. Both crosswalk designs dedicate space for the pedestrian; one with the yield sign and the other with the brick

pavers. The brick paver crosswalk adds an intricate design to the streetscape and it also provides texture and color to the roadway that alerts drivers that there may be people crossing the street which creates a higher chance the driver will slow down. Figure 19's design has a traditional crosswalk striping, except it also has a "Yield to Pedestrian Here" sign in the middle of the crosswalk. Having this yield sign in the crosswalk directs drivers in an informative way just as a road sign does for stopping or following the speed limit. It acts as a reminder to the driver to yield to pedestrians.



Figure 18. First Preferred Crosswalk



Figure 19. Second Preferred Crosswalk

The survey also mentioned bike lane design. Respondents were asked to choose the bike lane design that he or she most preferred out of the following pictured. Four options were presented and the design that received the most votes was a protected cycle track design which can be referenced below in Figure 20. Again, it can be assumed that survey respondents value safety. This specific bike lane design supplies cyclists with their own separate lane in traffic, creating a safer environment for the cyclist. The bike lane design pictured below has plastic bollards, but protection of the bike lane can come in the form of on street parking and planters as well.



Figure 20. Preferred Bike Lane

The last visual preference question in the survey focused on streetscape design. The respondents were asked to choose the two designs that they found most appropriate for Westwood. Out of the options, three designs received the most votes out of the six presented which can be referenced below in Figures 21, 22, and 23. The three designs chosen mainly had two aspects in common: dedicated cycle tracks and street vegetation. These responses lead to the conclusion that stakeholders want to see more green on the streets in the form of plants and trees. These responses also help strengthen the assumption that survey responders were mainly concerned with safety and having dedicated environments for pedestrians and cyclists, not just automobiles.



Figure 21. First Preferred Streetscape Design



Figure 22. Second Preferred Streetscape Design



Figure 23. Third Preferred Streetscape Design

After the visual preference questions, the survey then inquired about bus stop amenities and how they encourage transit ridership. Specifically, the survey asked, “Which of the following bus stop amenities would encourage you to take public transit? Please choose all that apply.” The answer choices included: Shelters, benches, crosswalks that directly connect to bus stops, bus stop lighting, and other. The answers to this question can be seen below in Figure 24.

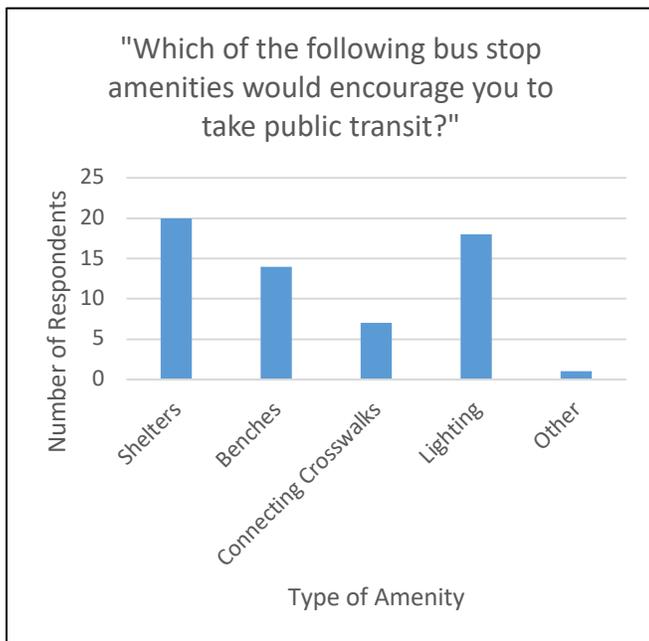


Figure 24. Preferred Bus Stop Amenities

The two main amenities that respondents said would encourage them to ride transit are shelters and lighting. Once more, the survey respondents were most concerned with safety. Lighting and transit shelters give a perception of safety if designed in the right way. GRTC recently announced its new Shelter Plan that is being rolled out starting in 2020.<sup>21</sup> The plan includes shelter design that includes solar lighting, glass siding, and a bench/lean bar. Though there are not any shelters planned to be placed in Westwood currently, this plan recommends a shelter to be added if new bus stops are placed in the study area going forward. The new shelter design for Henrico is seen below in Figure 25.



