Hickory Ridge Bicycle Corridor Study

Howard County Office of Transportation

November 2020

Hickory Ridge Bicycle Corridor Study

Appendix 1

Photo Log

001 Grace Drive looking northeast toward Cedar Lane intersection

002 Grace Drive looking northeast toward Cedar Lane intersection from Simpsonville Mill driveway

003 Grace Drive looking southwest from Simpsonville Mill driveway

004 Grace Drive looking east showing Cedar Lane traffic islands

005 Cedar Lane looking south toward intersection with Grace Drive

006 Cedar Lane pathway connection to Harriet Tubman Lane looking south toward Grace Drive

007 Cedar Lane looking north showing bridge over Middle Patuxent River

008 Cedar Lane pathway connection to Harriet Tubman Lane

009 Cedar Lane looking south showing bridge over Middle Patuxent River

010 Cedar Lane maintenance access to Robinson Nature Center pathway showing vehicular bridge looking south

011 Cedar Lane maintenance access to Robinson Nature Center pathway looking southeast

012 Cedar Lane maintenance access to Robinson Nature Center pathway looking northeast

013 Robinson Nature Center pathway connection off Cedar Lane looking southwest

014 Robinson Nature Center pathway connection to Cedar lane looking northeast

015 Robinson Nature Center pathway connection looking southwest

016 Robinson Nature Center pathway connection looking southwest showing turn to bridge underpass

017 Robinson Nature Center pathway connection looking southeast showing pathway to bridge underpass

018 Cedar Lane looking north showing vehicular entrance to Robinson Nature Center

019 Cedar Lane south of Freetown Road looking north

020 Cedar Lane south of Freetown Road looking south

021 Cedar Lane from east side of Freetown Road intersection looking south

022 Cedar Lane from east side of Freetown Road intersection looking north

023 Cedar Lane from east side of Freetown Road intersection looking west at slip lane crosswalk

024 Cedar Lane from east side of Freetown Road intersection looking north showing both crosswalks

025 Cedar Lane from east side of Freetown Road intersection looking west at Cedar Lane crosswalk

026 Cedar Lane from east side of Freetown Road intersection looking north looking north showing unmarked Freetown Road Crosswalk

027 Cedar Lane from west side of Freetown Road intersection looking east

028 Cedar Lane from west side of Freetown Road intersection looking east at Cedar Lane crosswalk

029 Cedar Lane from west side of Freetown Road intersection looking east at Cedar Lane crosswalk

030 Cedar Lane from west side of Freetown Road intersection looking south at Cedar Lane crosswalk

031 Cedar Lane from west side of Freetown Road intersection looking east across intersection

032 Cedar Lane from east side of Freetown Road intersection looking north

033 Cedar Lane north of Freetown Road intersection looking north

034 Cedar Lane at Owen Brown Road intersection looking south

035 Cedar Lane at Owen Brown Road intersection looking northwest

036 Cedar Lane at Owen Brown Road intersection looking north

037 Cedar Lane at Owen Brown Road intersection looking east

038 Owen Brown Road looking east from Cedar Lane intersection

039 Owen Brown Road east of Cedar Lane intersection looking east

040 Owen Brown Road west of Cedar Lane intersection looking west

041 Owen Brown Road west of Cedar Lane intersection looking west

042 Owen Brown Road west of Cedar Lane intersection looking east toward Sunny Spring Road

043 Owen Brown Road west of Sunny Spring intersection looking east

044 Owen Brown Road west of Martin Road intersection looking west

045 Owen Brown Road at Martin Road intersection looking west

046 Martin Road at Owen Brown Road intersection looking southwest

048 Martin Road at intersection with Owen Brown Road looking south

049 Martin Road looking south from Owen Brown Road intersection

050 Martin Road just south of intersection with Owen Brown Road looking south

051 Martin Road just south of intersection with Owen Brown Road looking north

052 Martin Road just south of intersection with Owen Brown Road looking south

053 Martin Road at Ferryboat Circle looking north

054 Martin Road at Kiteline Court intersection looking south

055 Martin Road at Tanager Lane intersection looking south

056 Martin Road at Tanager Lane intersection looking north

057 Martin Road at Tanager Lane intersection looking north showing ditch

058 Martin Road at Tanager Lane intersection looking south

059 Martin Road at Tanager Lane intersection looking north

060 Martin Road at Quarterstaff Road intersection showing utilities

061 Martin Road at Quarterstaff Road intersection looking south showing bridge

062 Martin Road at Atholten Adventist driveway looking south

063 Martin Road at Seneca Drive intersection looking south

064 Martin Road at Seneca Drive intersection looking south

065 Martin Road at Seneca Drive intersection looking north

066 Martin Road south of Seneca Drive intersection looking south

067 Martin Road at High Bench intersection looking south

068 Martin Road at High Bench intersection looking north

069 Martin Road at High Bench intersection east side bus pad

070 Martin Road at High Bench intersection east side bus stop looking south

071 Martin Road near sound barrier looking south

072 Martin Road near sound barrier looking north

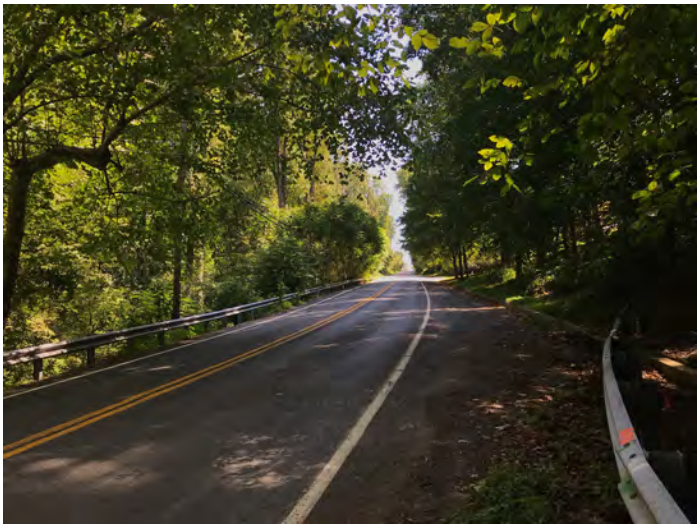
073 Martin Road near Freetown Road intersection looking west onto Harriet Tubman Lane

074 Harriet Tubman Lane and Freetown Road and Freetown Road intersection looking west

075 Harriet Tubman Lane from Freetown Road intersection looking west

076 Harriet Tubman Lane looking east toward Freetown Road intersection

077 Harriet Tubman Lane looking west down hill



078 Harriet Tubman Lane looking east up hill

079 Harriet Tubman Lane culvert looking south

080 Harriet Tubman Lane looking west along the Middle Patuxent River

081 Harriet Tubman Lane looking east along the Middle Patuxent River

082 Harriet Tubman Lane rock outcropping looking north

083 Harriet Tubman Lane parking area to Robinson Nature Center trails

084 Harriet Tubman Lane bridge over Middle Patuxent River showing Trail to Cedar Lane

085 Harriet Tubman Lane looking west toward Cedar Lane from parking area

086 Harriet Tubman Lane looking east along Middle Patuxent River from parking area

087 Martin Road intersection with Owen Brown Road looking east

088 Martin Road intersection with Owen Brown Road looking north

089 Martin Road north of intersection with Owen Brown Road looking north

090 Martin Road north of intersection with Owen Brown Road looking south

091 Martin Road looking south toward intersection with Owen Brown Road

092 Martin Road looking south showing south-most chicane

093 Martin Road looking north showing south-most chicane

094 Martin Road looking south showing parking on the east side of the roadway

095 Martin Road looking north showing middle chicane

096 Martin Road looking south showing middle chicane

097 Martin Road approaching intersection with Hickory Ridge Road looking north

098 Martin Road approaching intersection with Hickory Ridge Road looking south showing north-most chicane

099 Martin Road approaching intersection with Hickory Ridge Road looking north showing utility access point

100 Hickory Ridge Road trail crossing east of trail crossing east of Athletic Field Drive looking south

101 Hickory Ridge Road trail crossing east of Athletic Field Drive looking north

102 Hickory Ridge Road looking west showing trail crossing

103 Hickory Ridge Road east of the Bluffs Apartments showing end of bike lane

104 Hickory Ridge Road east of College Square intersection looking west

105 Hickory Ridge Road east of College Square intersection looking east

106 Hickory Ridge Road eastbound west of Martin Road intersection looking west

107 Hickory Ridge Road eastbound west of Martin Road intersection looking east

108 Hickory Ridge Road eastbound at Martin Road intersection looking west

109 Hickory Ridge Road eastbound at Martin Road intersection looking east

110 Hickory Ridge Road crosswalk at Martin Road intersection looking south

111 Hickory Ridge Road westbound at Martin Road intersection looking east showing signage and red light camera

112 Hickory Ridge Road westbound at Martin Road intersection looking west

113 Hickory Ridge Road westbound at Martin Road intersection looking east showing retaining wall and utilities

114 Hickory Ridge Road westbound near Martin Road intersection looking west

115 Hickory Ridge Road westbound near Broken Land Parkway intersection looking west

116 Hickory Ridge Road eastbound showing utility cabinets looking west

117 Hickory Ridge Road eastbound near Broken Land Parkway intersection looking east

118 Hickory Ridge Road eastbound near Broken Land Parkway intersection looking west

119 Hickory Ridge Road eastbound near Broken Land Parkway intersection showing informal path looking east

120 Hickory Ridge Road eastbound at Broken Land Parkway intersection showing right hand turn lane looking east

121 Broken Land Parkway southbound north of Hickory Ridge Road intersection looking north

122 Broken Land Parkway southbound looking north

123 Broken Land Parkway southbound looking south

124 Broken Land Parkway southbound south of Little Patuxent Parkway looking south

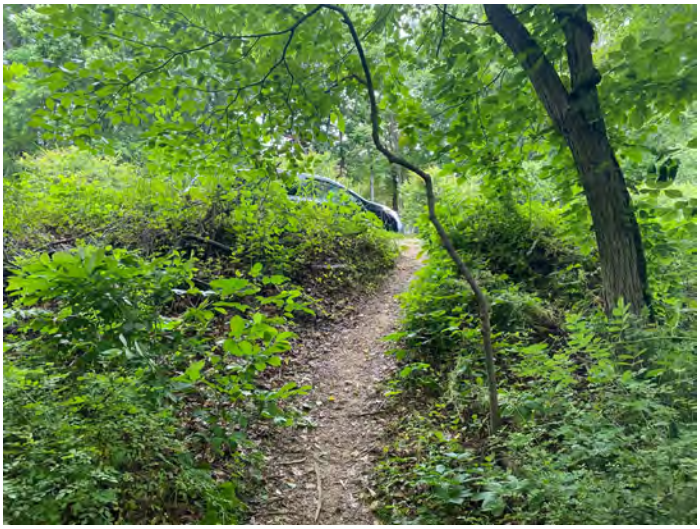
125 Columbia Association pathway heading east from Martin Road south of Hickory Ridge intersection

126 Columbia Association pathway heading east from Martin Road south of Hickory Ridge intersection

127 Columbia Association pathway heading east from Martin Road south of Hickory Ridge intersection

128 Columbia Association pathway heading east from Martin Road south of Hickory Ridge intersection

129 Informal trail between Columbia Association pathway and Hickory Ridge Road and Broken Land Parkway intersection



130 Informal trail between Columbia Association pathway and Hickory Ridge Road and Broken Land Parkway intersection

Hickory Ridge Bicycle Corridor Study

Appendix 2

Hickory Ridge Bicycle Corridor Survey Results Summary (Section 1 & 2)

Hickory Ridge Bike Corridor

Survey Results Summary • October 2019 • Howard County Office of Transportation


32
Clarksville
Atholton
High School
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Contents

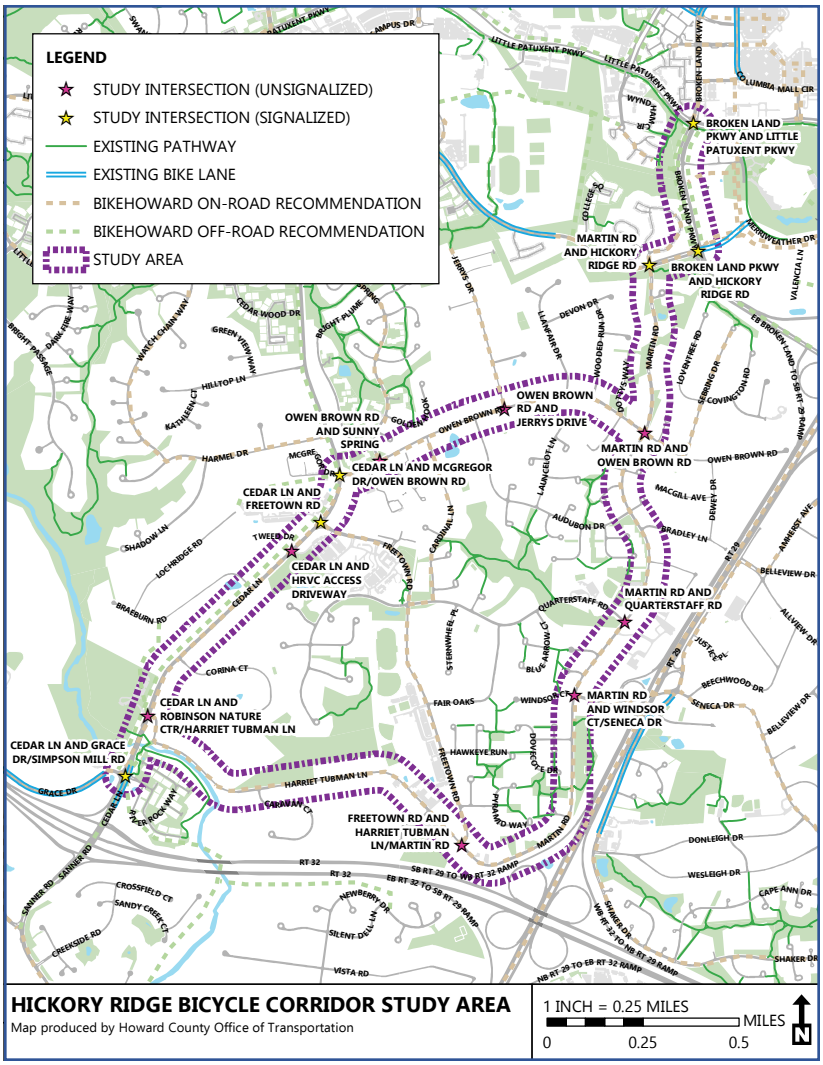
Figures

1. Introduction

Hickory Ridge, Town Center, and the other villages and neighborhoods of central and eastern Columbia have a strong network of internal pathways and neighborhood streets that facilitate safe and comfortable bicycling and support riding as a transportation mode for short trips. Similarly, River Hill has a strong internal network of pathways and a developing corridor of bicycle facilities on Great Star Drive, Summer Sunrise Drive, and Grace Drive. While these sets of bicycle facilities provide internal connectivity within the two discrete areas, the lack of safe, comfortable, and accessible bicycle facilities that connect Downtown Columbia and Hickory Ridge to River Hill is a barrier to bicycle travel between central and western Columbia. BikeHoward (the Howard County Bicycle Master Plan) identified Clarksville/River Hill, Robinson Nature Center, and Hickory Ridge Village Center as "Key Destinations," and included a route along Martin Road and Harriet Tubman Lane connecting them to Downtown Columbia in its short-term network.

While BikeHoward identified a **short-term route**, the Hickory Ridge Bike Corridor study is an effort to identify a **preferred route** for continuous bicycle facilities to connect existing bike lanes on Grace Drive (providing access from River Hill and points west) to Hickory Ridge, Downtown Columbia and the rest of the Columbia pathway system and bike network. While the study is primarily a technical assessment, local knowledge is key to understanding the context and challenges associated with the roadways in the study area (see Figure 1, right, for a study area map). Therefore, the Howard County Office of Transportation

Figure 1: Study Area



administered an online survey to gather residents and transient bicyclists' opinions about the road segments in the study area. The survey also included an opportunity to sign up for email updates specifically about the project. This report presents the results of the survey.

The survey had two main sections. The first was a segment-by-segment question sequence about the roads in the study area, asking respondents to rank four factors (vehicle speeds, traffic congestion, topography (i.e. hills), and "close passes" by vehicles) in order of how much they contribute to bicycling stress along the study segment. In addition, the survey asked specific routing questions about two segments (Broken Land Parkway between Hickory Ridge Road and Little Patuxent Parkway, and Cedar Lane between Grace Drive and Harriet Tubman Lane). The segments were shown in random order to each survey taker.