Figure 25. Bus Stop Shelter Design

The seventh question on the survey asks why the respondent currently visits Westwood and the surrounding area. This question was asked to gain an understanding of what relationships respondents have with the study area how they are associated with the survey responses. All in all, just under 70% of the respondents either live, work, or play in the Westwood and the surrounding areas. Only a little over 30% of the respondents said that they do not visit Westwood currently, but 3 of those 7 people said they would like to in the future. The answers to this question can be seen below in Figure 26.

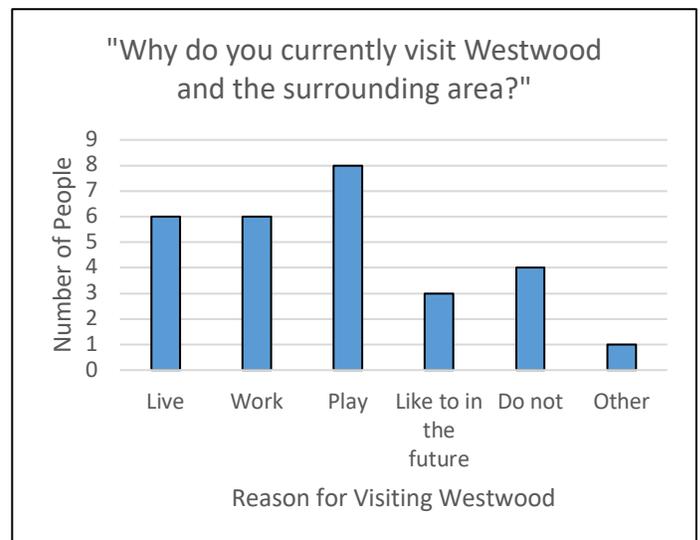


Figure 26. Reasons for Visiting Westwood

The last question in the survey asked if the respondent had any additional questions. Only 3 people answered this question, all other respondents left it blank. These comments can be seen below in Table 6. The comments are used to guide the recommendations.

Table 6: Public Comments

Number	Comment
1	"The more bike lanes the better!"
2	"Trees please"
3	"Anything that we can do to connect parts of town that has existing bike lanes is awesome. The area in question is touted as Henrico's version of Scott's Addition, so this makes complete sense."

The eight survey questions and their 22 answers were very beneficial to building the recommendations section of this plan. Most people who completed the survey favor multimodal transportation in Westwood and want to see improvements in connectivity, bike lanes, and pedestrian infrastructures.

## VISION STATEMENT:

In the future, Westwood will be a popular destination in Henrico County where people with all physical abilities can live, work, and play. Both, residents and visitors will have a safe and equitable environment with multiple modes of transportation available to them.

# Goal 1. Build a healthy, accessible and attractive environment.

<b>Objective 1.1</b>	Make Westwood more accessible.
<b>Action 1.1.1</b>	Construct the potential roads that Henrico’s Department of Planning previously identified in the Westwood Small Area Study.
<b>Action 1.1.2</b>	Engage with business and landowners in Westwood to consult with them regarding the construction of new roads.
<b>Action 1.1.3</b>	Connect sidewalk network in Westwood to the neighboring Libbie Mill Trails.
<b>Objective 1.2</b>	Implement complete street tactics on roads in Westwood.
<b>Action 1.2.1</b>	Add uniform, pedestrian scale street lighting to major corridors to provide safety and comfort to pedestrians.
<b>Action 1.2.2</b>	Plant street trees in available utility strips to slow down traffic and to provide a buffer between pedestrians and traffic.
<b>Action 1.2.3</b>	Add wayfinding signage around Westwood to direct visitors of popular destinations such as Topgolf and Strangeways Brewing Company.
<b>Objective 1.3</b>	Bring public transit into Westwood.
<b>Action 1.3.1</b>	Extend GRTC’s Route 18 on to Dabney Rd for the addition of two bus stops.
<b>Action 1.3.2</b>	Implement bus shelters with lighting at new GRTC bus stops.
<b>Action 1.3.3</b>	Add a BRT station at the intersection of Westwood Ave and Broad Street.



Figure 27. Complete Street as mentioned in Objective 1.2  
Retrieved from Birmingham, AL



Figure 28. Wayfinding Signage in Salt Lake City  
Retrieved from provocationutah.wordpress.com/2012/07/18/still-no-wayfinding-



Figure 29. Henrico County Bus Stop  
Photo Taken by Ashley Austin

Goal 1 focuses on building a healthy, accessible, and attractive Westwood. Westwood has very large blocks and little to no grid system. In order to create a more walkable environment, Achieving Objective 1.1 will create a grid system and smaller blocks. Having smaller blocks makes it easier for pedestrians to walk around from place to place in Westwood because it creates a shortened walk time and multiple options for getting to one destination. Another way to make Westwood more accessible is to connect the area to the neighboring Libbie Mill trails as mentioned in Action 1.1.3.