The second section of the survey asked respondents to categorize their approach to bicycling ("No Way No How," "Interested But Concerned," "Enthused and Confident," or "Strong and Fearless), as well as provide any open-ended comments about bicycling in Hickory Ridge. Finally, the survey asked for respondents' contact information, including email address and geographic location.

The survey was a success, gathering input from over 200 respondents. Most respondents were from Hickory Ridge or nearby, and represented a wide cross-section of bicycling experience, from those who say they would "no way no how" get on a bicycle to those who call their approach to riding "strong and fearless." Despite their wide range of approaches to bicycling, respondents agreed that vehicle speeds and "close passes" are the most widespread stressors for bicycling in Hickory Ridge. Responses demonstrated that approaches to bicycling on Broken Land Parkway differed widely by skill level, but nearly all considered Cedar Lane a difficult and sometimes unavoidable obstacle to bicycling. Finally, many respondents provided detailed open-ended comments that further explained their survey responses or provided suggestions for specific improvements.

While the survey yielded a large number of respondents, it was not a scientific survey and thus cannot be assumed to provide a representative sample of Hickory Ridge residents or transient bicyclists. Nevertheless, the results are valuable because they represent the knowledge and experiences of over 200 people who voluntarily took the time to complete the survey, demonstrating their level of interest in bicycling in and around Hickory Ridge. While the survey results will not be the only factor considered in identifying a preferred route, they do provide local insight that is impossible to attain in technical analysis and is thus invaluable in the planning process.

2. Summary of Results

Geography of Respondents

201 people responded to the survey. 99 of those (49 percent) provided location information: either a ZIP code, an address, or both. Respondents were highly geographically concentrated in the Hickory Ridge area. More than 70 percent of respondents who provided a ZIP code were located in 21044, which includes Hickory Ridge (see Figure 2). The summary map on page 11 shows that the geographic distribution of respondents' addresses is heavily concentrated in Hickory Ridge.

Figure 2: Respondent-Provided ZIP Codes

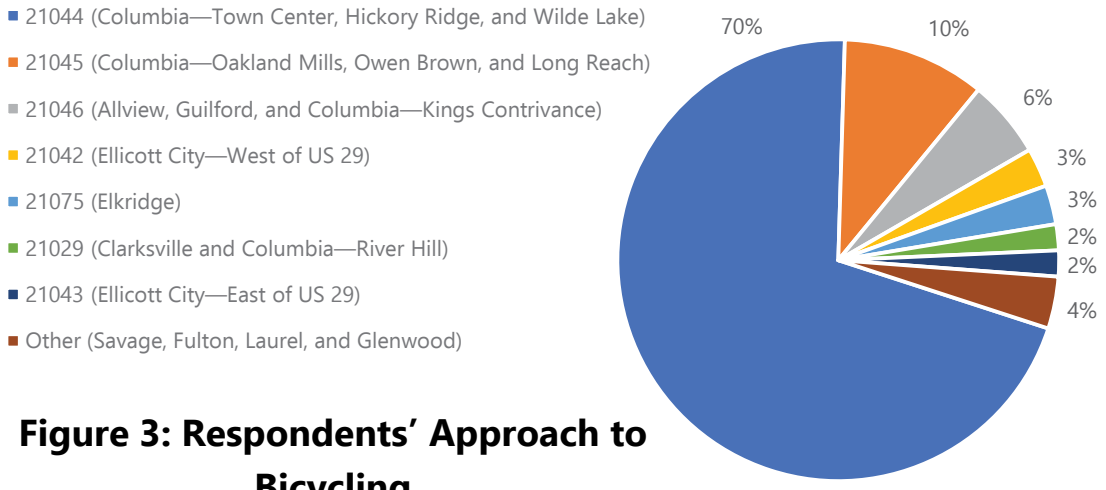
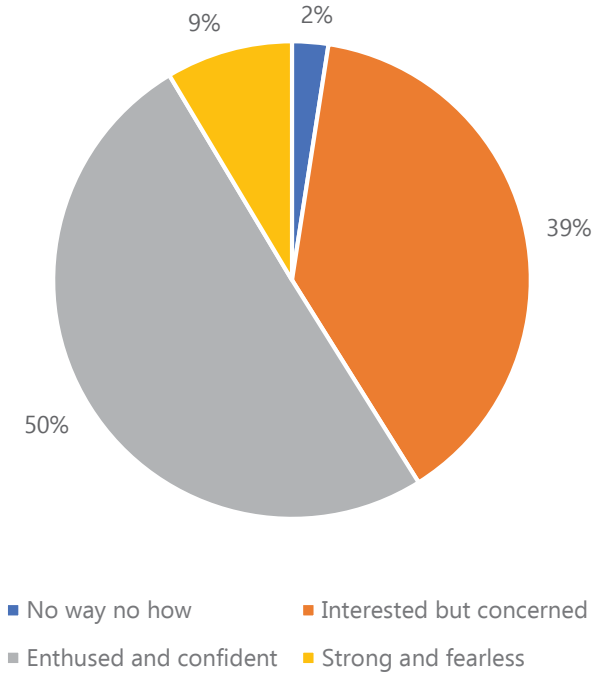


Figure 3: Respondents' Approach to Bicycling



This demonstrates that the survey successfully reached the Hickory Ridge community and provides evidence that the responses reflect the local knowledge that the survey sought to gather.

Approach to Bicycling

Figure 3, at left, shows how respondents characterized their approach to bicycling. These categories were based on the "Four Types of Cyclists" typology that has become widely used in planning and design of bicycling infrastructure. Small numbers of respondents categorized themselves as "No Way No How" or "Strong and Fearless"

riders, representing the low and high ends of the experience spectrum. 39 percent of respondents called themselves "Interested but Concerned," and 50 percent called themselves "Enthused and Confident," together constituting nearly 90 percent of respondents. To assess how responses differed by respondents' approaches to bicycling, the survey results have been divided into two categories, combining "No Way No How" and "Interested but Concerned" respondents into one group and "Enthused and Confident and "Strong and Fearless" respondents into a second group.

Stressfulness of Study Segments

Respondents at all levels found Cedar Lane between Owen Brown Road and Harriet Tubman Lane to be the most stressful segment in the study area. Vehicle speed tended to rank highest among the four stressors on Cedar Lane and the segment of Martin Road between Seneca Drive and Freetown Road, while "close passes" tended to rank highest on Owen Brown Road and other segments of Martin Road. Traffic congestion was found to be particularly stressful along Hickory Ridge Road and Broken Land Parkway. Harriet Tubman Lane was the only segment where topography ranked higher than last.

Hickory Ridge Road and Cedar Lane between Owen Brown Road and Harriet Tubman Lane had the smallest difference in reported stressfulness between the two categories of respondents; Hickory Ridge Road earned an average rating of 3.3 by No Way No How/Interested But Concerned Riders and 3.0 by Enthused and Confident/Strong and Fearless Riders, and the Cedar Lane segment was rated 3.8 and 3.5 by the two groups, respectively. Thus both segments had a difference of just 0.3 rating points between the two groups. Martin Road between Seneca Drive and Freetown Road had the largest difference; No Way No How/Interested but Concerned riders gave it an average rating of 2.5, while Enthused and Confident/ Strong and Fearless respondents rated it 1.8, a total difference of 0.7 rating points.

Across the study area, No Way No How/Interested but Concerned respondents tended to rate traffic congestion more highly than Enthused and Confident/Strong and fearless riders, while the case for vehicle speed and "close passes" was reversed (see the "Category Comparison" tables on Page 10). The map sets on page 16 through 39 show more detailed information about the responses to these questions.

Broken Land Parkway and Cedar Lane

The survey asked respondents "how do you usually bicycle" for two segments: "between the Hickory Ridge/Broken Land Parkway intersection and the Downtown Columbia Trail," and "between Grace Drive and Harriet Tubman Lane," accompanied by the segment maps shown in Figures 4 and 5.

Along Broken Land Parkway, route choice differed greatly between Enthused and Confident/ Strong and Fearless and No Way No How/Interested But Concerned respondents. While similar shares of both groups reported using Hickory Ridge Road extended and the Merriweather Drive pathway (24 vs 30

percent, respectively) or the sidewalk along Broken Land Parkway (22 vs 26 percent, respectively), a much larger share of Enthused and Confident/Strong and Fearless than No Way No How/Interested But Concerned respondents reported they rode in the lane on Broken Land Parkway (28 vs 9 percent).

Responses for the Cedar Lane segment similarly showed differences between respondents with different approaches to bicycling. A much larger share of Enthused and Confident/Strong and Fearless than No Way No How/Interested but Concerned respondents (55 vs 39 percent, respectively) reported they rode in the lane on Cedar Lane, while a modestly smaller share (as compared to No Way No How/ Interested but Concerned respondents) reported using the Simpson Mill pathway (7 vs 11 percent). In addition, fewer Enthused and Confident/Strong and Fearless respondents reported not bicycling in the area (31 vs 41 percent). The Route Choice maps (on pages 42 and 43) show more details about these responses.

Figure 4: Broken Land Parkway

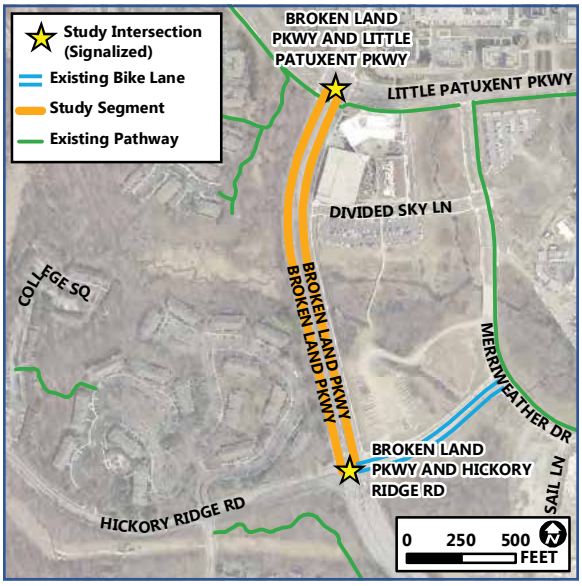
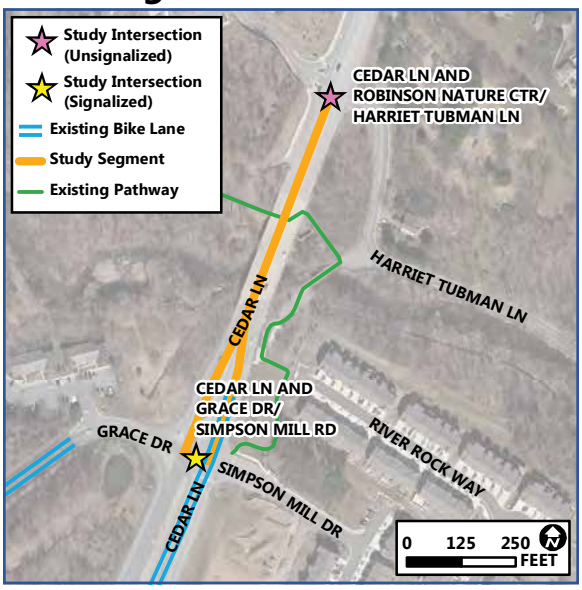


Figure 5: Cedar Lane



Summary Conclusions

Responses to the survey reflect a high degree of interest in bicycling in Hickory Ridge. Respondents were particularly concerned about vehicle speed and "close passes," and found Cedar Lane to be particularly stressful. Respondents found traffic congestion to be a more significant contributing factor to bicycling stress on Hickory Ridge Road and Broken Land Parkway, which are the study segments closest to Downtown Columbia. In addition, topography was a concern on Harriet Tubman Lane, but still lagged behind vehicle speeds and "close passes."

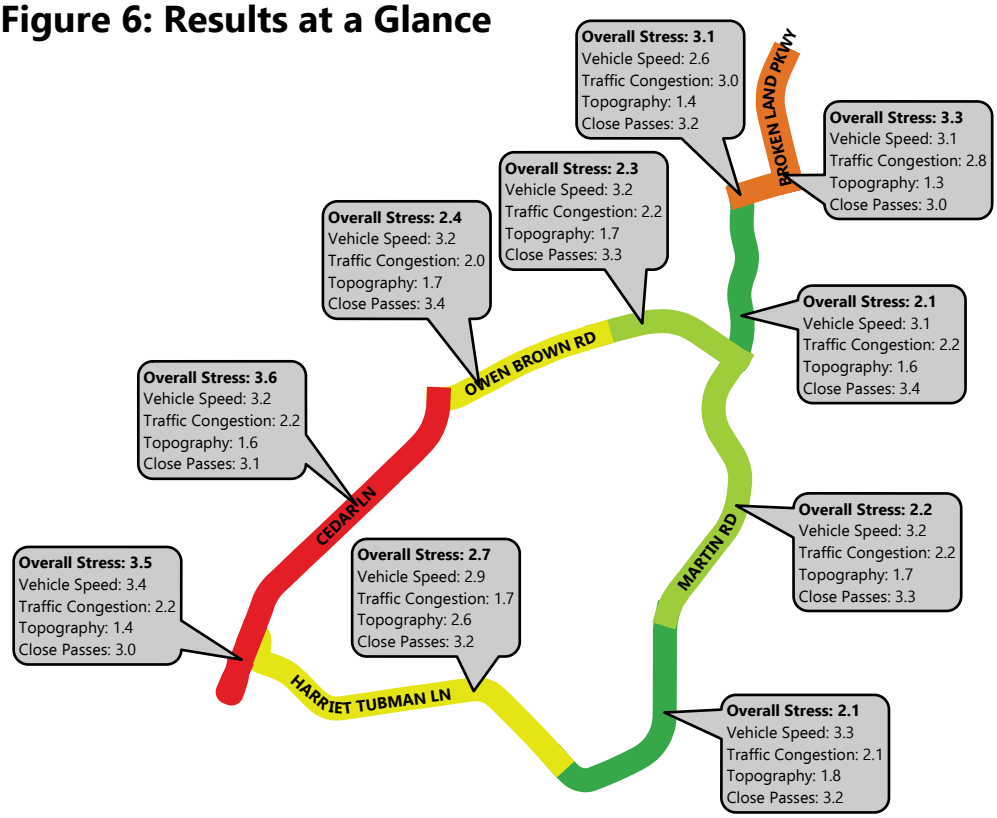
The survey found important differences between No Way No How/Interested But Concerned respondents and Enthused and Confident/Strong and Fearless respondents. Across the study area, No Way No How/Interested But Concerned respondents reported roadway segments to be more stressful than their Enthused and Confident/Strong and Fearless counterparts, with the greatest difference on

Martin Road between Seneca Drive and Freetown Road. No Way No How/Interested But Concerned residents consistently ranked traffic congestion as a greater contributor to stress than Enthused and Confident/Strong and Fearless respondents did. Finally, the two categories of respondents varied in their routing choice at two key locations: Broken Land Parkway between Hickory Ridge Road and Little Patuxent Parkway, and Cedar Lane between Grace Drive and Harriet Tubman Lane.

Report Organization

The remainder of this report contains detailed tables and maps showing survey results, as well as a list of all open-ended comments and a reproduction of the online survey form. Section 3 ("Data Tables") includes data tables showing all stress factors for each road segment across the two categories, as well as comparison data tables and bar charts showing route choice behavior. Section 4 ("Summary Maps') includes a map showing the geographic distribution of survey respondents who provided an address, as well as maps illustrating the information found in the data tables section. Section 5 ("Detailed Maps") shows results for each stress factor and category of respondent. Section 6 ("Route Choice Maps") presents the results for the Broken Land Parkway and Cedar Lane route choice questions in geographic and tabular format. Finally, two appendices are included. Appendix A ("Open-Ended Responses") includes every open-ended response received through the survey, along with the corresponding respondent category ("No Way No How" etc). Appendix B is the survey itself.

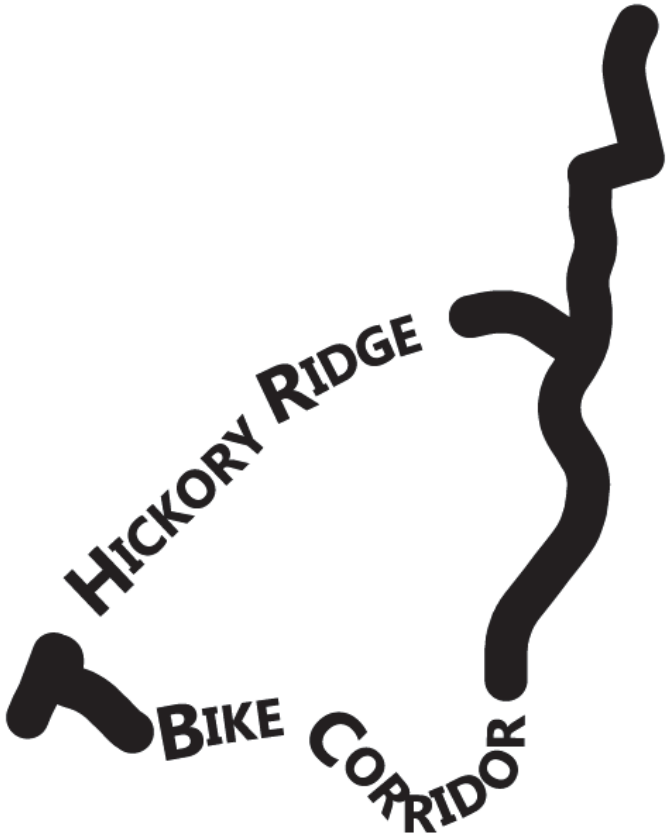
Figure 6: Results at a Glance



Hickory Ridge Bicycle Corridor Study

Appendix 3

Presentation to Hickory Ridge Village Board

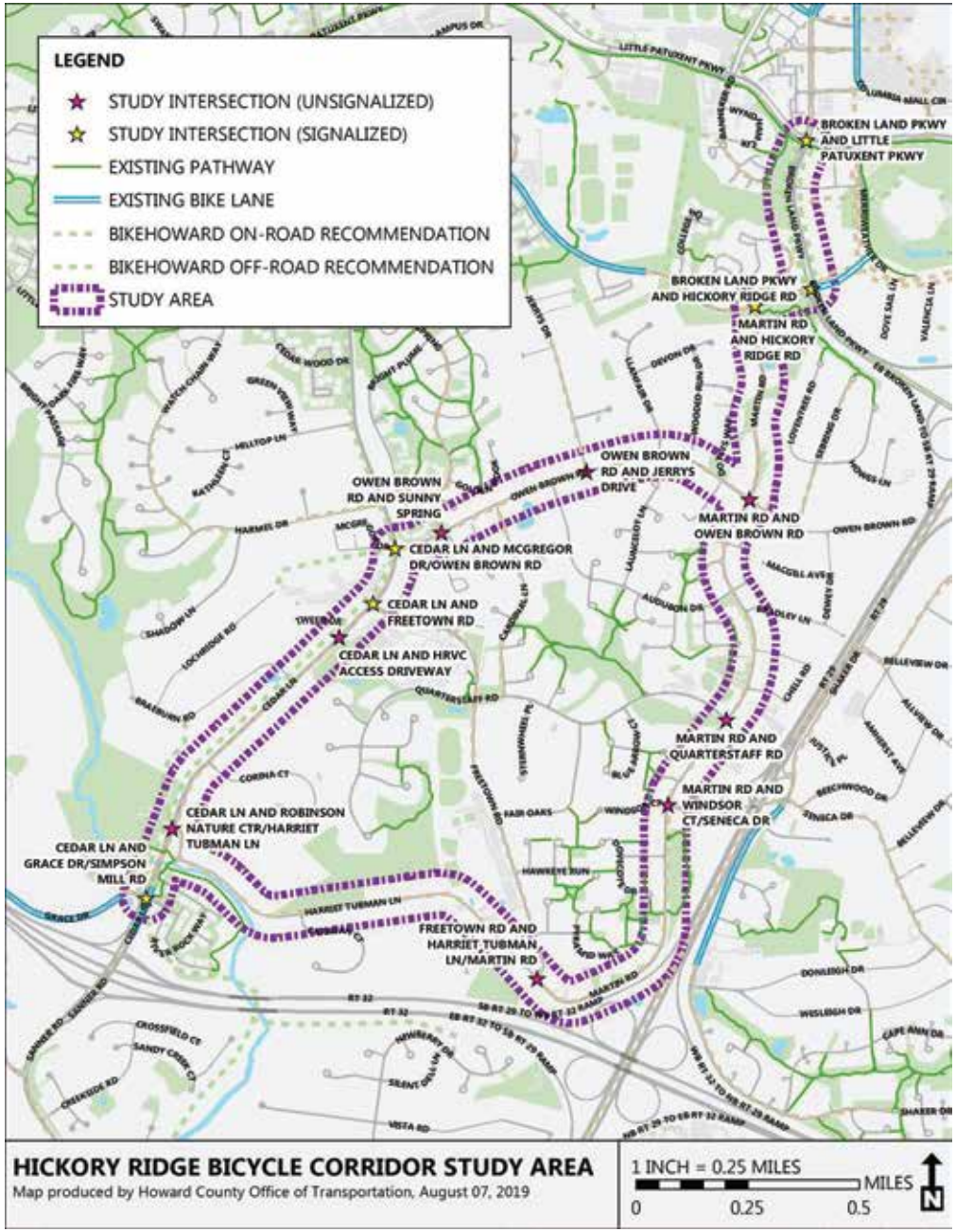


Presentation to
Hickory Ridge Village Board
September 3, 2019

Chris Eatough – Bicycle and Pedestrian Coordinator
Albert Guiney Engel – Transportation Planner
Howard County Office of Transportation

Study Purpose

Identify a preferred route for continuous bicycle facilities to connect existing bike lanes on Grace Drive (providing access from River Hill and points west) to Hickory Ridge, Downtown Columbia and the rest of the Columbia pathway system and bike network.



Study Area

Broken Land Parkway
Little Patuxent Pkwy to Hickory Ridge Rd

Hickory Ridge Road
Broken Land Pkwy to Martin Rd

Martin Road
Hickory Ridge Rd to Freetown Rd

Owen Brown Road
Martin Rd to Cedar Ln

Cedar Lane
Owen Brown Rd to Grace Dr

Harriet Tubman Lane
Freetown Rd to Cedar Ln

Anticipated Schedule

Data Gathering: August-September 2019

- Public Input Survey Open until September 15
- Field Observations

Technical Assessment: October-December 2019

- Level of Traffic Stress Analysis
- Environmental Analysis

Concept Development: January-February 2020

- Concept Sketches
- Tree, Right-of-Way, and Stormwater Impacts
- Compliance with Best Practices

Study Conclusion: March 2020

- Report Development
- Public Presentation

Level of Traffic Stress

Mekuria, Maaza C., Peter G. Furth, and Hilary Nixon. "Low-stress bicycling and network connectivity." (2012).

Photo: Baltimore Metropolitan Council

Level of Traffic Stress (LTS) 1

- The level that most children can tolerate.

Level of Traffic Stress (LTS) 2

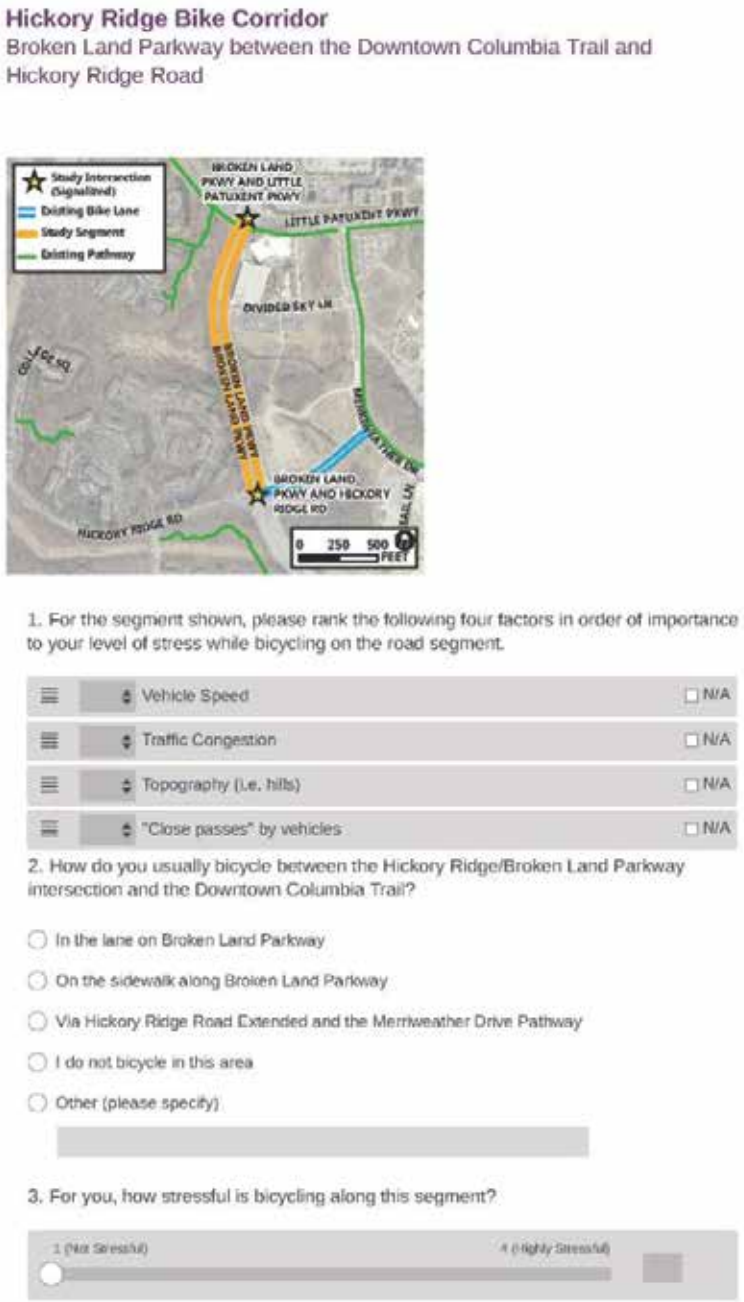
- The level that will be tolerated by the mainstream adult population.

Level of Traffic Stress (LTS) 3

- The level tolerated by American cyclists who are "enthused and confident" but still prefer having their own dedicated space for riding.

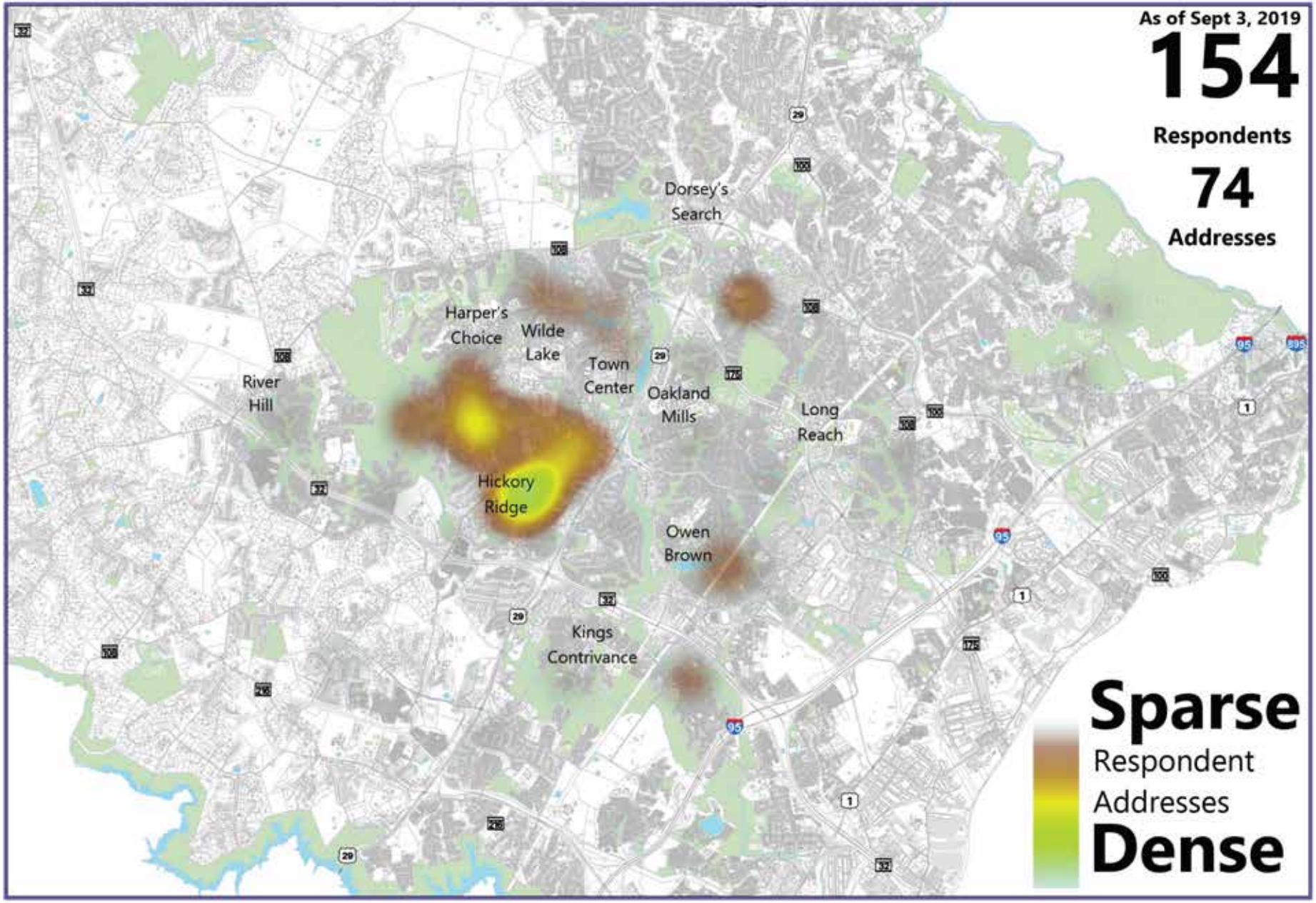
Level of Traffic Stress (LTS) 4

- A level tolerated only by those characterized as "strong and fearless."



Online Survey Goals

- Identify primary stressors for each road segment
- Develop average reported stress for each segment
- Determine preferred routes in two locations:
  - Broken Land Pkwy/ Merriweather Dr
  - Cedar Lane/ Simpson Mill Pathway
- Gather email addresses for project mailing list


As of Sept 3, 2019
154
Respondents
74
Addresses
Dorsey's Search
Harper's Choice
Wilde Lake
Town Center
Oakland Mills
Long Reach
River Hill
Hickory Ridge
Owen Brown
Kings Contrivance
Sparse
Respondent Addresses
Dense

Anticipated Report

Brief, graphical concept report including:

- Study process and identified concerns
- Existing conditions and concept plan
- Summary of public input
- Planning-level cost estimates and proposed project phasing

Questions?

Email: *transportation@howardcountymd.gov* **Phone:** (410) 313-0567

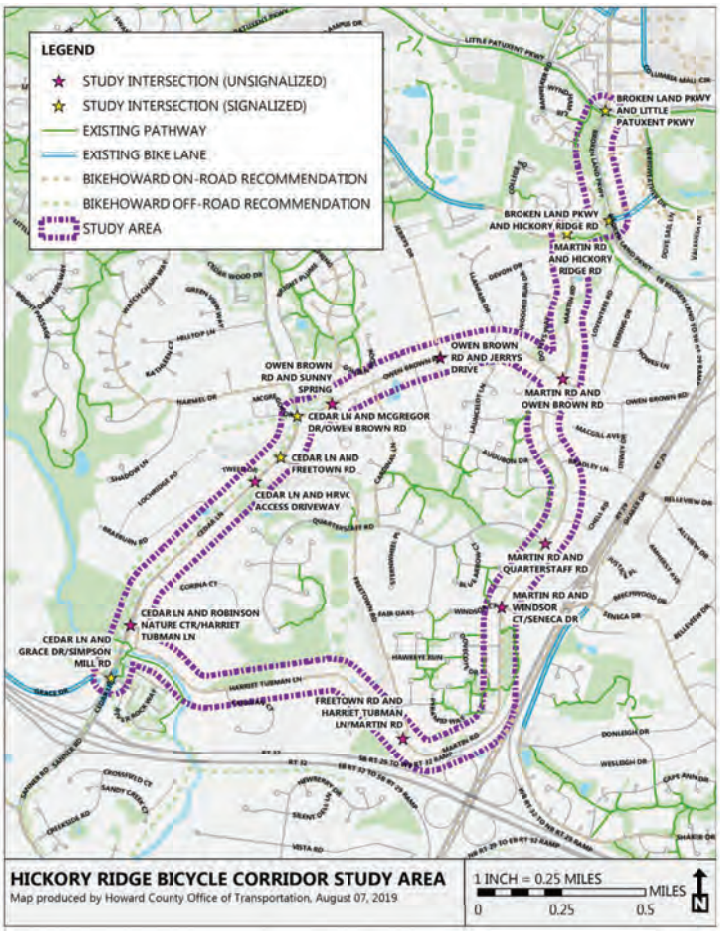
Hickory Ridge Bicycle Corridor Study

Appendix 4

Public Workshop Boards and Survey

HICKORY RIDGE BIKE CORRIDOR STUDY

The purpose of this project is to identify a preferred route and recommend improvements for continuous bicycle facilities to connect existing bike lanes on Grace Drive (providing access from River Hill and points west) to Hickory Ridge, Downtown Columbia and the rest of the Columbia pathway system and bike network.