The current way the streets in Westwood are configured are not considered a complete street. A complete street should offer multiple modes of transportation options, interesting places to walk, and a safe environment. Objective 1.2 aims to create this type of space in Westwood. By constructing street lighting mentioned in Action 1.2.1, the streets will be more well-lit, therefore,

becoming a safer street. Planting street trees help create a complete street depending on the species and if the trees are planted in the proper areas. Figure 30 below shows a model of Westwood designed as a complete street. The visual shows the proportion of lighting and trees to the pedestrians and cars.

As of now, Westwood does not have any public transit stops; although, it does have a few on its perimeter. Objective 1.3 is all about bringing public transit into Westwood. A current GRTC bus route, Route 18, drives through Staples Mill Rd, and Action 1.3.1 suggests that the route be extended through Dabney Road, the main corridor in Westwood. Having public transit access in the study area should boost the number of walkers in the area, which in turn, will put more eyes on the street. This creates a safer environment.



Figure 30. Recommended Westwood Designed as a Complete Street  
*SketchUp Model Created by Ashley Austin*

## Goal 2. Create a safe and viable environment for all pedestrians.

<b>Objective 2.1</b>	Build a safety initiative toward zero pedestrian deaths.
<b>Action 2.1.1</b>	Lower speed limits in Westwood to 25 mph or less.
<b>Action 2.2.2</b>	Engage with local stakeholders to set shared goals for vision zero.
<b>Objective 2.2</b>	Build sidewalks on every street in Westwood to create a complete sidewalk network.
<b>Action 2.2.1</b>	Follow ADA guidelines when developing crosswalks and sidewalks.
<b>Action 2.2.2</b>	Implement accessible pedestrian signals at crosswalks.
<b>Objective 2.3</b>	Insert crosswalks at every intersection.
<b>Action 2.3.1</b>	Crosswalks should be constructed across all legs of all intersections in Westwood.
<b>Action 2.3.2</b>	Crosswalks should be built using brick pavers to delineate a separate space for pedestrians and to send a visual to drivers.

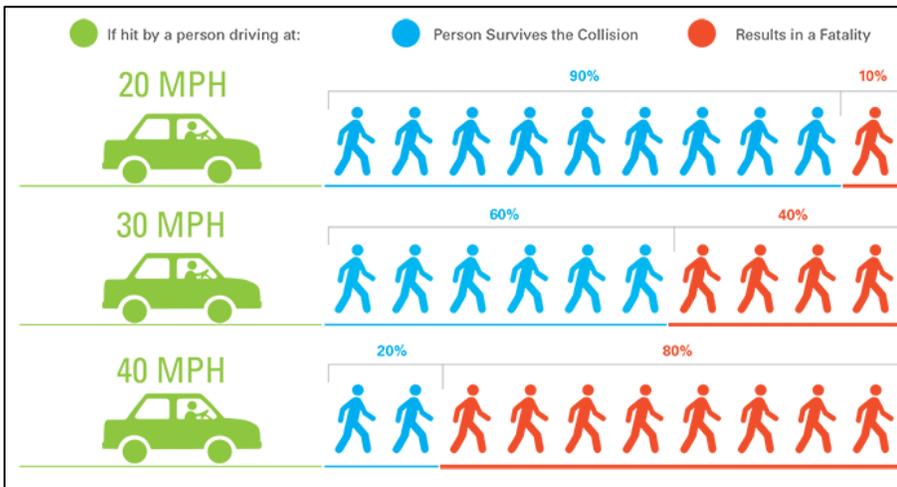


Figure 31. Impact of Traffic Speeds on Pedestrians  
Retrieved from San Francisco MTA Vision Zero Action Plan, February 2015



Figure 33. ADA Crosswalk Ramp in New York  
Retrieved from ADA Step Safe



Figure 32. Brick Paver Crosswalk Mentioned in Action 2.3.2  
Retrieved from Streets Blog, 2015



Figure 34. Accessible Pedestrian Signal in Chicago  
Retrieved from Chicago Department of Transportation, 2019

Goal 2's priority is centered around creating a safe and enjoyable environment for pedestrians, not just cars. It is very clear that Westwood is currently only designed for the convenience of the automobile. This is normal for a traditional industrial area, but now that Westwood is growing into more of a mixed-use environment, it is time to plan for the pedestrian. Objective 2.1 strives for zero pedestrian deaths in Westwood, this is also known as Vision Zero. Acquiring a Vision Zero mindset for Westwood includes prioritizing pedestrians and their safety. This can be done by lowering speed limits and engaging with the pedestrians that use Westwood.