Study Area

Broken Land Parkway
Little Patuxent Parkway to Hickory Ridge Road

Hickory Ridge Road
Broken Land Parkway to Martin Road

Martin Road
Hickory Ridge Road to Freetown Road

Owen Brown Road
Martin Road to Cedar Lane

Cedar Lane
Owen Brown Road to Grace Drive

Harriet Tubman Lane
Freetown Road to Cedar Lane

The concept designs you will see tonight reflect public feedback from a survey administered from July through September, field observations conducted by the design team, and a Bicycle Level of Traffic Stress analysis of existing roadways.

Please visit each station to learn the results of the survey and field observations, and how Bicycle Level of Traffic Stress analysis helps us design bike routes that are low-stress and work for everyone.

We need your feedback on the draft concept designs.

Please fill out a survey form after you have reviewed the boards!

Anticipated Schedule

Data Gathering: August-September 2019
- Public Input Survey Open until September 15
- Field Observations

Technical Assessment: October-December 2019
- Level of Traffic Stress Analysis
- Environmental Analysis

Concept Development: January-February 2020
- Concept Sketches
- Tree, Right-of-Way, and Stormwater Impacts
- Compliance with Best Practices

Study Conclusion: March 2020
- Report Development
- Public Presentation

WELCOME!

WRA Howard County

HICKORY RIDGE BIKE CORRIDOR STUDY

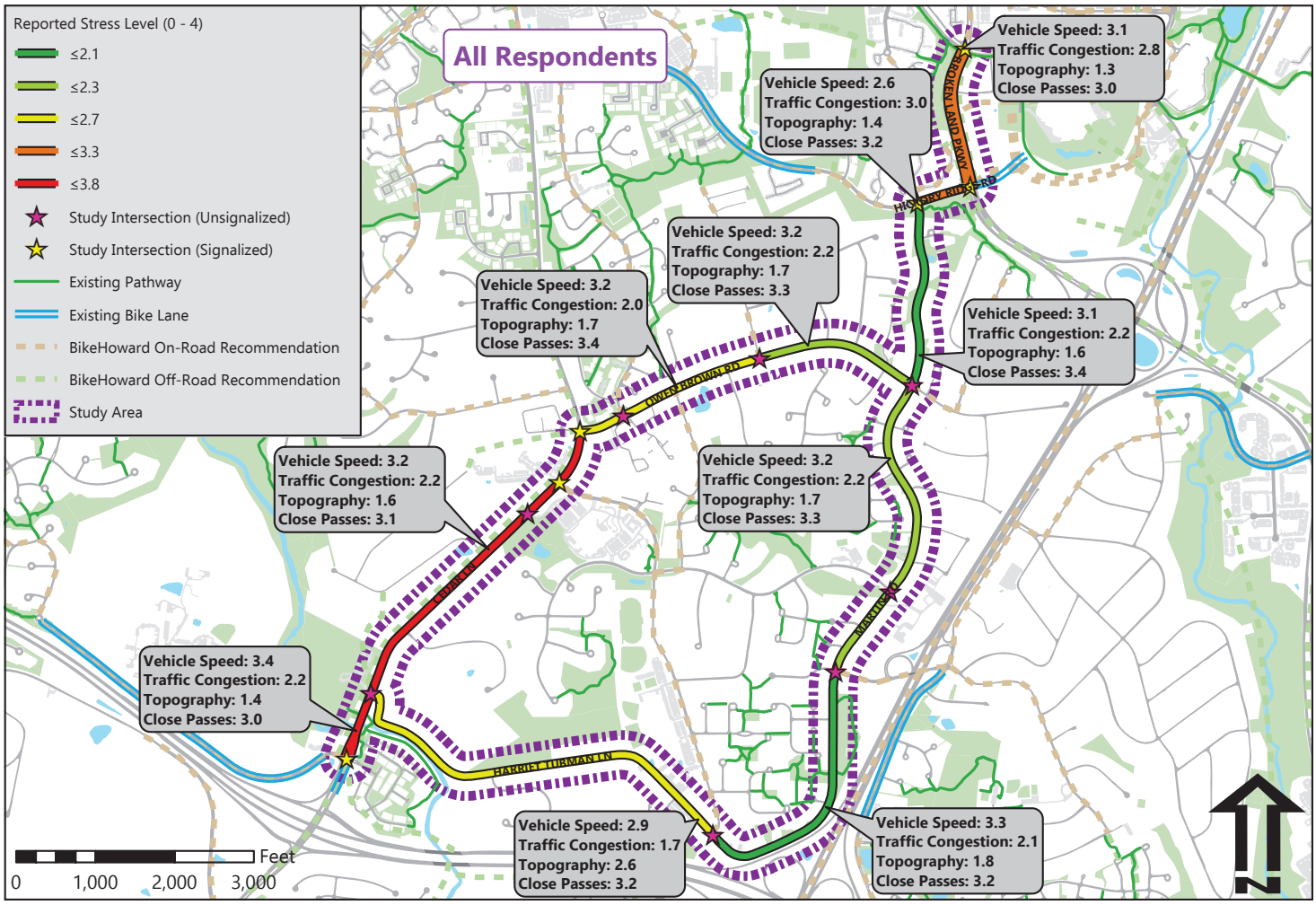
The Hickory Ridge Bike Corridor survey was posted on the Bike Howard website between July 30 - September 15, 2019 and received 201 responses. The survey was promoted by the Hickory Ridge Village Board, County Council, the Bicycle Advisory Group, and Bike Howard.

Survey Goals:

Gather input from people who bicycle in the area

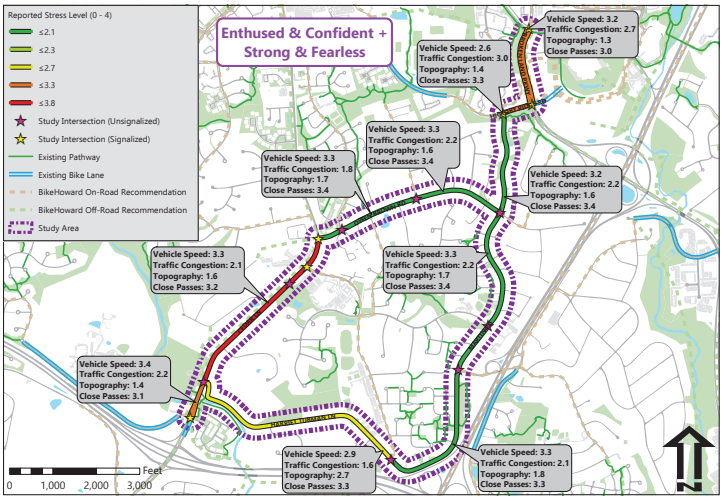
Identify what makes certain road segments stressful to bike on

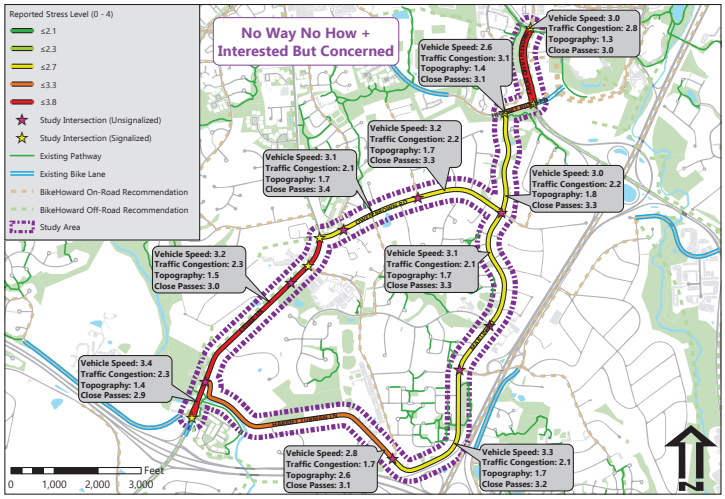
Respondents were asked to rate vehicle speed, traffic congestion, topography, and close passes from least to most stressful (0-4) for each of the segments shown in the below map. More stressful corridors are shown in red and less stressful in green, as indicated in the legend.



Respondents also identified their general approach to bicycling as No Way No How (2%), Interested But Concerned (39%), Enthused & Confident (50%), or Strong & Fearless (9%).

The below maps show how individuals with different approaches to bicycling experience stressors differently throughout the study area:





SURVEY RESULTS

HICKORY RIDGE BIKE CORRIDOR STUDY

How Bicycle Level of Traffic Stress is Measured

Bicycle Level of Traffic Stress analysis uses factors such as the speed of traffic, volume of traffic, and the number of lanes to rate each roadway segment on a scale of 1 to 4, where 1 is a low-stress place to ride and 4 is a high-stress place to ride. It analyzes the total connectivity of a network to evaluate how many destinations can be accessed using low-stress routes.

"Traffic stress… is a combination of perceived danger and other stressors… associated with riding a bike close to motor traffic."

- Northeastern University Professor Peter Furth

Mixed-Traffic Criteria

Number of Lanes	Average Daily Traffic	<25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
2-way street (no centerline)	0-750	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
	751-2000	LTS 1	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	2001-3000	LTS 1	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
	3001+	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
1 through lane per direction (1-way street or 2-way street with centerline)	0-750	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
	751-2000	LTS 1	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	2001-6000	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4
	6001+	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4
2 through lanes per direction	0-6000	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	6001+	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4
3+ through lanes per direction	any ADT	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4

Bike Lanes and Shoulders not Adjacent to a Parking Lane

Number of Lanes	Bike Lane Width	<25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
1 thru lane per direction, or unlaned	6+ feet	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
2 thru lanes per direction	6+ feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
3+ lanes per direction	any width	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4

Level of Traffic Stress	Description	Example
1	The level that most children can tolerate; shared use paths are considered low stress since the cyclist is removed from traffic	
2	Tolerated by the mainstreem adult population; roads with low volume and low speed auto traffic	
3	Tolerated by riders who are "enthused and confident" but still prefer having their own dedicated space for cycling	
4	Only tolerated by riders who are characterized as "strong and fearless"	

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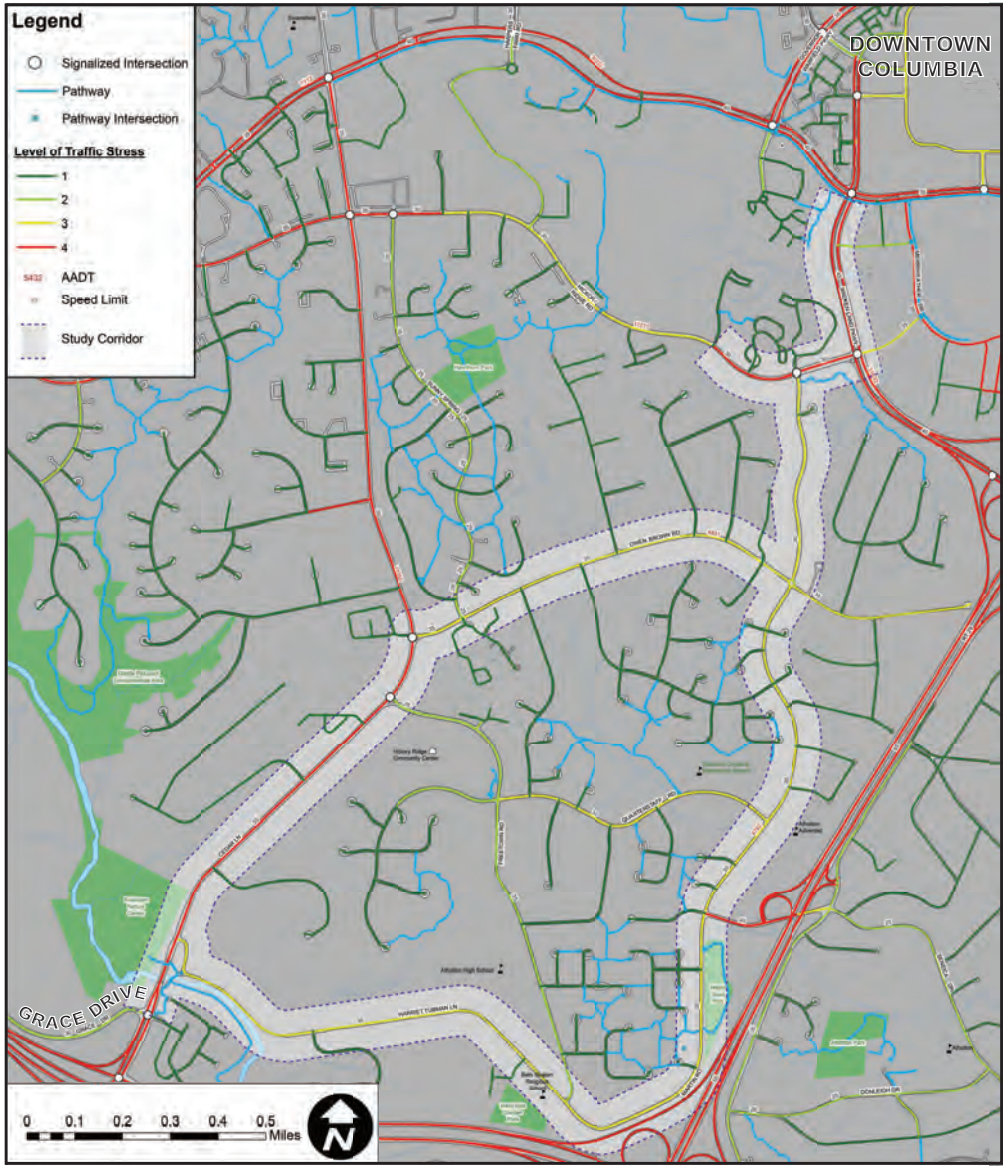
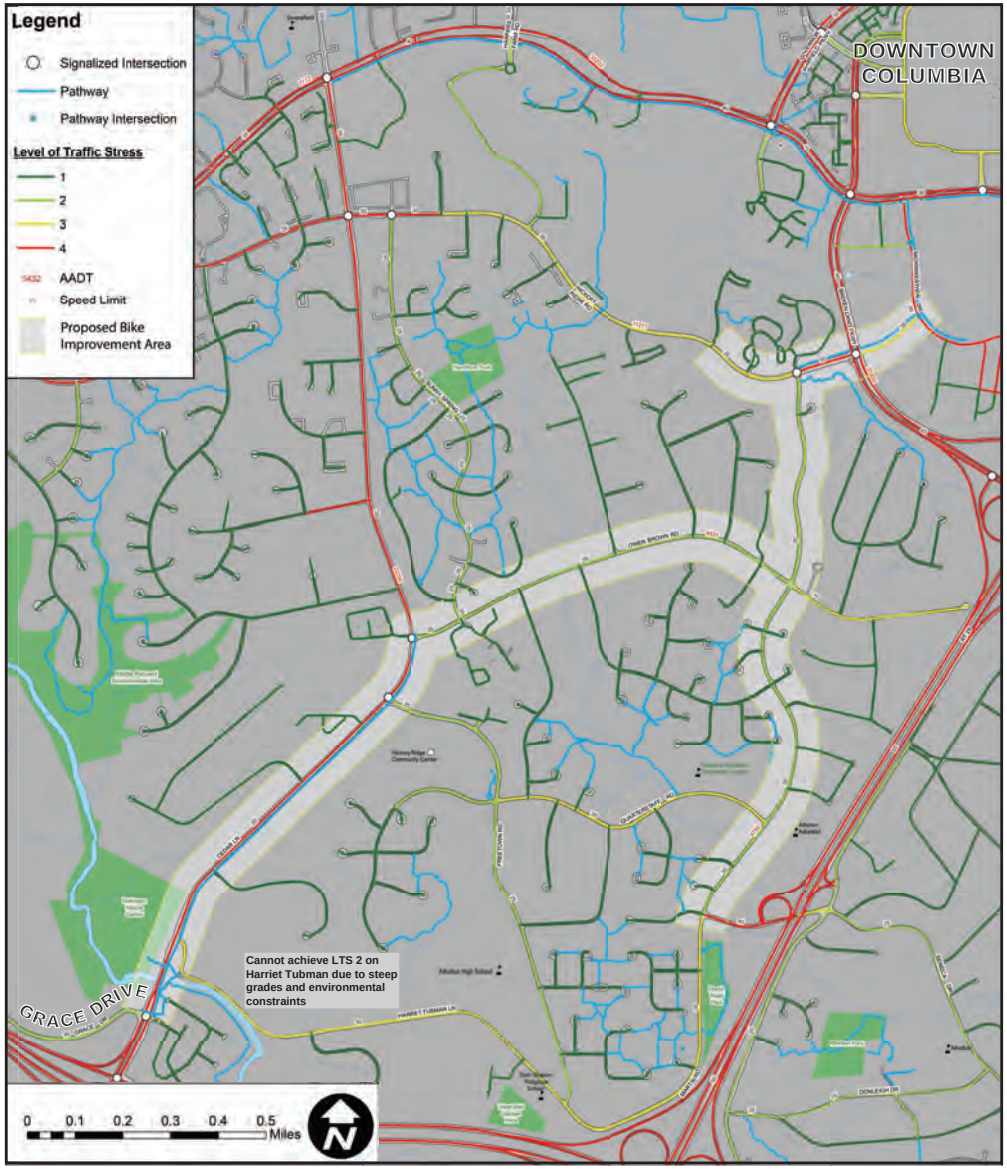
Routes We Studied