In its current state, Westwood little to no sidewalks, although, it does have one pedestrian signal nearby a large and popular office. Objective 2.2 focuses on building a complete sidewalk network. Its related actions recommend using ADA

standards of design to create an accessible street for all people. Some of these standards include automated pedestrian signals and compliant curb ramps. These additions, with the newly constructed sidewalk system, should create a walkable and easily accessible environment for pedestrians.

Crosswalks help improve pedestrian safety tremendously. Unfortunately, Westwood only has one crosswalk, so Objective 2.3 addresses this. Action 2.3.1 calls for crosswalks to be constructed at every intersection in Westwood. In addition, Action 2.3.2 says that the crosswalks should be constructed with brick pavers, not just white lines. Building the crosswalks like this delineates the pedestrian's dedicated space from the automobile's space. This causes drivers to slow down and be more cautious of pedestrians as they cross the street. Figure 35 below helps visualize this.



Figure 35. Recommended Westwood Intersection  
*SketchUp Model Created by Ashley Austin*

## Goal 3. Improve bicycle infrastructure in Westwood.

<b>Objective 3.1</b>	Create a bike lane network in Westwood.
<b>Action 3.1.1</b>	Implement buffer bike lanes on Dabney Rd, Bethlehem Rd, Thalbro St, Par St, and Westmoreland St.
<b>Action 3.1.2</b>	Implement head-start intersections for roads that have bike lanes.
<b>Action 3.1.3</b>	Add bike lane signage to inform drivers of nearby cyclists.
<b>Objective 3.2</b>	Increase bike parking in Westwood.
<b>Action 3.2.1</b>	Request neighboring businesses to implement bike racks in front of their buildings.
<b>Action 3.2.2</b>	Add bike parking beside new public transit stops in Westwood.
<b>Objective 3.3</b>	Connect the first and last mile to public transit stops.
<b>Action 3.3.1</b>	Implement a bike share station in Westwood.
<b>Action 3.3.2</b>	Partner with scooter sharing companies like Bird, Lime, Bolt, etc. and request the use of scooters in Westwood.



Figure 36. Buffer Bike Lane in Monterey Park  
Retrieved from Streets Blog, 2019



Figure 38. Bike Head-Start Intersection in San Francisco, CA  
Retrieved from Stride Blog, 2016



Figure 37. Scooter Sharing in Richmond, VA  
Retrieved from Virginia Mercury, 2018



Figure 39. RVA Bike Share  
Retrieved from Richmond Times Dispatch, 2018

Goal 3 strives for building a welcoming and safe environment for bicyclists in Westwood. Objective 3.1 plans to implement bike lanes on popular streets in the study area. A map of these streets can be seen below in Figure 40. Not only does this objective plan for bike lanes, it also prioritizes cyclists' safety by adding head-start boxes at intersections. This helps in ensuring the drivers clearly see cyclists and so cyclists can turn left with less stress. It is important to note that this area is not currently a common biking area because the infrastructure is not in place and the area is still transforming from an industrial district to a mixed-use district. As more cyclists travel in Westwood, it is crucial to inform the drivers of this, so Action 3.1.3 recommends adding signage to inform drivers of cyclists in the area.

As more cyclists start using Westwood's streets as travel corridors, it is important to provide proper bike parking. Objective 3.2 proposes adding bike parking near neighboring businesses and at new bus stops. Figure 41 shows bike parking option.

Because Westwood is lacking public transit, it is crucial to address the first mile last mile predicament. Westwood should have more public transit stops in the next 20 years, but it is realistic to say that not every street will have a transit stop nearby. To address this problem, Objective 3.3 focuses on connecting Westwood to transit by suggesting ways to mitigate long walks from transit stops. Some options Action 3.3.1 and Action 3.3.2 offer is implementing bicycle and scooter sharing in the area. Bikes and scooters can help people get from their transit stop to work or the brewery around the street faster and make the commute to these places more manageable and less intensive.

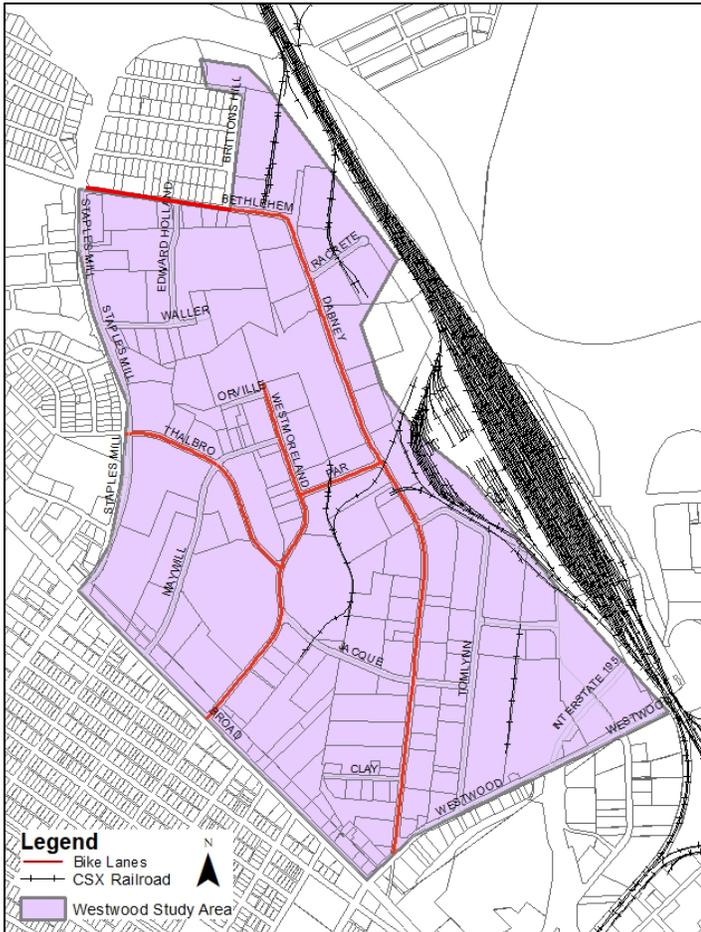


Figure 40. Recommended Bike Lane Placement  
Map Created by Ashley Austin



Figure 41. Recommended Bike Parking  
Retrieved from Dero, 2020

# IMPLEMENTATION PLAN

Table 7: Implementation Plan

Goals, Objectives, and Actions	1-2 years	5 years	10 years	15 years
<b>Objective 1.1</b> Make Westwood more accessible.				
<b>Action 1.1.1</b> Construct the potential roads that Henrico’s Department of Planning previously identified in the Westwood Small Area Study.				
<b>Action 1.1.2</b> Engage with business and landowners in Westwood to consult with them regarding the construction of new roads.				
<b>Action 1.1.3</b> Connect sidewalk network in Westwood to the neighboring Libbie Mill Trails.				
<b>Objective 1.2</b> Implement complete street tactics on roads in Westwood.				
<b>Action 1.2.1</b> Add uniform, pedestrian scale street lighting to major corridors to provide safety and comfort to pedestrians.				
<b>Action 1.2.2</b> Plant street trees in available utility strips to slow down traffic and to provide a buffer between pedestrians and traffic.				
<b>Action 1.2.3</b> Add wayfinding signage around Westwood to direct visitors of popular destinations such as Topgolf and Strangeways Brewing Company.				
<b>Objective 1.3</b> Bring public transit into Westwood.				
<b>Action 1.3.1</b> Extend GRTC’s Route 18 on to Dabney Rd for the addition of two bus stops.				
<b>Action 1.3.2</b> Implement bus shelters with lighting at new GRTC bus stops.				
<b>Action 1.3.3</b> Add a BRT station at the intersection of Westwood Ave and Broad Street.				
<b>Objective 2.1</b> Build a safety initiative toward zero pedestrian deaths.				
<b>Action 2.1.1</b> Lower speed limits in Westwood to 25 mph or less.				
<b>Action 2.2.2</b> Engage with local stakeholders to set shared goals for vision zero.				
<b>Objective 2.2</b> Build sidewalks on every street in Westwood to create a complete sidewalk network.				
<b>Action 2.2.1</b> Follow ADA guidelines when developing crosswalks and sidewalks.				
<b>Action 2.2.2</b> Implement accessible pedestrian signals at crosswalks.				