Routes Recommended for Improvements



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HICKORY RIDGE BIKE CORRIDOR STUDY

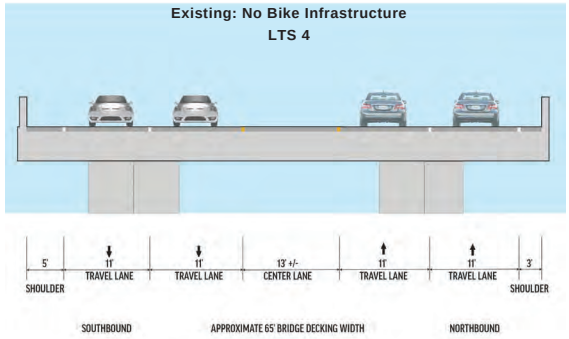
EXISTING

WEST

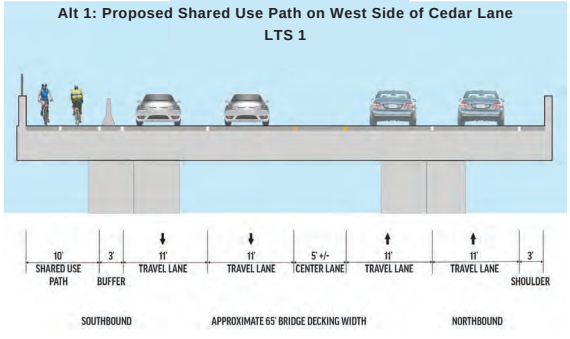
EAST

1 CEDAR LANE BRIDGE OVER MIDDLE PATUXENT RIVER

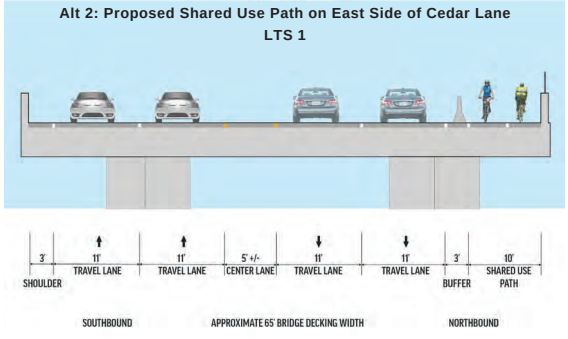
Existing: No Bike Infrastructure
LTS 4



Alt 1: Proposed Shared Use Path on West Side of Cedar Lane
LTS 1

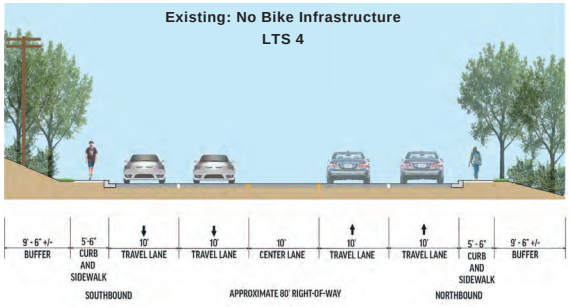


Alt 2: Proposed Shared Use Path on East Side of Cedar Lane
LTS 1

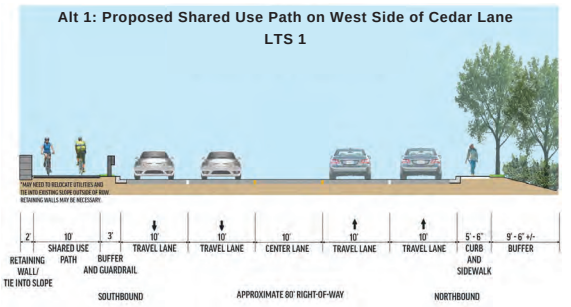


2 CEDAR LANE FROM OWEN BROWN ROAD TO BRIDGE OVER MIDDLE PATUXENT RIVER

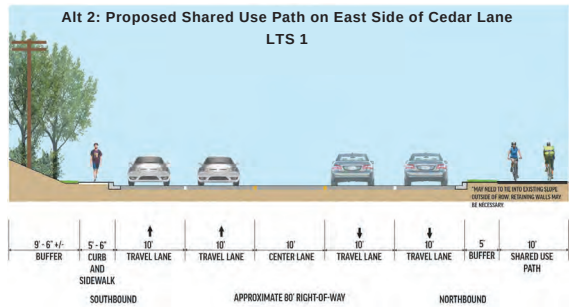
Existing: No Bike Infrastructure
LTS 4



Alt 1: Proposed Shared Use Path on West Side of Cedar Lane
LTS 1



Alt 2: Proposed Shared Use Path on East Side of Cedar Lane
LTS 1



WEST

+	Converts existing sidewalk from north of Owen Brown Road to Robinson Nature Center Direct access to Grace Drive and Robinson Nature Center Does not cross unsignalized intersection with Harriet Tubman Lane Minimal tree and slope impacts between Owen Brown Road and Freetown Road
—	Potential impacts to drainage features and stream (~1,600 Linear Feet) Potential impacts to existing overhead utilities (~3,000 Linear Feet) Potential impacts to existing guardrail (~1,600 Linear Feet) Potential impacts to slope (~2,100 Linear Feet) that may require more fill than east side

EAST

+	Direct access to Freetown Road, Hickory Village Town Center and Owen Brown Road Cyclist from the east would not need to cross Cedar Lane Minimal existing overhead utilities (~100 Linear Feet) Less potential impacts to drainage features (~700 Linear Feet) Provides facilities on both sides (existing sidewalk on west side; new shared use path on east side)
—	Potential impacts to drainage features (~ 700 Linear Feet) Existing sidewalk only from Freetown Road to Corina Court Potential impacts to existing guardrail (~1,000 Linear Feet) Potential impacts to slope (~1,550 Linear Feet) that may require more cut than west side

Do you prefer the west or east side location for the shared use path? Please tell us why on the survey.

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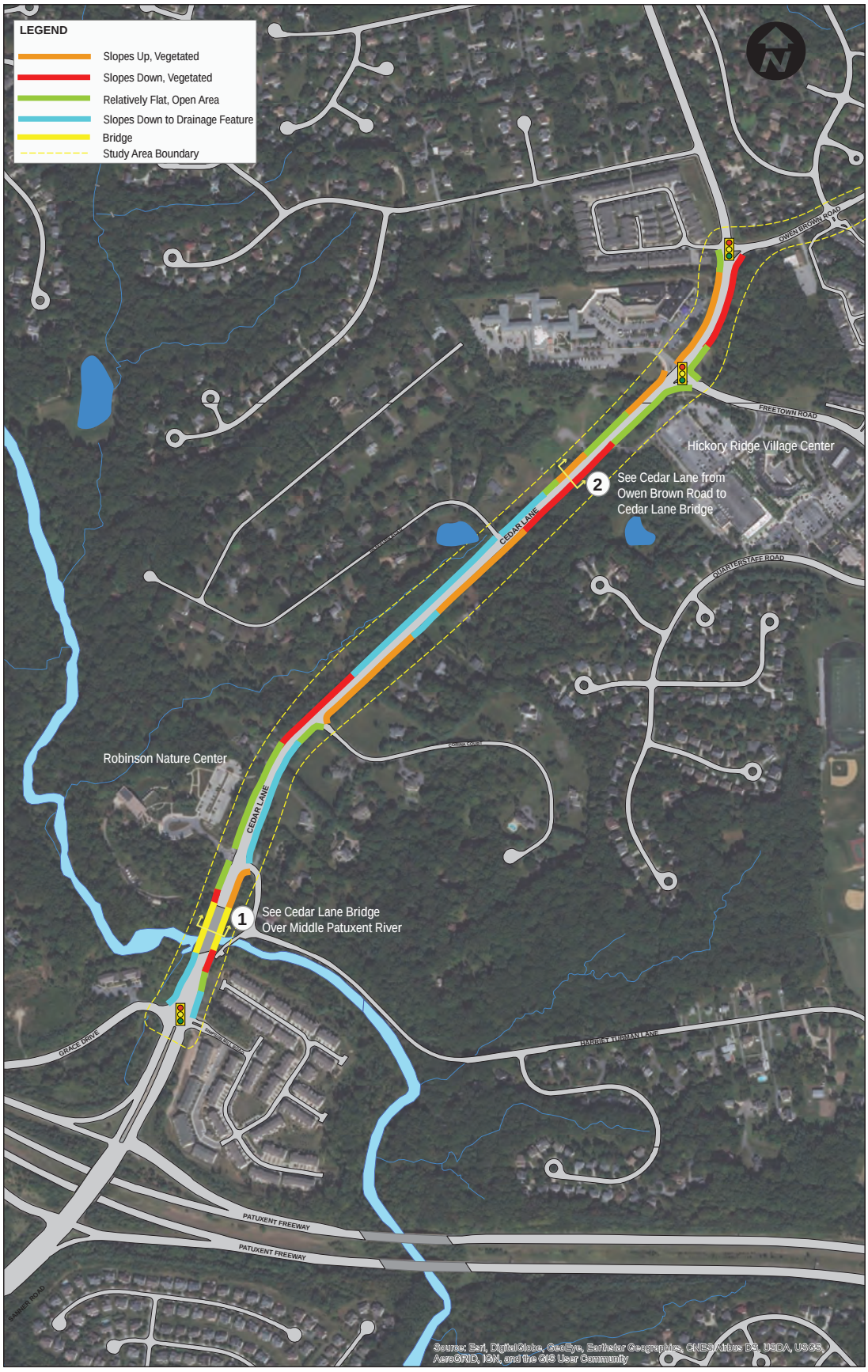
HICKORY RIDGE BIKE CORRIDOR STUDY

To meet project goals, a shared use path (LTS 1) is proposed along Cedar Lane from Owen Brown Road to Grace Drive. There are existing topographical constraints on both east and west of Cedar Lane. This map shows approximate locations of topography changes and drainage features.



CEDAR LANE TOPOGRAPHICAL CONSTRAINTS

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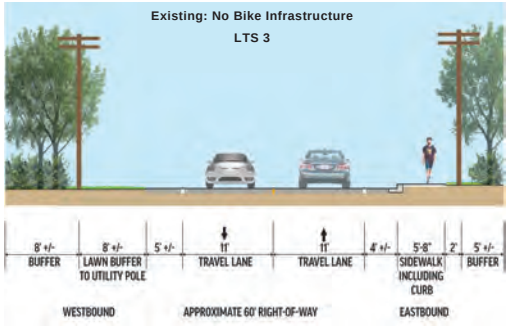
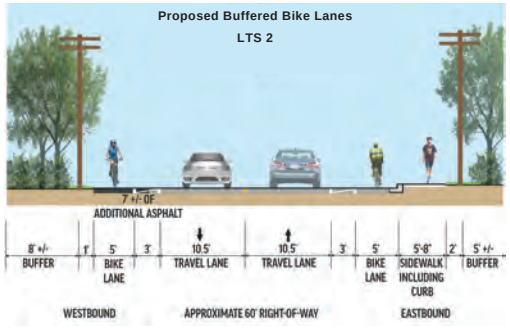
HICKORY RIDGE BIKE CORRIDOR STUDY

EXISTING

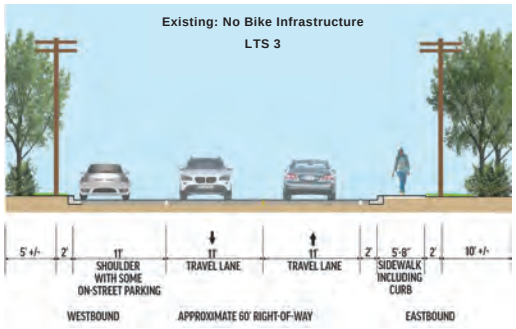
PROPOSED

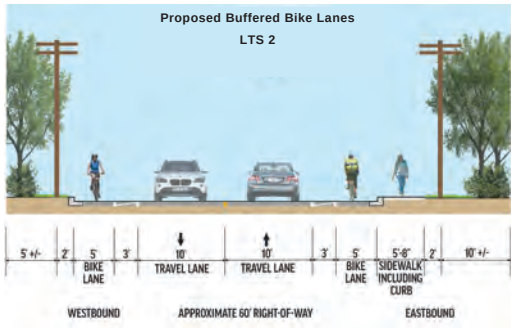
1 OWEN BROWN ROAD NEAR CEDAR LANE



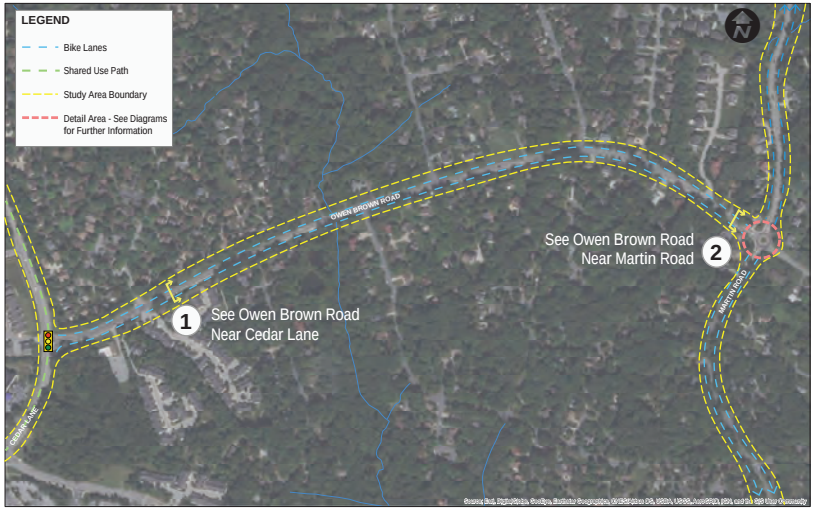


2 OWEN BROWN ROAD NEAR MARTIN ROAD ROUNDABOUT





The existing pavement width for Owen Brown Road between Martin Road and Cedar Lane allows for buffered bike lanes to be installed by restriping pavement. Minimal additional asphalt would be needed to achieve the project goal of a LTS 2 bicycle facility that connects Martin Road and Cedar Lane.