<b>Goals, Objectives, and Actions</b>	<b>1-2 years</b>	<b>5 years</b>	<b>10 years</b>	<b>15 years</b>
<b>Objective 2.3</b> Insert crosswalks at every intersection.				
Action 2.3.1 Crosswalks should be constructed across all legs of all intersections in Westwood.				
Action 2.3.2 Crosswalks should be built using brick pavers to delineate a separate space for pedestrians and to send a visual to drivers.				
<b>Objective 3.1</b> Create a bike lane network in Westwood.				
Action 3.1.1 Implement buffer bike lanes on Dabney Rd, Bethlehem Rd, Thalbro St, Par St, and Westmoreland St.				
Action 3.1.2 Implement head-start intersections for roads that have bike lanes.				
Action 3.1.3 Add bike lane signage to inform drivers of nearby cyclists.				
<b>Objective 3.2</b> Increase bike parking in Westwood.				
Action 3.2.1 Request neighboring businesses to implement bike racks in front of their buildings.				
Action 3.2.2 Add bike parking beside new public transit stops in Westwood.				
<b>Objective 3.3</b> Connect the first and last mile to public transit stops.				
Action 3.3.1 Implement a bike share station in Westwood.				
Action 3.3.2 Partner with scooter sharing companies like Bird, Lime, Bolt, etc. and request the use of scooters in Westwood.				

## FUNDING

Funding sources for this plan include:

1. The Virginia Smart Scale Program funds various transportation improvement projects that involve highway improvements, transit and/or rail expansion, bicycle and pedestrian improvements, or transportation demand management.<sup>22</sup>
2. The Virginia Transportation Alternatives Program funds transportation projects that create safe, accessible, attractive, and environmentally sensitive communities. More specifically, program funds the construction of on and off-road facilities for pedestrians and bicycles.<sup>23</sup>
3. The Virginia Transportation Enhancement Program funds projects that integrate transportation into communities. The program strives to improve non-motorized transportation, enhance the public's traveling experience, revitalize communities and improve the quality of life.<sup>23</sup>
4. The Congestion Mitigation and Air Quality Improvement Program supplies funding for projects that include transit, non-recreational bike and pedestrian facilities, signals, intersection improvements, intelligent transportation systems, teleworking, ridesharing, and more.<sup>24</sup>
5. The Regional Surface Transportation Program provides funding for projects to improve and preserve conditions of bicycle and pedestrian infrastructure, transit capital projects, and more.<sup>24</sup>
6. The Transportation Infrastructure Finance and Innovation Act Program offers Federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects. Surface transportation projects should include some form of highway, transit,

railroad, intermodal freight, or port access improvement.<sup>25</sup>

7. The Central Virginia Transit Authority is being established due to the Virginia General Assembly House Bill 1541. The bill provides Richmond region localities with dedicated transportation funding. It will include transit funding and construction and maintenance projects to help build and improve trails, roads, streets, bridges, bike lanes and sidewalks. The transit authority will administer local and regional funds for these types of projects.<sup>26</sup>

## CONCLUSION

The Westwood Multimodal Transportation Plan examines the transitioning study area and as it continues to grow and transform. Westwood is experiencing an industrial regeneration that will change the way the area is utilized by the surrounding communities. This plan evaluated the study area, retrieved community engagement, and researched equitable multimodal streetscape design tactics to inform recommendations that will create a multimodal Westwood. Sustainable, connected, and integrated transportation is essential to success and livability of the fast-growing study area.

This plan seeks out the most inefficient parts of Westwood and aims to correct those parts by recommending a streetscape redevelopment and public transit improvements that will create a multimodal environment. As the density increases in Westwood, these recommendations will help this area support the change and new traffic.

It is important to note, for Westwood to flourish, the entire plan does not need to be implemented in its entirety. Overtime, parts of this plan can be implemented, and the area will see benefit if the proper steps are taken.