1 View facing east of Owen Brown Road showing existing roadway configuration with sidewalk and curb on south side

2 View facing west of Owen Brown Road at roundabout showing existing roadway configuration with curb and sidewalk on south side and curb with parking in shoulder on north side

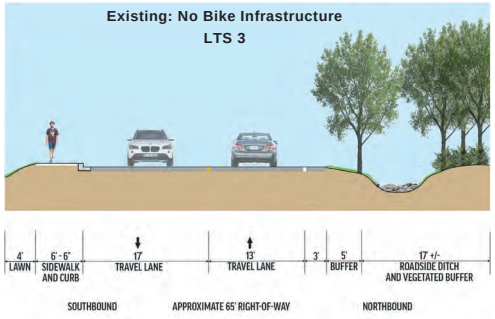
HICKORY RIDGE BIKE CORRIDOR STUDY

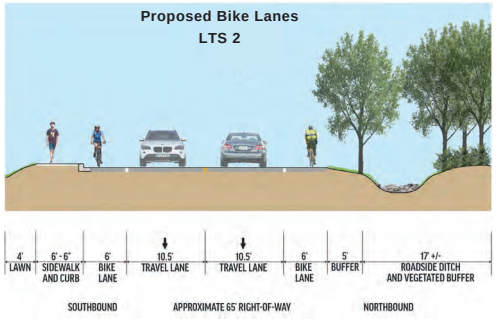
EXISTING

PROPOSED

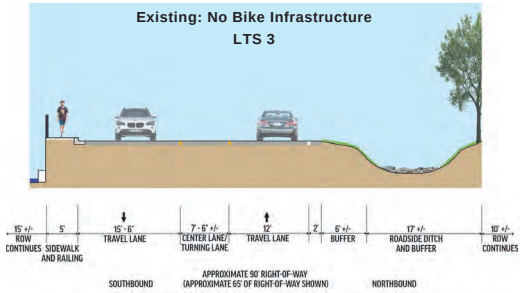
The typical sections depict two areas of constraint south of the roundabout at Owen Brown Road

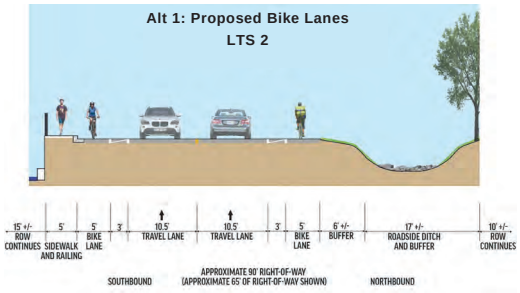
1 MARTIN ROAD NORTH OF QUARTERSTAFF DRIVE



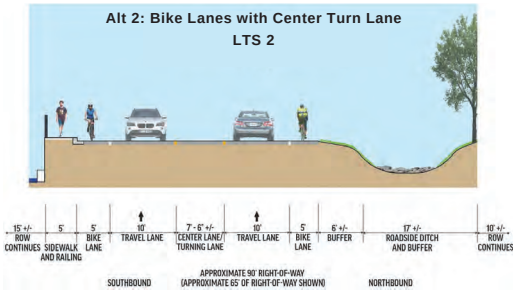


2 MARTIN ROAD SOUTH OF QUARTERSTAFF DRIVE





Existing turn lanes on Martin Road near Quarterstaff Drive



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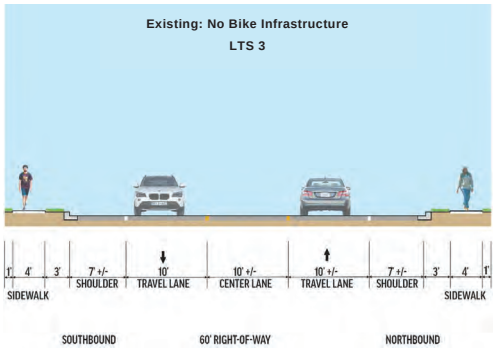
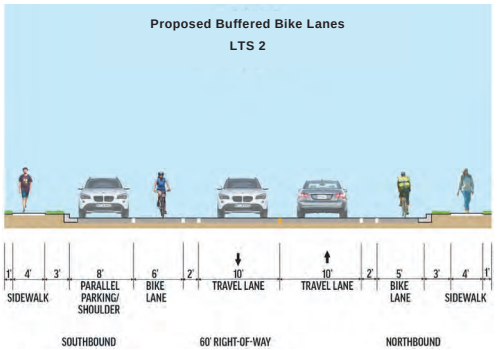
HICKORY RIDGE BIKE CORRIDOR STUDY

EXISTING

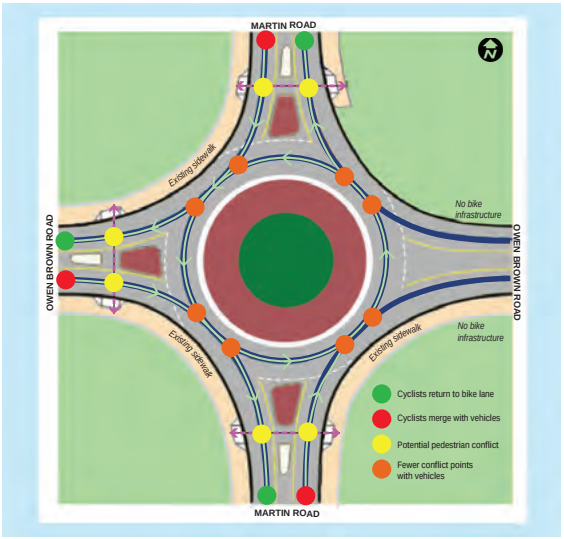
PROPOSED

1 MARTIN ROAD NORTH OF ROUNDABOUT



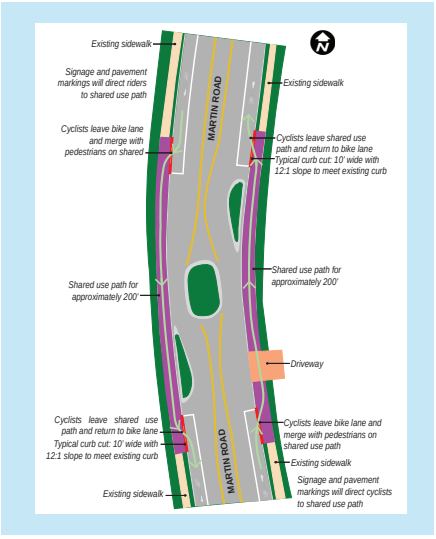


2 ROUNDABOUT DIAGRAM



Circulating as a vehicle: Bike lanes are not recommended within a roundabout. Instead, cyclists merge with traffic before entering the roundabout, circulate with traffic, and then re-enter the bike lane after exiting

3 TRAFFIC CALMING DIAGRAM



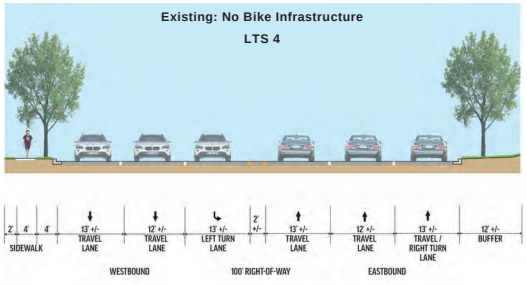
Navigating around traffic calming on Martin Road: Cyclists will leave dedicated on-street bike lane and use new curb cuts to merge onto shared use path around the traffic calming and return to on-street bike lane

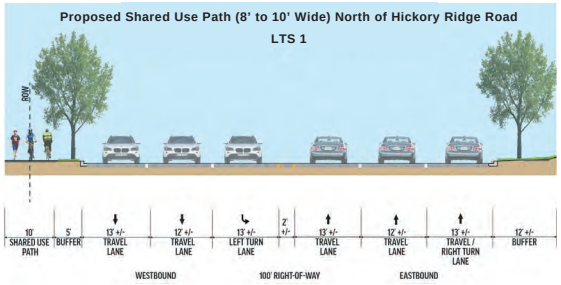
HICKORY RIDGE BIKE CORRIDOR STUDY

EXISTING

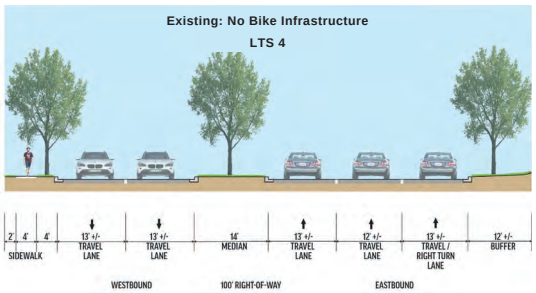
PROPOSED

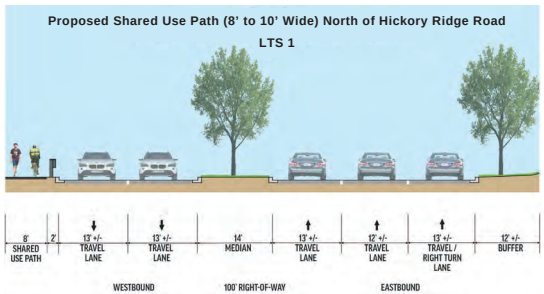
1 HICKORY RIDGE ROAD NEAR MARTIN ROAD

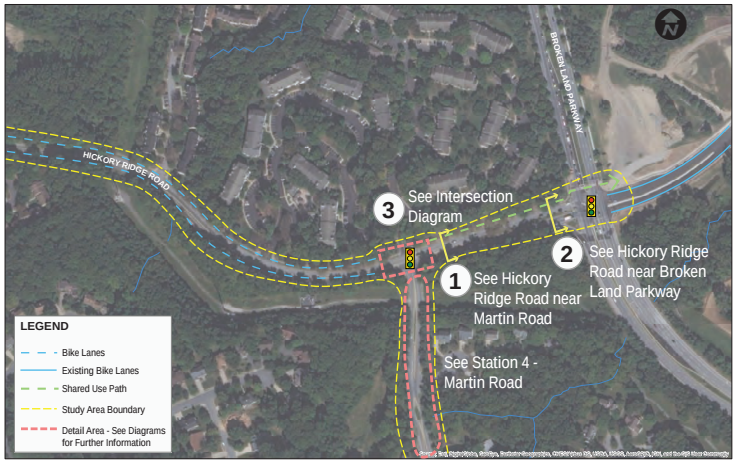




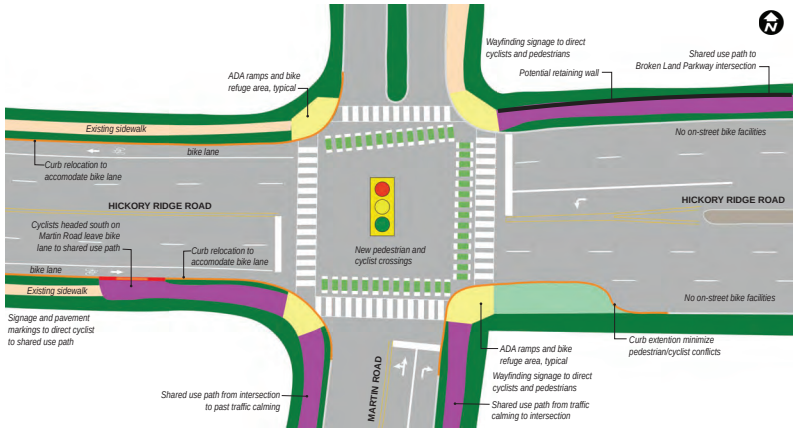
2 HICKORY RIDGE ROAD NEAR BROKEN LAND PARKWAY





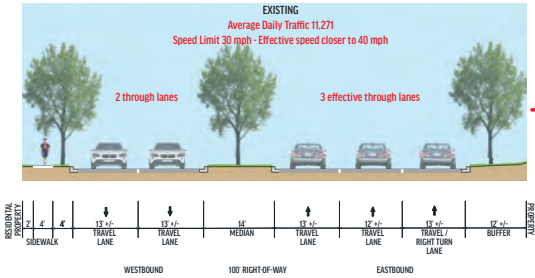


3 PROPOSED HICKORY RIDGE ROAD AND MARTIN ROAD INTERSECTION DIAGRAM



HICKORY RIDGE BIKE CORRIDOR STUDY

Existing conditions on Hickory Ridge Road evaluated with Mixed-Traffic Criteria



Mixed-Traffic Criteria

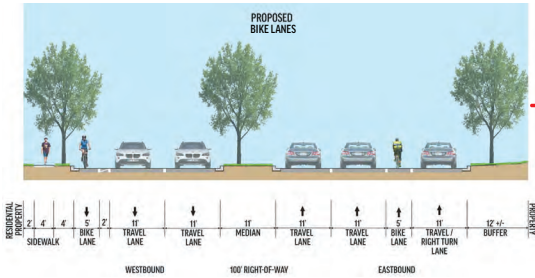
Number of Lanes	Average Daily Traffic	<25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
2-way street (no centerline)	0-750	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
	751-2000	LTS 1	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	2001-3000	LTS 1	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
	3001+	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
1 through lane per direction (1-way street or 2-way street with centerline)	0-750	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
	751-2000	LTS 1	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	2001-6000	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4
	6001+	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4
2 through lanes per direction	0-6000	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	6001+	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4
3+ through lanes per direction	any ADT	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4

The existing conditions as shown in the section to the left measure as a LTS 4 (only tolerated by "strong and fearless riders")

However, observations showed additional factors contributing to a high-stress condition including:

- Effective speeds were higher than 30 mph (assumed based on field observations)
- The double left turn from northbound Broken Land Parkway onto westbound Hickory Ridge results in frequent high vehicular volumes and cars cannot give cyclists adequate space when passing
- The full length right turn lane on eastbound Hickory Ridge also requires cyclists to change lanes to continue straight across Broken Land Parkway

Can we achieve LTS 2 with on-road bike lanes? NO



Bike Lanes and Shoulders not Adjacent to a Parking Lane

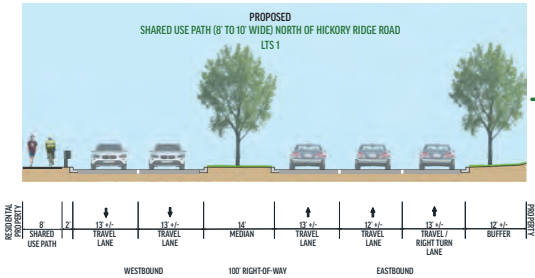
Number of Lanes	Bike Lane Width	<25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
1 thru lane per direction, or unlaned	6+ feet	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
2 through lanes per direction	6+ feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
3+ through lanes per direction	any width	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4

On-road bike lanes as shown in the section to the left measure as an LTS 3 (only tolerated by "enthused and confident riders"), which does not meet the goal of LTS 2.

Additionally, the project could not be accomplished through restriping:

- The bike lane cannot be accommodated within the existing curbs in the westbound direction but would require moving the median curb, resulting in a high-cost project that would take a long time to implement
- The bike lane in the eastbound direction would either be located between the right turn lane and through traffic (as shown in the section to the left), or against the curb, which would require cyclists to change lanes to continue straight across Broken Land Parkway
- Effective speeds would likely remain higher than 30 mph

Can we achieve LTS 2 with a shared use path? YES



*RIGHT-OF-WAY ACQUISITION AND RETAINING WALL MAY BE NECESSARY FOR AN 8' OR 10' WIDE SHARED USE PATH WITH A 5' BUFFER

Completely separated from traffic therefore LTS 1

The goal for the Hickory Ridge Bike Corridor is to have a continuous low-stress bicycle route between Downtown Columbia and Grace Drive.

For the purposes of this study, we are defining low-stress as at least LTS 2 (comfortable for the mainstream adult population) along each road segment.

Hickory Ridge Road is a multi-lane, high speed, high volume roadway currently rated LTS 4.

This board shows how we used the Level of Traffic Stress (LTS) methodology to decide on an appropriate low-stress bike facility along Hickory Ridge Road.

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Howard County

Hickory Ridge Bike Corridor Study
Atholton High School Media Center
Wednesday, January 15, 2020, 6:30-8:00 pm

Public Meeting Survey

The goal of the Hickory Ridge Bike Corridor study is to develop a preferred route and recommend improvements for continuous bicycle facilities to connect existing bike lanes on Grace Drive (providing access from River Hill and points west) to Hickory Ridge, Downtown Columbia, and the rest of the Columbia pathway system and bike network.

Please print your responses to the following questions. We appreciate any comments you may have.

Does the proposed route with improvements meet your bike transportation and/or recreational needs?
The proposed route is Grace Drive>Cedar Lane>Owen Brown Road>Martin Road>Hickory Ridge Road>Merriweather Drive.

☐ Yes ☐ Somewhat ☐ No

Why or why not?

_____

_____

_____

_____

How likely are you to use the proposed route with improvements?

☐ Very Likely ☐ Likely ☐ Neutral ☐ Unlikely ☐ Very Unlikely

Would anything make you more likely to use the proposed route with improvements?

_____

_____

_____

Do you prefer the east alignment or west alignment for the Cedar Lane shared use path?

☐ East alignment (same side as Hickory Ridge Village Center)
☐ West alignment (same side as Robinson Nature Center)

Why?