## APPENDICES

# Appendix 1: Survey

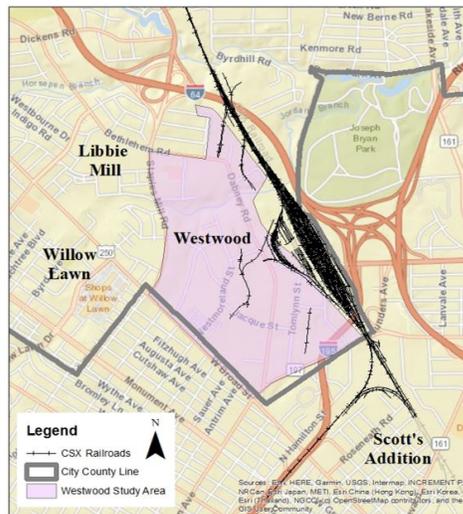
## Public Engagement Survey

### Westwood Multimodal Transportation Plan

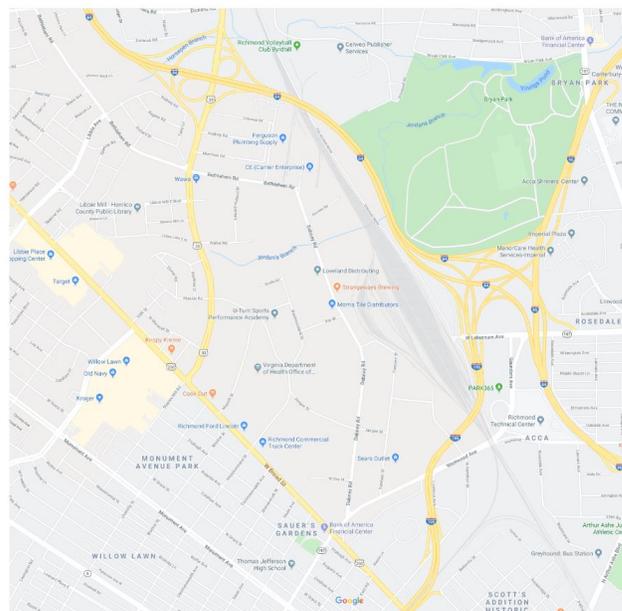
The Westwood Multimodal Transportation Plan is being prepared by a graduate student in the Master's of Urban and Regional Planning (MURP) program at VCU. This plan satisfies the MURP program's requirement to complete a client-based professional plan before graduation. The Westwood Multimodal Transportation Plan is being prepared for Henrico County's Department of Public Works to provide recommendations for using multi-modal transportation tactics in the Westwood area. This research acts as a starting point in the planning process for Henrico County. This plan is not an official document prepared by the county. If the County wishes to further pursue a multimodal environment for Westwood, further planning practices should be completed.

This survey is an opportunity for the public to provide guidance on planning and design alternatives for the Westwood area that will be shared with Henrico's Department of Public Works. Your participation in the survey provides feedback that will build the recommendations section for the Westwood Multimodal Transportation Plan. To provide context, a map of the study area can be seen below.

Westwood Study Area



Westwood Study Area from Google Maps



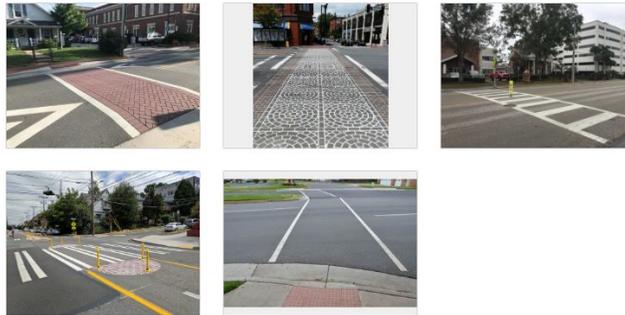
1. What is your age?

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

2. What best describes your gender?

- Female
- Male
- Prefer not to say
- Prefer to self describe:

3. From the following, which TWQ crosswalk designs do you prefer the *most*?



4. From the following, which type of bike lane do you prefer?



5. From the following, choose TWQ street corridor designs you find the *most* appropriate for the Westwood study area in the future.



6. Which of the following bus stop amenities would encourage you to take public transit? Please choose all that apply.

- Shelters at bus stops
- Benches at bus stops
- Crosswalks that directly connect to bus stops
- Bus Stop Lighting
- Other (please specify)

7. Why do you currently visit Westwood and the surrounding area?

- I live in the surrounding area
- I work in the surrounding area
- I spend my free time in the area
- I don't spend much time in the area currently, but I'd like to in the future
- I do not visit the surrounding area often
- Other (please specify)

8. Do you have any additional comments and/or street design suggestions for the Westwood study area?

Submit



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