_____

_____

(Survey continues on back of page)

Do you have any feedback on the proposed buffered bike lane on Owen Brown Road?

Do you have any feedback on the proposed bike lane and buffered bike lane on Martin Road?

Do you have any feedback on the proposed bike lane and shared use path on Hickory Ridge Road?

Please share any additional comments here:

Your comments and opinions are very important. All information you provide on this form will be carefully reviewed by Howard County. Thank you for your participation and contributions to this important transportation project.

Howard County

Please return this survey to the COMMENTS box <u>or</u>
scan and email to transportation@howardcountymd.gov

Hickory Ridge Bicycle Corridor Study

Appendix 5

Planning-Level Cost Estimates

HowardCounty maryland

Hickory Ridge Bicycle Corridor Study

WRA Whitman, Requardt & Associates, LLP 1915 100 YEARS 2015

Overall Planning-Level Cost Estimates

Corridor Section	Cost
Owen Brown Road Interim (no buffer for bike lanes)	$ 90,000
Martin Road (south of roundabout)	$ 130,000
Martin Road (north of roundabout)	$ 490,000
Hickory Ridge Road (west of Martin Road)	$ 1,020,000
Hickory Ridge Road Option A (east of Martin Road)	$ 560,000
Hickory Ridge Road Option B (east of Martin Road)	$ 1,100,000
Hickory Ridge Road Option C (east of Martin Road)	$ 350,000
Cedar Lane (Owen Brown Road to Grace Drive)	$ 5,350,000
Owen Brown Road (buffered bike lanes)	$ 520,000
Total	***$ 9,610,000***
Estimates do not include right of way or easement acquisition costs	

Hickory Ridge Bicycle Corridor Study

Howard County, Maryland

Planning-Level Cost Estimate - Owen Brown Road - Interim

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 2,848.50	$ 2,848.50
102	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 949.50	$ 949.50
103	Mobilization (8% of Categories 2-8)	1	LS	$ 3,798.00	$ 3,798.00
	Sub-Total Preliminary				**$ 7,596.00**
	CATEGORY 2 - GRADING				
	None				$ -
	Sub-Total Grading				**$ -**
	CATEGORY 3 - DRAINAGE				
	None				$ -
	Sub-Total Drainage				**$ -**
	CATEGORY 4 - STRUCTURES				
	None				$ -
	Sub-Total Structures				**$ -**
	CATEGORY 5 - PAVING				
501	5" Yellow Pavement Marking Lines	8,500	LF	$ 0.90	$ 7,650.00
502	5" White Pavement Marking Lines	9,000	LF	$ 0.90	$ 8,100.00
503	12" White Pavement Marking Lines	140	LF	$ 4.00	$ 560.00
504	24" White Pavement Marking Lines	530	LF	$ 8.00	$ 4,240.00
505	White Pavement Marking Legends and Symbols	180	SF	$ 15.00	$ 2,700.00
506	Removal of Existing Pavement Marking Lines	13,670	LF	$ 1.50	$ 20,505.00
	Sub-Total Paving				**$ 43,755.00**
	CATEGORY 6 - SHOULDERS				
	None				
	Sub-Total Shoulders				**$ -**
	CATEGORY 7 - LANDSCAPING				
	None				$ -
	Sub-Total Landscaping				**$ -**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	8	EA	$ 130.00	$ 1,040.00
802	Square Tubular Steel Anchor Bases	8	EA	$ 75.00	$ 600.00
803	Sheet Aluminum Signs	60	SF	$ 30.00	$ 1,800.00
805	Band Sign to Pole	8	EA	$ 35.00	$ 280.00
	Sub-Total Utilities, Lighting & Traffic				**$ 3,720.00**
		Subtotal			**$55,071.00**
		10% Contingency			$ 5,507.10
		20% Miscellaneous Items			$ 11,014.20
		Relocate Utilities (5% of Subtotal)			$ 2,753.55
		TOTAL NEAT CONSTRUCTION			**$74,345.85**
		Engineering Design Total (25% of Subtotal)			$ 13,767.75
				Total	**$ 88,113.60**
				SAY	***$ 90,000.00***

Design and estimate does not include roadway resurfacing.

Hickory Ridge Bicycle Corridor Study

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Planning-Level Cost Estimate - Martin Road South

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 2,500.00	$ 2,500.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 4,114.08	$ 4,114.08
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 1,371.36	$ 1,371.36
104	Mobilization (8% of Categories 2-8)	1	LS	$ 5,485.44	$ 5,485.44
	Sub-Total Preliminary				**$ 13,470.88**
	CATEGORY 2 - GRADING				
	None				$ -
	Sub-Total Grading				**$ -**
	CATEGORY 3 - DRAINAGE				
	None	-			$ -
	Sub-Total Drainage				**$ -**
	CATEGORY 4 - STRUCTURES				
	None				$ -
	Sub-Total Structures				**$ -**
	CATEGORY 5 - PAVING				
501	5" Yellow Pavement Marking Lines	13,530	LF	$ 0.90	$ 12,177.00
502	5" White Pavement Marking Lines	30,500	LF	$ 0.90	$ 27,450.00
503	12" White Pavement Marking Lines	96	LF	$ 4.00	$ 384.00
504	24" White Pavement Marking Lines	84	LF	$ 8.00	$ 672.00
505	White Pavement Marking Legends and Symbols	180	SF	$ 20.00	$ 3,600.00
506	Removal of Existing Pavement Marking Lines	13,710	LF	$ 1.50	$ 20,565.00
	Sub-Total Paving				**$ 64,848.00**
	CATEGORY 6 - SHOULDERS				
	None				
	Sub-Total Shoulders				**$ -**
	CATEGORY 7 - LANDSCAPING				
	None				$ -
	Sub-Total Landscaping				**$ -**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	8	EA	$ 130.00	$ 1,040.00
802	Square Tubular Steel Anchor Bases	8	EA	$ 75.00	$ 600.00
803	Sheet Aluminum Signs	60	SF	$ 30.00	$ 1,800.00
805	Band Sign to Pole	8	EA	$ 35.00	$ 280.00
	Sub-Total Utilities, Lighting & Traffic				**$ 3,720.00**
		Subtotal			**$82,038.88**
		10% Contingency			$ 8,203.89
		20% Miscellaneous Items			$ 16,407.78
		TOTAL NEAT CONSTRUCTION			**$106,650.54**
		Engineering Design Total (25% of Subtotal)			$ 20,509.72
				Total	**$ 127,160.26**
				SAY	***$ 130,000.00***

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Hickory Ridge Bicycle Corridor Study

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WRA Whitman, Requardt & Associates, LLP 1915 100 YEARS 2015

Planning-Level Cost Estimate - Martin Road North

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 10,000.00	$ 10,000.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 13,973.89	$ 13,973.89
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 4,657.96	$ 4,657.96
104	Mobilization (8% of Categories 2-8)	1	LS	$ 8,306.10	$ 8,306.10
	Sub-Total Preliminary				**$ 36,937.95**
	CATEGORY 2 - GRADING				
201	Class 2 Excavation	148	CY	$ 50.00	$ 7,400.00
202	Saw Cuts	25	LF	$ 5.00	$ 125.00
203	Removal of Existing Curb and Gutter	25	LF	$ 15.00	$ 375.00
204	Test Pit Excavation	20	CY	$ 130.00	$ 2,600.00
205	Removal of Existing Sidewalk	445	SY	$ 35.00	$ 15,575.00
	Sub-Total Grading				**$ 26,075.00**
	CATEGORY 3 - DRAINAGE				
301	SWM/Drainage/E&S (20% of Categories 2, 4, 5 and 6)	1	LS	$ 50,974.20	$ 50,974.20
	Sub-Total Drainage				**$ 50,974.20**
	CATEGORY 4 - STRUCTURES				
	None				$ -
	Sub-Total Structures				**$ -**
	CATEGORY 5 - PAVING				
501	5" Yellow Pavement Marking Lines	3,730	LF	$ 0.90	$ 3,357.00
502	5" White Pavement Marking Lines	4,950	LF	$ 0.90	$ 4,455.00
503	24" White Pavement Marking Lines	20	LF	$ 8.00	$ 160.00
504	White Pavement Marking Legends and Symbols	60	SF	$ 20.00	$ 1,200.00
505	Removal of Existing Pavement Marking Lines	3,730	LF	$ 1.50	$ 5,595.00
	Sub-Total Paving				**$ 14,767.00**
	CATEGORY 6 - SHOULDERS				
601	5" Concrete Sidewalk	6,008	SF	$ 9.00	$ 54,072.00
602	Traffic Calming Adjustments	1	LS	$ 75,000.00	$ 75,000.00
	Sub-Total Shoulders				**$ 129,072.00**
	CATEGORY 7 - LANDSCAPING				
701	Turfgrass Sod Establishment	214	SY	$ 5.00	$ 1,070.00
702	Tree Mitigation	1	LS	$ 8,000.00	$ 8,000.00
	Sub-Total Landscaping				**$ 9,070.00**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	6	EA	$ 130.00	$ 780.00
802	Square Tubular Steel Anchor Bases	6	EA	$ 75.00	$ 450.00
803	Sheet Aluminum Signs	50	SF	$ 30.00	$ 1,500.00
804	Band Sign to Pole	6	EA	$ 35.00	$ 210.00
	Sub-Total Utilities, Lighting & Traffic				**$ 2,940.00**
		Subtotal			**$269,836.15**
		10% Contingency			$ 26,983.62
		20% Miscellanous Items			$ 53,967.23
		Relocate Utilities (25% of Subtotal)			$ 67,459.04
		TOTAL NEAT CONSTRUCTION			**$ 418,246.04**
		Engineering Design Total (25% of Subtotal)			$ 67,459.04
				Total	**$ 485,705.07**
				SAY	***$ 490,000.00***

Estimate does not include right of way or easement acquisition costs

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Hickory Ridge Bicycle Corridor Study

Howard County, Maryland

WRA Whitman, Requardt & Associates, LLP 1915 100 YEARS 2015

Planning-Level Cost Estimate - Hickory Ridge Road - West

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 10,000.00	$ 10,000.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 29,518.08	$ 29,518.08
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 9,839.36	$ 9,839.36
104	Mobilization (8% of Categories 2-8)	1	LS	$ 37,084.64	$ 37,084.64
	Sub-Total Preliminary				**$ 86,442.09**
	CATEGORY 2 - GRADING				
201	Class 2 Excavation	200	CY	$ 50.00	$ 10,000.00
202	Saw Cuts	915	LF	$ 5.00	$ 4,575.00
203	Removal of Existing Curb and Gutter	915	LF	$ 15.00	$ 13,725.00
204	Removal of Existing Pavement	68	CY	$ 60.00	$ 4,080.00
205	Test Pit Excavation	50	CY	$ 130.00	$ 6,500.00
206	Removal of Existing Sidewalk	1311	SY	$ 30.00	$ 39,330.00
	Sub-Total Grading				**$ 78,210.00**
	CATEGORY 3 - DRAINAGE				
301	SWM/Drainage/E&S (20% of Categories 2, 4, 5 and 6)	1	LS	$ 114,326.55	$ 114,326.55
	Sub-Total Drainage				**$ 114,326.55**
	CATEGORY 4 - STRUCTURES				
	None				$ -
	Sub-Total Structures				**$ -**
	CATEGORY 5 - PAVING				
501	Superpave Asphalt Mix 9.5 mm for Surface, PG 64S-22, Level 1	222	TON	$ 120.00	$ 26,640.00
502	Superpave Asphalt Mix Base, 19.0 mm, PG 64S-22, Level 2	370	TON	$ 95.00	$ 35,150.00
503	4 Inch Graded Aggregate Base	2,625	SY	$ 15.00	$ 39,375.00
504	Full Depth Patching	136	TON	$ 200.00	$ 27,200.00
505	5" Yellow Pavement Marking Lines	2,500	LF	$ 0.90	$ 2,250.00
506	5" White Pavement Marking Lines	3,060	LF	$ 0.90	$ 2,754.00
507	12" White Pavement Marking Lines	280	LF	$ 4.00	$ 1,120.00
508	24" White Pavement Marking Lines	20	LF	$ 8.00	$ 160.00
509	White Pavement Marking Legends and Symbols	200	SF	$ 20.00	$ 4,000.00
510	Removal of Existing Pavement Marking Lines	5,860	LF	$ 1.50	$ 8,790.00
	Sub-Total Paving				**$ 147,439.00**
	CATEGORY 6 - SHOULDERS				
601	Concrete Curb and Gutter	915	LF	$ 30.00	$ 27,450.00
602	Detectable Warning Surface Mat	24	SF	$ 40.00	$ 960.00
	Sub-Total Shoulders				**$ 28,410.00**
	CATEGORY 7 - LANDSCAPING				
701	Turfgrass Sod Establishment	1525	SY	$ 4.50	$ 6,862.50
702	Tree Mitigation	1	LS	$ 54,000.00	$ 54,000.00
	Sub-Total Landscaping				**$ 60,862.50**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	8	EA	$ 130.00	$ 1,040.00
802	Square Tubular Steel Anchor Bases	8	EA	$ 75.00	$ 600.00
803	Sheet Aluminum Signs	60	SF	$ 30.00	$ 1,800.00
804	Band Sign to Pole	8	EA	$ 35.00	$ 280.00
805	Pedestrian Signal Head	6	EA	$ 1,500.00	$ 9,000.00
806	Modified Traffric Signal Phasing/Timing (1 Intersection)	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total Utilities, Lighting & Traffic				**$ 62,720.00**
	Subtotal				**$578,410.14**
	10% Contingency				$ 57,841.01
	20% Miscellanous Items				$ 115,682.03
	Relocate Utilities (20% of Subtotal)				$ 115,682.03
	TOTAL NEAT CONSTRUCTION				**$ 867,615.21**
	Engineering Design Total (25% of Subtotal)				$ 144,602.53
	Total				**$ 1,012,217.74**
	SAY				***$ 1,020,000.00***

Estimates do not include right of way or easement acquisition costs. Design and estimate does not include roadway resurfacing.

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Hickory Ridge Bicycle Corridor Study

Howard County, Maryland

WRA Whitman, Requardt & Associates, LLP 1915 100 YEARS 2015

Planning-Level Cost Estimate - Hickory Ridge Road - Option A

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 10,000.00	$ 10,000.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 15,967.85	$ 15,967.85
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 5,322.62	$ 5,322.62
104	Mobilization (8% of Categories 2-8)	1	LS	$ 19,274.46	$ 19,274.46
	Sub-Total Preliminary				**$ 50,564.93**
	CATEGORY 2 - GRADING				
201	Class 2 Excavation	100	CY	$ 50.00	$ 5,000.00
202	Saw Cuts	800	LF	$ 4.00	$ 3,200.00
203	Removal of Existing Curb and Gutter	800	LF	$ 15.00	$ 12,000.00
204	Removal of Existing Pavement	60	CY	$ 60.00	$ 3,600.00
205	Test Pit Excavation	10	CY	$ 130.00	$ 1,300.00
	Sub-Total Grading				**$ 25,100.00**
	CATEGORY 3 - DRAINAGE				
301	SWM/Drainage/E&S (20% of Categories 2, 4, 5 and 6)	1	LS	$ 49,456.80	$ 49,456.80
	Sub-Total Drainage				**$ 49,456.80**
	CATEGORY 4 - STRUCTURES				
	None				$ -
	Sub-Total Structures				**$ -**
	CATEGORY 5 - PAVING				
501	Superpave Asphalt Mix 9.5 mm for Surface, PG 64S-22, Level 1	68	TON	$ 120.00	$ 8,160.00
502	Superpave Ashalt Mix Base, 19.0 mm, PG 64S-22, Level 2	120	TON	$ 95.00	$ 11,400.00
503	4 Inch Graded Aggregate Base	820	SY	$ 12.00	$ 9,840.00
504	Full Depth Patching	120	TON	$ 200.00	$ 24,000.00
505	12" White Pavement Marking Lines	925	LF	$ 4.00	$ 3,700.00
506	24" White Pavement Marking Lines	63	LF	$ 8.00	$ 504.00
507	White Pavement Marking Legends and Symbols	100	SF	$ 20.00	$ 2,000.00
	Sub-Total Paving				**$ 59,604.00**
	CATEGORY 6 - SHOULDERS				
509	Concrete Curb and Gutter	800	LF	$ 30.00	$ 24,000.00
602	Detectable Warning Surface Mat	30	SF	$ 40.00	$ 1,200.00
	Sub-Total Shoulders				**$ 25,200.00**
	CATEGORY 7 - LANDSCAPING				
701	Turfgrass Sod Establishment	610	SY	$ 5.00	$ 3,050.00
	Sub-Total Landscaping				**$ 3,050.00**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	8	EA	$ 130.00	$ 1,040.00
802	Square Tubular Steel Anchor Bases	8	EA	$ 75.00	$ 600.00
803	Sheet Aluminum Signs	60	SF	$ 30.00	$ 1,800.00
804	Band Sign to Pole	8	EA	$ 35.00	$ 280.00
805	Modified Traffric Signal Phasing/Timing and Pedestrian Signal Head (1 Intersection)	1	LS	$ 100,000.00	$ 100,000.00
	Sub-Total Utilities, Lighting & Traffic				**$ 103,720.00**
		Subtotal			**$316,695.73**
		10% Contingency			$ 31,669.57
		20% Miscellanous Items			$ 63,339.15
		Relocate Utilities (20% of Subtotal)			$ 63,339.15
		TOTAL NEAT CONSTRUCTION			**$ 475,043.59**
		Engineering Design Total (25% of Subtotal)			$ 79,173.93
				Total	**$ 554,217.52**
				SAY	***$ 560,000.00***

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Hickory Ridge Bicycle Corridor Study

Howard County, Maryland

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Planning-Level Cost Estimate - Hickory Ridge Road - Option B

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 10,000.00	$ 10,000.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 32,095.60	$ 32,095.60
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 10,698.53	$ 10,698.53
104	Mobilization (8% of Categories 2-8)	1	LS	$ 18,815.73	$ 18,815.73
	Sub-Total Preliminary				**$ 71,609.86**
	CATEGORY 2 - GRADING				
201	Class 2 Excavation	400	CY	$ 50.00	$ 20,000.00
202	Test Pit Excavation	20	CY	$ 130.00	$ 2,600.00
203	Removal of Existing Sidewalk	390	SY	$ 35.00	$ 13,650.00
	Sub-Total Grading				**$ 36,250.00**
	CATEGORY 3 - DRAINAGE				
301	SWM/Drainage/E&S (20% of Categories 2, 4, 5 and 6)	1	LS	$ 110,574.60	$ 110,574.60
	Sub-Total Drainage				**$ 110,574.60**
	CATEGORY 4 - STRUCTURES				
601	Retaining Walls	1,995	SF	$ 150.00	$ 299,250.00
	Sub-Total Structures				**$ 299,250.00**
	CATEGORY 5 - PAVING				
501	Superpave Asphalt Mix 9.5 mm for Surface, PG 64S-22, Level 1	65	TON	$ 120.00	$ 7,800.00
502	Superpave Ashalt Mix Base, 19.0 mm, PG 64S-22, Level 2	110	TON	$ 95.00	$ 10,450.00
503	4 Inch Graded Aggregate Base	776	SY	$ 12.00	$ 9,312.00
504	12" White Pavement Marking Lines	676	LF	$ 4.00	$ 2,704.00
505	24" White Pavement Marking Lines	42	LF	$ 8.00	$ 336.00
506	White Pavement Marking Legends and Symbols	100	SF	$ 20.00	$ 2,000.00
	Sub-Total Paving				**$ 32,602.00**
	CATEGORY 6 - SHOULDERS				
601	Detectable Warning Surface Mat	12	SF	$ 40.00	$ 480.00
	Sub-Total Shoulders				**$ 480.00**
	CATEGORY 7 - LANDSCAPING				
701	Turfgrass Sod Establishment	410	SY	$ 5.00	$ 2,050.00
	Sub-Total Landscaping				**$ 2,050.00**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	8	EA	$ 130.00	$ 1,040.00
802	Square Tubular Steel Anchor Bases	8	EA	$ 75.00	$ 600.00
803	Sheet Aluminum Signs	60	SF	$ 30.00	$ 1,800.00
804	Band Sign to Pole	8	EA	$ 35.00	$ 280.00
805	Modified Traffric Signal Phasing/Timing and Pedestrian Signal Heads (1 Intersection)	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total Utilities, Lighting & Traffic				**$ 53,720.00**
	Subtotal				**$606,536.46**
	10% Contingency				$ 60,653.65
	20% Miscellanous Items				$ 121,307.29
	Relocate Utilities (25% of Subtotal)				$ 151,634.11
	TOTAL NEAT CONSTRUCTION				**$ 940,131.51**
	Engineering Design Total (25% of Subtotal)				$ 151,634.11
				Total	**$ 1,091,765.62**
				SAY	***$ 1,100,000.00***

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Hickory Ridge Bicycle Corridor Study

Howard County, Maryland

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Planning-Level Cost Estimate - Hickory Ridge Road - Option C

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 60,000.00	$ 60,000.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 6,912.08	$ 6,912.08
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 2,304.03	$ 2,304.03
104	Mobilization (8% of Categories 2-8)	1	LS	$ 9,043.31	$ 9,043.31
	Sub-Total Preliminary				**$ 78,259.42**
	CATEGORY 2 - GRADING				
201	Class 2 Excavation	200	CY	$ 50.00	$ 10,000.00
202	Saw Cuts	300	LF	$ 5.00	$ 1,500.00
203	Removal of Existing Curb and Gutter	300	LF	$ 15.00	$ 4,500.00
204	Test Pit Excavation	20	CY	$ 130.00	$ 2,600.00
205	Removal of Existing Sidewalk	50	SY	$ 35.00	$ 1,750.00
	Sub-Total Grading				**$ 20,350.00**
	CATEGORY 3 - DRAINAGE				
301	SWM/Drainage/E&S (20% of Categories 2, 4, 5 and 6)	1	LS	$ 9,863.40	$ 9,863.40
	Sub-Total Drainage				**$ 9,863.40**
	CATEGORY 4 - STRUCTURES				
	None				
	Sub-Total Structures				**$ -**
	CATEGORY 5 - PAVING				
501	Superpave Asphalt Mix 9.5 mm for Surface, PG 64S-22, Level 1	27	TON	$ 120.00	$ 3,240.00
502	Superpave Ashalt Mix Base, 19.0 mm, PG 64S-22, Level 2	60	TON	$ 95.00	$ 5,700.00
503	4 Inch Graded Aggregate Base	56	SY	$ 12.00	$ 672.00
504	12" White Pavement Marking Lines	145	LF	$ 4.00	$ 580.00
505	24" White Pavement Marking Lines	22	LF	$ 8.00	$ 176.00
	Sub-Total Paving				**$ 10,368.00**
	CATEGORY 6 - SHOULDERS				
601	Concrete Curb and Gutter	300	LF	$ 30.00	$ 9,000.00
602	Detectable Warning Surface Mat	54	SF	$ 40.00	$ 2,160.00
	Sub-Total Shoulders				**$ 2,160.00**
	CATEGORY 7 - LANDSCAPING				
701	Turfgrass Sod Establishment	569	SY	$ 5.00	$ 2,845.00
702	Tree Mitigation	1	LS	$ 20,000.00	$ 20,000.00
	Sub-Total Landscaping				**$ 20,000.00**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	4	EA	$ 130.00	$ 520.00
802	Square Tubular Steel Anchor Bases	4	EA	$ 75.00	$ 300.00
803	Sheet Aluminum Signs	50	SF	$ 30.00	$ 1,500.00
804	Band Sign to Pole	4	EA	$ 35.00	$ 140.00
805					
806	Modified Traffric Signal Phasing/Timing and Pedestrian Signal Heads (1 Intersection)	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total Utilities, Lighting & Traffic				**$ 52,460.00**
		Subtotal			**$193,460.82**
		10% Contingency			$ 19,346.08
		20% Miscellanous Items			$ 38,692.16
		Relocate Utilities (25% of Subtotal)			$ 48,365.21
		TOTAL NEAT CONSTRUCTION			**$ 299,864.28**
		Engineering Design Total (25% of Subtotal)			$ 48,365.21
				Total	**$ 348,229.48**
				SAY	***$ 350,000.00***

Estimates do not include right of way or easement acquisition costs

HowardCounty maryland

Hickory Ridge Bicycle Corridor Study

Howard County, Maryland

WRA Whitman, Requardt & Associates, LLP 1915 100 YEARS 2015

Planning-Level Cost Estimate - Cedar Lane

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 50,000.00	$ 50,000.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 155,268.99	$ 155,268.99
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 51,756.33	$ 51,756.33
104	Mobilization (8% of Categories 2-8)	1	LS	$ 207,025.33	$ 207,025.33
	Sub-Total Preliminary				**$ 464,050.65**
	CATEGORY 2 - GRADING				
201	Class 2 Excavation	800	CY	$ 50.00	$ 40,000.00
202	Saw Cuts	865	LF	$ 4.00	$ 3,460.00
203	Test Pit Excavation	100	CY	$ 130.00	$ 13,000.00
204	Removal of Existing Curb and Gutter	300	LF	$ 12.00	$ 3,600.00
205	Removal of Existing Pavement	65	CY	$ 55.00	$ 3,575.00
206	Removal of Existing Sidewalk	2845	SY	$ 30.00	$ 85,350.00
	Sub-Total Grading				**$ 148,985.00**
	CATEGORY 3 - DRAINAGE				
301	SWM/Drainage/E&S (20% of Categories 2, 4, 5 and 6)	1	LS	$ 569,254.68	$ 569,254.68
	Sub-Total Drainage				**$ 569,254.68**
	CATEGORY 4 - STRUCTURES				
401	Retaining Walls	5,850	SF	$ 150.00	$ 877,500.00
	Sub-Total Structures				**$ 877,500.00**
	CATEGORY 5 - PAVING				
501	Superpave Asphalt Mix 9.5 mm for Surface, PG 64S-22, Level 1	200	TON	$ 126.00	$ 25,200.00
502	Superpave Ashalt Mix Base, 19.0 mm, PG 64S-22, Level 2	335	TON	$ 114.00	$ 38,190.00
503	4 Inch Graded Aggregate Base	5,690	SY	$ 8.00	$ 45,520.00
504	5" Yellow Pavement Marking Lines	2,496	LF	$ 0.90	$ 2,246.40
505	5" White Pavement Marking Lines	3,200	LF	$ 0.90	$ 2,880.00
506	12" White Pavement Marking Lines	970	LF	$ 4.00	$ 3,880.00
507	24" White Pavement Marking Lines	530	LF	$ 8.00	$ 4,240.00
508	White Pavement Marking Legends and Symbols	200	SF	$ 20.00	$ 4,000.00
509	Removal of Existing Pavement Marking Lines	7,196	LF	$ 1.50	$ 10,794.00
	Sub-Total Paving				**$ 136,950.40**
	CATEGORY 6 - SHOULDERS				
601	5" Concrete Sidewalk	2,500	SF	$ 9.00	$ 22,500.00
602	7" Concrete Combination Curb and Gutter	865	LF	$ 35.00	$ 30,275.00
603	Detectable Warning Surface Mat	120	SF	$ 40.00	$ 4,800.00
604	Exisitng Driveway Adjustments	1,160	SF	$ 25.00	$ 29,000.00
605	Traffic Barrier W Beam - 6 Foot Post	600	LF	$ 25.00	$ 15,000.00
	Sub-Total Shoulders				**$ 101,575.00**
	CATEGORY 7 - LANDSCAPING				
701	Turfgrass Sod Establishment	2695	SY	$ 4.50	$ 12,127.50
702	Tree mitigation	1	LS	$ 170,000.00	$ 170,000.00
	Sub-Total Landscaping				**$ 182,127.50**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	16	EA	$ 130.00	$ 2,080.00
802	Square Tubular Steel Anchor Bases	16	EA	$ 75.00	$ 1,200.00
803	Sheet Aluminum Signs	120	SF	$ 30.00	$ 3,600.00
804	Band Sign to Pole	16	EA	$ 35.00	$ 560.00
805	Modified Traffric Signal Phasing/Timing and Pedestrian Signal Heads (3 Intersections)	1	LS	$ 450,000.00	$ 450,000.00
806	F Shape Barrier	548	LF	$ 208.00	$ 113,984.00
	Sub-Total Utilities, Lighting & Traffic				**$ 571,424.00**
	Subtotal				**$3,051,867.23**
	10% Contingency				$ 305,186.72
	20% Miscellanous Items				$ 610,373.45
	Relocate Utilities (20% of Subtotal)				$ 610,373.45
	TOTAL NEAT CONSTRUCTION				**$ 4,577,800.85**
	Engineering Design Total (25% of Subtotal)				$ 762,966.81
				Total	**$ 5,340,767.66**
	SAY				***$ 5,350,000.00***

Estimates do not include right of way or easement acquisition costs. Design and estimate does not include roadway resurfacing.

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Hickory Ridge Bicycle Corridor Study

Howard County, Maryland

WRA Whitman, Requardt & Associates, LLP 1915 100 YEARS 2015

Planning-Level Cost Estimate - Owen Brown Road

Item No.	Item Description	Qty.	Unit	Unit Cost	Cost
	CATEGORY 1 - PRELIMINARY				
101	Clearing and Grubbing	1	LS	$ 10,000.00	$ 10,000.00
102	Maintenance of Traffic (6% of Categories 2-8)	1	LS	$ 16,084.56	$ 16,084.56
103	Construction Stakeout (2% of Categories 2-8)	1	LS	$ 5,361.52	$ 5,361.52
104	Mobilization (8% of Categories 2-8)	1	LS	$ 21,446.08	$ 21,446.08
	Sub-Total Preliminary				**$ 52,892.16**
	CATEGORY 2 - GRADING				
201	Class 2 Excavation	100	CY	$ 50.00	$ 5,000.00
202	Test Pit Excavation	50	CY	$ 130.00	$ 6,500.00
	Sub-Total Grading				**$ 11,500.00**
	CATEGORY 3 - DRAINAGE				
301	SWM/Drainage/E&S (20% of Categories 2, 4, 5 and 6)	1	LS	$ 70,000.00	$ 70,000.00
	Sub-Total Drainage				**$ 70,000.00**
	CATEGORY 4 - STRUCTURES				
	None				$ -
	Sub-Total Structures				**$ -**
	CATEGORY 5 - PAVING				
501	Superpave Asphalt Mix Final Surface 12.5 MM, PG 64-22S, Level 2	176	TON	$ 126.00	$ 22,176.00
502	Superpave Asphalt Mix Intermediate Surface 12.5 MM, PG 64-22S, Level 2	176	TON	$ 126.00	$ 22,176.00
503	Superpave Asphalt Mix Base 19.0 MM, PG 64-22S, Level 2	530	TON	$ 114.00	$ 60,420.00
504	6 Inch Graded Aggregate Base	1,572	SY	$ 20.00	$ 31,440.00
505	5" Yellow Pavement Marking Lines	8,500	LF	$ 0.90	$ 7,650.00
506	5" White Pavement Marking Lines	18,300	LF	$ 0.90	$ 16,470.00
507	12" White Pavement Marking Lines	140	LF	$ 4.00	$ 560.00
508	24" White Pavement Marking Lines	530	LF	$ 8.00	$ 4,240.00
508	White Pavement Marking Legends and Symbols	180	SF	$ 20.00	$ 3,600.00
509	Removal of Existing Pavement Marking Lines	9,350	SF	$ 1.50	$ 14,025.00
	Sub-Total Paving				**$ 182,757.00**
	CATEGORY 6 - SHOULDERS				
	None				
	Sub-Total Shoulders				**$ -**
	CATEGORY 7 - LANDSCAPING				
701	Turfgrass Sod Establishment	22	SY	$ 4.50	$ 99.00
	Sub-Total Landscaping				**$ 99.00**
	CATEGORY 8 - UTILITIES & TRAFFIC				
801	Square Perforated Tubular Steel Sign Posts	8	EA	$ 130.00	$ 1,040.00
802	Square Tubular Steel Anchor Bases	8	EA	$ 75.00	$ 600.00
803	Sheet Aluminum Signs	60	SF	$ 30.00	$ 1,800.00
805	Band Sign to Pole	8	EA	$ 35.00	$ 280.00
	Sub-Total Utilities, Lighting & Traffic				**$ 3,720.00**
		Subtotal			**$320,968.16**
		10% Contingency			$ 32,096.82
		20% Miscellaneous Items			$ 64,193.63
		Relocate Utilities (5% of Subtotal)			$ 16,048.41
		TOTAL NEAT CONSTRUCTION			**$433,307.02**
		Engineering Design Total (25% of Subtotal)			$ 80,242.04
				Total	**$ 513,549.06**
				SAY	***$ 520,000.00***

Design and estimate does not include roadway resurfacing.